Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

GDL: an easy win

Strong laws maximize benefits

ALSO IN THIS ISSUE

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It's been nearly two decades since graduated driver licensing (GDL) programs began to take hold in the U.S., and these novice driver laws have proved extremely successful in reducing fatal crashes among teenagers. Still, many laws could be better. At least 10 states could more than halve or nearly halve their rate of fatal crashes among 15-17 year-olds if they adopted the five strongest GDL provisions, IIHS estimates.

Separately, a new IIHS study of GDL laws shows that progress on enhancing the most effective provisions of GDL has slowed. In recent years, most revisions to young driver laws have addressed driver cellphone use and texting, while other provisions known to promote big safety benefits have seen little change.

Graduated licensing gradually introduces new teenage drivers to the driving task as they mature and develop on-the-road skills. The system has three stages: a supervised learner's period, an intermediate license (after passing a road test) that limits driving in high-risk situations except under supervision, and a license with full privileges.

An online calculator developed by IIHS and HLDI in 2012 shows individual states the safety gains they could achieve by adopting some or all of the most beneficial GDL provisions in effect today (see *Status Report*, May 31, 2012, at iihs.org). Based on IIHS and HLDI research, the calculator shows the estimated fatal crash and collision claim rate reductions that a given state can achieve with any combination of specific law changes.

At least 10 states could sharply lower their rate of fatal crashes among teens if they adopted the 5 strongest provisions of graduated licensing.

"The question lawmakers should be asking themselves is, have we done all that we can do to keep our youngest drivers safe on the road? In many cases, the answer is no," says Anne McCartt, the Institute's senior vice president for research and an author of the GDL law study.

The five key components of GDL included in the calculator are permit age, practice driving hours, license age (which might be raised as a result of a long holding period for a learner permit) and restrictions on night driving and teen passengers.

Since there is no nationwide GDL system, the laws vary among states. The current best practices are a minimum intermediate license age of 17 (New Jersey), a minimum permit age of 16 (Connecticut, Delaware, District of Columbia, Kentucky, New Jersey, New York, Pennsylvania, Massachusetts and Rhode Island), at least 70 supervised practice hours (Maine) and, during the intermediate stage, a night driving restriction starting at 8 p.m. or earlier (sunset in Idaho and 6 p.m. during Eastern Standard Time in South Carolina) and a ban on all teen passengers (15 states and D.C.).

Prior IIHS and HLDI research has shown that states with the strongest laws enjoy the biggest reductions in fatal crashes among 15-17-year-old drivers and the biggest reductions in collisions reported to insurers among 16-17-year-old drivers, compared with states with weak laws (see *Status Report*, May 7, 2009, and Sept. 9, 2008).

States with the most room to improve

When the Institute introduced its GDL calculator three years ago, it pointed to South Dakota and Iowa as two states that could sharply lower fatal crash rates among teen drivers. These are among the top 10 states that could see the biggest reductions if they adopted the toughest GDL provisions. South Dakota still leads the list.

If South Dakota adopted the strongest provisions across the board, the state could see a 63 percent reduction in teens' fatal crashes and a 38 percent reduction in collision claims. Iowa could realize a 55 percent reduction in fatal crashes and a 30 percent decline in collision claims among teens if it followed suit.

Neighboring North Dakota would benefit from an estimated 56 percent reduction in the fatal crash rate of teen drivers if it strengthened its GDL law to match the toughest laws in the nation. Montana could reduce teens' fatal crashes by 53 percent, Arkansas by 50 percent, Idaho by 49 percent, Mississippi by 48 percent, New Mexico by 47 percent, Kansas by 46 percent and South Carolina by 45 percent.

States don't have to adopt all of the toughest provisions to realize benefits. For example, Montana allows teens to obtain a learner permit at age 14½ and a license at age 15. If it were to boost its learner permit age to 15½ and its licensing age to 16, the state could achieve

Calculating the state of GDL

Teenage drivers as a group have the highest crash rate among all but the oldest drivers. GDL laws are a proven way to help reduce the risk for young drivers new to the road. Since the U.S. doesn't have a national GDL system, teen driving laws are decided at the state level. The strictest laws yield the most benefits. Weak laws can leave teen drivers vulnerable to too much risk. An online calculator (iihs.org/gdl) developed by IIHS and HLDI shows individual states the safety gains they could achieve by adopting some or all of the most beneficial GDL provisions.

This example shows how Mississippi could dramatically reduce collision claims and fatal crash rates among teenage drivers by matching the toughest GDL provisions. Go to iihs.org/gdl to see how other state GDL systems compare.

Most room to improve

10 states that could reduce teens' fatal crash rates the most by adopting strongest policies among 5 GDL components

State	Fatal crash reduction
South Dakota	63 percent
North Dakota	56 percent
Iowa	55 percent
Montana	53 percent
Arkansas	50 percent
Idaho	49 percent
Mississippi	48 percent
New Mexico	47 percent
Kansas	46 percent
South Carolina	45 percent

Toughest laws

Permit age of 16:

Connecticut
Delaware
D.C.
Kentucky
New Jersey
New York
Pennsylvania
Massachusetts
Rhode Island

70 supervised practice hours:

Maine

Licensing age of 17:

New Jersey

8 p.m. night driving restriction:

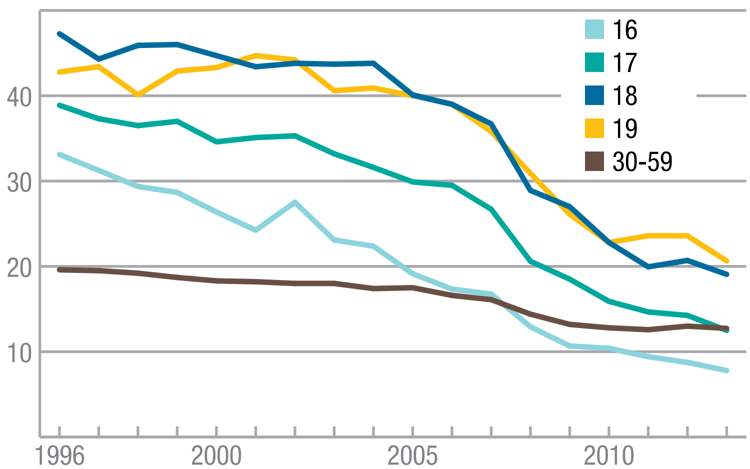
Idaho (sunset to sunrise)
South Carolina (6 p.m. EST)

No teen passengers:

Alaska
California
Colorado
Connecticut
D.C.
Georgia
Indiana
Maine
Maryland
Massachusetts
Nevada
Oregon
Utah
Vermont
Washington
West Virginia

Since the first GDL program was implemented in 1996, fatal crash rates have fallen more dramatically for teens than for adults.

Fatal crashes per 100,000 people
By driver age, 1996-2013



an estimated 26 percent reduction in fatal crashes and an estimated 8 percent reduction in collision claims among 15 to 17 year-olds.

A crucial GDL provision is a night driving restriction. Vermont is the only state that doesn't restrict novices from driving at night without an adult. Enacting an 8 p.m. restriction to match the strictest in the U.S. would reduce Vermont teens' fatal crashes by an estimated 20 percent.

Allowing beginning drivers to transport other teens without adult supervision raises their risk of crashing. Florida, Iowa, Mississippi, North Dakota and South Dakota don't impose any passenger restrictions on novice drivers. All five of these states could reduce fatal crashes among 15 to 17 year-olds by limiting teen passengers to one when an adult isn't riding along, and could reduce fatal crashes even more by barring all teen passengers.

Even New Jersey, whose licensing age of 17 is the highest in the nation, could improve its standing by replacing its one-passenger limit with a zero-passenger restriction. The move would reduce teen fatal crashes by an estimated 16 percent.

In addition, New Jersey could reduce fatal crashes by an estimated 4 percent and collision claims by an estimated 17 percent if it were to require 70 hours of supervised practice driving. New Jersey is one of eight states (along with Alabama, Arizona, Arkansas, Mississippi, Nebraska, South Dakota and West Virginia) without a requirement that beginners get a minimum number of supervised practice driving hours before progressing to an intermediate license.

Legislative progress since initial laws

Starting with Florida in 1996, states quickly began adopting elements of graduated licensing (see *Status Report*, Aug. 10, 1996). Early law changes most often included a learner period usually lasting about six months. Nighttime driving restrictions were more common than teen passenger restrictions. Georgia implemented the first passenger limit in the U.S. in 1997, and that same year Michigan was first to require a minimum number of hours of supervised driving before obtaining an intermediate license.

Since the mid-1990s, all but seven states have strengthened their initial GDL requirements by adding or strengthening key features, such as lengthening the learner permit period or the duration of nighttime driving or passenger restrictions.

Between 1998 and 2010, an average of 11 upgrades to GDL laws were made each year. The busiest legislative year was 2005, when 18 laws were strengthened. The pace has slowed since 2010.

Only four states have adopted substantial upgrades to their teen driver laws since IIHS launched its GDL calculator in 2012. Three states increased the minimum number of supervised practice hours — from 35 to 70 in Maine, 30 to 40 in Minnesota and 20 to 30 in Texas. Iowa, meanwhile, increased the minimum learner permit holding period from 6 months to a year.

The reasons for the slowdown in GDL improvements aren't clear. Changes in the political composition of state legislatures may have played a role, and some lawmakers may be reluctant to tinker with long-established GDL systems.

Quick spread of distracted driving laws

Another reason may be because policymakers have focused on distracted driving amid concerns about teens' widespread cellphone use and the fact that their immaturity and inexperience behind the wheel make them more susceptible to distractions of any kind.

"Enacting distracted driving laws for teens appears to be more palatable than enacting stricter GDL laws," McCartt says. "Only two states had a cellphone or texting ban for teenage drivers in 2004. Since then, 38 states and D.C. have implemented teen-specific bans. That's a remarkable pace."

Forty-eight states and D.C. have texting bans covering young drivers, 37 states and D.C. ban all cellphone use for young drivers, and three states ban hand-held cellphone use for young drivers. Additional states have hand-held cellphone bans covering drivers of all ages.

Few studies have examined the effects of cellphone and texting laws on crashes involving teenagers, and the evidence from these studies is mixed and inconclusive. Evaluations of North Carolina's law banning all cellphone use by teen drivers found no short-term or long-term decrease in use (see *Status Report*, June 9, 2008).

For a copy of "History and current status of state graduated driver licensing (GDL) laws in the United States" by A.F. Williams et al., email publications@iihs.org.

Distracting behaviors are common at red lights, less so at roundabouts

Drivers engage in distracting behaviors in all types of traffic situations, but the most demanding activities are more likely to be seen at red lights than during more challenging driving, a new IIHS study shows.

Researchers observed nearly 17,000 drivers on four roads in Northern Virginia during 2013-14. On each road, observations were made at different times of day on a straightaway, in a roundabout and at a signalized intersection. The locations on a given road were in close proximity to one another, allowing the researchers to observe a similar group of drivers in varying traffic situations.

Nearly a quarter of all the drivers were observed doing something in addition to driving. The most common secondary behavior, seen among 5 percent of drivers, was holding, but not using, a cellphone. The next-most common behavior, at 4 percent, was talking on a hand-held phone.

When it comes to specific roadway situations, the rates of any secondary behavior were 30 percent among drivers stopped at traffic lights, 24 percent on straightaways, 23 percent of drivers in moving vehicles at intersections and 21 percent in roundabouts. Eating or drinking was the most commonly observed activity among drivers waiting for the light to change, with nearly 6 percent seen doing it. That compares with about 3 percent of drivers on straightaways, in roundabouts or moving through an intersection. The next-most common behavior among stopped drivers was talking or singing with a passenger.

Percentage of drivers engaged in secondary behaviors in different traffic situations

	Straightaway	Roundabout	Moving at intersection	Stopped at intersection
Any secondary behavior	24.1	21.2	23.3	30.0
Holding cellphone	6.0	4.2	6.3	2.2
Talking on hand-held cellphone	4.4	4.2	4.0	3.6
Eating or drinking	3.3	2.6	2.7	5.5
Talking or singing with passenger	2.0	3.4	2.1	4.3
Manipulating cellphone	2.8	1.2	2.7	3.8
Talking or singing without passenger present	1.8	2.5	1.7	3.3
Smoking	1.4	1.6	1.7	2.6
Wearing headphones or earbuds	1.2	1.6	1.2	1.3
Other	1.3	0.7	1.2	3.8
Wearing Bluetooth device	0.5	0.6	0.5	0.8
Manipulating in-vehicle system	0.5	0.2	0.5	0.9
Grooming	0.5	0.1	0.2	1.3
Manipulating or holding device other than cellphone	<0.1	<0.1	<0.1	<0.1

Note: Multiple secondary behaviors could be coded for each driver.

After controlling for driver age and gender, community and time of day, the researchers found that the likelihood of a driver engaging in any secondary behavior was 41-66 percent higher when drivers were stopped at a red light than in any other situation. The likelihood was lowest when drivers were traveling through roundabouts.

Drivers stopped at red lights were more likely to be talking or singing with passengers, eating or drinking, or manipulating a cellphone than drivers in the other situations. They were less likely to be simply holding a cellphone, but this may be because they were doing more complex tasks instead. Drivers navigating roundabouts were less likely to be engaged in any secondary behavior than drivers in other situations. In particular, they were 40-73 percent less likely to be manipulating a cellphone. Talking on a handheld phone didn't vary by situation.

"It makes sense that drivers would be more likely to give their full attention to the road when the driving is more complicated, as in a roundabout," says David Kidd, an IIHS senior research scientist and the study's lead author. "It seems that some drivers are saving the most demanding tasks like eating, dialing a phone or texting for when they're stopped at a light."

Drivers stopped at red lights were more likely to be talking or singing with passengers than drivers in other situations. They also were more likely to be eating, drinking or manipulating a cellphone.

Drivers' apparent intuition about which secondary behaviors are more demanding is borne out in other research, at least when it comes to cellphone use. A 2014 report by IIHS and the Virginia Tech Transportation Institute looked at cellphone use and other secondary behaviors by 105 drivers whose daily driving was recorded in a naturalistic driving study for a year. Researchers found that the risk of a crash or near crash tripled when a driver was reaching for, answering or dialing a cellphone. In contrast, talking on a cellphone wasn't associated with an increased rate of crashes or near crashes (see *Status Report*, Oct. 24, 2014, at iihs.org). In a similar finding to the current observational study, drivers in the naturalistic study were much more likely to be reaching for, answering or dialing a phone when they were stopped than when they were moving, while the likelihood that a driver was talking on the phone didn't vary much.

For a copy of "The influence of roadway situation, other contextual factors, and driver characteristics on the prevalence of driver secondary behaviors" by D.G. Kidd et al., email publications@iihs.org. ▯

Bicycle crash study could guide design of bicyclist detection systems

A growing number of vehicles are equipped with front crash prevention technology that can recognize the back of another vehicle and prevent a rear-end crash. If more of these systems could also recognize the backs of bicycles and bicyclists, they could prevent or mitigate a large portion of the crashes that kill people traveling on two wheels.

More than 3,300 bicyclists were killed in crashes in a five-year period from 2008 to 2012. Seventy-four percent of those deaths occurred when the bicyclist was struck by the front of a passenger vehicle, IIHS researchers found in a new study of bicyclist crash types relevant to the design of crash prevention systems. Of those crashes, the most common scenario, accounting for 45 percent, involved a vehicle traveling in the same direction as a bicycle and hitting it from behind, the researchers found. In contrast, pedestrian fatalities most commonly result from being struck while crossing a roadway (see *Status Report*, March 30, 2011, at iihs.org).

The most common configuration among all bicycle crashes, fatal and nonfatal, was a bicycle crossing the path of a straight-moving vehicle. That scenario was the second-most common among bicyclist fatalities involving the front of a passenger vehicle, accounting for 22 percent of deaths. The third-most common fatal scenario involved a vehicle moving straight and a bike moving against traffic. Crashes involving turning vehicles and bicycles either crossing traffic or moving in line with traffic were the second- and third-most common crashes, respectively, but were not among the most common fatal crash scenarios.

The study was based on information on crashes from two federal databases, the Fatality Analysis Reporting System, a census of all fatal crashes, and the National Automotive Sampling System General Estimates System, which is a nationally representative sample of police-reported crashes.

Compared with the total number of people who die on the nation's roads, the number of bicyclists killed in crashes with motor vehicles is small, but it has been going up since 2010, when 621 were killed. In 2013, the last year for which data are available, the toll was 741.

"Biking has been enjoying a resurgence in recent years, as individuals and local governments seek a greener form of transportation that doesn't contribute to traffic congestion," says David Zuby, IIHS executive vice president and chief research officer. "The auto industry should keep bicyclists in mind as it continues to develop crash avoidance technology."

So far most efforts to improve bicyclist safety have focused on infrastructure. Cities have added bike lanes and cycle tracks and have delineated bike boxes at intersections to give bicyclists their own space to wait for a light to change. In many cases, safety was found to improve after such changes (see *Status Report*, Jan. 24, 2013).

Volvo is among a handful of automakers already adding bicyclist detection capabilities to their crash avoidance systems.

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But even with improved infrastructure, it would be impossible to eliminate all conflicts between vehicles and bicycles. That's why it's important to incorporate bicyclist detection into front crash prevention systems.

Addressing the most frequent deadly crash scenario — a vehicle striking a bicyclist from behind — requires relatively minor modifications to current front crash prevention systems, which are typically designed to prevent front-into-rear crashes between vehicles. Adding the capability to identify bicyclists to these systems could prevent or mitigate up to 32 percent of fatal bike crashes and up to 6 percent of all bike crashes.

Preventing crashes with bicyclists crossing traffic is more complex and has similar requirements to pedestrian detection systems, which must identify people as they step in front of the vehicle from the side of the road.

A handful of automakers are already adding bicyclist detection to their crash avoidance systems. Volvo and Subaru say their optional forward collision warning and automatic braking systems recognize bicyclists as well as pedestrians. BMW's Night Vision is designed to detect bicyclists, pedestrians and large animals in the dark and highlight them on a display, issuing an audible warning if necessary. All these systems have certain limitations, and it's not clear what percentage of bike crashes they actually prevent or mitigate.

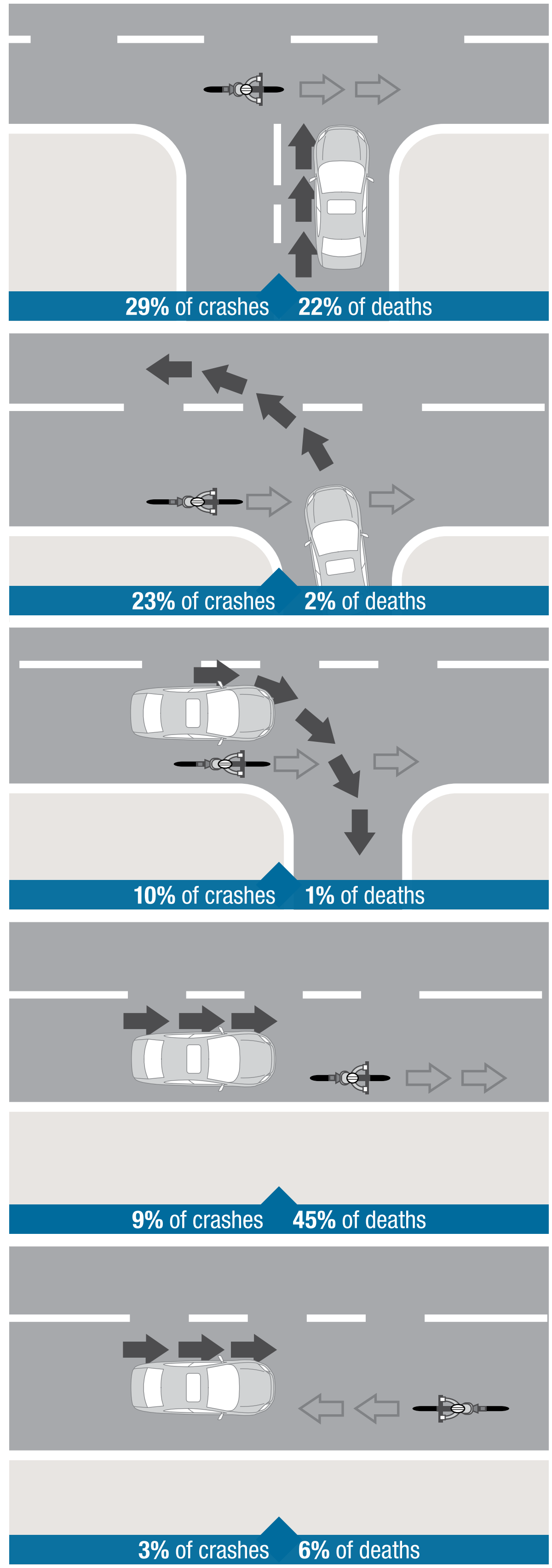
The new study estimates the number of crashes that could potentially be addressed. Systems designed with the three most common deadly crash scenarios in mind have the potential to help mitigate or prevent up to 26 percent of bicycle crashes and 52 percent of fatal crashes. Systems that also address the remaining two most common crash modes could help mitigate or prevent up to a total of 47 percent of crashes and 54 percent of fatal crashes.

In addition to crash configurations, the study also looked at vehicle speed and time of day. Half of fatal crashes and nearly a quarter of all crashes involving the front of a vehicle occurred at night or during twilight. Most crashes occurred on roads with speed limits of less than 40 mph, but only about a third of fatal ones did. Currently, not all front crash prevention systems are effective in darkness or at high speeds, but they would need to be to have the biggest effect on bicyclist crashes and fatalities.

For a copy of "Cyclist crash scenarios and factors relevant to the design of cyclist detection systems" by A. MacAlister, email publications@iihs.org. ▯

Common crash scenarios

Crashes involving bicyclists and fronts of passenger vehicles



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Safeco Insurance Companies
Samsung Fire & Marine Insurance Company
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