

Q&A: Speed — Speed and speed limits

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1 | [Is speeding a safety problem?](#)

Yes. In 2010, a total of 10,395 deaths, or nearly a third of all motor vehicle fatalities, occurred in speed-related crashes. Based on a nationally representative sample of police-reported crashes, speeding – defined as exceeding the speed limit, driving too fast for conditions or racing – was involved in 16 percent of property-damage-only crashes and 20 percent of crashes with injuries or fatalities. The National Highway Traffic Safety Administration (NHTSA) estimates that the economic cost of speed-related crashes is more than \$40 billion each year. ¹

In a high-speed crash, a passenger vehicle is subjected to forces so severe that the vehicle structure cannot withstand the force of the crash and maintain survival space in the occupant compartment. Likewise, as crash speeds get very high, restraint systems such as airbags and safety belts cannot keep the forces on occupants below severe injury levels.

Speed has a major impact on the number of crashes and injury severity. ² It influences the risk of crashes and crash injuries in three basic ways:

- It increases the distance a vehicle travels from the time a driver detects an emergency to the time the driver reacts.
- It increases the distance needed to stop a vehicle once the driver starts to brake.
- It increases the crash energy exponentially. For example, when impact speed increases from 40 to 60 mph (a 50 percent increase), the energy that needs to be managed increases by 125 percent.

For practical reasons, there are limits to the amount of crash energy that can be managed by vehicles, restraint systems and roadway hardware such as barriers and crash cushions. The higher the speed, the higher the likelihood that these limits will be exceeded in crashes, limiting the protection available for vehicle occupants. To put this into perspective, note that the government runs crash tests for occupant protection at 30-35 mph — speeds considered to be severe impact speeds.

2 | [Who speeds?](#)

Many drivers exceed speed limits by some amount at least occasionally. In a study of drivers on limited access highways, high-speed drivers were more often male and more often judged to be younger than 30. ³ An observational study conducted on roads with speed limits ranging from 40-55 mph compared drivers traveling at least 15 mph above posted speed limits with drivers of adjacent vehicles traveling no more than 5 mph above the speed limit. ⁴ Speeders were younger than drivers in the comparison group and had more violations and crashes on their driving records.

Although speeding is a problem among all driver age groups, the crashes and violations of young drivers are much more likely to be related to speeding than is the case for drivers of other ages. ⁵ Studies in California found that the rate of speeding violations per mile traveled was at least 3 times as high for drivers 16-19 years old as it was for drivers 30 and older. ⁶

A NHTSA analysis of data on fatal crashes in 2008 found that at all ages the fatal crashes of male drivers were more likely than those of female drivers to be speed-related. Twenty-four percent of all male drivers involved in fatal crashes were speeding at the time of the crash, compared with only 15 percent of all female drivers. ¹ In addition, the proportion of fatal crashes that were speed-related decreased with increasing driver age. For example, 37 percent of male drivers ages 15-20 in fatal crashes were speeding at the time of the crash, compared with 22 percent of male drivers ages 35-44 and 16 percent of male drivers ages 45-54.

3 | [Isn't speed variation — not high speed — the real problem?](#)

No. Both variation and speed are important. Although research conducted in the 1950s on two-lane rural roads indicated that vehicles traveling much faster or much slower than average were more likely

to be involved in crashes, involvement in severe crashes increased with speed.⁷ The risk of death and severe injury is a direct exponential function of speed, not speed differences.

Many differences in travel speeds are unavoidable because of the slower speeds of turning or merging vehicles. Higher speeds of the other vehicles exacerbate this problem. Besides, many crashes and nearly half of those resulting in occupant deaths are single-vehicle impacts in which differences among vehicle speeds play no role or only a minor one.

4 | [What's the history of speed limit laws in the United States?](#)

Speed limit laws, which date to 1901, traditionally have been the responsibility of the states. Before 1973, when Congress responded to oil shortages by directing the U.S. Department of Transportation to withhold highway funds from states that did not adopt a maximum speed limit of 55 mph, speed limits on rural interstates in most states ranged from 65 to 75 mph, with the majority of states setting rural interstate speed limits of 70 mph.⁸ In urban areas, most states maintained 55 mph speed limits before the national maximum speed limit was established.

By March 1974, all states adopted the 55 mph national maximum speed limit. Concerns about fuel availability and costs faded, however, and Congress in 1987 allowed states to increase speed limits on rural interstates to 65 mph.

The National Highway System Designation Act of 1995 repealed the maximum speed limit, allowing states to set their own limits for the first time since 1974. Many states quickly moved to raise speed limits on both rural and urban interstates and limited access roads. As of July 2012, 35 states had raised speed limits to 70 mph or higher on some portion of their roadway systems. On some rural sections of interstates in Texas and Utah speed limits are 80 mph. The Texas state legislature has authorized speed limits of up to 85 mph on highways originally constructed and designed to accommodate the higher speed. As of July 2012, the Texas Department of Transportation has stated that it will conduct engineering studies near the portions of Highway 130, still under construction, to determine whether 85 mph is a reasonable speed limit.

[Maximum posted speed limits for passenger vehicles by state](#)

5 | [What was the effect of the national maximum speed limit?](#)

The National Research Council attributed 4,000 fewer fatalities to the decreased speeds in 1974 compared with 1973 and estimated that returning the speed limit on rural portions of the interstate highway system to pre-1974 levels would result in 500 more fatalities annually, a 20-25 percent increase on these highways.⁹

6 | [How has abolishing the national speed limit affected speeds?](#)

Most states raised speed limits in response to the 1995 abolishment of the national maximum speed limit, and the higher limits were associated with immediate increases in travel speeds. Within one year after speed limits were raised from 55 to 70 mph on three urban freeways in Texas, the percent of passenger vehicles traveling faster than 70 mph increased from 15 to 50 percent; the percent exceeding 75 mph increased from 4 to 17 percent.¹⁰ On California urban freeways where speed limits were raised from 55 to 65 mph, the percent of motorists traveling faster than 70 mph increased from 29 to 41 percent.¹⁰ A more recent Institute study examined longer-term changes in traffic speeds on roads where limits were increased following repeal of the national speed limit.¹¹ Ten years after speed limits were raised from 65 to 75 mph on rural interstates, the proportion of passenger vehicles exceeding 80 mph tripled in Nevada and nearly tripled in New Mexico. By comparison, declines in travel speeds were observed on urban freeways in California and Nevada where speed limits did not change and where there were large increases in traffic volume and development of surrounding areas.

In 2006 Texas raised the daytime speed limit for passenger vehicles on segments of I-10 and I-20 from 75 to 80 mph. During the 16-month period following the speed limit increase, mean speeds of passenger vehicles on I-20 increased by 9 mph relative to the comparison road, where no speed limit change occurred and traffic speeds declined. On I-10 mean speeds increased by 4 mph relative to the comparison road.¹²

In 2007 the Institute monitored travel speeds on interstates in eight metropolitan areas (Albuquerque, Atlanta, Boston, Denver, Los Angeles, Omaha, Tampa and Washington, D.C.).¹³ On urban interstates, the average speed of passenger vehicles exceeded the limits in all eight metro areas. On suburban and rural interstates, average speeds were faster than the limits in half of the metro areas. The proportion of passenger vehicles exceeding 70 mph on urban interstates ranged from 1 percent in Denver and Tampa to 38 percent in Albuquerque, while the percentage exceeding 75 mph on suburban and rural interstates ranged from 6 percent in Los Angeles to 49 percent in Tampa. The same study examined segments of rural interstates located 30-50 miles outside three of the metro areas (Washington, Atlanta and Los Angeles). Outside Washington, where limits are 70 mph, 19 percent of passenger vehicles were logged exceeding 70 mph, and 3 percent surpassed 75 mph. Speeds were much faster on the Los Angeles intercity segment, where 86 percent of passenger vehicles surpassed the 70 mph limit and 35 percent traveled faster than 80 mph.

7 | How has abolishing the national speed limit affected fatalities?

Institute studies show that deaths on rural interstates increased 25-30 percent when states began increasing speed limits from 55 to 65 mph in 1987. In 1989, about two-thirds of this increase — 19 percent, or 400 deaths — was attributed to increased speed and the rest to increased travel.^{14,15,16}

A 1999 Institute study of the effects of the 1995 repeal of the national maximum speed limit indicated this trend had continued. Researchers compared the numbers of motor vehicle occupant deaths in 24 states that raised speed limits during late 1995 and 1996 with corresponding fatality counts in the six years before the speed limits were changed, as well as fatality counts from seven states that did not change speed limits. The Institute estimated a 15 percent increase in fatalities on interstates and freeways.¹⁷

A 2002 study by researchers at the Land Transport Safety Authority of New Zealand also evaluated the effects of increasing rural interstate speed limits from 65 mph to either 70 or 75 mph. Based on deaths in states that did not change their speed limits, states that increased speed limits to 75 mph experienced 38 percent more deaths per million vehicle miles traveled than expected — an estimated 780 more deaths. States that increased speed limits to 70 mph experienced a 35 percent increase, resulting in approximately 1,100 more deaths.¹⁸

A 2009 study examining the long-term effects of the 1995 repeal of the national speed limit found a 3 percent increase in road fatalities attributable to higher speed limits on all road types, with the highest increase of 9 percent on rural interstates. The authors estimated that 12,545 deaths were attributed to increases in speed limits across the U.S. between 1995 and 2005.¹⁹

8 | How are speed limits established?

State laws set maximum speed limits for each type of road (e.g., interstate highway, two-way undivided highway) and land use (urban or rural).²⁰ For example, in Minnesota there are statutory maximum speed limits of 10 mph in alleys, 30 mph in urban districts, 35 mph in rural residential districts, 65 mph on urban interstates, 70 mph on rural interstates and 55 mph in locations other than those specified in the statutes.²¹ Statutory speed limits also can be established for special situations such as school zones. For example, California law establishes speed limits of 25 mph in school zones when children are present and on streets (other than state highways) adjacent to senior centers posted with "SENIOR" warning signs.²²

The posted speed limit for a particular road or section of a road can be below the maximum speed limit allowed, however, if the local or state agency in charge of the road decides a lower limit is warranted. A common approach is to consider the 85th percentile speed in free-flowing traffic, which is the speed that 85 percent of vehicles are traveling at or below in free-flowing conditions. Speed limits are sometimes raised to conform with this number if drivers are commonly violating the posted limit. Traffic engineers also take into account such factors as roadside environment, roadway design, crash experience and the prevalence of pedestrians.

9 | Are speed limits based on the 85th percentile traffic speed appropriate?

Not always. Advocates of this approach argue that measuring the speed distribution of a roadway and then setting the speed limit so that 85 percent of motorists would be in compliance reduces the need for

enforcement and, at the same time, reduces crash risk by narrowing variation among vehicle speeds. However, numerous studies of travel speeds on rural interstate highways have shown that 85th percentile speeds increased when speed limits were raised to 65 mph and then continued increasing.¹² The 85th percentile is not a stationary point. It is, rather, a moving target that increases when speed limits are raised. If speed limits are raised to meet a current 85th percentile speed, a higher new 85th percentile speed will soon result.

10 | [Some claim that higher speed limits would reduce crashes. Is this true?](#)

No. Advocates of higher speed limits have claimed that research on speed variation indicates faster speeds are not hazardous. They cite David Solomon's research from the mid-1950s that seems to show an increase in crash likelihood among drivers traveling slower than the average speed and a minimum of crashes at 5-10 mph above the average speed.⁷ However, the speeds of the crash-involved drivers in these studies were based on self-reports. It is well known that drivers exceeding speed limits are likely to deliberately underestimate their speeds. Such underestimation can account for much of the apparent underinvolvement of moderately high-speed drivers in crashes. Later research found that simply removing the crashes involving intersections and turning maneuvers from the Solomon data eliminated the overinvolvement of slower drivers in crashes.²³ More important, the Solomon research addressed only speed variation, not speed limits.

11 | [Should trucks have lower speed limits than cars?](#)

Although there is no definitive research showing crash effects associated with posting lower (differential) speed limits for large trucks, many safety experts favor differential limits because large trucks require much longer distances than cars to stop. Lower speed limits for trucks make stopping distances of trucks closer to those of lighter vehicles. Slower truck speeds also allow passenger vehicle drivers to pass trucks more easily. And because on average, large trucks tend to go slower than passenger vehicles on expressways with uniform speed limits,¹¹ lower speed limits for trucks reflect a natural speed differential between larger trucks and passenger vehicles.

Institute research published in 1991 found that lower speed limits for trucks on 65 mph highways reduced the proportion traveling faster than 70 mph without increasing variation among vehicle speeds. The percentage of trucks traveling faster than 70 mph was twice as large in states with uniform 65 mph limits (14 percent in Arizona, 9 percent in Iowa) as it was in states with different passenger vehicle (65 mph) and large truck (55 mph) speed limits (4 percent in California, 3 percent in Illinois).²⁴

References