

**Sixteen-Year-Old Drivers
in Fatal Crashes in 2002**

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ABSTRACT

Objective: To assess the status of the 16-year-old driver crash problem in the United States in 2002, subsequent to most jurisdictions enacting graduated licensing legislation.

Methods: Fatal crashes and crash patterns of 16-year-old drivers in 2002 were examined and compared with 16-year-old driver crashes in 1995, just prior to the graduated licensing movement.

Results: The number of 16-year-old drivers in fatal crashes per 100,000 population in 2002 was 14 percent lower than in 1995, relative to older drivers, largely due to a drop in the licensing rate of 16 year-olds. Surprisingly, the 16-year-old fatal crash rate, after decreasing from 35 to 24 per 100,000 during 1995-2001, increased to 27 in 2002. There were somewhat fewer fatalities associated with unsupervised late-night travel and unsupervised transporting of young passengers in 2002 than in 1995, in states in which nighttime or passenger restrictions had been introduced. Still, as many as two-thirds of all of the deaths in the crashes of 16 year-olds nationwide during 2002 are, or could be, subject to restrictions on these high-risk activities.

Conclusions: There has been progress in addressing the 16-year-old driver crash problem, which is the main target of graduated licensing, although the upturn in the fatal crash rate in 2002 is troubling. Strengthening laws and finding ways to improve compliance with the restrictions could produce further gains.

INTRODUCTION

During 1996-2002, 45 states and the District of Columbia put into effect one or more elements of graduated licensing (Insurance Institute for Highway Safety, 2003). In a graduated system, young beginners are phased in to full driving privileges in stages, starting with a supervised learner period lasting at least several months; this is followed by an initial license with restrictions on some types of high-risk driving. Prior licensing systems in the United States typically allowed full driving privileges with the initial license, and there were no holding period requirements (or they were minimal) for the learner phase (Williams et al., 1996).

Graduated licensing generally applies to drivers younger than 18. The primary targets are 16 year-olds, the age group with the highest crash risk (Williams, 2003). Seventeen year-olds also may be subject to driving restrictions, although in many jurisdictions teenagers can graduate from the restrictions by the 17th birthday. As of 2002, 43 of the 51 jurisdictions required learner periods ranging from 2 to 12 months, typically 6 months. Thirty-six jurisdictions had late-night driving restrictions, and 22 had passenger restrictions for initial license holders. The supervised learner period is known to involve very low crash risk (Mayhew, Simpson, and Pak, 2003). Late-night driving and passenger presence greatly increase the crash risk of young beginners (Williams and Ferguson, 2002).

Thus as of 2002, 16 year-olds in almost all U.S. jurisdictions may be subject to an extended learner period and/or nighttime driving restrictions and sometimes passenger restrictions. However, many of the restrictions were weak; late-night driving was allowed until midnight or 1 a.m. in some jurisdictions, and some passenger limits still allowed more than one passenger (Insurance Institute for Highway Safety, 2003).

With the exception of California, evaluations of graduated licensing in 5 U.S. states and 3 Canadian provinces have reported crash reductions among 16-year-old drivers, often in the 20-30 percent range (Masten and Hagge, 2003; Shope and Molnar, 2003; Simpson, 2003). The purpose of the present study was to assess what progress has been made in addressing the 16-year-old driver crash problem across the United States, given the flurry of graduated licensing laws that have been enacted. Fatal crashes and crash patterns of 16-year-old drivers in 2002 were examined and compared with 16-year-old driver crashes in 1995, just prior to the modern graduated licensing movement. This is not meant as a direct test of the effectiveness of graduated licensing; rather it is an attempt to assess the current status of the 16-year-old driver crash problem in the United States and how it has changed since 1995.

METHODS

Data for the analyses were obtained from the Fatality Analysis Reporting System (FARS), which includes detailed information on virtually all fatal crashes occurring on public roads in the United States. Population data from the U.S. Bureau of the Census and driver licensing data from the Federal Highway Administration also were used.

RESULTS

In 2002 a total of 1,114 16-year-old drivers were in fatal crashes; 1,271 people died in these crashes. Thirty-eight percent of the deaths were the 16-year-old drivers. Thirty percent of the deaths involved passengers in their vehicles, in most cases other teenagers (83 percent). Occupants of other vehicles (26 percent) and pedestrians and bicyclists (6 percent) accounted for the remainder of the deaths.

There was not a lot of variation during 1985-94 in the rate for 16-year-old drivers in fatal crashes per 100,000 population. Their per capita rates ranged from 30 to 35 per 100,000 during this period. This pattern changed during 1995-2002, as the per capita rate for 16-year-old drivers in fatal crashes dropped from 35 to 24 per 100,000 population between 1995 and 2001, but then increased to 27 per 100,000 in 2002 (Table 1). Still, there was a 23 percent per capita drop from 1995 to 2002. Relative to drivers ages 20 and older (whose per capita rate dropped 9 percent), the per capita fatal crash rate of 16 year-olds declined by 14 percent between 1995 and 2002 (95 percent confidence interval: -21 to -7).

Table 1
16-Year-Old Drivers in Fatal Crashes per 100,000
Population and 16-Year-Old Licensure Rates, 1995-2002

| | Per Capita Rate | Percent Licensed | Number of Jurisdictions* |
|------|--------------------|---------------------|-----------------------------|
| 1995 | 35 | 43 | — |
| 1996 | 33 | 41 | 3 |
| 1997 | 31 | 43 | 8 |
| 1998 | 29 | 43 | 15 |
| 1999 | 29 | 37 | 29 |
| 2000 | 26 | 37 | 37 |
| 2001 | 24 | 34 | 44 |
| 2002 | 27 | 34 | 46 |

*Jurisdictions in which graduated licensing went into effect, 1995-2002

Among 17 and 18 year-olds, there were per capita declines of 8 percent for 17 year-olds (from 38 to 35 per 100,000) and 9 percent for 18 year-olds (from 48 to 43 per 100,000). Per capita rates for 17 and 18 year-olds in 2002 were the same as in 2001. The evidence does not indicate that the crashes averted at age 16 merely were delayed for a year or two.

Per licensed driver, the fatal crash involvement rate for 16-year-old drivers did not decline much. From 1995 to 2001, it had declined by 12 percent (from 82 to 72 per 100,000 licensed drivers), but this change was not significantly different from that of drivers ages 20 and older. In 2002, the rate was 81 per 100,000 licensed 16 year-olds. This indicates that much of the per capita drop in fatal crashes for 16 year-olds was due to a change in their licensure rate, which declined from 43 percent in 1995 to 34 percent in 2001 and 2002 (Table 1) after ranging between 42 and 46 percent during 1985-94.

Calculations were made of the proportions of deaths in the crashes of 16-year-old drivers that could be subject to nighttime and passenger restrictions. Because these restrictions vary among jurisdictions, the calculations were based on a typical set of restrictions — unless an adult (age 25 or older) is in the vehicle, no transporting of passengers younger than 20, and no driving between midnight and 6 a.m. Sixty-one percent of the deaths in crashes of 16-year-old drivers during 2002 could have been subject to these restrictions; 11 percent involved driving at night and 50 percent involved transportation of young passengers during other hours of the day. This represents a minor change from 1995, when 64 percent of the deaths (12 percent from midnight to 6 a.m., 52 percent transporting young passengers during other hours) would have been subject to the restrictions ($\chi^2 = 2.51$, $p = 0.12$). However, in states that had put nighttime and/or passenger restrictions into effect between 1995 and 2002, deaths subject to the restrictions declined from 65 percent (12 percent midnight to 6 a.m., 52 percent transporting passengers) to 59 percent (11 percent nighttime, 49 percent passengers) ($\chi^2 = 5.71$, $p = 0.02$). In the other states, they were 62 percent in 1995 and 64 percent in 2002.

The majority of existing late-night driving restrictions begin at midnight, but some start earlier, e.g., 9 p.m. in three states. More nighttime crashes of 16 year-olds happen from 9 p.m. to midnight than

from midnight to 6 a.m. In 2002, 203 (60 percent) of the 336 9 p.m.-6 a.m. deaths that involved unsupervised travel took place before midnight. If driving restrictions extended from 9 p.m. to 6 a.m. and prohibited the transport of young passengers outside those hours without supervision, 67 percent of all the deaths in the crashes of 16-year-old drivers (27 percent nighttime, 40 percent passenger transport) would be subject to these requirements. If drivers were limited to one instead of zero passengers younger than 20, as is the case in some states, the percentage of deaths that would be subject to restrictions drops to 45 percent (27 percent nighttime, 19 percent passenger transport). Note that these calculations do not predict the effect of the restrictions because compliance will be nowhere near universal, and alternative types of legal travel to get around the restrictions are not risk free. For example, reducing the numbers of passengers transported likely will result in more teenage driving trips in total.

DISCUSSION

The analyses in this paper addressed the extent to which the crashes and crash patterns of 16 year-olds, the primary targets of graduated licensing programs, have changed subsequent to implementation of such programs since 1995. These analyses were conducted without taking into account or necessarily knowing the extent to which individual 16-year-old drivers in fatal crashes in 2002 were subject to various graduated licensing restrictions; this would be unknowable in many cases because it would depend on when a 16 year-old first entered the licensing system. The analyses reveal the overall progress in addressing the high-risk 16-year-old driver population and opportunities for further gains.

It should be noted that the analyses were based on fatal crashes, and the patterns reported may not be the same for nonfatal crashes. Most state evaluations have concentrated on all police-reported crashes, although three studies singled out fatal crashes. Two studies reported statistically significant reductions in fatal crashes (Foss et al., 2001; Kilgore, 2001); the other found a nonsignificant reduction (Shope et al., 2001).

One of the features of graduated licensing is lengthening the learner period, and much of the reduction in the fatal crash rate for 16 year-olds appears to result from converting 16-year-old license holders into permit holders, i.e., delaying licensure. This is consonant with the findings of individual state evaluations (Shope and Molnar, 2003). The question of whether a delay in licensure merely shifts the young driver crash problem to an older age group is important. The present study reveals no evidence of shifting, based on comparisons of 16-year-old drivers with 17- and 18-year-old drivers. However, these analyses may be too crude to pick up this phenomenon, if it exists. Studies in individual jurisdictions should address this question. Only Nova Scotia, which enacted graduated licensing in 1994, has done so; no evidence of a delayed negative effect was found (Mayhew, Simpson, Williams, and Desmond, 2003). Other graduated licensing programs have been implemented too recently to conduct similar studies.

Only two states introduced graduated licensing provisions in 2002. With the graduated licensing trend slowing, it would be expected that the licensing rate and the per capita crash rate would stabilize. The licensing rate of 16 year-olds was the same in 2001 and 2002, however the per capita rate increased. This is an unexpected and unfavorable finding, and its meaning is unclear. Data from 2003 should provide some clarification.

Studies in individual jurisdictions have found benefits of nighttime restrictions (Foss et al., 2001; Mayhew, Simpson, Williams, and Desmond, 2003; Shope et al., 2001), and benefits of passenger restrictions have been reported (Automobile Club of Southern California, 2000; Masten and Hagge, 2003). The analyses in this paper do not constitute a direct test of nighttime and passenger restrictions. However, they do show smaller proportions of deaths involving unsupervised nighttime travel or transporting young passengers unsupervised now than in 1995 in states that have adopted these provisions.

Results also indicate that the full potential of nighttime and passenger restrictions has by no means been realized. As many as two-thirds of the 2002 deaths in the crashes of 16-year-old drivers could be addressed through comprehensive restrictions on nighttime driving (beginning at 9 p.m.) and passengers (none younger than 20). It is not known how many of these deaths would be exempted from the restrictions. For example, 16 year-olds in some jurisdictions are allowed to transport members of their immediate families, and work-related travel at night generally is allowed. However, even if these cases were subtracted, the potential remains large for nighttime and passenger restrictions to further reduce deaths in 16-year-old driver crashes. Compliance would be key to realizing the potential.

Although considerable graduated licensing legislation had been enacted by 2002 (and a few states subsequently enacted such laws), many gaps still compromise the coverage. It has been recommended that 16 year-olds in graduated licensing systems be covered the entire year by a learner's permit or, once licensed, by restrictions on late-night driving and transporting passengers (Insurance Institute for Highway Safety and Traffic Injury Research Foundation, 2003). A few states (Kansas, Montana, Oklahoma, Wyoming) still have not lengthened the learner period or restricted high-risk driving when first licensed, and many do not have nighttime or passenger restrictions. Thirty-seven jurisdictions had the recommended combination of learner permit phase and some limits on high-risk driving for initial license holders by 2002, but in many jurisdictions the nighttime and passenger restrictions are weak. Twenty-four of the 36 nighttime restrictions begin at midnight or 1 a.m.; thus they address a very small proportion of 16-year-old driver crashes. Nine of the 22 passenger restrictions allow more than one passenger. Some jurisdictions allow graduation to full driving privileges prior to age 17. There also is the issue of compliance with the restrictions (Mayhew et al., 1998; Williams et al., 2002). Ways to enhance compliance need to be developed and tested (Foss and Goodwin, 2003).

In summary, the 16-year-old driver crash problem in the United States is smaller than it used to be, but it still is a large problem. There is a clear need to strengthen laws and seek ways to increase compliance with graduated licensing requirements.

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REFERENCES

- Automobile Club of Southern California. 2000. California teen passenger deaths and injuries drop as graduated driver license law marks second anniversary. Los Angeles, CA.
- Foss, R.D.; Feaganes, J.R. and Rodgman, E.A. 2001. Initial effects of graduated driver licensing on 16-year-old driver crashes in North Carolina. *Journal of American Medical Association* 286:1588-92.
- Foss, R.D. and Goodwin, A.H. 2003. Enhancing the effectiveness of graduated driver licensing legislation. *Journal of Safety Research* 34:79-84.
- Insurance Institute for Highway Safety. 2003. U.S. licensing systems for young drivers. Arlington, VA. Available: http://www.hwysafety.org/safety%5Ffacts/state_laws/us_licensing_systems.pdf.
- Insurance Institute for Highway Safety and Traffic Injury Research Foundation. 2003. Graduated licensing: a blueprint for North America. Arlington, VA: Insurance Institute for Highway Safety. Available: <http://www.hwysafety.org/safety%5Ffacts/teens/blueprint.pdf>.
- Kilgore, E. 2001. An evaluation of Ohio's graduated driver license law. Columbus, OH: Office of the Governor's Highway Safety Representative, Ohio Department of Public Safety.
- Masten, S.V. and Hagge, R.A. 2003. Evaluation of California's graduated driver licensing program. Sacramento, CA: California Department of Motor Vehicles.
- Mayhew, D.R.; Simpson, H.M.; Ferguson, S.A. and Williams, A.F. 1998. Graduated licensing in Nova Scotia: a survey of teenagers and parents. *Journal of Traffic Medicine* 26:37-44.
- Mayhew, D.R.; Simpson, H.M. and Pak, A. 2003. Changes in collision rates among novice drivers during the first months of driving. *Accident Analysis and Prevention* 35:683-91.
- Mayhew, D.R.; Simpson, H.M.; Williams, A.F. and Desmond, K. 2003. Specific and long-term effects of Nova Scotia's graduated licensing program. *Traffic Injury Prevention* 4:91-97.
- Shope, J.T. and Molnar, L.J. 2003. Graduated driver licensing in the United States: evaluation results from the early programs. *Journal of Safety Research* 34:63-69.
- Shope, J.T.; Molnar, L.J.; Elliott, M.R. and Waller, P.F. 2001. Graduated driver licensing in Michigan: early impact on motor vehicle crashes among 16-year-old drivers. *Journal of American Medical Association* 286:1593-98.
- Simpson, H.M. 2003. The evolution and effectiveness of graduated licensing. *Journal of Safety Research* 34:25-34.

Williams, A.F. 2003. Teenage drivers: patterns of risk. *Journal of Safety Research* 34:5-15.

Williams, A.F. and Ferguson, S.A. 2002. Rationale for graduated licensing and the risks it should address. *Injury Prevention* 8 (suppl II):ii9-ii16.

Williams, A.F.; Nelson, L.A. and Leaf, W.A. 2002. Responses of teenagers and their parents to California's graduated licensing system. *Accident Analysis and Prevention* 34:835-42.

Williams, A.F.; Weinberg, K.; Fields, M. and Ferguson, S.A. 1996. Current requirements for getting a drivers license in the United States. *Journal of Safety Research* 27:93-101.