Insurance Institute for Highway Safety
Highway Loss Data Institute

GDL calculator methodology:
summary of IIHS-HLDI research on teen licensing law components

The Insurance Institute for Highway Safety (IIHS) and the Highway Loss Data Institute (HLDI) developed an online calculator to show individual states the safety gains or losses that would be expected to result from adopting specific changes in their current teen licensing laws. The calculator is based on complementary studies conducted by IIHS and HLDI examining changes in fatal crashes and the filing of insurance claims, respectively, that are associated with the relative strength of specific components of teen licensing laws.

These components include the minimum age at which a teen can obtain a learner's permit, minimum length of time a teen must hold the permit, number of supervised practice hours required during the permit phase, minimum age at which a teen can obtain an intermediate license, and restrictions on unsupervised driving after a certain hour at night and on the number of teen passengers during the intermediate stage.

Laws governing these components vary considerably across states in terms of strength, which drivers are covered, and how long the night and passenger restrictions last. These laws also vary over time within states. Many laws include provisions that weaken or exempt certain restrictions for teens who have taken driver's education courses. For the purpose of these studies, the strengths of licensing components were evaluated based on the weakest form of restriction a teen could achieve by taking driver's education courses and advancing in the system as early as possible. The study was not able to evaluate the length of time night and passenger restrictions applied, but it makes sense that the benefit of a restriction would be associated with both its strength and how long it lasts.

The IIHS study examined the rate of teenage passenger vehicle drivers involved in fatal crashes per 100,000 teenagers in the population across variation in teen licensing laws by state and time (quarters) during 1996–2007 using Poisson regression. To investigate the variation in these licensing laws, researchers coded permit age, holding period, required practice hours, intermediate license age, and the number of restricted nighttime hours as continuous variables and coded passenger restriction as categorical (no passengers allowed, one allowed, and no restriction or two or more allowed). To account for state/time influences unrelated to licensing laws on fatal crash rate, the corresponding fatal crash rate for drivers ages 30–59 was included in the Poisson models as a covariate.

The HLDI study examined collision claim frequency by state and year using 1996–2008 auto insurance coverage and loss data. A collision claim pays for damage to the policyholder's vehicle from a single or multiple-vehicle crash in which they were generally at-fault. Claim frequency is the number of collision claims filed per 100 insured vehicle years. An insured vehicle year is a measure of exposure equivalent to one vehicle insured for one year, two vehicles insured for 6 months each, etc. This study's methods were similar to the IIHS study, with some minor differences. The main study group was 16–17-year-old rated drivers of relatively new passenger vehicles. The comparison group was 35–55-year-old rated drivers. For insurance purposes, the rated driver is the one who typically represents the greatest loss potential for the insured vehicle. Although this is generally the primary driver of the vehicle, the actual driver at the time of the crash is unknown.

Increased permit and license ages were associated with reductions in fatal crash rates and collision claim frequencies. Neither study found a benefit of holding period beyond any effect it may have on the license or permit age. Increasing the number of required practice hours before licensure had a small effect on fatal crash rates and a larger effect on collision claim frequencies. Stronger night and passenger restrictions were associated with reductions in teen crash rates, especially for fatal crashes.

Incidence rate ratios for continuous predictors computed in the study can be rescaled to represent changes of any size (within the range of study data). For example, the effect of a one-month increase in license age is just more than 1 percent (RR = 0.988), whereas the effect of a 12-month increase in license age is about 13 percent (RR = 0.98812 = 0.865). Similarly, the effect of multiple changes is computed by taking the product of corresponding rate ratios. For example, if a state created a passenger restriction that prohibits all (nonfamily) teen passengers and increased license age by one year, then the expected reduction in 15–17-year-old drivers' fatal crash rate would be 32 percent (RR = 0.98812 x 0.786 = 0.680).

Adjusted incidence rate ratios from Poisson regression analyses of the effects of GDL components on teen crash rates

	Fatal crashes per 100,000 population (ages 15–17)	Collision claims per 100 insured vehicle years (ages 16–17)
Permit age (one-month increase)	0.989*	0.967
Practice hours (one-hour increase)	0.999	0.997*
License age (one-month increase)	0.988*	0.996*
Night restriction (one-hour increase in restricted hours)	0.976*	0.990*
Passenger restriction (teen passengers allowed)		
0 vs 2+	0.786*	—
1 vs 2+	0.935*	—
0/1 vs 2+	—	0.952*

*statistically significant at 0.05 level

References

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The Insurance Institute for Highway Safety (IIHS) is an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from motor vehicle crashes.

The Highway Loss Data Institute (HLDI) shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

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