Federal Highway Traffic Safety Policies: Impacts and Opportunities

/name redacted/
Analyst in Transportation Policy

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Summary

In 2013, 32,000 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.

The number of people killed in crashes has declined significantly over the past decade. The reasons for this sharp decline are not entirely clear. While traffic safety agencies have attributed it, at least in part, to their safety efforts, it is in line with a general trend: as measured by the number of miles people are driving, the rate at which people are killed in traffic crashes has been declining steadily since records began to be kept in 1929.

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 Congress has authorized is intended to fund safety improvements to highway infrastructure.

A federal study estimated that half of the improvement in highway fatality rates since 1960 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 development 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. Given that most vehicles remain in use for many years, it may be a decade or more before the majority of cars on the road incorporate those new technologies.

There is opportunity for further improvement: crash and injury rates are no longer declining, and preliminary estimates indicate the fatality rate increased significantly in the first nine months of 2015. Several other nations have significantly improved their highway safety rates in the past few decades, surpassing the U.S. rates. 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, encouraging the use of automated traffic enforcement to reduce speeding and failure to stop at red lights and stop signs, and accelerating the deployment of new vehicle safety technologies. Motorcycle helmet laws and automated traffic enforcement have encountered public opposition.

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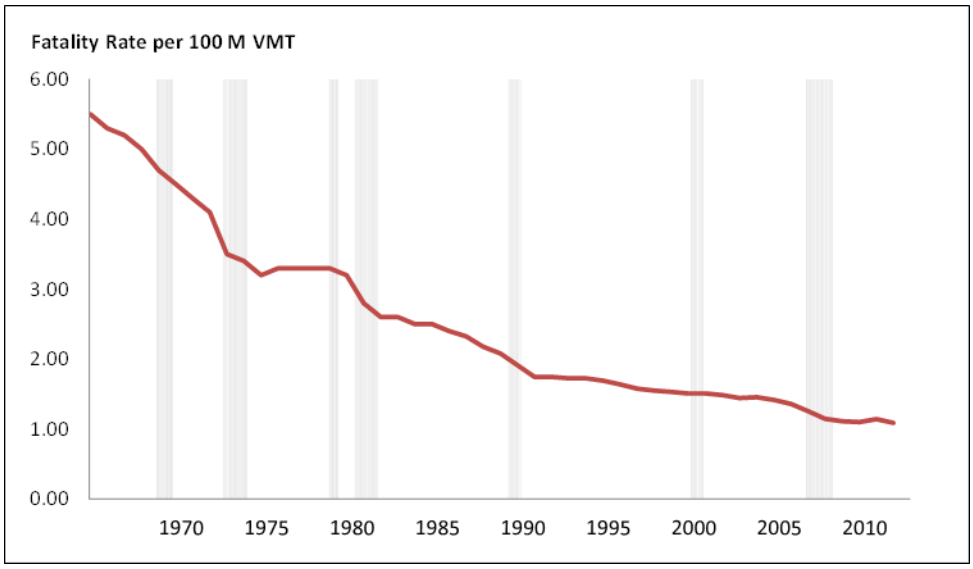
Traffic Safety Trends

There are several ways to measure traffic safety: 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 per million miles traveled, per million registered drivers, and per million persons in the total population. Similar measures can reveal trends for narrower categories such as vehicle occupants and bicyclists.

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. Nearly every crash involving a fatality is 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.

As **Figure 1** indicates, the fatality rate has improved significantly since the passage of the first federal highway safety legislation in 1966. However, the improvement has not been continuous. The fatality rate dropped rapidly, from around 5.5 per 100 million VMT to around 3.2, in the first decade of federal oversight. As the fatality rate has become lower, reductions in that rate have necessarily become more modest: over the past 20 years it dropped from around 1.8 to 1.1. 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.

Figure 1. Fatalities per 100 Million Vehicle Miles Traveled



Source: CRS, based on data from National Highway Traffic Safety Administration (NHTSA), *Traffic Safety Facts 2013*, DOT HS 812139, Table 2.

Note: 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 in 2013. This decline took place in the context of significant increases in both the number of licensed drivers and annual VMT (see **Table 1**).

Table 1. Traffic Deaths, Licensed Drivers, and Vehicle Miles Traveled, 1972 and 2013

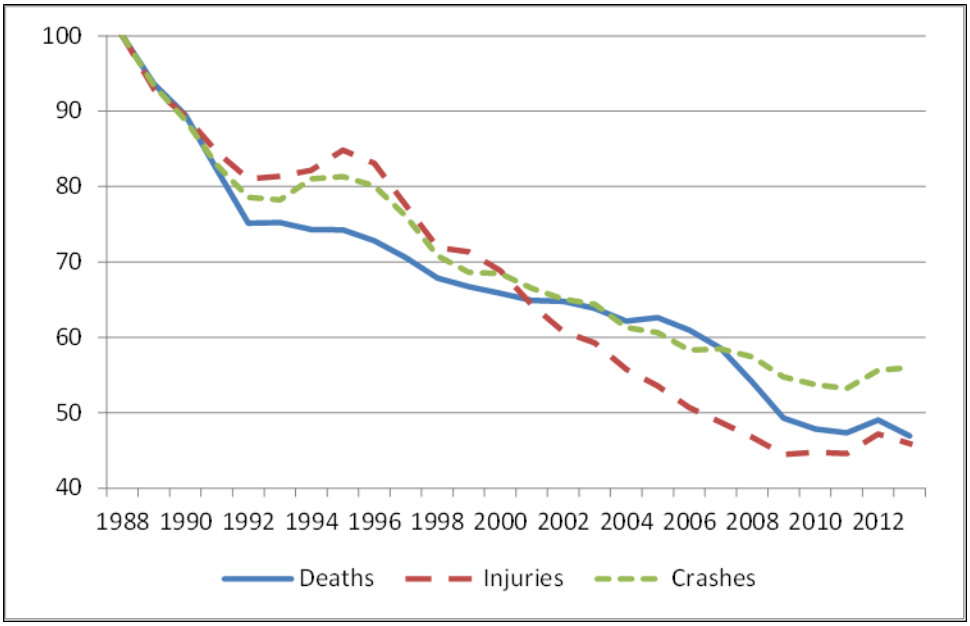
	1972	2013
Traffic deaths	54,589	32,719
Licensed drivers	118 million	212 million
Vehicle miles traveled (VMT)	1.26 trillion	3.0 trillion
Deaths per million licensed drivers	461	154
Deaths per 100 million VMT	4.33	1.09

Source: NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 2.

Although the fatality rate from motor vehicle crashes has fallen to a record low, other measures indicate that improvement in traffic safety has stalled. The rate of crashes resulting in serious injuries was significantly higher in 2013 than in 2008, and the overall crash rate has been rising (**Figure 2**).

Figure 2. Trends in Rates for Crashes, Serious Injuries, and Deaths, 1988-2013

Index, 1988=100



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

Notes: NHTSA began collecting injury data in 1988. The rates are indexed to their 1988 level for ease of visual comparison. The actual rates for injuries and serious crashes per 100 million VMT are many times larger than the fatality rate: in 2013, the fatality rate per 100 million VMT was 1.1, the injury rate was 77, and the serious crash rate was 190.

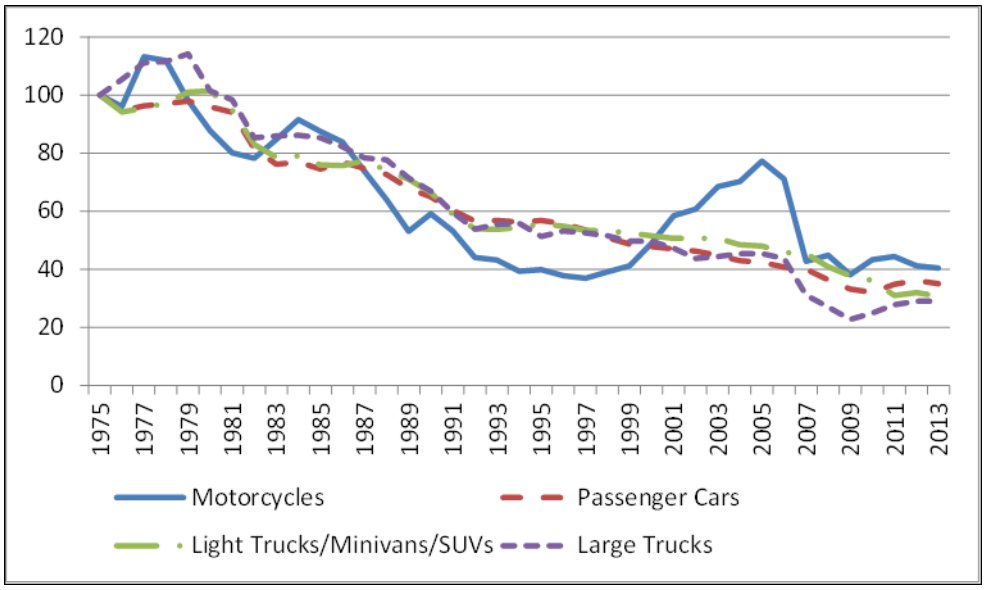
Highway safety rates and trends vary by state. Fatality rates tend to be lower in more urbanized states. In addition, some states have relatively strict laws concerning safety matters, such as enforcement of mandatory seat belt use and requirements that motorcyclists wear helmets, while other states have fewer safety laws or enforce such laws less vigorously.

Motorcycle Fatality Rates Are Not Falling

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 and 2007. Since then, there has been no further improvement. The motorcycle fatal crash rate in 2013 was slightly higher than in 1996 (see **Figure 3**).

Figure 3. Trends in Fatal Crash Rates by Vehicle Type, 1975-2013

Index, 1975=100



Source: CRS; data from NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 3.

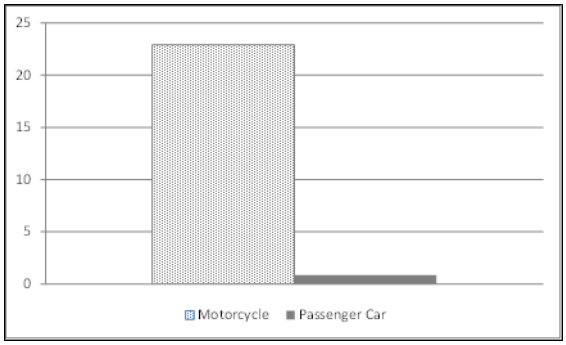
Notes: VMT data collection for passenger vehicles and light trucks changed in 2010; this change had the effect of reducing the VMT of passenger vehicles (thus slightly increasing their fatality rate) and increasing the VMT of light trucks (thus slightly decreasing their fatality rate). Rates given in this figure refer to number of vehicles involved in crashes, not to number of individuals involved; in the case of multivehicle crashes, 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; large trucks are trucks over 10,000 pounds.

Motorcyclists are somewhat more likely to be involved in a crash than other drivers.[1] 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 2013 the likelihood of a motorcyclist dying in a crash was more than 26 times that of a passenger car occupant. **Figure 4** compares the fatality rate for occupants of motorcycles and passenger cars.

[1] 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.

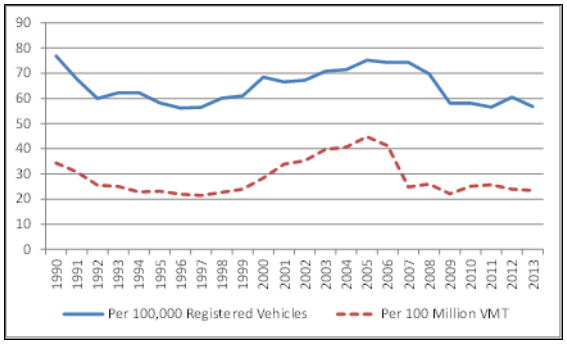
Figure 4. Fatality Rate for Motorcycle and Passenger Car Occupants, 2013

Rate per 100 million VMT



Source: CRS, from NHTSA, *Traffic Safety Facts 2013 Data: Motorcycles*, DOT HS 812148, May 2015, Table 2.

Figure 5. Motorcyclist Fatality Rates, 1990-2013



Source: CRS; data from NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 3.

The causes of the recent trend in the motorcycle fatality rate—rising, then falling back to near the level reached in the mid-1990s but no lower (see **Figure 5**)—are not clear. Motorcycle registrations increased during this period, but at a lesser rate than the increase in the fatality rate, and registrations continued to increase even as the fatality rate declined after the recession. The median age of motorcyclists has increased from 27 in 1985 to 41 in 2003[2]—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 average age of motorcyclists dying in crashes has also increased.[3] The proportion of fatally injured motorcycle operators on a bike 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.[4] One factor that appears to be important in motorcycle deaths is alcohol. While 23% of passenger car drivers involved in fatal crashes in 2013 were legally intoxicated, the figure for motorcyclists was 27% (though this was down from 33% in 1995).[5]

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 2013. 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 2013 and represented 9% of

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

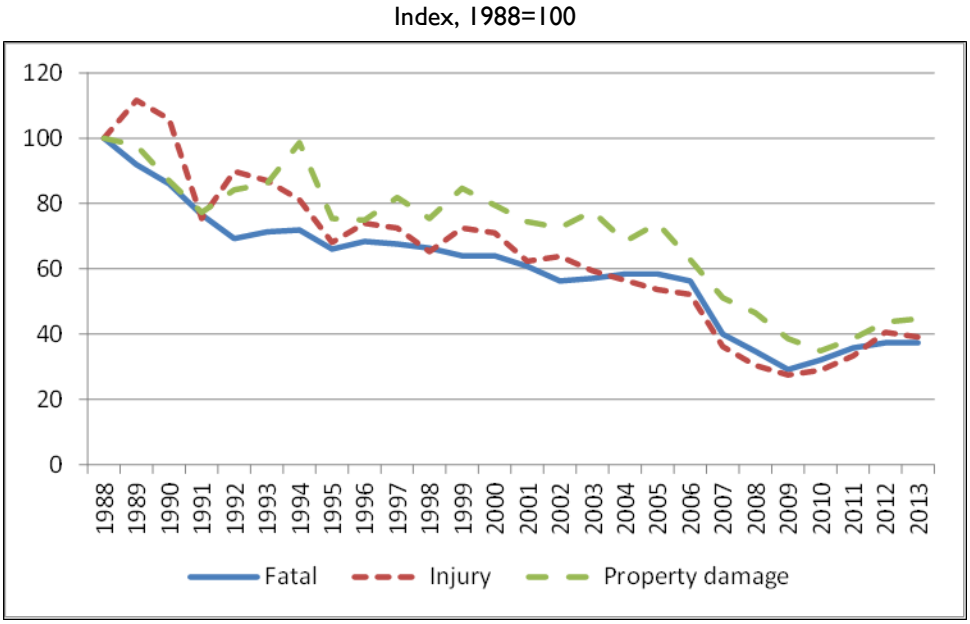
[3] In 1985, 72% of motorcyclists dying in crashes were under 30, and only 9% were over 40; in 2013 27% were under 30 and 55% were over 40. Insurance Institute for Highway Safety, *Fatality Facts: Motorcycles*, "Percentage of motorcyclist deaths by age, 1975-2013," http://www.iihs.org/iihs/topics/t/motorcycles/fatalityfacts/motorcycles.

[4] 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.

[5] National Highway Traffic Safety Administration, *Traffic Safety Facts 2013*, DOT HS 812139, Table 17.

vehicles involved in fatal crashes.[6] The crash involvement rate of large trucks, like that of most other types of vehicles, has fallen significantly since 1988 (see **Figure 6**).

Figure 6. Large-Truck Crash Involvement Rate Trend by Type of Crash, 1988-2013



Source: CRS; data from NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, 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.[7] This is noteworthy, since drivers of combination trucks do most of their driving on the Interstate System (see **Table 2**), on which accident and fatality rates are far lower than on the local roads on which most single-unit truck mileage is logged.[8]

[6] National Highway Traffic Safety Administration, *Traffic Safety Facts: Overview, 2013 Data*, DOT HS 812169, July 2015, p. 9, http://www-nrd.nhtsa.dot.gov/Pubs/812169.pdf.

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

[8] 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, 2012

In billions of VMT

Vehicle Type	Total VMT	Interstate VMT	% of VMT on Interstate
All light-duty vehicles	2,664	614	23%
Single-unit trucks	104	24	23%
Combination trucks	163	84	52%

Source: Federal Highway Administration, *Highway Statistics 2012*, Table VM-1.

Fatal large truck crashes often involve multiple vehicles. Over 90% of the persons killed in such crashes are occupants of the other vehicle(s) rather than occupants of large trucks (see **Table 3**), so the decline in fatalities in crashes involving large trucks is likely due at least in part to improved crashworthiness of cars and light trucks (see **Table 3**).

Table 3. People Killed in Crashes Involving Large Trucks, 2013

	Number	Percentage of Total
Occupants of large trucks	691	17%
In single-vehicle crashes	*427*	*11%*
In multiple-vehicle crashes	*264*	*7%*
Occupants of other vehicles in crashes involving large trucks	2,834	71%
Nonoccupants (pedestrians, bicyclists, etc.)	439	11%
Total	3,964	100%

Source: NHTSA, *Traffic Safety Facts: Overview, 2013 Data*, DOT HS 812169, July 2015, Table 7 (http://www-nrd.nhtsa.dot.gov/Pubs/812169.pdf).

Driver intoxication is a far less significant factor in large truck crashes than in crashes involving passenger vehicles. Of greater concern with respect to drivers of large trucks is fatigue. 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.[9] However, fatigue is not a risk confined to commercial drivers; in a 2006 study of crashes involving both passenger vehicles and large trucks, fatigue was listed as a contributing factor for 8% of the commercial drivers—and for 15% of the passenger vehicle drivers.[10]

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 groups sponsor a "Roadcheck," a three-day "blitz" of commercial vehicle inspections. The dates 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. During the 2015 Roadcheck, roughly 70,000 vehicles and their drivers were inspected; 5% of the

[9] 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.

[10] 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.

drivers and 18% 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. The trend over time for vehicle condition has been improving; in 1991 around 5% of drivers and 35% of vehicles were placed out of service during the Roadcheck period.[11]

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).[12] 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) is not known. In 2013, 14% of pedestrians killed were children under the age of 15.

Consistent miles traveled exposure data is not available for bicyclists, and highway safety organizations including the National Highway Traffic Safety Administration (NHTSA) within the U.S. Department of Transportation (DOT) tend to report the number of bicyclist fatalities rather than calculating a rate based on population.[13] 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 741 in 2013 (0.24). The recent increase may simply be tracking the general increase in vehicle-related accidents 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.[14]

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 and one-fifth of bicyclists killed in 2013 were legally intoxicated.

[11] Commercial Vehicle Safety Alliance, *International Roadcheck 2015, Facts-at-a-Glance*, http://cvsa.informz.net/CVSA/data/images/Roadcheck/2015%20Roadcheck%20Facts-at-a-Glance.pdf.

[12] 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.

[13] 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.

[14] 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.

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 accident rates and rates of involvement in fatal crashes than drivers 25 or over (see **Table 4**).

Table 4. Driver Involvement Rate in Fatal Crashes by Age, 2013

Rate per 100,000 registered drivers in age-group

Age	Rate
16-20	31.79
20-24	32.07
All Drivers	21.01

Source: NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 62.

Since 1975, the number of licensed drivers under 25 has fallen by nearly 3 million; that cohort accounted for 22.6% of all licensed drivers in 1975, but only 12.5% in 2013. 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.

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.[15] 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.

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 2014, it was 25%. All else being equal, the greater share of driving occurring on Interstate highways would be expected to lead to lower accident and fatality rates.

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

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

a 10% decrease in the price of gasoline is associated with a 1.6% increase in fatal crashes.[16] 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.[17]

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. 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.[18] The decline in fatal crashes per 100 million VMT during recessions is associated with a decline in fatal crashes involving a drunk driver.[19]

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 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, in announcing this good news, cited the improvement as evidence that DOT's efforts to improve safety were succeeding.[20] However, since 2010, the improvement has stopped.

[16] 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.

[17] 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.

[18] 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.

[19] 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.

[20] 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.

This raises three questions: Why did the fatality rate drop so dramatically in the late 2000s, why did it stop dropping, and to what extent are DOT safety efforts responsible for these changes? While it seems clear that the Great Recession played a role in the changing rates, to date researchers have not found convincing answers to these questions.

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.

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 2015, the Highway Safety Improvement Program distributed $2.2 billion to the states.

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 the event a serious crash occurs.

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 $130 million to oversee motor vehicle design and engineering in FY2015.[21]

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[22]—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.[23] One theory to explain this is that the type of person who chooses to wear a seat belt may also be the type of person who is less likely to engage in other risky driving behavior, such as speeding or driving while intoxicated.[24] 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.[25]

[21] The comparison of $130 million in federal spending on vehicle design versus $2.2 billion on 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.

[22] 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.

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

[24] 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.

[25] 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.

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.[26]

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.[27]

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,[28] adaptive cruise control, automatic braking, and on the horizon the integration of these features and others 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.[29]

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.[30] 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

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

[27] 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.

[28] 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.

[29] 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).

[30] 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* (Eighth Edition, 2015), pp. 5-10, 6-3, 6-16 - 6-19, 7-9–7-12, 9-19.

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 there 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 FY2015. 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.[31] 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.[32] At the time of enactment, 19 states had such laws; by the end of FY2004, every state had such a law (see **Table 7**).

[31] As of January 2016, only 19 states had universal helmet laws.

[32] 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.

Strong enforcement, however, can evoke resistance, which may lead to the enforcement effort being scaled back. 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.

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[33] of the state's federal-aid highway funding be used for certain safety-related purposes; 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 requirements, felt that the transfer penalty amount was too small to influence the state legislature.[34]

[33] 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.

[34] 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 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)	FY2016 (Sixteenth Transfers Applied)
Open container requirement (§154)	14	31	35	37	38
Repeat offender requirements (§164)	5	24	28	33	35
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; 2016 data from Federal Highway Administration, "Apportionment of Federal-Aid Highway Program Funds for Fiscal Year (FY) 2016," Notice N 4510.802, January 8, 2016.

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 FY2016, 13 states were not in compliance with the requirement concerning open containers, and 16 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.

Table 9. States Subject to Federal Highway Funding Penalties for Noncompliance with Open Container and Repeat DUI Offender Requirements, FY2016

States subject to both penalties marked with asterisk

State	Open Container Penalty	Repeat DUI Offender Penalty
Alaska*	X	X
Arkansas	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
North Dakota		X
Ohio*	X	X
Oregon		X
Rhode Island		X
South Dakota		X
Tennessee	X	
Virginia	X	
Vermont		X
Wyoming*	X	X
Total	**13 states**	**16 states**

Source: Federal Highway Administration, "Apportionment of Federal-Aid Highway Program Funds for Fiscal Year (FY) 2016," Notice N 4510.802, January 8, 2016.

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.[35] 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.[36]

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.[37] In the three years following 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, while two years later states received 193 grants.[38]

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

	Number of States Receiving Grants	
Incentive Grant Program	**2013**	**2015**
Impaired Driving	47	50
Ignition Interlock	2	4
Occupant Protection	44	47
Traffic Data Collection	49	49
Distracted Driving	7	1
Graduated Driver's Licenses	0	0
Motorcycle Safety	46	42
Total Grant Recipients	**195**	**193**

Source: CRS; data from Governors Highway Safety Association, Section 405 National Priority Safety Program, Funding tables.

Notes: The District of Columbia and certain territories were also eligible for grants, but are omitted from this table. The decline in distracted driving grants 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.

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

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

[37] 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.

[38] 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.

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.[39] 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 wore safety belts.[40] 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.[41] 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 February 2016, 34 states and the District of Columbia had primary enforcement laws.[42] 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%
2014	33	87%

Source: NHTSA, *Traffic Safety Facts Research Note, Seat Belt Use in 2014–Overall Results*, DOT HS 812113, February 2015.

Alcohol-Impaired Driving

Almost one-third of traffic fatalities involve an alcohol-impaired driver (one with a blood alcohol content [BAC] above the legal limit, currently .08%).[43] 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 just above 20% (see **Figure 7**).

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

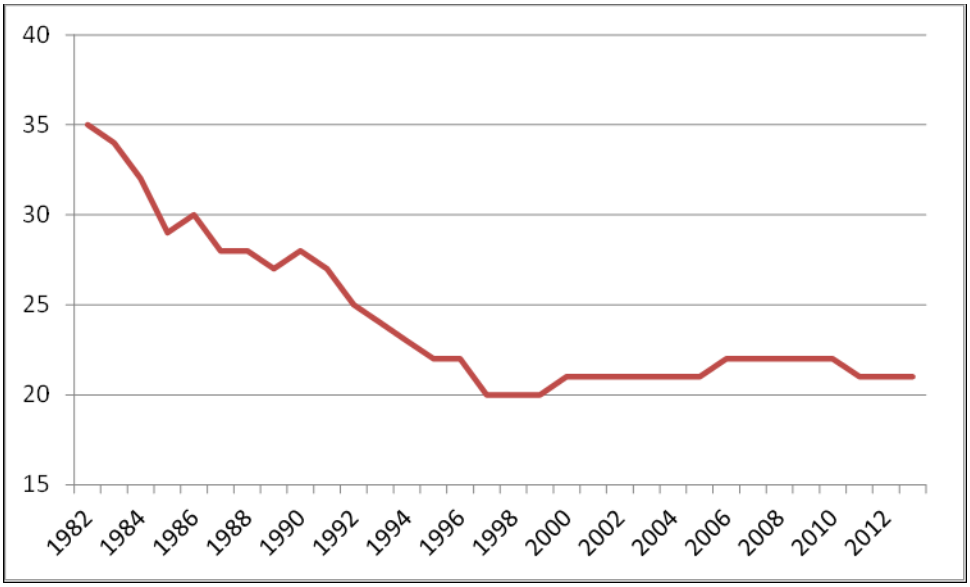
[40] NHTSA, *Traffic Safety Facts: Estimating the Lives Saved by Restraint Use and Minimum Drinking Age Laws*, DOT HD 812137, April 2015.

[41] 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 just for violation of a seat belt law.

[42] 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 2016 from, Governors Highway Safety Association, "Seat Belt Laws," ttp://www.ghsa.org/html/stateinfo/laws/seatbelt_laws.html.

[43] NHTSA, *Countermeasures That Work* (Eighth Edition: 2015), p. I-1.

Figure 7. Percent of Drivers Involved in Fatal Crashes Who Were Alcohol-Impaired, 1982-2013



Source: NHTSA, *Traffic Safety Facts 2013*, DOT HS 812139, Table 15.

Note: Blood alcohol concentration 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, 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.[44] There was also a decline in alcohol-related crashes in other countries, so other factors may have played a role as well.[45] Moreover, as **Figure 7** 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.

Congress does not have the power to directly regulate alcohol consumption by the general public; that is a state authority.[46] 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

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

[45] 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/.

[46] 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.

proportion of drunk drivers involved in fatal crashes between 1982 and 1997, with demographic factors accounting for the rest.[47]

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;[48] 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.[49]

There have been two significant improvements in alcohol-impaired driving numbers since 1997; neither, however, is attributed to policies targeting impaired driving. 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. And there was an overall drop in alcohol-impaired crashes starting in 2007, which reflected the overall decrease in crashes and fatalities in every mode starting that year, largely due to the economic recession.

Fatality rates due to alcohol-impaired driving vary significantly from state to state, and even from area to area within states. For example, in 2013 the proportion of drivers involved in fatal crashes who had a blood alcohol content of .08% or higher was 21% nationwide; among the states it varied from a low of 13% (Utah) to a high of 32% (South Carolina).[50] Factors such as rural versus urban population, road conditions, and economic activity, as well as state laws and programs and socioeconomic factors, affect the rate of DUI activity.

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.

Congress currently has no policy to discourage speeding. In 1974, Congress adopted a national maximum speed limit of 55 miles per hour (mph).[51] That change was estimated to have saved 2,000 to 4,000 lives annually due to reductions in the number and severity of crashes.[52] 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 Interstate speed limits. 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.[53] Estimates suggest that

[47] J. N. Dang, "Statistical Analysis of Alcohol-related Driving Trends, 1982-2005," National Highway Traffic Safety Administration, DOT HS 810942, May 2008.

[48] P.L. 106-346, §351.

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

[50] National Highway Traffic Safety Administration, *Traffic Safety Facts 2013*, DOT HS 812139, Table 118.

[51] 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.

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

[53] 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. (continued...)

reinstituting a national maximum speed limit would save between 1,000 and 3,000 lives per year. It would also have some benefit in reducing 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.[54]

Congress has made it harder for states to enforce speed limits by barring the use of federal transportation funding for automated speed enforcement. Studies indicate that automated speed enforcement is an effective way to enforce speed limits.[55]

Distracted Driving

Driver distraction is estimated to be a factor in 10% of fatal crashes.[56] Driver distraction is difficult to detect, as it typically leaves no evidence, and drivers have incentives not to admit 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 looking at objects outside the vehicle ("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.[57] Many states have passed laws prohibiting hand-held cell phone use by drivers, but allowing hands-free usage. 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.[58] Text messaging, which combines cognitive distraction with diverting the driver's eyes from the road, is significantly more distracting than carrying on a conversation. Automakers are potentially expanding the sources of driver distraction by offering Internet-connected information/entertainment systems on new vehicles.

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-six states and the District of Columbia ban text messaging by all drivers, 38 states and the District of Columbia ban cell-phone use by novice drivers, and 14 states and the District of Columbia ban all drivers from using hand-

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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.

[54] 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.

[55] 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.

[56] National Highway Traffic Safety Administration, *Countermeasures That Work* (Eighth Edition), 2015, p. 4–2.

[57] 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.

[58] D. L. Strayer et al., *Measuring Cognitive Distraction in the Automobile*, AAA Foundation for Traffic Safety, June 2013, p. 28.

held cell phones while driving.[59] 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. The only countermeasure that has been clearly proven to work is graduated driver licensing—that is, limiting the driving opportunities for teens.[60]

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 are 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. Only one state[61] qualified for a grant under this program in FY2014 and FY2015. In December 2015[62] Congress deleted the requirement for an increased fine for repeat offenders; this is expected to allow more states to qualify for grants.

Motorcycle Safety

Injuries to the head are the most common cause of fatalities among motorcyclists; they are also a common type of nonfatal injury.[63] 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").[64]

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 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. The absence of mandatory helmet laws may be related to the fact that the motorcycle fatality rate is roughly what it was 20 years ago, while fatality rates for occupants of cars and light trucks have declined.

Currently, 19 states, the District of Columbia, and four territories have universal helmet laws; 28 states and one territory require helmets for young riders, and three states have no helmet requirements. 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 8**). NHTSA has estimated that if every state had a universal helmet law, nearly 1,000 motorcyclist deaths would be prevented each year.[65]

[59] Governors Highway Safety Association, "Distracted Driving Laws," January 2016.

[60] National Highway Traffic Safety Administration, *Countermeasures That Work* (Eighth Edition), 2015, p. 4–7.

[61] Connecticut.

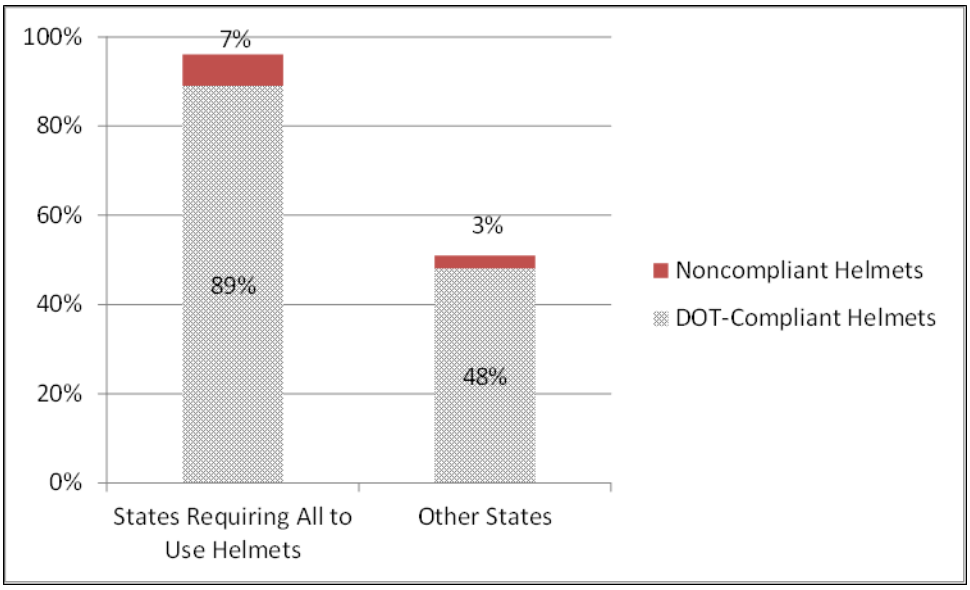
[62] §4005 of the FAST Act, P.L. 114-94.

[63] 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.

[64] 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.

[65] The number varies each year with the number of fatal crashes, but has been between 700-850 each year for the past decade; see National Highway Traffic Safety Administration, *Traffic Safety Facts 2013*, DOT HS 812139, p. 223

Figure 8. Motorcycle Helmet Use in 2014, by State Law and Helmet Type



Source: T. M. Pickrell and E. H. Choi. *Traffic Safety Facts Research Note: Motorcycle Helmet Use in 2014—Overall Results*, DOT HS 812110, NHTSA, January 2015, 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). NHTSA has initiated a rulemaking that would restrict the sale and use of noncompliant helmets.[66]

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."[67] Congress established six criteria; a state can qualify for a grant by having any two of the six. Two are numerical measures (reducing the number of motorcycle deaths and the rate of crashes involving motorcycles compared with the previous year; 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 three of the six criteria are effective in reducing crash or fatality rates.[68] The safety policy that has been

[66] NHTSA, *Federal Register*, Vol 80, p. 29458, May 21, 2015.

[67] 23 U.S.C. 405(f)(1).

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

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. 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 steadily improved, there is room for further improvement. Since 2010 the reductions in U.S. fatality and injury rates have stalled, and preliminary estimates indicate that traffic deaths increased by 9% in the first nine months of 2015 compared to the same period in 2014,[69] while VMT increased by less than 3%.[70] 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.[71]

There are several policy actions Congress could consider that are recommended by safety advocates as being relatively low-cost but effective interventions. These include actions dealing with seat belt usage, motorcycle helmets, automated traffic enforcement, and implementation of new vehicle safety technologies.

Seat Belt Usage

A survey found that 87% of front-seat occupants wore seat belts in 2014. The rate was 90% in states with primary enforcement seat belt laws, and 79% in states with other laws.[72] Other countries have achieved higher use rates: Australia (96%), England (95%), and Canada (92%).[73] NHTSA estimated that in 2013 an additional 2,800 lives would have been saved if all unrestrained passenger vehicle occupants five years of age and older had worn seat belts.[74] 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

[69] National Highway Traffic Safety Administration, *Traffic Safety Facts: Early Estimate of Motor Vehicle Traffic Fatalities for the First Nine Months (Jan-Sep) of 2015*, DOT HS 812240, January 2016, http://www-nrd.nhtsa.dot.gov/Pubs/812240.pdf.

[70] Calculated by CRS using monthly VMT data from Federal Highway Administration's monthly *Traffic Volume Trends* reports available at http://www.fhwa.dot.gov/policyinformation/travel_monitoring/tvt.cfm.

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

[72] National Highway Traffic Safety Administration, *Traffic Safety Facts: Seat Belt Use in 2014—Overall Results*, DOT HS 812113, February 2015.

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

[74] 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.

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

Ninety nations, representing 77% of the world's population, have universal mandatory helmet laws, including a standard for helmet performance. In Australia, the reported helmet use rate by motorcycle operators is 99%.[75] Universal helmet laws have been shown to be very effective in promoting helmet usage, because a violation of the law is easily seen. Currently, 19 states and the District of Columbia have universal helmet laws. NHTSA estimates that if every motorcyclist wore a helmet meeting DOT standards, hundreds of motorcyclists' lives would be saved each year.[76] However, 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 and to create checkpoints that specifically target motorcyclists.[77]

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 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.[78] 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.[79] 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. 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.[80]

In the 2012 surface transportation authorization act, Congress prohibited states from using any federal-aid highway funding for automated traffic enforcement (except in school zones), and prohibited states from using any of their federal highway safety funding for automated traffic

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

[76] National Highway Traffic Safety Administration, *Traffic Safety Facts 2013*, DOT HS 812139, p. 223.

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

[78] 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.

[79] 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.

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

enforcement;[81] Congress continued these prohibitions in the FAST Act.[82] In a further disincentive to the use of automated enforcement, Congress required 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.[83]

Accelerating Deployment of Increasingly Autonomous Vehicles

Since driver error plays a major role in traffic crashes, the prospect of reducing the role of the human driver in driving decisions is considered to have great potential to reduce crashes and the resulting deaths and injuries. Industry is racing ahead with developing and implementing driver-assistance technologies, with the goal of largely, if not entirely, replacing the human driver. NHTSA has been studying the impact of driver-assistance technologies in the context of considering what features might be added to the list of mandatory safety standards. The last such addition was in 2007, when electronic stability control was mandated for all passenger vehicles beginning with the 2012 model year. It is estimated that it takes around 17 years for the U.S. automobile fleet to turn over, and this time period has been lengthening due to the increasing reliability of cars and decline in crashes, so the impact of new vehicle technologies is likely to take some time to appear. There is also a question about how quickly new safety technologies reach higher-risk drivers, as those at highest risk are younger drivers who may be less able to afford new vehicles.

DOT has announced that it would work with industry, states, and other stakeholders to accelerate the deployment of autonomous vehicles, and has proposed a 10-year, $4 billion program to test connected vehicles.[84] Given the potential safety impact of the new collision-avoidance technologies and the lag in the spread of such technologies, an analysis of the costs and benefits of a program to encourage drivers to replace older cars with new cars equipped with these technologies may be worthwhile. Recent experience with the Consumer Assistance to Recycle and Save Act of 2009 (which created the so-called "Cash for Clunkers" program paying vehicle owners to scrap old cars and purchase new, more fuel-efficient ones) can help inform the prospects of such a proposal.[85]

Author Contact Information

(name redacted)
Analyst in Transportation Policy
[redacted]@crs.loc.gov , 7-....

[81] 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.

[82] P.L. 114-94, §1401.

[83] Ibid., §4002. The survey shall 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.

[84] DOT Briefing Room, "Secretary Foxx Unveils President Obama's FY17 Budget Proposal of Nearly $4 Billion for Automated Vehicles and Announces DOT Incentives to Accelerate Vehicle Safety Innovations," January 14, 2016.

[85] P.L. 111-32, Title XIII.