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Are Teens Driving Safer?

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For many teens, learning to drive and obtaining a driver's license are exciting achievements, often allowing them more freedom to socialize, work at a job, or participate in other activities without being totally reliant on a parent or others for transportation. Driving is often the first of many new privileges and responsibilities that teens experience as they move toward adulthood. With these new opportunities, however, come new safety and health risks for teens as drivers and passengers of other teen drivers. Motor vehicle crashes are the number one cause of death of teens and young adults, accounting for 40 percent of all deaths to teens ages 16 to 19 in 2002 or over 5,000 deaths.

Recently, the media, Congress, researchers, and others have brought increased attention to teen driving fatalities, hoping to find answers on how to reduce them. Those concerned cite a variety of reasons for the high rate of teen traffic deaths, ranging from lack of experience to a propensity for risk-taking and even incomplete brain development. Strategies that have been used in an effort to reduce teen motor vehicle crashes and fatalities include raising the driving age, instituting graduated licensing, restricting cell phone use while driving, mandatory seat belt laws, and programs to reduce teen drinking and driving.

In this brief we provide an overview of relevant data including teen crash rates and trends, licensure rates, seat belt use, and other risk factors associated with fatal crashes among teenagers. In addition, we discuss possible causes for the high rate of teens in fatal crashes, strategies states have taken to make teens safer, and some implications for policy and future research.

WHO DRIVES?

Not every teen rushes out for a driver's license at the age of 16. For example, according to the National Longitudinal Survey of Youth 1997 (NSLY97), only about six in ten seventeen-year-olds had a license in 2001. (See Table 1) That number increases to a little more than seven in ten by age 18 (an age beyond any state licensure restrictions) and about eight in ten by age 19. Differences by race and ethnicity were even more striking. Among youth ages 16 to 20, the proportion ranged from around one-half for American Indian, black, and Hispanic youth (47, 49, and 52 percent, respectively) to 77 percent for Asian youth and 81 percent for white youth. Differential access to licenses translates into different levels of car-related health risk for these groups, as well as differential access to the benefits of driving.

Other research indicates that the percentage of 16-year-olds who have driver's licenses fell by over a quarter between 1993 and 2003, at least partly as the result of state graduated licensing programs that were introduced around the country over that period.¹ Licensure rates for older teens also declined during that time period, but to a lesser extent.

Table 1 The Percentage of Teens Ages 16-20 with a Driver's License, By Age, Gender, Income, and Poverty Level, 2001

| | |
|-----------------|------|
| Total | 73.6 |
| Age | |
| 16 | 56.8 |
| 17 | 61.3 |
| 18 | 72.0 |
| 19 | 79.4 |
| 20 | 81.8 |
| Gender | |
| Male | 74.1 |
| Female | 73.1 |
| Race | |
| White | 81.3 |
| Black | 48.6 |
| Hispanic | 52.4 |
| Asian | 76.9 |
| American Indian | 46.8 |

MOTOR VEHICLE CRASH STATISTICS

In 2002, motor vehicle crashes accounted for more than 5,000 deaths to persons ages 16 to 19, or 40 percent of all deaths to that age group.² Motor vehicle crash death rates rise dramatically during the teen years, climbing from 7.5 deaths per 100,000 at age 14 to 25.6 per 100,000 at age 16, and peaks at 35.9 at age 18.³ (See Figure 1) The fact that crash death rates continue to rise through age 18 is in part due to the increasing percentage of youth who have licenses at older ages. Regardless of when they get their license, however, research indicates that motor

vehicle crash rates are the highest for drivers during the first two years that they have their license.⁴

Male teens are more likely than females to die in a motor vehicle crash; about 2 out of 3 crash death victims ages 13 to 19 in 2003 were males.⁵ Young males are more likely to engage in risky driving behaviors such as speeding.^{6,7} According to the Youth Risk Behavior Surveillance Study of 2003, high school males are more likely than their female counterparts to report driving after drinking (15 percent versus 9 percent, respectively) and are less likely to wear a seat belt (22 percent versus 15 percent never or rarely wear a seat belt, respectively).⁸

There has been a substantial decline in fatal motor vehicle crashes for teens in the last several decades, with males experiencing a larger decline than females. Rates among teens ages 15 to 19 have decreased 42 percent for males and 17 percent for females between 1980 and 2002. Most of this decline took place in the 1980's and early 1990's, however, with progress stalling more recently. For teens ages 15 to 19, the motor vehicle crash rate per 100,000 was 42 in 1980, declined to 33 per 100,000 in 1990, and continued to decline at a slower rate to 25 per 1,000 in 1999. Rates increased slightly between 2001 and 2002, from 26 per 1,000 to 28 per 1,000.⁹ (See Figure 2)

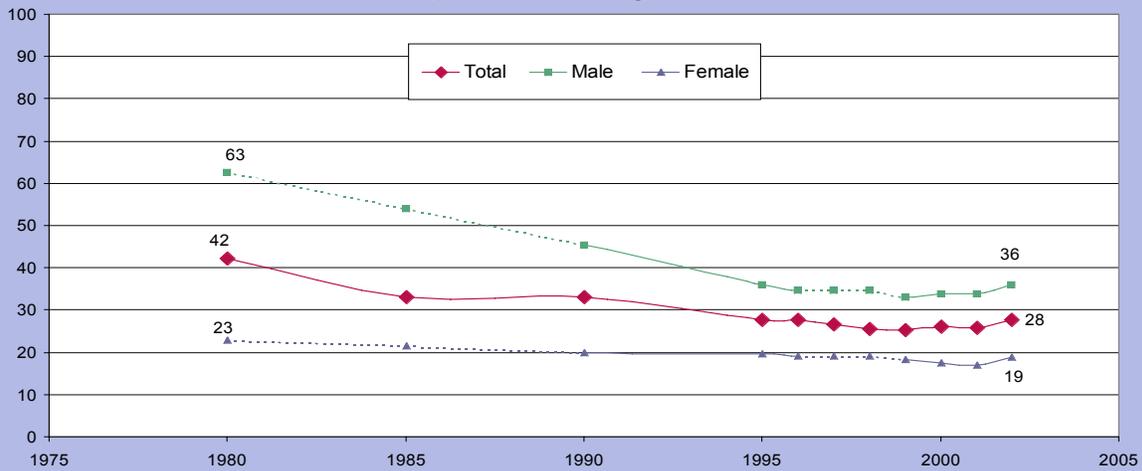
SEAT BELT USE

Research shows that seat belts greatly reduce the chance of serious injury or fatality in a motor vehicle crash. According to the National Highway and Transportation Safety Administration, wearing a manual lap/shoulder belt reduces the chance of moderate to serious injury and of fatality in a motor vehicle crash by 50 percent. Wearing a manual lap belt reduces the risk of moderate to serious injury by 30 percent and the risk of fatality by 35 percent.¹⁰



Figure 2

Motor Vehicle Death Rate per 100,000 Teens Ages 15 to 19, Selected Years 1980-2002



Seat belt use among youth ages 16 to 24 has steadily increased in the last decade, from 53 percent in 1994 to 77 percent in 2004.¹¹ (See Figure 3) Males have a lower rate of seat belt use than females. In 2003, 22 percent of male high school students reported rarely or never wearing a seat belt when riding in a car driven by someone else, compared with 15 percent of female students.¹²

OTHER RISK FACTORS FOR FATAL CRASHES

Night Driving

There are certain high risk situations that elevate teens' risk of a fatal crash.¹³ Driving at night is a risk factor for all drivers, but adolescents, especially males, spend more

time proportionally driving at night than do older drivers.¹⁴ Driving at night is a major risk factor for young drivers for several reasons. Driving is more difficult in the dark. Most new drivers have had most of their driving experience during the day. Also, alcohol use is more likely to be a factor at night, and fatigue may be more of a problem at night.¹⁵ In 2003, 42 percent of teen motor vehicle crash deaths took place between 9 PM and 6 AM.¹⁶

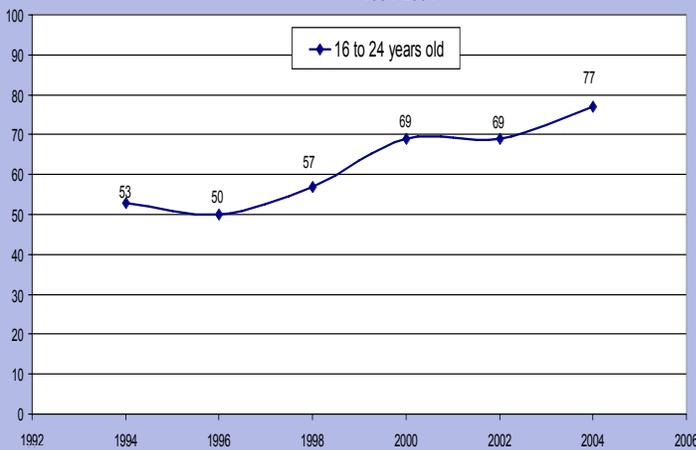
Teen Passengers

Having other teen passengers is another important risk factor for teen motor vehicle crashes. In general, teens are more likely than older drivers to be in crashes caused by driver error.¹⁷ When driving with friends in the car, teens can become distracted, causing the driver to give less adequate attention to

the new task of driving and increasing the possibility of error. The presence of teen passengers is also associated with increased risk-taking behavior for teen drivers, such as driving at high speeds, tailgating, and other behaviors done to "show off" for friends.¹⁸ Gender appears to be a factor in risky driving behavior with teen passengers as well. Research indicates that males report driving more dangerously with other male passengers, but are more careful with females and parents on board.¹⁹

Figure 3

Percentage of Youth 16 to 24 years old Using Seat Belts or Restraints, 1994-2004



Researchers have tried to measure the risk associated with teen passengers, with one study finding that teen drivers' crash risk rises exponentially with one, two, or three or more passengers in the car.²⁰ Another found that for most types of crashes, the crash rate for those ages 16 to 19 approximately doubled with the presence of passengers, but that this was not true for drivers ages 20 to 24 or 25 to 59.²¹

Alcohol

Driving after drinking alcohol, while a risk factor for drivers of all ages and abilities, is a major risk factor for teens. Research has found that while teen drivers drink and drive less often than older drivers, when they do drink their crash risks are much higher at all blood alcohol concentration (BAC) levels.²²

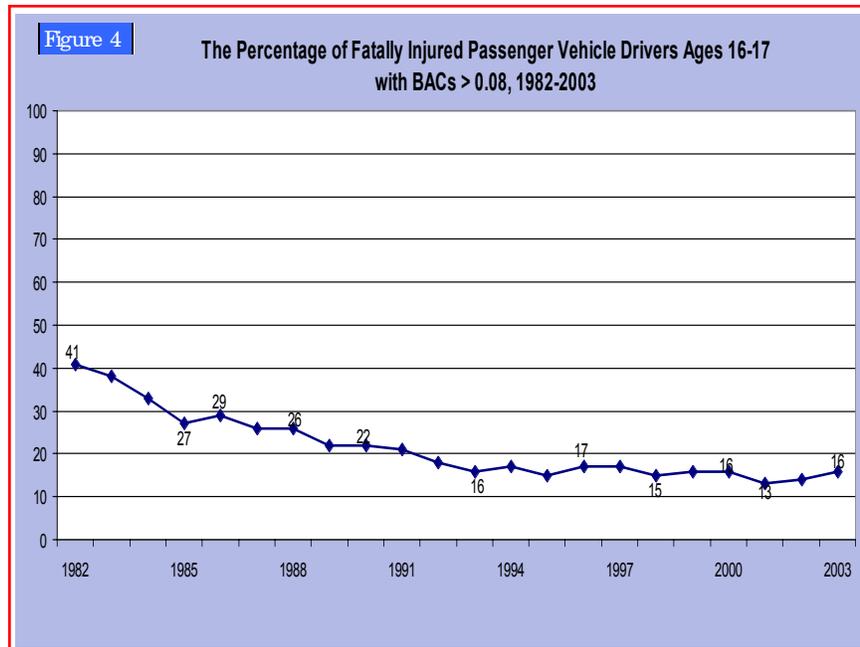
The percent of crashes involving alcohol has, however, been declining for teens. For drivers ages 16 and 17, the estimated percent of fatally injured passenger vehicle drivers

with a blood alcohol concentration greater than or equal to 0.08 declined dramatically between 1982 and 2003, from 41 percent to 16 percent, with most of the decline taking place during the 1980s. (See Figure 4) Declines were also substantial for youth ages 18 to 20, from 57 percent to 32 percent.²³ This pattern was also evident for older drivers.

Lack of Experience

Lack of experience is a major reason for the high rate of fatal motor vehicle crashes among teens. Skills such as anticipation and risk avoidance develop and sharpen over time.²⁴ Whether measured by miles driven, total population, or number of licensed drivers, crash rates are much higher the first two years of driving. Risk is highest during the

first 500 miles of independent driving.²⁵ Findings from one study indicate that crash rates decline significantly in the first two years after licensure, and decline most significantly during the first 6 months of driving. For example, the authors found that the crash rate for novice drivers ages 16 to 19 declined by 42 percent during the first 7 months of driving. The decline is especially large for single vehicle, off-the-road, night, and weekend accidents, perhaps suggesting that certain skills are learned more quickly than others.²⁶



Age

Another possible reason for the high rate of fatal motor vehicle crashes among teens is age. Per mile driven, drivers age 16 are more than twice as likely as drivers ages 20 to 24 and about four times as likely as drivers aged 25 to 29 to be involved in a fatal passenger vehicle crash.²⁷ (See Table 2) In a study of crash rates among novice drivers during the first two years of driving, Mayhew et al. (2003) found age to be a factor in collision rates independent of level of driving experience. The authors found that novice drivers ages 16 to 19 had more crashes than novice drivers ages 20 and older with the same amount of driving experience. The authors also looked at crash rates by single year of age and noted that during the first months of

Table 2 Fatal passenger vehicle crash involvements per 100 million miles traveled by driver age, April 2001 - March 2002

| Age | Crash involvements | Total* | |
|-------|--------------------|-------------------|------|
| | | Miles | Rate |
| 16 | 1,021 | 10,991,775,116 | 9.3 |
| 17 | 1,410 | 17,007,229,957 | 8.3 |
| 18 | 1,790 | 27,575,876,114 | 6.5 |
| 19 | 1,885 | 26,116,988,928 | 7.2 |
| 20-24 | 7,184 | 167,139,739,780 | 4.3 |
| 25-29 | 4,873 | 215,143,526,035 | 2.3 |
| 30-59 | 21,831 | 1,396,858,272,119 | 1.6 |
| 60-69 | 3,094 | 193,593,030,635 | 1.6 |
| >70 | 4,716 | 116,084,984,569 | 4.1 |

*Total includes other and/or unknowns

driving, 16-year-olds had higher crash rates than older teens. They found that during the first and second months of driving, the crash rates for 16-year-olds were 241 per 10,000 novice drivers and among 17-year-olds the crash rate was 178 per 10,000 novice drivers. By the 9th and 10th months of driving, the rates declined by 56 percent for 16 year olds and by 30 percent for 17-year-olds.²⁸

A new study from the Insurance Institute for Highway Safety (IIHS) also addresses age-related factors. The study looked at 16-year-old drivers after the rise of graduated licensing laws in the 1990s, looking specifically at the time period from 1993 to 2003, during which graduated licensing systems were introduced in 46 states and the District of Columbia. Graduated licensing is a system where new drivers must first go through a supervised learning period, are then allowed to drive under restricted conditions (intermediate phase), and finally, over time, restrictions are lifted until the driver receives a full license. During this time period, the Institute found that despite an 18 percent increase in the 16-year-old population, the number of 16-year-olds in fatal crashes declined by 13 percent. As more and more jurisdictions implemented graduated licensing systems, the percent of licensed 16-year-olds dropped and the per capita crash rate of 16-year-olds declined. Fatal crash rates per licensed *driver*, however, did not change for

16-, 17-, 18-, or 19-year-olds between 1993 and 2003.²⁹

Brain Development

The issue of age as a risk factor in motor vehicle crashes has taken a new form in the emerging debate over the role of brain development. A longitudinal study by researchers in the Child Psychiatry Branch of the National Institute of Mental Health has brought national attention to the issue of brain development. Through a brain imaging technique called magnetic resonance imaging (MRI), researchers have conducted longitudinal studies of adolescent brain development. They have found that the dorsal lateral prefrontal cortex, the part of the brain responsible for executive decision making, such as impulse control, is among the last of the brain regions to develop. One paper from this study by Dr. Jay N. Giedd, Chief of Brain Imaging at the Child Psychiatry Branch reports that the dorsal lateral prefrontal cortex does not fully mature until the early to mid 20s (previously thought to be 18).³⁰

Researchers at the NIH did not perform their research in order to study risk-taking or teen driving. There has not been any research linking brain development directly to driving and it is not known how much development between ages 16 and 25 actually affects driving decisions. Nonetheless, their research has been cited nationally in newspapers and by legislators who see the results of the study as evidence that teens ages 16 or 17 are not ready to be driving. State legislators in Maryland and Virginia have referenced the brain development findings while proposing cell phone bans, increased driver training, and restrictions on passengers.

Researchers have also taken notice of the potential application of brain development research to driving. Laurence Steinberg at Temple University has planned a new study involving "scanning teenagers' brains while they perform a task which simulates driving decisions, in an effort to understand the biological underpinnings of risk-taking among young people."³¹

POLICIES AND PROGRAMS

Over the last several decades states have been actively promoting policies and programs intended to reduce driving fatalities, encouraging behaviors known to reduce driving fatalities. Some focus on all ages while others target young drivers. For example, states have made concerted efforts with such policies as mandatory seat belt laws, Click It or Ticket (CIOT) campaigns, raising the drinking age to 21, and reducing blood alcohol concentration levels required to convict drivers of driving while under the influence (DUI). In addition, since the late 1990s most states and the District of Columbia have enacted graduated licensing programs for teens, which restrict the circumstance in which young drivers can drive in high risk situations, such as at night or with other young passengers.

Seat Belt Programs and Laws

Seat belt enforcement programs, such as Click It or Ticket (CIOT) campaigns, appear to be an effective way to increase seat belt use, which is proven to dramatically increase the likelihood of surviving a crash. During CIOT campaigns there is a short, intensive period of seat belt enforcement of the state seat belt law, along with media campaigns alerting motorists of the enforcement effort and using the "Click It or Ticket" slogan. In 2002, the National Highway Traffic Safety Administration conducted a study of 10 states implementing CIOT programs (implementation states) and compared them to four states using some paid advertisement (some implementation) and four states with no paid advertising (comparison states). Researchers found that, in the implementation states, front seat occupant seat belt use rose between 3.0 and 18.7 percent with, an average increase of 8.6 percentage points. The four states with some implementation saw an increase of 2.7 percentage points, and comparison states had an increase of 0.5 percentage points.³²

Besides public campaigns, the type of seat

belt law that a state implements can also play a role in seat belt usage. Primary safety laws mean that a police officer can pull over a car with unbelted passengers in any situation. Secondary seat belt laws mean that a police officer can only write a citation for not wearing a seat belt after writing a citation for another infraction. Teen drivers living in States with a primary safety belt law are more likely than teens living in States with a secondary law to use safety belts. California, Maryland, Michigan, North Carolina, and Oregon have the highest rates of teen seat belt use and have some of the most stringent seat belt laws in the country. In June 2002, the average safety belt use rate in States with primary enforcement laws was 11 percentage points higher than in States without primary enforcement laws.³³ (Safety belt use was 80 percent in primary law States versus 69 percent in States without primary enforcement.)

Programs and Laws to Reduce Teen Drinking and Driving

According to the National Highway Traffic Safety Administration, between 1982 and 1998 the percentage of motor vehicle fatalities involving alcohol dropped 36 percent. During this time, the percentage of fatal crashes involving drivers under the age of 21 involving alcohol dropped by 61 percent.³⁴ In addition, youth drinking did not decrease as much as youth drinking and driving during this time period, implying that other factors contributed to the decrease in drunk driving among teens. School-based programs have been found to increase student's awareness of the risks of drunk driving and prepare them to deal with situations involving drinking and driving, though more rigorous evaluations of these programs are needed. Similarly, evaluations of community-based programs, often involving media campaigns and awareness and enforcement efforts, show promise but must also be better evaluated so that the most effective aspects of the programs can be determined.³⁵

Lastly, laws designed to lower the maximum allowed blood alcohol concentration (BAC) level for drivers were enacted in all states between 1990 and 1998 after a national law in 1991 provided incentives for the states to do so. The evidence from research conducted thus far indicates that such laws can reduce teen drinking and driving and alcohol-related crash rates. One comprehensive study of state BAC laws specifying lower BAC levels for drivers under age 21 found the frequency of self-reported driving after drinking declined 19 percent after such laws were implemented.³⁶ Driving after drinking five or more drinks declined by 23 percent. However, the results did not show changes in the drinking behaviors of the youth or significant declines in the number of youth riding in a car with a driver who had been drinking.³⁷ In a review of BAC law research, Zwerling and Jones (1999) reported that all six studies reviewed showed reductions in injuries or crashes for young drivers. Three studies found statistically significant decreases ranging from 11 percent to 33 percent.³⁸ The authors noted that, though study results were often hard to compare due to methodological differences, the fact that similar results were found across countries and with varying laws strengthens the evidence that BAC laws reduce crash rates for young drivers.

Graduated Licensing Laws

Graduated licensing is a system where new drivers first go through a supervised learning period, are then allowed to drive under restricted conditions (intermediate phase), and finally restrictions are lifted over time until the driver receives a full license. Graduated licensing became popular in the mid-1990's; and, between 1993 and 2003, 46 states and the District of Columbia implemented graduated licensing systems.³⁹ Licensing systems vary greatly across states, and as of 2005, only nine states (Arizona, Arkansas, Hawaii, Kansas, Kentucky, Minnesota, Montana, North Dakota, and Oklahoma) had licensing systems that lacked an intermediate stage.⁴⁰

Programs vary in the restrictions they

impose (number of passengers, time of day, maximum speed, previous hours of supervision), the duration of the restrictions, and the minimum age for each stage. Typical restrictions in the intermediate phase include prohibiting unsupervised driving from late night to early morning (12 PM to 5 AM for example) and restrictions on driving with passengers under the age of 21 unless supervised by an adult (restrictions are often only for the first six months and usually exclude family members).⁴¹ This system is intended to allow inexperienced drivers to gain driving experience while restricting the highest risk driving conditions.

Research shows reductions in crashes among 16-year-olds in four states following enactment of graduated licensing ranging from 11 to 33 percent.⁴² There have been several studies of state graduated licensing systems. One study of North Carolina's program compared crash rates before and after graduated licensing legislation was enacted, and compared 16-year-old drivers to drivers ages 25 to 54 in an effort to control for other factors. The authors noted a dramatic decrease in all type of motor vehicle crashes for 16-year-olds, with a reduction in fatal crashes of 57 percent and that nighttime crashes were 43 percent less likely. North Carolina's program was particularly stringent compared to other states' legislation, requiring a supervised period of driving for one year, followed by supervised driving at night, before full licensure.⁴³ A 2003 evaluation of Pennsylvania's graduated licensing system, which increased the learner's permit period to six months, extended nighttime provisions so that they began at 11PM instead of 12AM, required 50 hours of supervised driving, and increased penalties for traffic violations during the intermediate driving phase, was also associated with positive outcomes. Crashes involving 16-year-old drivers dropped 28 percent and crashes involving 17-year-old drivers dropped 2 percent between 1999 and 2000 (rates for drivers ages 18 to 21 increased slightly).⁴⁴

While most states allow young drivers to obtain a full license between age 16 and 17,

several states have gone so far as to increase the age at which one can hold an unrestricted license to 18. Currently in Washington D.C. and the states of Florida, Georgia, Indiana, Massachusetts, Missouri, New Jersey, and Virginia the age for full licensure is 18.⁴⁵

Cell Phones and Teen Driving

Another policy area that pertains to the safety of teen drivers are laws restricting the use of cell phones while driving. Research shows that cell phone use while driving impairs young drivers' abilities, making them more likely to miss stop signs and traffic lights, slowing their reaction time to traffic signals, and making them more likely to be in rear-end collisions.⁴⁶

One study from the University of Utah found that when conversing on a cell phone (both hand-held and hands-free), drivers had "18 percent slower brake onset times, had a 12 percent greater following distance, and took 17 percent longer to recover the speed that was lost following braking." There was also an increase in rear-end collisions. Interestingly, the effect of talking on the phone made the reaction time of youth ages 18 to 25 equivalent to those of older drivers, ages 64 to 75 years old who were not using cell phones.⁴⁷ Currently, however, only Maine and New Jersey ban cell phone use for young drivers.⁴⁸ A report from the National Transportation Safety Board recommended that all states ban cell phone use for young drivers.⁴⁹

New Federal Legislation

The U.S. House of Representatives included an initiative to study the issue of teen driving in a committee report attached to the 2005 transportation bill "Transportation Equity Act: A Legacy for Users". Citing facts that teens have the highest crash risk and are more likely to be involved in crashes where speeding or driver error played a role, the provision will require the Secretary of the Department of Transportation to conduct a study on the causes of teen motor vehicle crashes and evaluate existing programs for teen drivers. Within a year the Secretary is

to report the results of study and make recommendations on how to reduce teen driver crashes, such as through graduated licensing requirements or driving school curricula.^{50,51}

Discussion

Motor vehicle traffic deaths account for 40 percent of all deaths to teens ages 16 to 19, or over 5,000 deaths in 2002.⁵² The good news is that the risk of dying in a car crash has declined markedly for these youth since the early 1980s, from 42 per 100,000 to 28 per 100,000 between 1980 and 2002. The federal and state programs and policies described above have undoubtedly played a substantial role in bringing this about, though which policies account for how much is difficult to assess. The bad news is that most of these gains were made in the 1980s and early 1990s. In fact, the rate drifted up slightly in 2002 to 28 per 100,000, the same as it was back in 1995.

Clearly, additional steps will need to be taken if more progress is to be made against the number one killer of America's youth. Policies designed to bring about further reductions in teen drinking and driving are a likely starting point. It is probably not coincidental that the major declines in teen crash deaths mirrored the dramatic declines in teen binge drinking, nor that gains slowed when progress against teen binge drinking stalled in the early 1990s. Adoption of stricter graduated licensing laws by additional states may also produce further gains, though it is worth pointing out that national levels of teen motor vehicle crash death rates have been relatively stable during the time when most states were adopting such laws.

In addition, the role of parents in teen driver safety should not be overlooked. Parents are role models of safety behaviors such as seat belt use and drunk driving, often teach their teen how to drive when they obtain a permit, and set limits once a provisional or full license is granted. Parental involvement and monitoring related to driving have been linked to less risky driving by teenagers.⁵³ Graduated licensing creates a unique role for

parents. On the roads, graduated licensing restrictions can only be enforced if a police officer pulls over a teen driver for a separate violation, but parents are in a position to enforce graduated licensing restrictions before their teen ever gets behind the wheel. One study of Connecticut parents indicates that parents may not always be aware of some of the riskiest driving conditions for teen drivers, such as at night and with multiple teen passengers.⁵⁴ While parents are generally in favor of graduated licensing laws for beginning drivers,⁵⁵ many of the restrictions put extra demands on the daily lives of teens and their parents, and there is some evidence that parents do not enforce restrictions that they find too extreme.⁵⁶

Available research indicates that many of the policies reviewed above are effective at some level in reducing the risk of teen crash deaths. Additional research is urgently needed, however, that can help to identify which are the most effective, and where there are the greatest opportunities remaining to implement these more effective approaches. In addition, research is particularly needed to better understand graduated licensing laws in order to identify which elements are effective and which are not. Lastly, research connecting parent and teen attitudes towards driving restrictions to parental enforcement and teen compliance with graduated licensing provisions may also help contribute to more effective programs and policies to keep teen drivers safe.

Note:

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DATA SOURCES FOR TABLES AND FIGURES

Table 1

Source: Child Trends' analyses of the National Longitudinal Survey of Youth 1997.

Table 2

Insurance Institute for Highway Safety. "Fatality Facts 2003: Teenagers." http://www.hwysafety.org/research/fatality_facts/teenagers.html

Figure 1

Source: Centers for Disease Control and Prevention. Web-based Injury Statistics Query and Reporting System (WISQARS) [Online]. (2003). National Center for Injury Prevention and Control, Centers for Disease Control and Prevention (producer). Available from: URL: www.cdc.gov/ncipc/wisqars. [Cited December 10 2004].

Figure 2

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Figure 4

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