

Are teens safer on the road than they were ten years ago? – Yes, and no

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EXECUTIVE SUMMARY

While recent annual statistics reflect a steady decrease in both the number of fatal traffic crashes and traffic deaths across all age groups, motor vehicle crashes continue to be the number-one killer of teens throughout the United States, and novice drivers are more likely to be involved in fatal crashes than are more experienced drivers. Drivers age 19 and under have a fatal crash rate nearly three times greater than the overall driving population. (1) Novice drivers (15 to 17 years old) are at a distinct disadvantage, not only because of their limited driving experience, but also because of their incomplete brain development. Research has found that the prefrontal cortex of the brain – the region responsible for weighing the consequences of risky behavior – is the last part of the brain to develop, and its development is not complete until nearly the age of 25. (2)

Challenges faced by teenage drivers are more pronounced when teenage passengers are in the vehicle due to the increased distraction created by those passengers, and the increased tendency for the drivers to exhibit risky behaviors in the presence of those passengers. (3) One such risky behavior is speeding, which has become slightly more common as a fatal crash factor for teen drivers in recent years. (4)

This paper presents an exploratory examination of a decade of fatal crash involvement in the U.S. by novice drivers relative to that of young adult drivers (18 to 24 years old) when drivers in each group are accompanied by one or more teenage passengers.

The data reviewed here illustrate differences in crash likelihood between the two groups by means of a measure of relative risk (RR). This measure demonstrates that despite significant reductions in the absolute number of fatal crashes involving novice drivers, the likelihood that novice drivers in fatal crashes will have teen passengers has increased over the past decade relative to fatal crashes involving young adult drivers.

From 2002 to 2011, the number of drivers aged 15 to 17 involved in fatal crashes nationwide dropped from 2,832 to 1,134 – a 60 percent decrease. However, in 2011, novice drivers were nearly eight times more likely to have had two or more 13- to 17-year-old passengers in the vehicle at the time of a fatal crash when compared to drivers aged 18 to 24. That likelihood, or relative risk, was only six in 2002 and has been increasing nearly every year since then. The decline in the number of novice drivers in fatal crashes certainly indicates substantial improvement. At the same time, however, the increase in the proportion of fatal crashes involving novice drivers that also include multiple teen passengers relative to those crashes with somewhat older and more experienced – but still young – drivers, should at the very least raise cautionary flags with respect to the persistence of fatal crash issues among novice teen drivers that merit continued attention.

During the 10-year analysis period, many states enacted or strengthened existing graduated driver license (GDL) provisions. Most of those states allow novice drivers to carry only one teenage passenger (family members excepted), while 15 states prohibit teenage passengers altogether during the restriction period, which typically lasts for six to 12 months. These restrictions are intended to reduce the likelihood of crashes among these drivers. Nevertheless, the risk that fatal crashes involving

novice drivers have young passengers actually grew worse during this period relative to young adult drivers.

In addition to GDL restrictions on novice drivers, including those related to the permissible number and age of young passengers, laws prohibiting or restricting electronic voice and/or texting while driving have also been enacted in numerous state and local jurisdictions. The use of cell phones by young drivers has been well documented, as has the increase in text messaging activity by teens and research has demonstrated that most teens openly admit to talking and/or texting in spite of those bans. While the current analysis does not seek to provide definitive explanations for the worsening risk for novice drivers with teenage passengers, the possible connection of that trend and the increase in mobile communication is noteworthy and meaningful.

Also noteworthy is the fact that the percentage of teen-driver fatal crashes in which speeding was a factor grew slightly during the study period. This trend, then, could also have contributed to the increase in relative risk for novice drivers with teen passengers.

OVERALL COMPARISON

As shown in Figure 1, the total number of 15 to 17-year-old drivers in fatal crashes has declined sharply over the past decade, from 2,832 in 2002 to 1,134 in 2011. Fatal crash involvement by young adult drivers, 18-24 years of age, also decreased over this time period, from 11,809 to 7,678. Unlike the relatively steady decline evident among novices throughout the entire period, decreases in young adult fatal crashes are particularly discernible beginning in 2007.

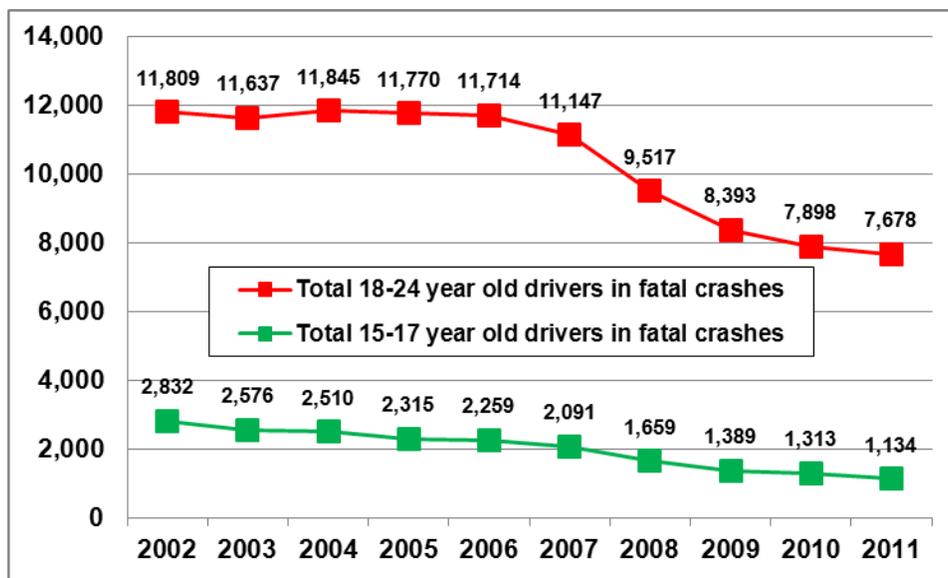


Figure 1. Total number of 15-17 and 18-24 year old drivers in fatal crashes in the U.S. from 2002-2011.

The measure of relative risk employed in Figures 2 and 3 is defined as the ratio of two proportions; specifically, the proportion of all teen drivers in fatal crashes who had a specified number of 13-17 year-old passengers (either one or two or more), divided by the proportion of all young adult drivers in fatal crashes who had the same number of 13-17 year-old passengers. For calculation, this reduces to

$$[a/(a + b)] / [c/(c + d)]$$

where:

a = number of 15-17 year old drivers in fatal crashes with the specified number of teen passengers,
 b = number of 15-17 year old drivers in fatal crashes with fewer or greater than the specified number of teen passengers,
 c = number of 18-24 year old drivers in fatal crashes with the specified number of teen passengers,
 d = number of 18-24 year old drivers in fatal crashes with fewer or greater than the specified number of teen passengers.

Drivers between the ages of 15 and 17, inclusive, are defined here as being *novice drivers*.

Eighteen-24 year-old drivers are defined as *young adult drivers*.

Teen passengers include all passengers from 13-17 years old.

Use of the relative risk measure does not establish how likely an event is to occur in absolute terms. Rather, it indicates how likely an event is to occur in one group relative to another group. In this case, the groups comprise:

- Novice drivers with one or with two or more teenage passengers who are involved in fatal crashes, and
- Young adult drivers with one or with two or more teenage passengers who are involved in fatal crashes.

Relative risk allows us to make statements of the form:

Novice drivers involved in fatal crashes are X-times more likely to have had teen passengers than are young adult drivers who were in fatal crashes.

DRIVERS IN FATAL CRASHES WITH ONE PASSENGER

Figures 2 and 3 illustrate the percentage of all fatal crashes involving novice and young adult drivers in which one teen passenger was in the vehicle and the relative risk of 15-17 year-old drivers having one teen passenger compared to 18-24 drivers having a single teen passenger when they had a fatal crash for each year from 2002 through 2011. In 2002, 26.2 percent of all fatal crashes involving 15-17 year-old drivers had one teen passenger. In the same year, one teen passenger accompanied 7 percent of all fatal crashes with 18-24 year-old drivers in crashes in which at least one person was killed. Over the ten years of crash data reviewed, these percentages generally stayed flat or decreased from one year to the next for both driver groups. By 2011, a teen passenger was in the fatal crash vehicle for 23.2 percent of the novice drivers and 4.5 percent of the young adult drivers in fatal crashes. Proportionally, the likelihood that young adults had a young passenger decreased substantially more than it did for novice drivers. Consequently, the relative risk that novice drivers had one teen passenger when involved in a fatal crash (also shown in both figures) increased during the same period when compared to young adult drivers. In 2002, novice drivers were 3.7 times more likely to have a teen passenger in the vehicle at the time of a fatal crash than were young adult drivers. By 2011, novice drivers involved in fatal crashes were 5.1 times more likely to have had teen passengers than were young adult drivers who were in fatal crashes.

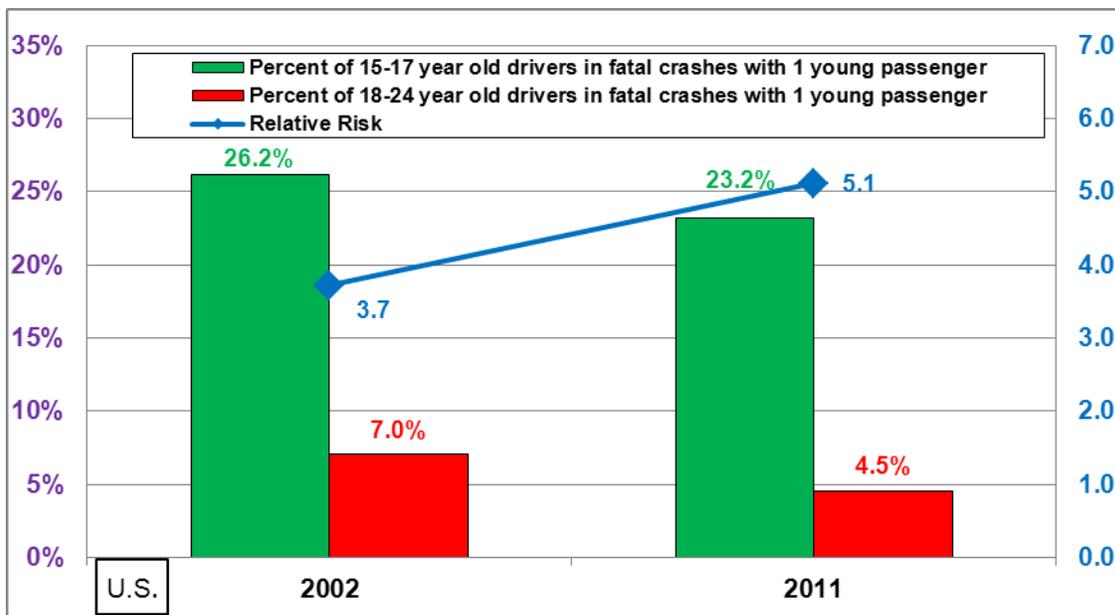


Figure 2. Snapshot of 15-17 and 18-24 year old drivers in fatal crashes in U.S. with one 13-17 year old passenger and Relative Risk of those drivers having one young passenger compared to 18-24 drivers in fatal crashes having one teen passenger (blue axis), 2002 compared to 2011.

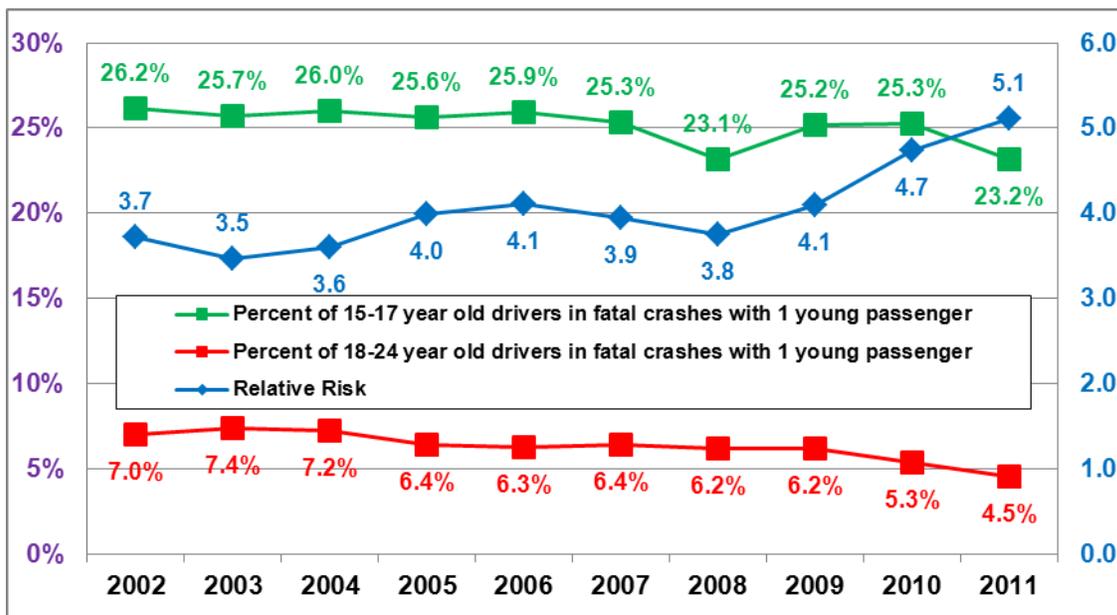


Figure 3. Detailed trend data for percentage of all 15-17 and 18-24 year old drivers in fatal crashes in U.S. with one 13-17 year old passenger (purple axis) and the Relative Risk of those drivers having one young passenger compared to 18-24 drivers in fatal crashes having one teen passenger (blue axis).

DRIVERS IN FATAL CRASHES WITH TWO OR MORE PASSENGERS

Figures 4 and 5 provide the same data for fatal crashes with two or more teen passengers as shown in Figures 2 for fatal crash-involved drivers who have only one teen passenger. Drivers in both age groups carrying two or more teen passengers were responsible for a smaller share of fatal crashes than were drivers carrying one passenger. The percentage for novice drivers improved from 16.2 percent to 14.6 percent over the ten-year period. The percentage for young adult drivers also improved, from 2.8 percent to 1.9 percent.

The total number of novice drivers involved in fatal crashes dropped dramatically during the study period, from 2,832 to 1,134. Despite this significant improvement in terms of sheer volume, the relative risk for novice drivers grew worse over the same time. At the beginning of the analysis period, novice drivers were 5.9 times more likely to have had two or more teen passengers in the vehicle at the time of a fatal crash than were young adult drivers. But 10 years later, that teen passenger / fatal crash scenario had become 7.7 times more likely to occur.

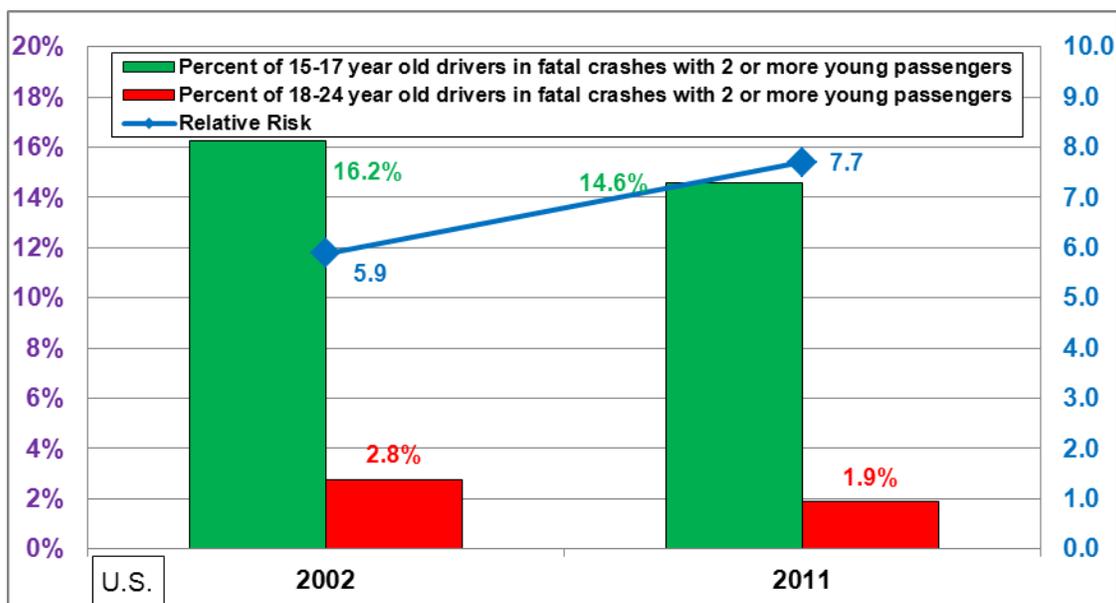


Figure 4. Snapshot of 15-17 and 18-24 year old drivers in fatal crashes in U.S. with two or more 13-17 year old passengers (purple axis) and Relative Risk of those drivers having two or more young passengers compared to 18-24 drivers in fatal crashes having two or more teen passengers (blue axis), 2002 compared to 2011.

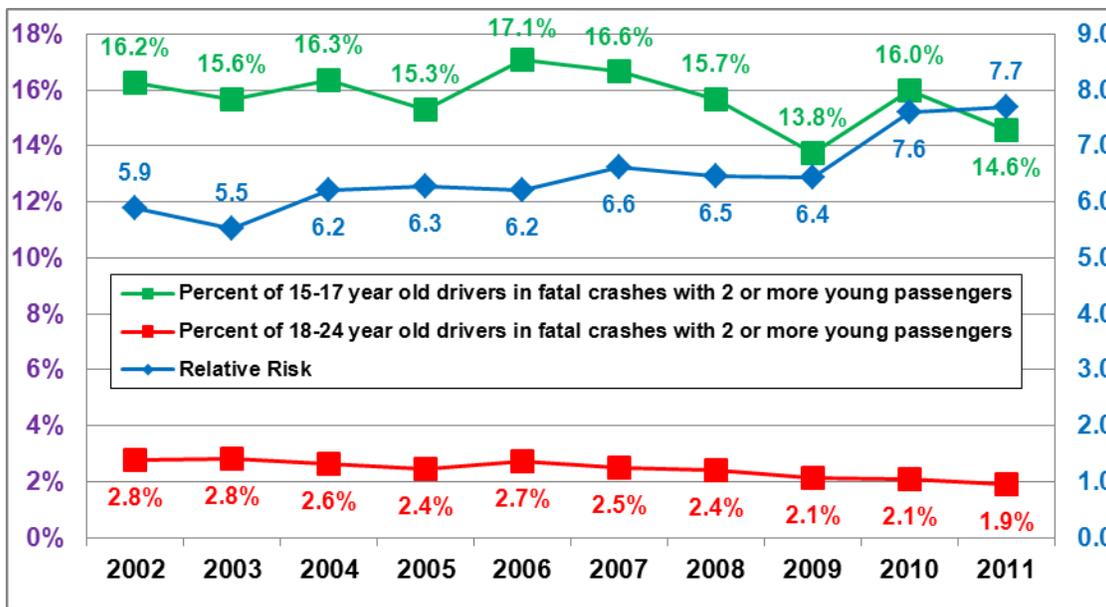


Figure 5. Detailed trend data for percentage of 15-17 and 18-24 year old drivers in fatal crashes in U.S. with two or more 13-17 year old passengers (purple axis) and Relative Risk of those drivers having two or more young passengers compared to 18-24 drivers in fatal crashes having two or more teen passengers (blue axis).

DRIVERS IN FATAL CRASHES WITH YOUNG PASSENGERS IN SELECTED STATES

All of the novice and young adult crash data addressed thus far applies to the U.S. as a whole. Clearly, however, just as GDL restrictions and other laws governing driving vary among the states, so also does the fatal crash experience of novice and young adult drivers differ among the states. Table 1 shows the absolute number of fatal crashes involving 15-17 and 18-24 year-old drivers and other fatal crash data for novice and young adult drivers involved in fatal crashes in 2002 and 2011 for the ten states with the largest resident populations of 15-24 year-olds in the 2010 census. The population of the target age groups provides one measure for assessing that these states have the highest potential exposure to crashes involving novice and young adult drivers. This metric was used in the absence of comprehensive national driver licensure or vehicle miles traveled data by age.

Figure 6 indicates the total number of 15-17 and 18-24 year old drivers in fatal crashes in Texas in 2002 and 2011. The decrease in fatal crashes for novice drivers (age 15 to 17) at the national level over this time span has been 60.0 percent – by comparison, the decrease has been 68.3 percent in Texas. Figures 7 through 10 illustrate the percentage of all 15-17 and 18-24 year old drivers in fatal crashes in Texas with one 13-17 year old passenger and with 2 or more 13-17 year old passengers, respectively.

Table 1. 2002 and 2011 fatal crash data for states with the largest 15-24 year-old resident populations

State	Total Drivers in Fatal Crashes in 2002 by Age		Total Drivers in Fatal Crashes in 2011 by Age		2002 Percent of Drivers in Fatal Crashes with One Teen Passenger by Age			2011 Percent of Drivers in Fatal Crashes with One Teen Passenger by Age			2002 Percent of Drivers in Fatal Crashes with Two or more Teen Passenger by Age			2011 Percent of Drivers in Fatal Crashes with Two or more Teen Passenger by Age		
	15-17	18-24	15-17	18-24	15-17	18-24	Relative Risk	15-17	18-24	Relative Risk	15-17	18-24	Relative Risk	15-17	18-24	Relative Risk
California	196	1,222	62	694	23.5	8.2	2.9	24.2	3.7	6.5	18.4	4.0	4.6	16.1	1.6	10.2
Texas	268	1,154	85	770	27.6	6.9	4.0	23.5	4.5	5.2	15.3	3.0	5.0	18.8	1.6	12.1
New York	87	403	29	248	31.0	7.9	3.9	24.1	2.8	8.6	25.3	0.99	25.5	10.3	2.0	5.1
Florida	159	792	64	556	26.4	6.7	3.9	20.3	6.8	3.0	17.6	2.2	8.2	9.4	0.72	13.0
Illinois	107	413	42	211	31.8	5.3	6.0	31.0	3.3	9.3	21.5	2.4	8.9	14.3	2.4	6.0
Pennsylvania	86	461	51	339	20.9	5.2	4.0	13.7	3.8	3.6	18.6	3.2	5.7	21.6	1.8	12.2
Ohio	128	341	39	241	25.0	6.4	3.9	25.6	4.1	6.2	13.3	2.4	5.7	15.4	1.7	9.3
Michigan	101	361	44	247	32.7	5.3	6.2	22.7	4.4	5.1	13.9	2.5	5.6	13.6	1.6	8.4
Georgia	105	386	49	257	21.9	8.3	2.6	16.3	5.1	3.2	10.5	2.3	4.5	8.2	3.1	2.6
North Carolina	95	396	48	315	24.2	7.6	3.2	7.1	6.7	4.1	13.7	2.5	5.4	25.0	0.95	26.3

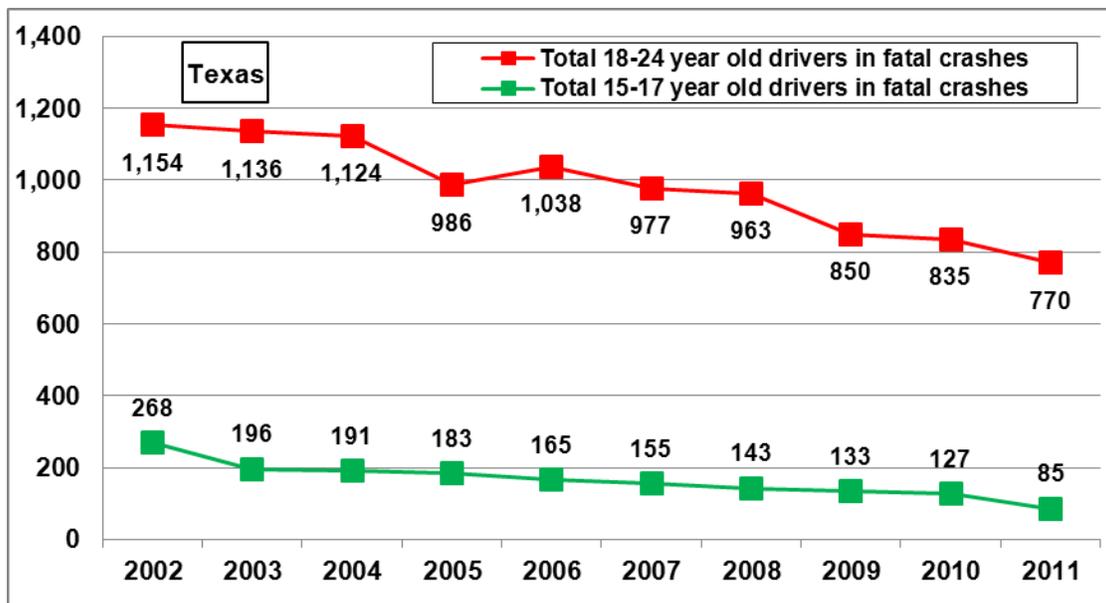


Figure 6. Total number of 15-17 and 18-24 year old drivers in fatal crashes in Texas from 2002-2011.

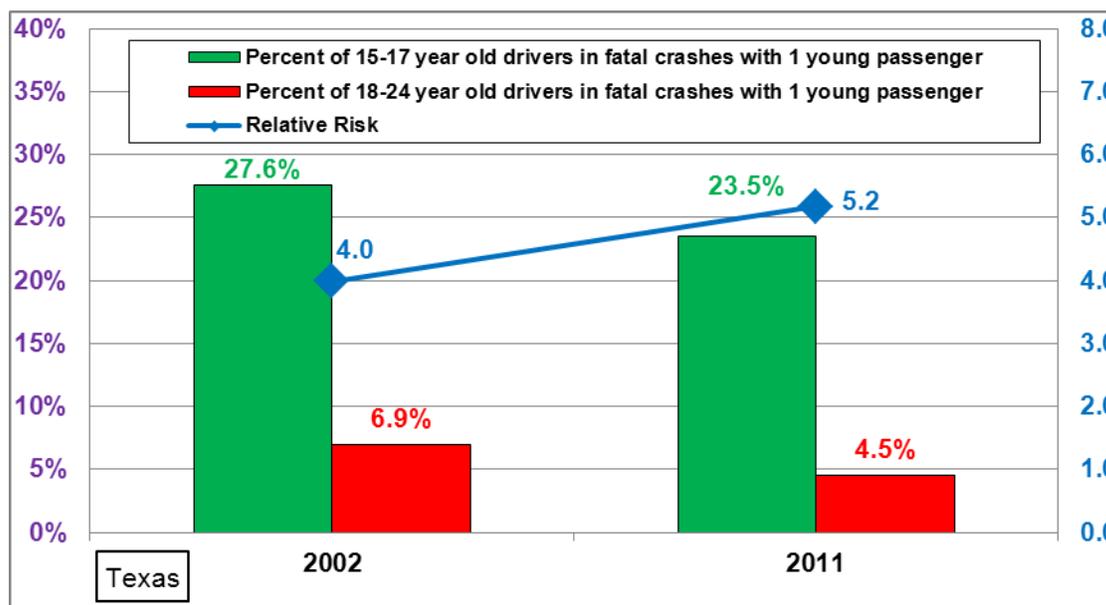


Figure 7. Snapshot of 15-17 and 18-24 year old drivers in fatal crashes in Texas with one 13-17 year old passenger (purple axis) and Relative Risk of those drivers having one young passenger compared to 18-24 drivers in fatal crashes having one teen passenger (blue axis), 2002 compared to 2011.

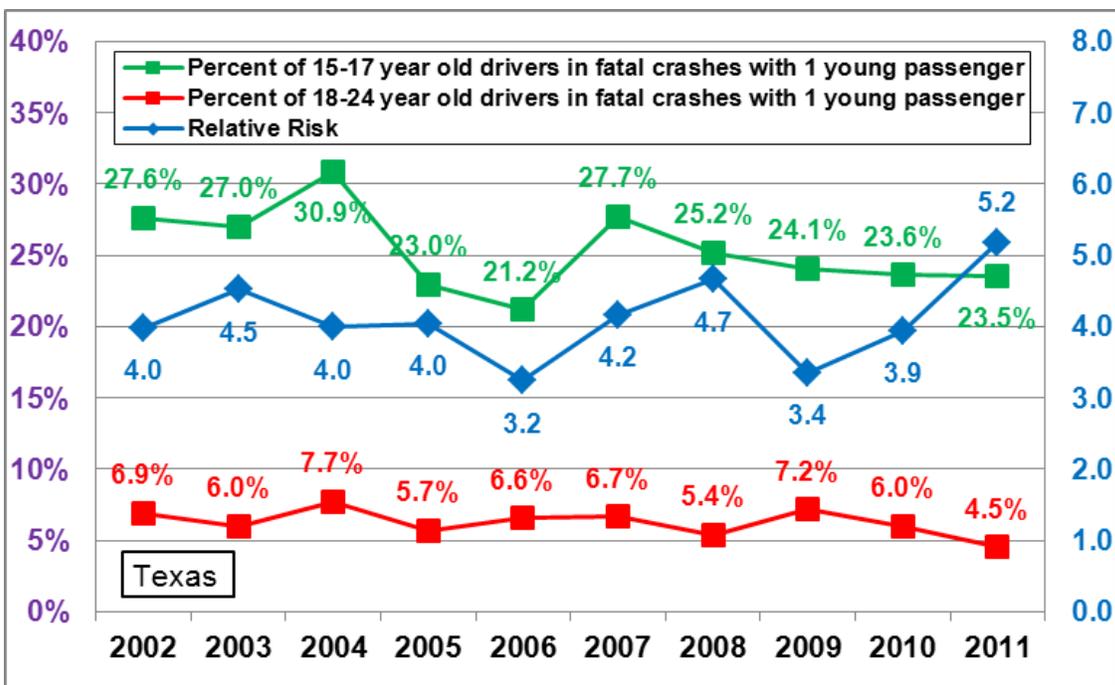


Figure 8. Detailed trend data for percentage of all 15-17 and 18-24 year old drivers in fatal crashes in Texas with one 13-17 year old passenger (purple axis) and the Relative Risk of those drivers having one young passenger compared to 18-24 drivers in fatal crashes having one teen passenger (blue axis).

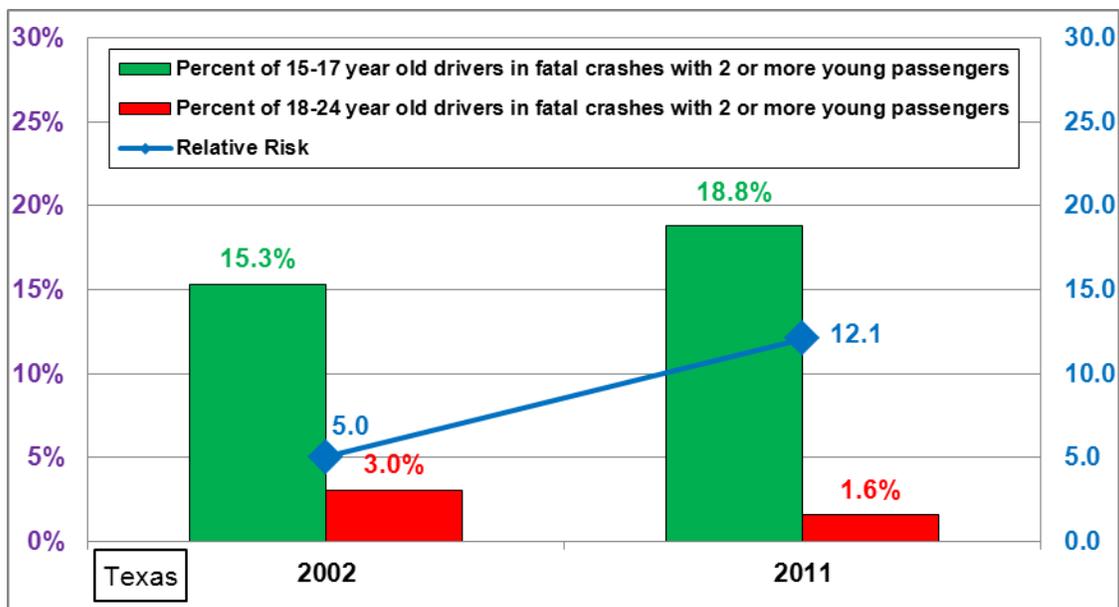


Figure 9. Snapshot of 15-17 and 18-24 year old drivers in fatal crashes in Texas with two or more 13-17 year old passengers (purple axis) and Relative Risk of those drivers having two or more young passengers compared to 18-24 drivers in fatal crashes having two or more teen passengers (blue axis).

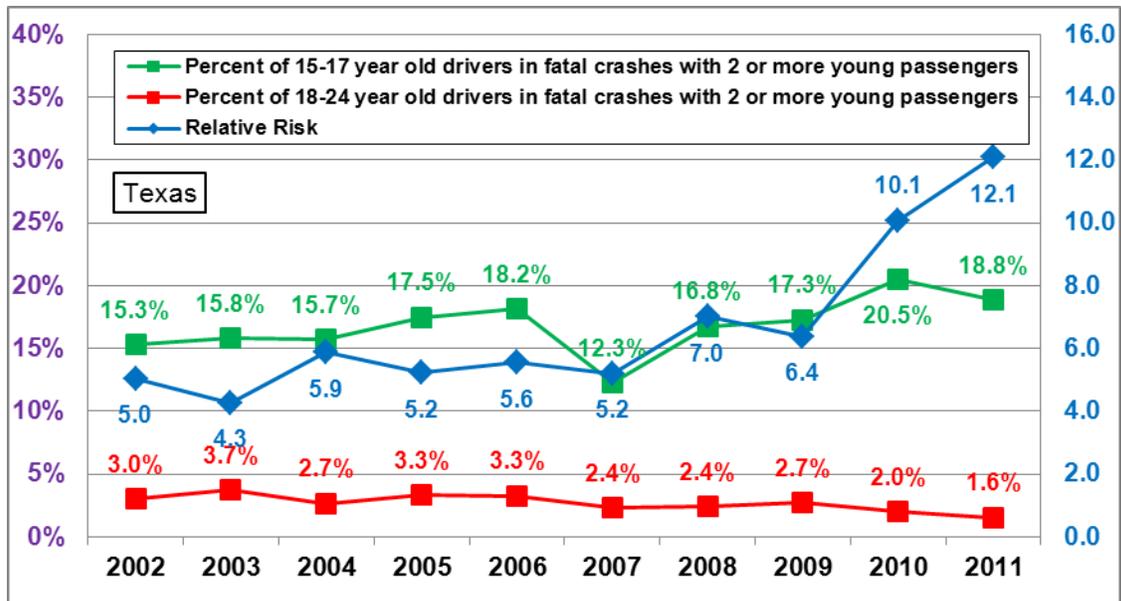


Figure10. Detailed trend data for percentage of 15-17 and 18-24 year old drivers in fatal crashes in Texas with two or more 13-17 year old passengers (purple axis) and Relative Risk of those drivers having two or more young passengers compared to 18-24 drivers in fatal crashes having two or more teen passengers (blue axis).

LAWS RELATED TO NOVICE DRIVERS

All U.S. states now impose restrictions on novice drivers through means of a graduated driver license (GDL) law. These laws place limits on the number of passengers and time of day when newly-licensed drivers may legally drive. Thirty-seven states also prohibit these drivers from using a cell phone while driving. Depending on the state, these restrictions are typically imposed for a period of six to 12 months from the time the driver license is issued, but roughly half of the 37 states extend the prohibition until the driver is 18 years old.

In addition to these restrictions, GDL laws typically involve a three-phase approach to licensure. The first phase employs a learner's permit, which requires that the new driver must have a licensed driver over age 21 present in the vehicle. Nighttime, cell phone and passenger restrictions are introduced in the second phase. After driving under those conditions for six to 12 months, the driver can become fully licensed. Florida enacted the first GDL law in 1996, and all other states have followed suit since then.

Numerous studies have demonstrated that GDL laws are effective in reducing the rate of fatal crashes for young drivers. In one such study, the fatal crash rate for 15-17 year old drivers was 30 percent lower for laws rated as "good" by the Insurance Institute for Highway Safety (IIHS) when

compared to laws rated “poor.” The rate of improvement was 11 percent lower for laws rated as “fair.” (5)

Many states either enacted or strengthened their GDL laws during the 2002-2011 period reflected in this analysis. And while research has shown that these laws – which typically involve a limit on teenage passengers – improve safety for novice drivers, the likelihood of passenger involvement in fatal crashes for novice drivers has actually worsened during this period, when compared to that likelihood for young adult drivers.

CELL PHONE USE BY YOUNG DRIVERS

Recent studies document a steady increase in teen ownership and use of cell phones. For 14- to 17-year olds, the median number of texts sent each day was 60 in 2009; by two years later, the number had increased to 100 each day. (6)

Half (52 percent) of cell phone-owning 16 and 17 year olds say they have talked on a cell phone while driving, and one third (34 percent) say they have texted while driving. Forty-eight percent say they’ve been in a car when a teen driver used a cell phone in a way that put themselves or others in danger. (7)

Teenage drivers also have an inaccurate perception of risk as it relates to texting. Forty percent believe that reading a text message is very dangerous, while 62 percent believe that sending a text message is very dangerous. Research has demonstrated, however, that there is no discernible difference in the risk level associated with both activities. (8)

The dangers of talking or texting on a cell phone are serious for drivers of any age. The danger for novice drivers and their passengers, however, is compounded by two factors. With limited experience, these drivers are already at greater risk than other drivers, and the added cognitive burden created by cell phone use is a more serious issue for the higher-risk group. In addition, novice drivers are impaired by the fact that their prefrontal cortex (which is responsible for assessing risk) is not yet fully developed when they become of driving age. Taken together, these three conditions can create a perfect storm effect.

Adding to the overall problem is the fact that the collection of data about cell phone use as a contributing cause in a crash is generally under-reported because attempts to collect the data rely heavily upon self-reported behavior or witness accounts. “There is strong evidence to support that under-reporting of driver cell phone use in crashes is resulting in a substantial under-estimation of the magnitude of this public safety threat.” (9) Without an understanding of that magnitude, it is difficult to make informed decisions about resources and strategies to address the problem.

Moreover, the period of crash analysis in this study mirrors the period during which the text messaging phenomenon took American society by storm. In 2002, the number of text messages sent each month in the U.S. was one billion. In 2011, the number was 193 billion. (10) For young teenagers, their text message volume nearly doubled from 2009 to 2011. The growth in texting activity is concentrated among young people, whose culture has largely been defined by this form of

communication. From 2004 to 2011, the percentage of drivers visibly manipulating hand-held communication devices while driving has been significantly higher among drivers aged 16 to 24 than for any other age group. (11)

Most states in the U.S. have enacted laws that prohibit or restrict cell phone use by teenage drivers, but preliminary analyses of the impacts of these laws suggests that they appear to have no substantial positive effect. In one of the only studies yet conducted to examine the effectiveness of such laws, researchers noted that North Carolina's cell phone restriction has had no measurable effect on young drivers. Their study did note a decrease in cell phone use two years after the effective date of the law, from 2006 to 2008, but data suggest that the decrease was largely due to teens shifting their cell phone use from talking to texting during that time. (12)

The dangers of texting while driving have been well documented through research, primarily through the use of driving simulators. In one of the first studies to examine the problem in an actual driving environment, the findings demonstrated that the effects of sending or receiving text messages while driving result in a doubling of a driver's reaction time, making the driver far less able to avoid sudden hazards. The researchers noted that the degree of compromised reaction time is even greater than previously thought. Moreover, the study countered the common assumption that reading a text message is less dangerous than composing one, finding no meaningful difference in the risk level of the two activities. (13)

It has been well established that teens engage in text messaging behind the wheel and that rapidly increasing numbers of them do so. And as demonstrated through this analysis, the safety gap separating novice drivers from young adult drivers has widened over the past decade, even as fatal crash frequency for teens has steadily declined. While a direct cause and effect relationship cannot be established between the two trends, circumstantial evidence suggests a connection that is, at the very least, noteworthy and meaningful.

THE SPEED FACTOR IN FATAL CRASHES

Speed is one of the most common contributors to fatal crashes involving young drivers, and the presence of passengers exacerbates this problem. Recent research notes, in fact, that speed is a contributing factor in half of all fatal crashes involving 16-year-old drivers carrying three or more passengers. (14) From 2000 to 2011, the share of teen-driver fatal crashes involving excessive speed grew from 30 percent to 33 percent.

While there is some question as to the correlation between speed and crash likelihood, there is a direct correlation between speed and crash severity. In higher-speed crashes, then, the chances of injury or death become greater. As technology has improved, safety features such as anti-lock brakes and air bags have become more affordable and therefore more common, even in lower-priced passenger vehicles. Even so, the immense force of impact in high-speed crashes can often stretch these safety features beyond their capabilities.

Many states raised speed limits prior to and during the ten-year period of this analysis. Furthermore, it has been documented that teenage drivers are more likely to drive at excessive speeds at night and in the presence of passengers.

Considerable attention has been devoted to the risk of cell phone use by young drivers in recent years. Similarly, the dangers of driving while intoxicated have been central to many years of public awareness campaigns throughout the nation. While completely justified, the attention assigned to impaired and distracted driving has to a degree come at the expense of the speeding problem.

Research also suggests that speeding, while certainly dangerous, is nonetheless somewhat accepted by a portion of the driving public. The American Automobile Association Foundation for Traffic Safety conducted its Traffic Safety Culture Index again in 2012, and the survey of some 4,000 showed that 49 percent of the respondents said they had driven 15 miles per hour over the speed limit on a freeway within the past month, and more than one in four consider it acceptable to do so. (15)

Such numbers would suggest that speeding and distracted driving do not yet have the stigma that is associated with DWI. The fact that drunk driving is less socially acceptable than it once was is due in large measure to years of public service advertising and advocacy efforts by groups such as Mothers Against Drunk Driving. Public opinion on the issue has shifted as a reflection of traffic safety culture – the collective values shared by growing numbers of road users. That shift in public attitudes took place over many years. In similar fashion, attitudes toward seat belt use have evolved over time, as demonstrated by increasing acceptance and use of seat belts since they first became standard equipment in U.S. cars in the 1960s (helped along, of course, by legislation and public service campaigns).

Similar time and effort will likely be necessary before significant changes in the traffic safety culture can be realized with respect to speeding and distracted driving.

SUMMARY AND CONCLUSIONS

Traffic fatalities have declined significantly over the past decade, yet roadway crashes remain the number-one cause of death for teenagers. Novice drivers are significantly more likely to be involved in a fatal crash than are young adult drivers and the likelihood of novice drivers having one or more teen passengers is greater for novices. Over the past decade, the likelihood of a novice driver who is in a fatal crash having two or more teen passengers has increased by 30 percent when compared with young adult drivers involved in fatal crashes under this same driving condition. So, in relative terms, drivers who were already at greater risk than other groups are even less safe than they were a decade ago, despite the fact that teen-driver fatal crashes have dropped dramatically in number during the same period.

This study does not attempt to explore the reasons behind the increasing relative risk that young drivers in fatal crashes have young passengers. However, there are two characteristics of the driving experience that have changed to a conspicuous degree during the 10-year period reviewed:

- The majority of drivers of nearly all ages now have a cell phone in their possession while they are driving. Cell phone ownership and use among teenagers is at an all-time high, and a majority of teens admits to talking and / or texting on their phones while driving.
- In addition, recent research demonstrates that the percentage of speed-related fatal crashes for teenage drivers has increased during the period of this analysis, suggesting that increased speeds may be another factor contributing to the increased danger associated with the novice driver / teen passenger connection in fatal crashes, when compared with young adult drivers possessing even a modest measure of added experience and maturity.

Regardless of the reasons behind the increased passenger risk for novice drivers, its trend – taking place even as teen crash fatalities continue to decline – underscores the need for continued efforts to address the persistent challenges related to young driver safety.

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