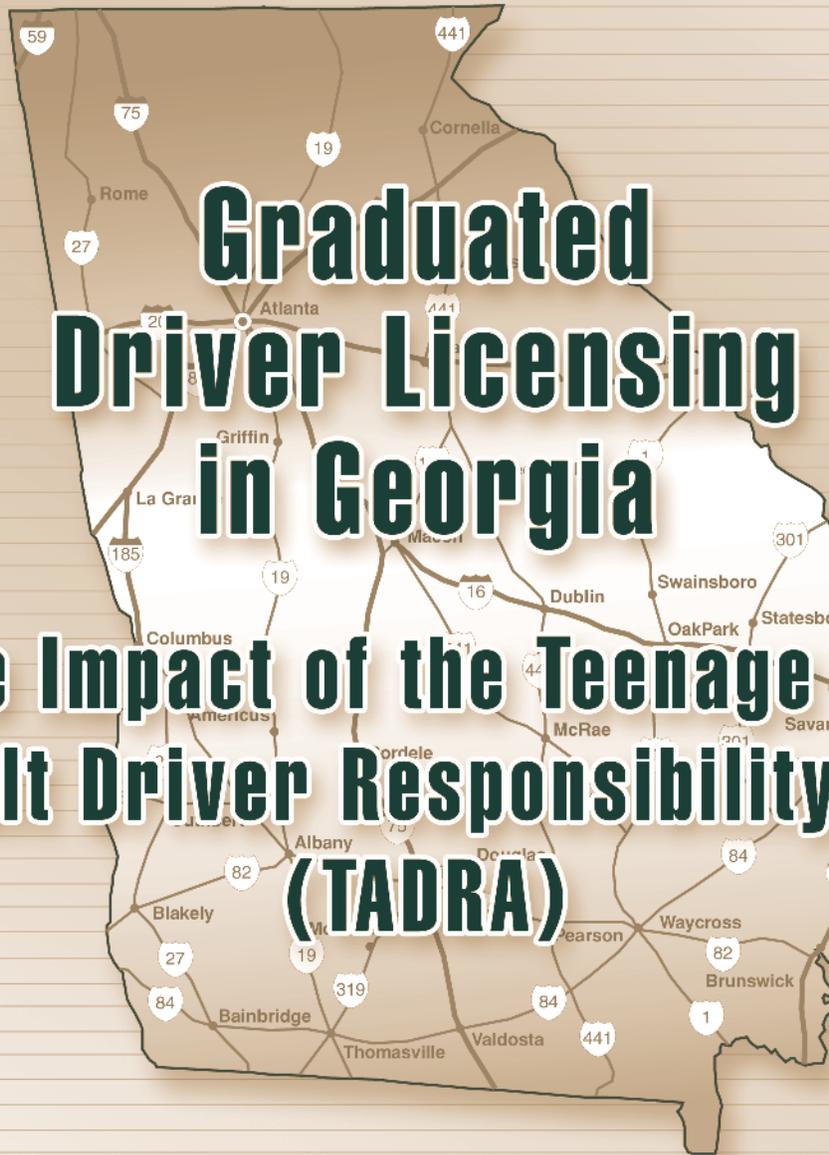
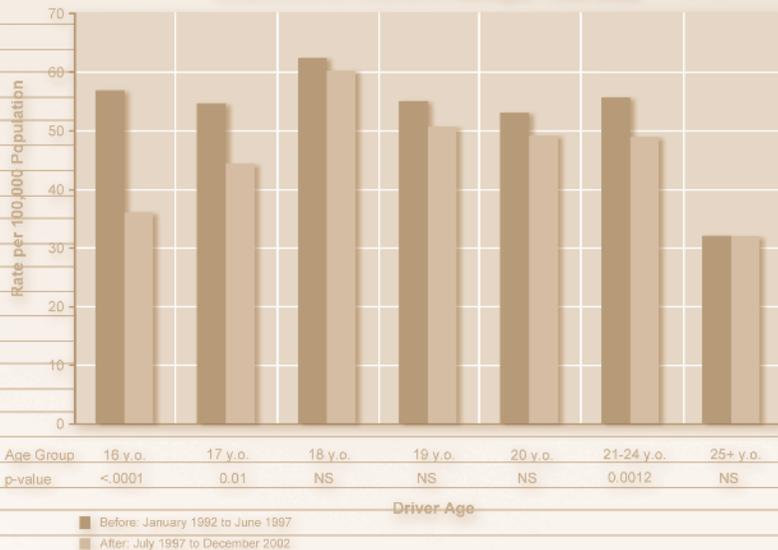


Graduated Driver Licensing in Georgia

The Impact of the Teenage and Adult Driver Responsibility Act (TADRA)



Driver Fatal Crash Rates By Driver Age, Before and After Enactment of TADRA in Georgia, 1992-2002



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16. Abstract The effectiveness of The Teenage and Adult Driver Responsibility Act (TADRA) passed by the Georgia legislature in 1997, in reducing fatal crashes among 16-year-old drivers was examined using the Fatality Reporting System. Results showed that during the first 5 1/2 years following the enactment of TADRA, the average annual driver crash rate for 16-year-olds declined 36.8 percent. When these data are compared to three bordering states that did not enact similarly restrictive legislation on 16-year-old drivers, the rate in Georgia (following TADRA enactment) was 34 percent lower than in Tennessee, 32 percent lower than in Alabama, and 18 percent lower than in South Carolina, although prior to the enactment of TADRA in Georgia, these states all had similar fatal crash rates among 16 year-old drivers. This finding strongly suggests that TADRA was responsible for the reduction in crash rate observed in Georgia.			
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**Graduated Driver Licensing in Georgia
The Impact of the Teenage and Adult Driver Responsibility Act
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Executive Summary

In response to a series of widely publicized fatal crashes involving teenaged drivers, the Georgia General Assembly passed the Teenage and Adult Driver Responsibility Act, known as TADRA, during its 1997 legislative session. The law took effect in July of the same year. TADRA was subsequently strengthened by Georgia's General Assembly in 2001. In addition to introducing graduated driver's licensing in Georgia, TADRA imposed additional restrictions on young drivers. These include "zero tolerance" for DUI and automatic license revocation for excessive speeding and other dangerous driving behaviors.

To assess the impact of TADRA, we analyzed fatal crash data by driver age in Georgia for 5 ½ years before enactment of TADRA, and 5 ½ years afterward. To control for historical effects, we compared Georgia's experience to that of three neighboring States that did not enact equally comprehensive legislation during the study period.

During the final 5 ½ years before TADRA was enacted (January 1, 1992, to June 30, 1997):

- A total of 317 Georgia drivers age 16 were involved in fatal crashes. This represents an average annual driver fatal crash rate of 57.0 per 100,000 16-year-olds.
- The average annual fatal crash rate involving Georgia drivers 16 years old was 77 percent higher than that of Georgia drivers 25 and older.
- The average annual fatal crash rates of drivers 17 to 24 was more than 50 percent higher than that of Georgia drivers 25 and older.
- Unsafe or illegal speed was the most prevalent contributing factor in fatal crashes involving 16-year-old Georgia drivers. Fully 35.6 percent of fatal crashes in this age group during the pre-TADRA period involved "unsafe or illegal speed."

During the first 5 ½ years after TADRA was enacted (July 1, 1997, to December 31, 2002):

- 230 Georgia drivers age 16 were involved in fatal crashes. This represents an average annual driver fatal crash rate of 36.1 per 100,000 16-year-olds. Compared to the 5 ½ years prior to enactment of TADRA, the average annual rate of fatal crashes involving 16-year-old drivers decreased 36.8 percent.
- The average annual fatal crash rate of Georgia drivers age 16 was only 12.8 percent higher than that of Georgia drivers 25 and older.
- Speed-related fatal crashes involving 16-year-old Georgia drivers were cut by 42 percent, and alcohol-related fatal crashes were reduced by nearly 60 percent without displacing fatal crashes to older age groups.
- The first cohort of Georgians to grow up under TADRA (i.e., those who reached age 21 in 2002) experienced an annual rate of fatal crashes 38 percent lower than drivers who reached age 21 in 1997, the year TADRA was enacted. Georgia drivers who reached age 21 in 2002 and were involved in a fatal crash that year were substantially less likely than their age-matched peers in 1997 to: (a) have a prior record of speeding; (b) have been previously convicted of DUI, or (c) have a prior license suspension for hazardous driving. These observations suggest that TADRA may exert lasting favorable effects on driver behavior.

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Introduction

Young drivers are involved in fatal motor vehicle crashes at substantially higher rates than older drivers.¹⁻³ This is probably the result of driver inexperience and the well-known tendency of many teens to engage in high-risk behavior, including risky driving.⁴⁻⁹ In an effort to reduce fatal crashes involving teenage drivers, many States have enacted conditional, or “graduated” driver licensing (GDL) laws.¹⁰⁻¹³ As of March 2005, 41 States and the District of Columbia had implemented GDL systems that include all three recommended stages -- a supervised learner’s period, an intermediate license for a specified period of time, followed by issuance of a full-privilege driver’s license.¹⁴ Despite these core similarities, State systems vary by the number and strictness of their provisions. To date, GDL laws have been evaluated in just a few States, including California, Connecticut, Florida, Kentucky, Michigan, North Carolina, Ohio, Pennsylvania, and Utah, with widely varying effects (Appendix 1).¹⁵⁻²⁰

Responding to a series of highly publicized fatal crashes involving teen drivers, and with the strong encouragement of (then) Governor Zell Miller, the 1997 session of the Georgia General Assembly implemented a comprehensive package of measures designed to reduce fatal crashes involving teens. The law, entitled the Teenaged and Adult Driver Responsibility Act (TADRA) was passed with bipartisan support, quickly signed by the Governor, and took effect in July, 1997.²¹⁻²³ In addition to addressing driver inexperience through introduction of graduated driver licensing, TADRA carried additional provisions aimed at two other important causes of fatal crashes involving young drivers – impaired driving and excessive speed.

A formative assessment of the law’s impact six months following implementation suggested that it immediately produced beneficial effects among 16 and 17-year-old drivers.²⁴ However, this evaluation was limited by its short follow-up interval. To determine if TADRA’s impact was both real and sustained, we analyzed data from the National Highway Traffic Safety Administration’s Fatality Analysis Reporting System (FARS) during the 5-½-year period immediately prior to enactment of TADRA (i.e., January 1, 1992, to June 30, 1997) and compared this to the State’s experience during the first 5 1/2 years following enactment (July 1, 1997, to December 31, 2002). To determine if any change in age-specific fatality rates was due to historical or regional effects, we compared Georgia’s experience with that of Alabama, South Carolina, and Tennessee – three States that did not enact similarly comprehensive legislation during the study interval. (Appendix 2)

Methods

Data sources

Data on fatal crashes in Georgia and the three comparison States were obtained from the National Highway Traffic Administration’s Fatality Analysis Reporting System. FARS is a national database of crashes in the United States occurring on public roadways that result in one or more deaths within 30 days of the crash. It includes over 180 driver, vehicle, scene, and crash variables. To assess TADRA’s effects over a prolonged period of time, crash data was analyzed over an 11-year period – 1992 through 2002. This allowed us to compare driver fatal crash rates during the final 5 1/2 years before enactment of TADRA to the first 5 1/2 years after enactment of the law.

For our analysis, a "driver fatal crash" was defined as a motor vehicle crash involving a driver of a given age in which a fatality occurred to any occupant of any vehicle involved in the crash or a pedestrian struck by the driver's vehicle. Under this definition, a "driver fatal crash" could involve the driver or another occupant of the driver's vehicle, an occupant of the vehicle struck by the driver's vehicle, a pedestrian, or multiple victims of the same crash.

To calculate rates of "driver fatal crashes" by age group, we obtained population data from the U.S. Census Bureau for 1992-2002 "Estimates of the Population of the U. S. and States by Single Year of Age and Sex". All rates presented are annual rates.

Seat belt usage for vehicle occupants in fatal crashes was obtained from the FARS database and reflects usage as recorded on the fatal crash reports filed by the investigating law enforcement officers.

Georgia's TADRA law

Georgia's TADRA law targets three major factors associated with fatal crashes involving young drivers -- inexperience, alcohol-impaired driving, and excessive speed.

Graduated licensing – In Georgia, a provisional, Class D license is issued to an individual who is at least age 16 and who has held a valid Instruction Permit for 12 months, and who during the preceding 12 months has not been convicted of DUI, hit-and-run, leaving the scene of an accident, or any offense for which four or more points are assessed.

To receive a Class D license, an applicant must either complete an approved driver education course and a total of 20 hours of supervised driving (including 6 hours at night) or complete 40 hours of supervised driving with at least 6 of these occurring at night.

When TADRA was enacted in 1997, a Class D license did not allow an individual to drive between 1 a.m. and 5 a.m. unless the driver was going to work, a school event, a religious activity, or a medical, fire, or law enforcement emergency. In 2001, this provision was significantly toughened to extend the curfew hours to between midnight and 6 a.m., and the curfew exemptions were rescinded. Class D license holders cannot legally drive with more than three passengers under the age of 21 who are not members of their immediate family. During the first six months of conditional licensing, the driver's passengers can only be members of the driver's immediate family.

Class D restrictions remain in effect until age 18, when a unrestricted Class C License can be obtained if the driver has held a valid Class D license for at least 12 months and has not been convicted of DUI, hit-and-run, leaving the scene of an accident, or any offence for which four or more points are assessed.

No Georgian under age 18 is issued an instructional permit or a provisional driver's license unless they are enrolled in or have graduated from high school, have a parent's permission to withdraw from school, or have received a GED. The Instructional Permit or driver's license is suspended if an individual under 18 drops out of school without parental permission, misses 10 consecutive days of school without an excuse, or is suspended from school for threatening or striking a teacher or school employee, possessing drugs or alcohol on school property, or possessing a weapon on school property.

Zero tolerance of DUI – Under TADRA, any individual under 21 found to have a blood alcohol concentration (BAC) of .02 grams per deciliter or more at any time within three hours of driving is deemed guilty of driving under the influence (DUI). Georgians guilty of DUI automatically forfeit their driver’s licenses for a minimum of six months. In Georgia, a first DUI conviction can also result in significant monetary penalties, jail time, and mandatory community service. Individuals under 21 who are convicted of DUI must reapply and be successfully retested to re-obtain their driver’s licenses.

Automatic license revocation for excessive speeding and other dangerous driving behaviors
Under TADRA, Georgia drivers under 21 who are caught traveling more than 24 miles per hour over the posted speed limit (e.g., 55 mph in a zone posted for 30 mph or 90 mph in a zone posted for 65 mph) automatically forfeit their driver licenses for a period of 6 months. Other offenses that result in automatic license revocation include: hit-and-run or leaving the scene of an accident; racing or eluding an officer; reckless driving; any offense for which four or more points are assessed; purchasing or attempting to purchase an alcoholic beverage; and DUI. A first offense leads to automatic license revocation for 6 months; a second offense (or any DUI with a BAC of .08 or more) results in 12 months’ revocation. Re-instatement requires re-application and successful re-testing.

Implementation and Dissemination

Legislative deliberations and subsequent enactment of TADRA were widely covered by the news media, especially in metropolitan Atlanta, which contains approximately half of the State’s population. The law took effect in July of 1997. The State did not undertake significant dissemination efforts beyond the extensive coverage provided by the new media. Anecdotal reports from observers at the time suggest that the most effective “free advertising” was generated by the word-of-mouth complaints of teenaged drivers who lost their licenses after violating one or more TADRA provisions.

Data analysis

To assess the impact of TADRA on motor vehicle crash fatalities in Georgia, we calculated the fatal crash rates of drivers in different age strata (16, 17, 18, 19, 20, 21-24, and 25+) during the 5 1/2 years prior to enactment of the law, and compared them to the fatal crash rates compiled by drivers in the same age strata during the 5 1/2 years following enactment.

To determine if certain aspects of TADRA’s legislative package were more effective than others, we analyzed age-specific rates of driver fatal crashes involving three high-risk behaviors if this was noted by the investigating officer and documented on the FARS report. These included: underaged DUI (denoted by the FARS variable “Driver Drinking”), excessive speed (denoted by the FARS variable “Driving too Fast for Conditions” or “In Excess of Posted Speed”), and late-night driving (denoted by determining the time of day in which the fatal crash occurred, divided into 3-hour time segments). The potentially confounding effect of rising rates of seat belt usage (a behavior not directly addressed by TADRA, but prone to influence by high-visibility enforcement) was examined as well.

To determine if any changes in driver fatal crash rates were due to historical effects rather than the impact of TADRA itself, we compared pre- and post-enactment rates of driver fatal crashes involving Georgia drivers in various age groups to their peers in Alabama, South Carolina, and

Tennessee – three States that did not enact similarly comprehensive legislation during the study time frame (Appendix 2). To further dissect TADRA’s effects on the principal age group of interest (16-year-old drivers), we compared pre- and post-enactment fatal crash rates among 16-year-old Georgia drivers to those of 16-year-old drivers nationwide.

To determine if TADRA produced any sort of “cohort effects,” we compared the fatal crash rate of Georgia drivers who turned 21 in 2002 – five years after enactment of TADRA – to that of Georgians who turned 21 in 1997 (the year that TADRA was enacted).

For each analysis, the rate of fatal crashes in an age stratum was calculated by dividing the number of fatal crashes involving drivers of that age before and after enactment of TADRA by the sum of the State’s population in that age stratum during the same time period, multiplied by 100,000. All rates presented are annual rates.

Statistical considerations

Statistical significance was determined by using Chi-square with an alpha level set at 0.01 except when 25 percent or more of the cells had expected counts less than 5. In that case, the Fisher’s Exact Test was used to calculate p-values. The statistical significance of differences in driver fatal crash rates 5 1/2 years before and 5 1/2 years after the law went into effect was tested separately for drivers age 16, 17, 18, 19, 20, 21-24, and 25+) in Georgia and the three comparison States – Tennessee, South Carolina, and Alabama. Similar comparisons were made pre- and post-TADRA enactment for speed-related fatal crashes, alcohol-involved fatal crashes, and driver fatal crashes involving 16-year-old drivers at various 3-hour intervals of the day. Descriptive statistics were calculated using Microsoft Excel. Tests of significance were calculated using SAS (SAS Version 8.2, Cary, NC).

Results

Driver fatal crashes

During the 5 1/2 years before TADRA was enacted, 317 Georgia drivers age 16 were involved in a crash that produced one or more fatalities -- an average annual rate of 57.0 fatal crashes per 100,000 16-year-old drivers. During the first 5 1/2 years following enactment of TADRA, 230 Georgia drivers age 16 were involved in a fatal crash - an average annual rate of 36.1 per 100,000 16-year-old drivers. This represents a 36.8 percent decrease in the rate of fatal crashes involving this age group of drivers ($p = <0.0001$).

Prior to enactment of TADRA, the annual rate of fatal crashes among 16-year-old Georgia drivers was 77 percent higher than that of Georgia drivers 25 and older. Following enactment of TADRA, the annual fatal crash rate among 16-year-old Georgia drivers was only 12.8 percent higher than that of Georgia drivers 25 and older.

Prior to enactment of TADRA, the annual rate of fatal crashes among 16-year-old Georgia drivers was 2.1 percent higher than that of Georgia drivers 21 to 24 years old. In the first 5 1/2 years after enactment, the annual fatal crash rate among 16-year-old Georgia drivers was 26 percent less than that of Georgia drivers 21-24 years old.

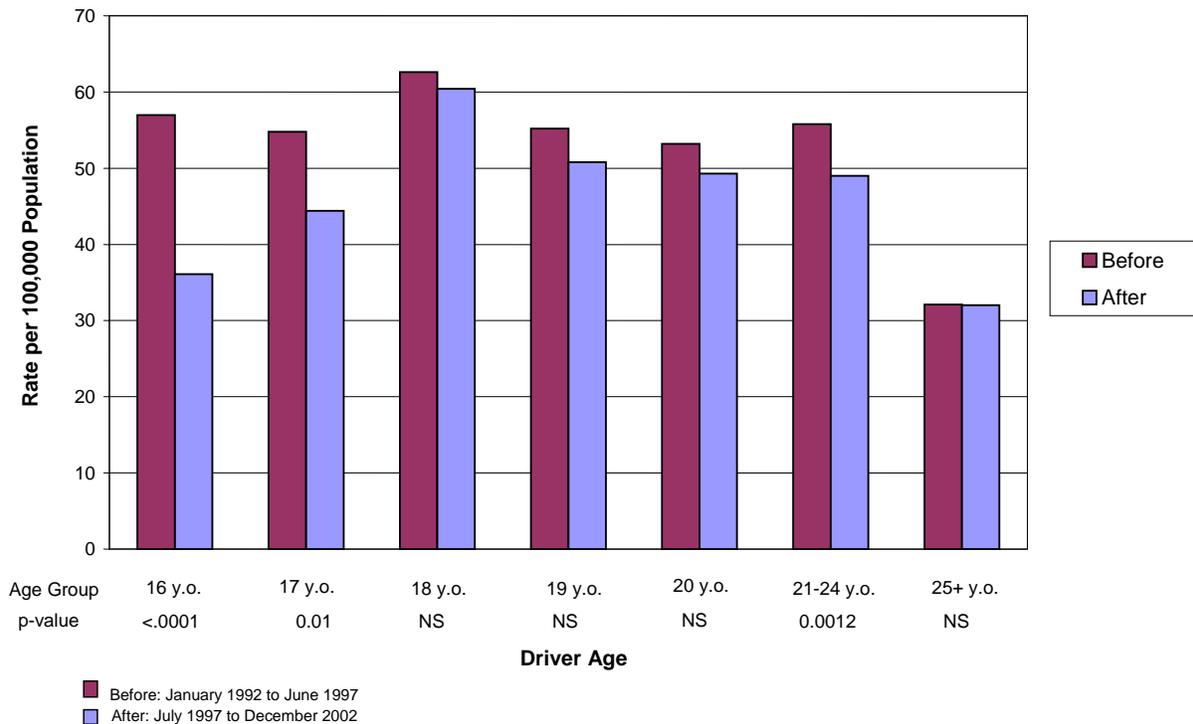
Enactment of TADRA was also associated with a significant decrease in the number and rate of fatal crashes involving drivers 17 years old, but the decrease was less than that observed among 16-year-old drivers. In the post-enactment period, the average annual fatal crash rate per 100,000 Georgia drivers age 17 decreased 19.1 percent, from 54.8 per 100,000 pre-enactment to 44.4 post-enactment ($p = 0.01$).

Georgia drivers age 18 showed no significant change in their annual rate of fatal crashes following enactment of TADRA---62.6 per 100,000 pre-enactment to 60.4 post-enactment. Both before and after enactment of TADRA, 18-year-olds had the highest age-specific annual rate of driver fatal crashes in the State.

Among 19- and 20-year-old drivers, enactment of TADRA was not associated with statistically significant declines in driver annual fatal crash rates. Because Georgia’s population grew a great deal during the 11-year study time frame, the total number of driver-related fatalities in these age groups increased slightly during the post-enactment period. Fatal crashes involving drivers 21 to 24 years old (and not subject to the provisions of TADRA) decreased by 12 percent in the post-enactment period, from an average annual rate of 55.8 per 100,000 pre enactment to 49.0 per 100,000 afterwards ($p = 0.001$). There was no change in the annual rate of fatal crashes involving drivers 25 and older (Figure 1).

Figure 1

Driver Fatal Crash Rates By Driver Age, Before and After Enactment of TADRA in Georgia, 1992-2002



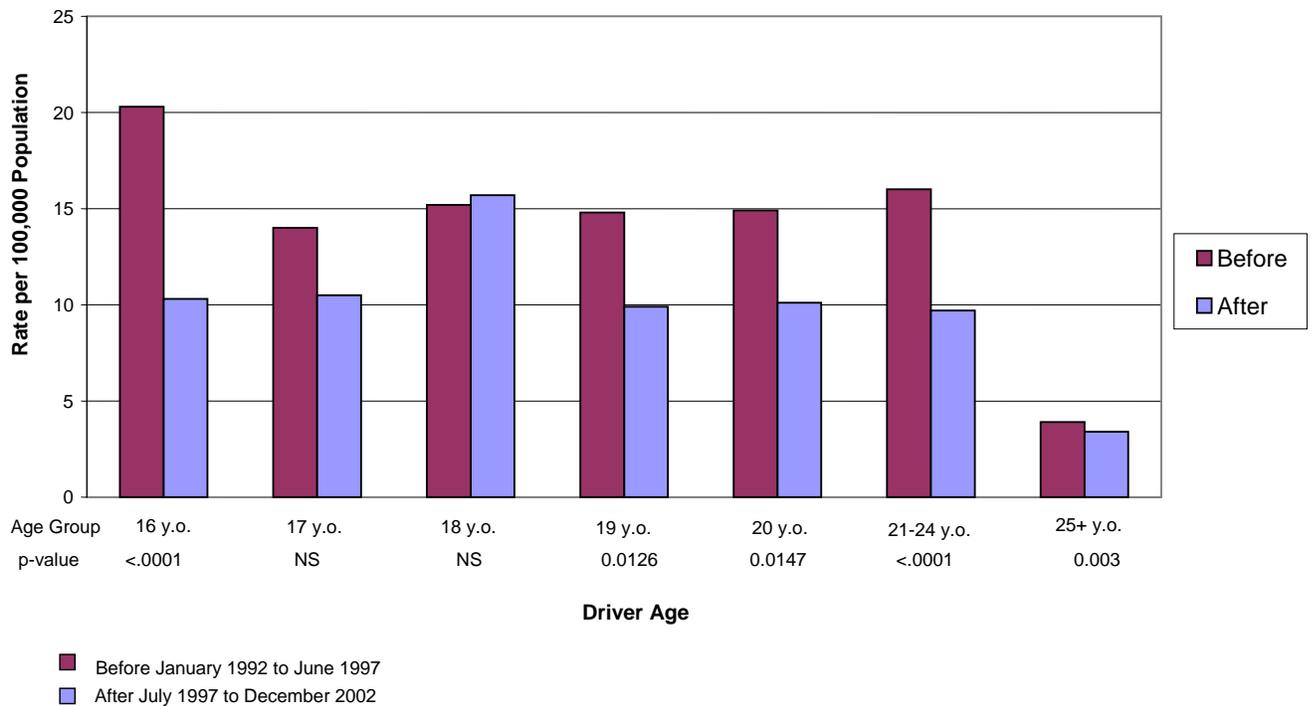
Speed-related fatal crashes

Driving at an unsafe or illegal speed is a behavior commonly implicated in fatal crashes involving young drivers. Speed also contributes to other causes of crashes, including running off the roadway, following too closely, and failure to yield.

Following enactment of TADRA, the annual rate of speed-related driver fatal crashes among Georgia 16-year-olds was cut almost in half, from 20.3 per 100,000 before the law went into effect to 10.3 afterward ($p = <0.0001$). Among 17-year-old drivers, speed-related driver fatal crashes declined 25.1 percent, from 14.0 per 100,000 in the pre-enactment period to 10.5 afterward. The only age group that did not experience a decline in speed-related fatal crashes was 18-year-old drivers. Among drivers in the 19, 20 and 21-24 year age strata, rates of speed-related fatal crashes declined by more than 30 percent. For drivers aged 21-24, this decline was statistically significant ($p = <0.0001$). Among drivers 25 years old or older, the annual rate of speed-related driver fatal crashes fell by 13 percent ($p = 0.003$). It should be noted that the average annual rate of speed-related crashes among drivers 25+ years old was substantially lower than that of younger drivers both before and after enactment of TADRA (Figure 2)

Figure 2

Speed-Related Fatal Crash Rates by Driver Age Before and After Enactment of TADRA in Georgia, 1992-2002



Definition: Speeding consisted of 'Driving too Fast for Conditions or In Excess of Posted Speed'

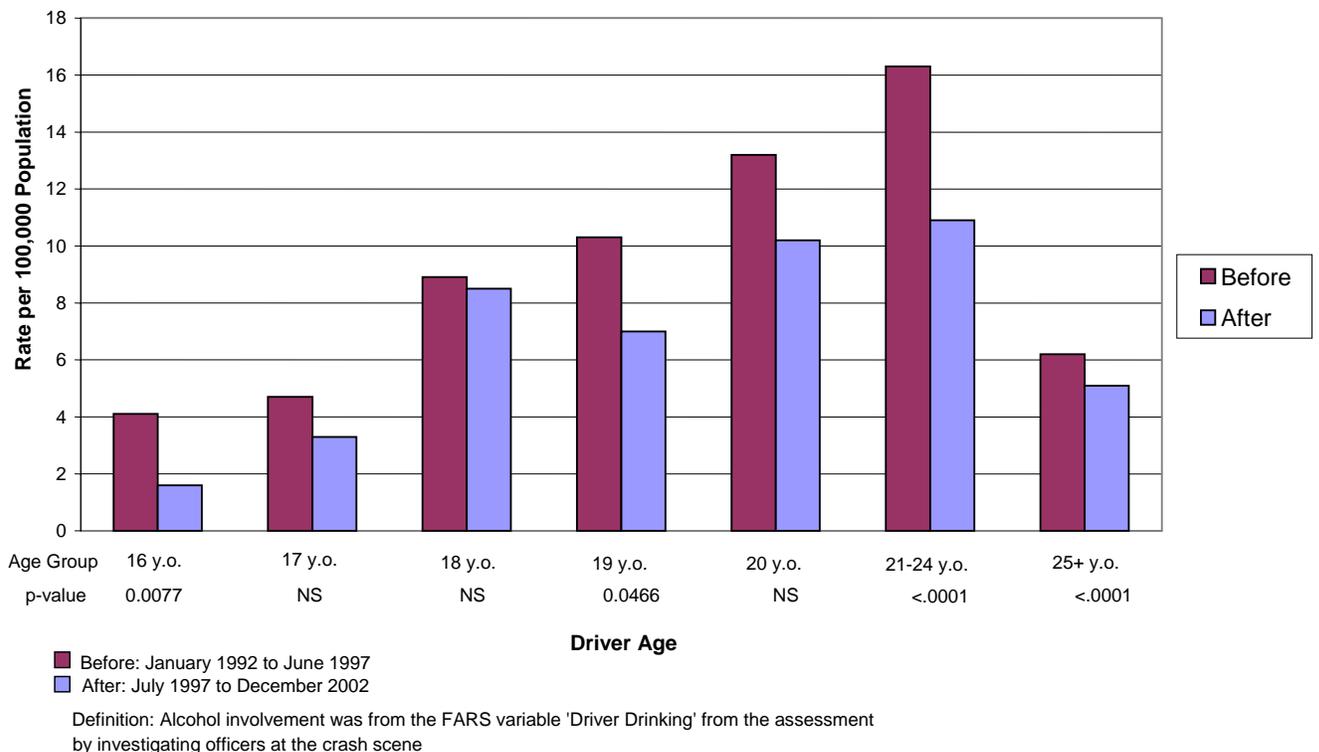
Alcohol-involved fatal crashes

In Georgia, fatal crashes involving alcohol-involved drivers under 18 years old are relatively uncommon (Williams, 2002). However, once drivers reach age 18, rates of alcohol-involved fatal crashes begin to climb dramatically, peaking in the 21- to 24-year-old age group. Nevertheless, during the first 5 1/2 years after TADRA was enacted, fatal alcohol-involved crashes of Georgia drivers 16 years old declined 62.1 percent, from 4.1 per 100,000 pre-enactment to 1.6 afterwards ($p = 0.008$). Among 17-year-old drivers, alcohol-involved fatal crashes declined by 30 percent, from 4.7 per 100,000 before enactment to 3.3 in the post-enactment period. Because of the relatively small number of fatal crashes involved in this comparison, the decline is not statistically significant.

The change in observed alcohol-involved fatal crashes involving 18-year-old drivers following enactment was not significant. As was the case with speed-related crashes, larger post-enactment decreases in alcohol-involved fatal crashes were noted in the 19, 20, 21-24, and 25+ age groups. Among drivers age 21 to 24 and 25+, these reductions were statistically significant ($p < 0.0001$) (Figure 3).

Figure 3

Alcohol-Involved Fatal Crash Rates by Driver Age, Before and After Enactment of TADRA in Georgia, 1992-2002



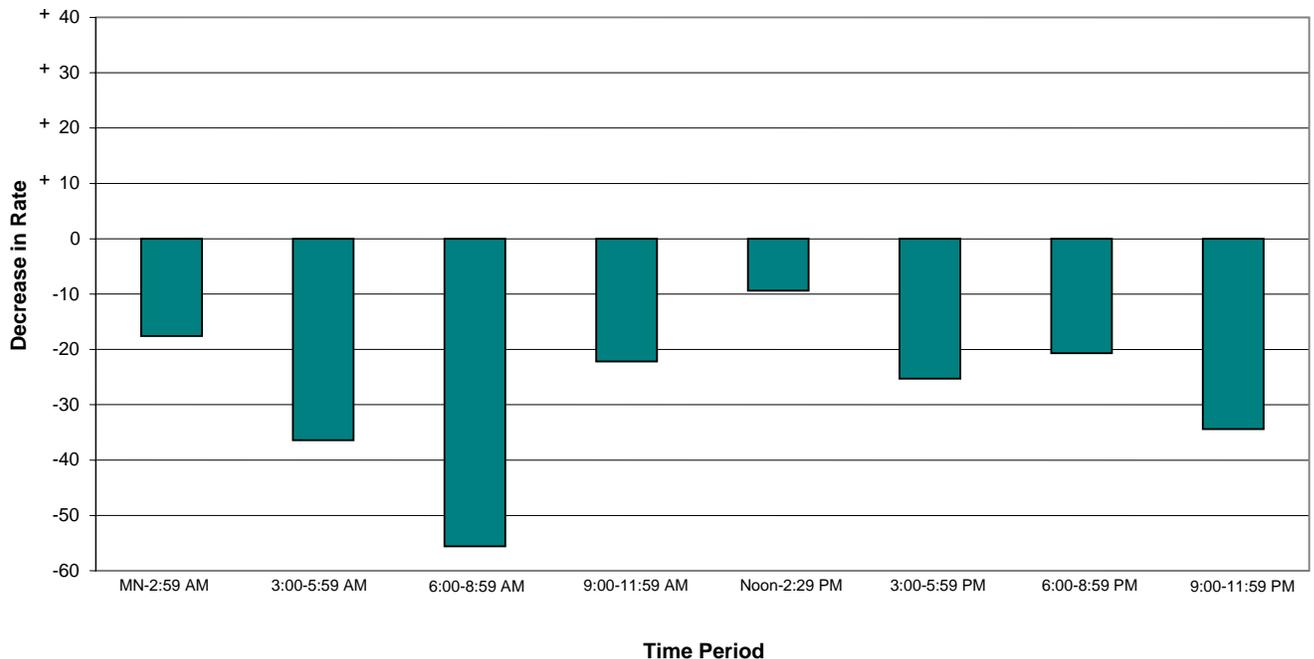
Fatal crashes by time of day

TADRA sharply restricts late-night driving by 16-year-olds. However, the most dangerous time for beginning drivers in Georgia is the 3 p.m. – 6 p.m. “rush hour” immediately after school.^{24,27} Both before and after enactment of TADRA, slightly more than one out of every four fatal crashes involving a 16-year-old Georgia driver occurred during this 3-hour afternoon interval. After TADRA was enacted, substantial decreases in 16-year-old driver fatal crash rates were noted in this afternoon time period, and every other 3-hour interval in the 24-hour cycle. The largest decrease in fatal crashes did not occur late at night, but between 6 a.m. to 9 a.m. (55.6 percent). The smallest decrease was in the 12 Noon to 3 p.m. time period (9.4%) (Figure 4).

Figure 4

Percent Change in Fatal Crash Rates Involving 16-year-old Drivers by Time of Day Before and After Enactment of TADRA in Georgia, 1992-2002

(Rate per 100,000 Population)



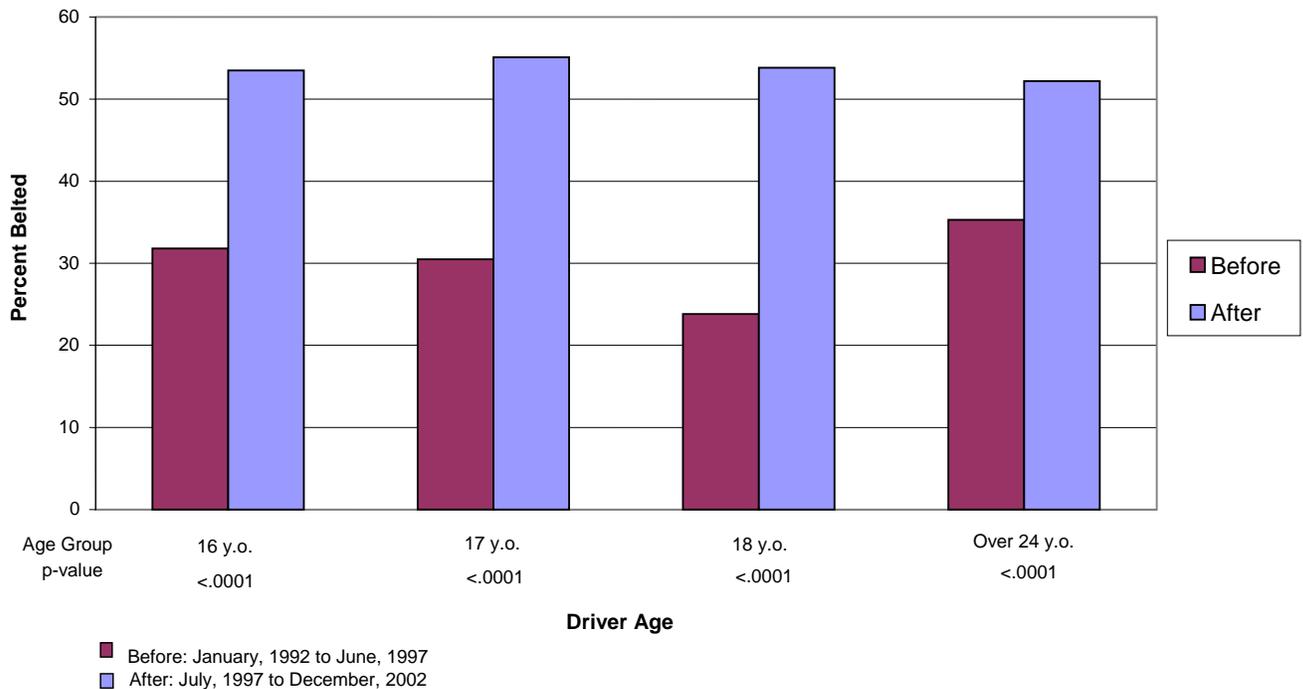
Seat belt use

Following enactment of TADRA, average annual rates of safety restraint usage among drivers and passengers of vehicles involved in a fatal crash were higher in all age groups. Seat belt use among 16-year-old drivers involved in a fatal crash increased from 34.4 percent in the pre-enactment period, to 54.2 percent in the post-enactment period. Restraint use among the passengers of 16-year-old drivers increased from 29.4 percent to 52.7 percent. The greatest absolute increase in the observed annual rate of seat belt usage was noted among the occupants

of vehicles with an 18-year-old driver – their restraint use in fatal crashes was nearly three times higher than that noted during the pre-enactment period. The smallest post-enactment increases in restraint usage were noted among the occupants of vehicles driven by an individual over the age of 24. All comparisons of changing rates of seat belt usage before and after TADRA were significant ($p < .0001$) (Figure 5).

Figure 5

Safety Belt Use by Drivers and Passengers Involved in Fatal Crashes Before and After Enactment of TADRA in Georgia, 1992-2002



Georgia’s experience compared to three adjoining States

To determine if the reductions in driver fatal crash rates observed in Georgia after enactment of TADRA were due to regional or historical effects rather than the law itself, we compared age-specific pre- and post-enactment annual rates of driver fatal crashes in Georgia to those of three bordering States (South Carolina, Tennessee, and Alabama) that did not enact similarly restrictive legislation during the same time period. In the first 5 1/2 years following enactment of TADRA, South Carolina’s annual rate of fatal crashes per 100,000 citizens increased in both younger and older age groups. Among drivers over age 24, the increase was significant ($p < 0.0001$).

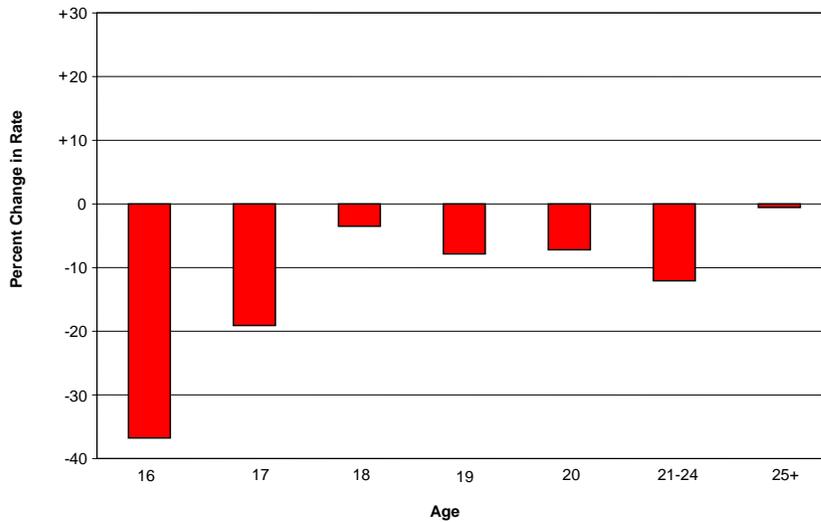
During the same time frame, annual driver fatal crash rates in Tennessee declined slightly in all age groups except 18-year-olds. However, the decline was only significant for drivers age 21 to 24 ($p = .01$). In Alabama, annual fatal crash rates involving 16- and 17-year-old drivers decreased by 23 and 16 percent respectively ($p = 0.01$ and 0.08 respectively). However, the

annual driver fatal crash rate increased significantly among 18-year-olds (23 percent, $p=0.02$), (Table 6).

Prior to enactment of TADRA, the rate of driver fatal crashes among 16-year-old Georgia drivers was similar to that of 16-year-old drivers in the three comparison States. Following enactment of TADRA, the rate of fatal crashes involving 16-year-old drivers in Georgia was 34 percent lower than that in Tennessee, 32 percent lower than that in Alabama, and 18 percent lower than in South Carolina. Seventeen-year-old Georgia drivers experienced a fatal crash rate 21 percent, 16 percent and 21 percent lower than that the fatal crash rates of their age-matched peers Alabama, South Carolina and Tennessee, respectively. Figures 6a-d on the following two pages depict the net change in each State's age-specific driver fatal crash rate during the 5- $\frac{1}{2}$ -year follow-up period. Additional graphs, illustrating the year-by-year fatal crash rates of 16-year-old drivers in each State, are presented in Appendix 4.

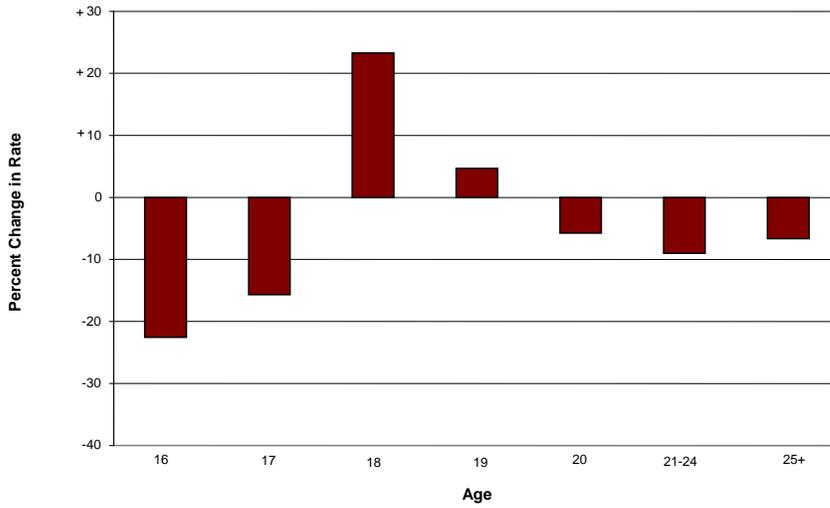
Figure 6.a.

Percent Change of Driver Fatal Crash Rates Following Enactment of TADRA* in Georgia



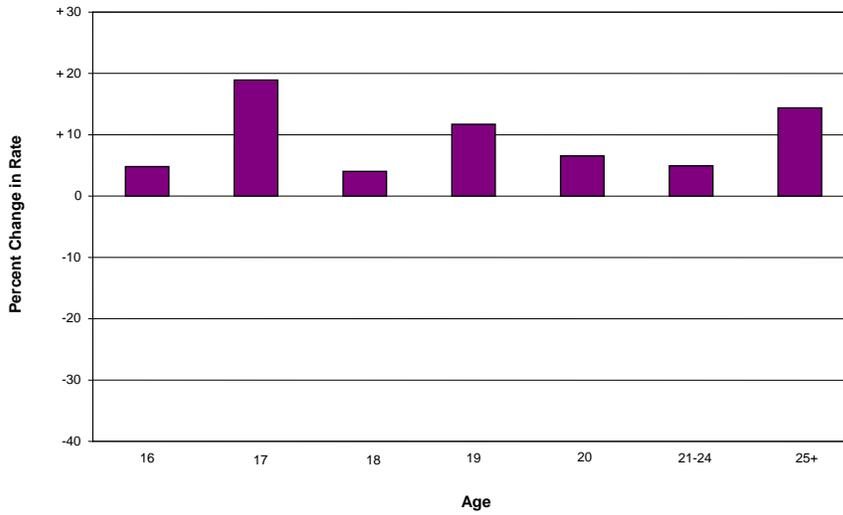
*(TADRA enacted in Georgia on July 1, 1997)

Figure 6.b.
Percent Change of Driver Fatal Crash Rates Following Georgia's Enactment of TADRA* Alabama (non-TADRA control)



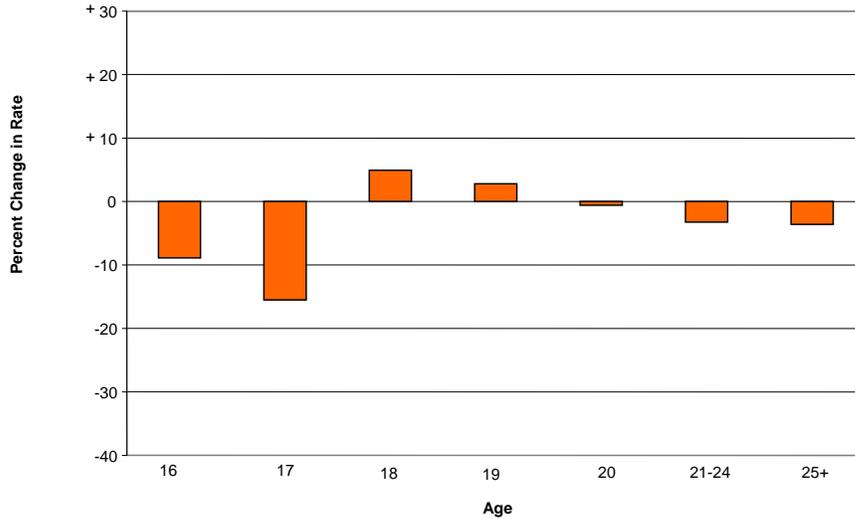
*(TADRA enacted in Georgia on July 1, 1997)

Figure 6.c.
Percent Change of Driver Fatal Crash Rates Following Georgia's Enactment of TADRA* South Carolina (non-TADRA control)



*(TADRA enacted in Georgia on July 1, 1997)

Figure 6.d.
Percent Change of Driver Fatal Crash Rates Following Georgia's Enactment of TADRA*
Tennessee (non-TADRA control)



*TADRA enacted in Georgia on July 1, 1997)

Does TADRA continue to influence the behavior of drivers after they reach age 21?

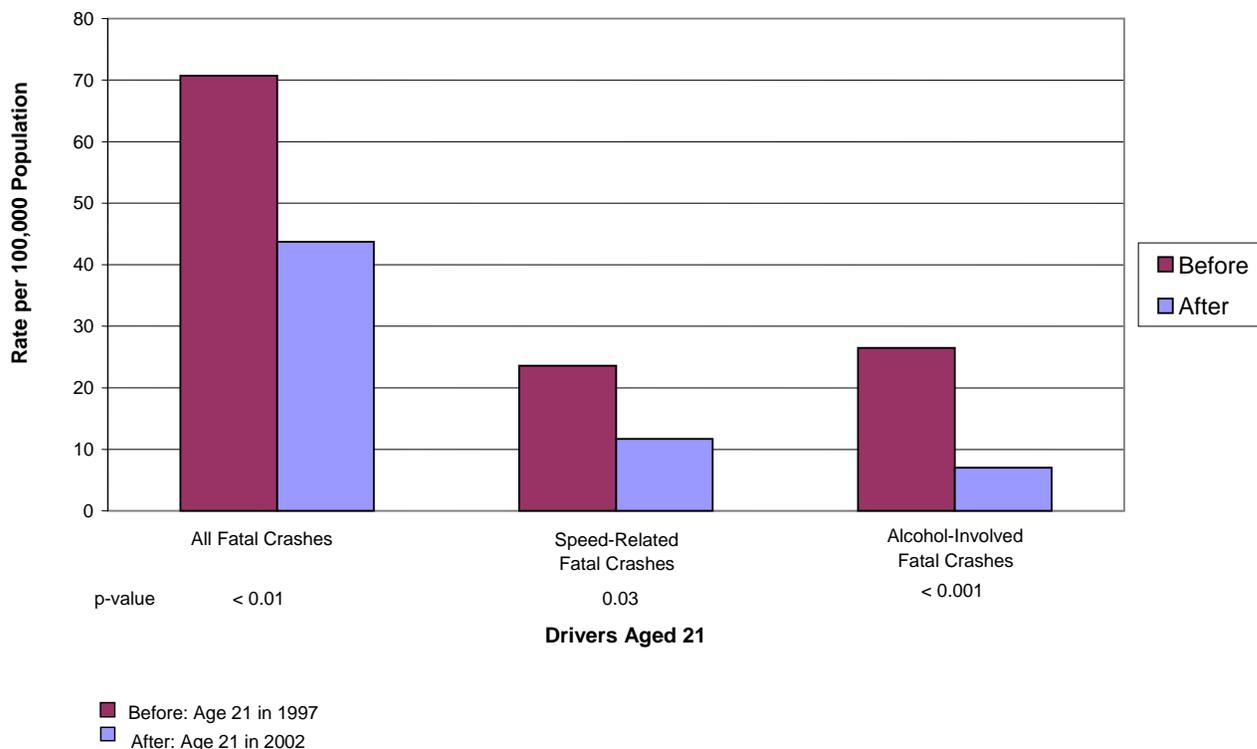
To determine whether Georgia teenagers who grew up under TADRA are driving differently at age 21 than Georgians who turned 21 immediately before enactment of the law, we compared the annual fatal crash rate and driving records for 21-year-old drivers involved in a fatal crash in 1997 (the year TADRA was enacted) to those of 21-year-old drivers involved in fatal crashes in 2002 (5 years after enactment). We also noted the percentage of driver fatal crashes pre- and post-enactment that were related to excessive speed or consumption of alcohol.

Compared to their age-matched peers who were involved in a fatal crash in 1997, 21-year-old Georgia drivers involved in a fatal crash in 2002 were significantly less likely to have been previously convicted of speeding ($p = <0.0001$), other harmful motor vehicle infractions ($p = 0.001$), or to have a prior license suspension ($p = 0.001$). Prior DUI convictions among 21-year-old Georgia drivers involved in a fatal crash were also decreased, but the difference was only marginally significant (Fisher's Exact $p = .045$).

The first cohort of 21-year-old Georgia drivers who began driving in the era of TADRA were 38 percent less likely to be involved in a fatal crash ($p= 0.007$), 50 percent less likely to be involved in a speed-related fatal crash ($p= 0.0299$), and 74 percent less likely to be involved in an alcohol-related fatal crash ($p= 0.0002$) than their peers who turned 21 in 1997, the year that TADRA went into effect (Figure 7).

Figure 7

Rate of Fatal Crashes Involving 21-Year-Old Georgia Drivers Before and After Enactment of TADRA in Georgia



Discussion

Background: TADRA's enactment came after a 6-year period of intense legislative lobbying and community activism. The political pressure to do something about teen crash fatalities reached a crescendo in the fall of 1996 following a series of highly publicized, multiple-fatality teen car crashes in the Metropolitan Atlanta area. The first version of TADRA was signed into law by then Governor Zell Miller on March 14, 1997.²¹⁻²² The legislation was further strengthened in 2000 with extension of driving curfew hours, elimination of curfew exemptions, and additional limitations on the number of passengers that can ride in a vehicle driven by provisional license holder. These features were signed into law by then Governor Roy Barnes on April 11, 2001.²⁵⁻²⁶

The first examination of the impact of TADRA was conducted by Angelyn Rios and reported in the *Georgia Highway Safety 1999 Fact Book*.²⁴ She noted an immediate and highly positive effect of the law, particularly among 16- and 17-year-old drivers (a decrease of 35.1% in fatal crashes involving 16- and 17-year-old drivers). These findings suggest that TADRA had an immediately favorable impact, but the evaluation interval was too short to reach a definitive conclusion about the law.

In 2001, Rios reexamined TADRA 18 months following enactment. At that point, the rate of fatal crashes involving Georgia drivers 16 and 17 years old was still 30 percent lower than it had been immediately prior to enactment.²⁷ Although Rios' findings were highly encouraging,

Georgia's experience was not compared to that of neighboring States, so it was possible that much of the law's perceived benefit might be due to historical effects, such as stricter traffic enforcement or rising rates of seat belt use.

The Current Study: Our evaluation confirms Rios' earlier findings and indicates that the effects of TADRA were sustained over time. During the 5-½-year follow-up period, the rate of fatal crashes involving 16-year-old Georgia drivers was 36.8 percent lower than during the final 5 ½ years before enactment. This reduction was substantially greater than that observed in the comparison States, and twice the decline noted among 16-year-olds nationwide during this time interval. This suggests that enactment of TADRA produced significant benefits above and beyond what might be attributed to historical effects.

We also found a statistically significant but more modest effect on fatal crashes involving 17-year-old drivers. No appreciable decrease in fatal crashes involving 18-year-olds was noted, but no increase was noted, either. This largely rules out displacement of crashes from younger to older age groups. If TADRA had simply encouraged young drivers to delay the onset of driving, or to reduce their frequency of driving until they were older, any net benefit from a decrease in fatal crashes involving 16- and perhaps 17-year-old drivers would be offset by higher rates of fatal crashes among 18-and-older drivers. This was not the case.

TADRA's impact on fatal crash rates involving 16-year-old drivers was greater than that noted in a number of States where GDL legislation has been evaluated (Appendix 1). We believe TADRA's impact is greater because it includes a number of supplemental provisions aimed at deterring specific high-risk driving behaviors, most notably excessive speeding. TADRA also differs from many other State GDL systems because it imposes a highly meaningful and inescapable sanction -- automatic license revocation -- on those who violate its provisions (Appendix 2).

Analyzing 11 years of data allowed us to compare driver fatal crash rates by age group for 5 ½ years pre- and post-enactment. Most evaluations of GDL laws have had been limited by relatively short follow up intervals.¹¹ Rather than limit our analysis to the youngest age groups of drivers, we examined changing rates of fatal crashes across the age spectrum. This allowed us to determine if TADRA simply displaced fatal crashes to older age groups. Comparing our data with that of three neighboring States allowed us to exclude potentially confounding historical effects. Adjusting for changes in population was necessary because Georgia, like other southern States, experienced significant growth during the study interval. Use of relatively lengthy pre- and post-enactment periods increased the power of our study to explore TADRA's effects on specific types of hazardous driving behavior, such as excessive speeding, drunk driving, and late-night driving. It also enabled us to confirm that the law's benefits were long-lasting.

Every study is subject to limitations. The data used in our analysis is derived from fatal crash reports that reflect the perspectives of the law enforcement officers that complete them as well as the fiscal limitations of the agencies that support these collections. Enforcement of laws against various high-risk driving behaviors, such as nonuse of seat belts, speeding, and drunk driving, vary from State to State and probably change over time.

We decided to calculate age-specific rates of driver fatal crashes using each State's population, rather than the number of licensed drivers in each age group because the only national database that contains State and age-specific counts of licensed drivers (FHWA, Highway Statistics, DL-

22) specifically excludes drivers holding a provisional or restricted license.²⁸ In 1989, a FHWA committee decided that the enumeration of licensed drivers for this file should not include Class P permit holders (i.e., instructional permits) as well as drivers with limited-use or restricted licenses.

When this FHWA rule was implemented, it significantly reduced State counts of licensed drivers in the youngest age groups. Moreover, since different States interpreted the rule differently, it added a degree of variability to what had previously been a consistent process. Both effects make State-by-State comparisons based on current counts of licensed drivers highly problematic. Regardless of how officials in a particular State interpret the rule, it is clear that FHWA statistics significantly undercount drivers in youngest age groups, particularly drivers in GDL States where the issuance of Class P and various types of restricted licenses is quite common.

Because drivers with restricted licenses are frequently on the road, particularly during peak hours of the day and evening, using FHWA data to calculate fatal crash rates could seriously undercount the number of young drivers at risk. The practical impact of this error would be to artificially inflate fatal crash rates in this age group, thereby masking the beneficial effects of GDL legislation and other measures aimed at young drivers.

To avoid this error, we used standardized, age-specific population data as our denominator to calculate driver fatal crash rates. This approach offers the advantage of consistency, but it has its own limitations. It is possible that use of age-specific population data may overestimate the number of drivers at risk, since not all individuals choose to obtain driver licenses the moment they are eligible to do so. However, there is little evidence that large numbers of teens are deferring their decision to acquire driver licenses, beyond speculation based on misinterpretation of falling rates of licensure using FHWA statistics.

Confounding effects: Certain historical effects may explain some but clearly not all of the benefits we observed. Although seat belt use was not directly encouraged by TADRA, it increased in Georgia as it did elsewhere throughout the 11-year study interval.²⁹ In Georgia, observed rates of seat belt usage in all age groups increased from 50.6 percent in 1992 to 77.0 percent in 2002.³⁰⁻³¹ As recorded on the fatal crash reports filed by law enforcement officers, seat belt usage by occupants involved in fatal crashes also increased, from 47 percent in 1992 to 79.6 in 2002. To control for the historical effect of rising seat belt usage as well as other factors such as the proliferation of more crash worthy vehicles, we compared Georgia's experience to that of three neighboring States that did not enact similarly comprehensive legislation during the study time frame. Nationwide, the fatal crash rate involving 16-year-old drivers decreased 14.8 percent during the 5 1/2 year period immediately following the Georgia General Assembly's enactment of TADRA. This is less than half the decrease that was observed among Georgia's 16-year-old drivers during the same time period. If the decrease was due to seat belt use, we would have expected it to be gradual and mirrored in all States. Instead, we noted an immediate, "step-wise" reduction in fatal crash rates involving 16-year-old drivers – an effect that was not mirrored in the comparison States (Appendix Four).

Why is TADRA so effective among 16-year-olds? At age 16, the vast majority of teenagers are inexperienced drivers who live at home and are therefore subject to their parents' or guardians' supervision.³²⁻³³ They are also dependent on their parents or guardians for economic support. By age 17, many teens have acquired enough driving experience to become overconfident; they may also be less fearful of the disapproval of their parents or guardians. By

age 18, many teens have moved out of the house to go to college or start their first job, and are therefore living independently of their parents or guardians. They may also find it easier to acquire alcohol. In light of these developmental and social milestones, it is not surprising that TADRA had its greatest effect on 16-year-old drivers, and a diminishing but nonetheless valuable impact on 17-year-old drivers.

If TADRA merely discouraged 16- and 17-year-olds from driving, or delayed the onset of high-risk driving without fundamentally altering driver behavior, any benefits accrued among 16- and 17-year-olds might be offset by a compensatory increase in fatal crashes involving drivers 18 or older. This did not occur.

The provision in TADRA that calls for automatic revocation of the license of a teen driver traveling more than 24 miles per hour over the posted speed limit may be particularly effective. Before enactment of TADRA, unsafe or illegal speed-related fatal crashes accounted for more than one-third of all fatal crashes involving 16-year-old drivers. After TADRA went into effect, annual rates of speed-related fatal crashes involving 16-year-old Georgia drivers were cut nearly in half. In fact, the reduction of speed-related fatal crashes accounted for more than half of the law's effect among 16-year-old drivers.

A Potential Cohort Effect: We found evidence that TADRA may impart lasting benefits to drivers who grow up under the law. The first cohort of Georgia drivers who reached age 21 in the era of TADRA were involved in fatal crashes at a rate fully 38 percent lower than that of Georgia drivers who turned 21 in 1997, the year that TADRA went into effect. Although some of this benefit is undoubtedly due to improvements in vehicle design and rising rates of seat belt use, the change is much greater than that noted on a national basis during this time frame. This suggests that Georgians who are reaching age 21 in the era of TADRA may be driving more responsibly than their predecessors. This is a fertile area for further research.

Comparisons to Neighboring Southeastern States: TADRA's effects were not mirrored in three adjoining Southern States* that did not enact similar legislation during the study interval.³⁴

- *The three comparison States added partial graduated licensing provisions to their existing motor vehicle statutes during the TADRA study period. Legislation was passed in Alabama in 2003, South Carolina in 1998, and Tennessee in 2004. See 54 Alabama Law Review 1473 (Summer, 2003), 56 South Carolina Code Annotated 1 § 175,176,180 and 55 Tennessee Code Annotated 50 §301-304, 311,312, 322 as well as, 49 Tennessee Code Annotated 6 §3017.*

The differences between Georgia and its neighboring States of Tennessee and South Carolina are particularly stark. In the third comparison State, Alabama, fatal crashes involving 16-year-old drivers declined to a greater degree than the national average, but the decrease was not as great as that noted in Georgia. Based on these comparisons, it is highly unlikely that the decreases we observed among 16- and 17-year-old Georgia drivers were exclusively due to historical factors. This suggests that other States may achieve impressive reductions in teen fatal crash rates if they enact legislation similar to Georgia's TADRA law.

In Alabama, the rate of fatal crashes involving 16-year-old drivers decreased 22.5 percent during the post-enactment period. Alabama did not enact GDL legislation prior to 2002, and the State's GDL law did not go into effect until September 1 of that year (See Appendix 2). No other major legislative changes were adopted by Alabama during the 11-year interval of our study. To determine if other public education or enforcement interventions were implemented in Alabama during this time, we contacted colleagues in Alabama to ask them why Alabama's experience diverged from that of Tennessee and South Carolina. They could not identify a reason. While Alabama's decline during the study interval is intriguing, it was only 7.5 percent greater than the overall decline in the United States during the same time period. Furthermore, Alabama's decrease was 14.3 percent *less* than that observed in Georgia's during the same time frame.

Final Observations: Although our findings are encouraging, it is important to keep TADRA in perspective. Before TADRA was enacted, the rate of fatal crashes involving 16-year-old drivers in Georgia was quite high. In the first 5 ½ years following enactment, fatal crashes involving 16-year-old Georgia drivers declined dramatically, but the post enactment rate was still 28.6 percent higher than the U.S. average among 16-year-olds (36.1 per 100,000 in Georgia versus 28 per 100,000 nationwide). Happily, this "mortality gap" is less than half what it was before TADRA was enacted (57 per 100,000 in Georgia versus 32.8 per 100,000 nationwide). Georgia has made progress, but the State still has a long way to go.

Nevertheless, TADRA appears to have had a favorable impact on highway safety in Georgia. One way to quantify this benefit is to use sensitivity analysis to project the rate of fatal crashes that might otherwise have occurred if the Georgia's General Assembly had failed to enact TADRA in 1997, or the Governor had failed to sign it into law. If Georgia had experienced the more modest decline in driver fatal crashes that was noted in Alabama during the 5-½-year follow-up interval (the "best case scenario"), 221 additional drivers age 16 to 20 would have been involved in a fatal crash. However, if driver fatal crash rates in Georgia had risen as much as they did in South Carolina (the "worst case scenario"), 434 additional drivers age 16 to 20 would have been involved in a fatal crash. Since a "driver fatal crash" can claim more than one life, it is likely that TADRA saved a minimum of 220 to 430 lives during its first 5 ½ years of existence. It is also possible, if not likely, that TADRA prevented a large number of serious but nonfatal injuries.

Why did TADRA have more impact than many States' GDL laws? We cannot answer this question with certainty, but we believe it is probably because TADRA links graduated driver licensing with supplemental provisions designed to deter high-risk driving behaviors by teens. Chief among these are measures designed to deter driving at excessive rates of speed, drag racing, and evading a police officer, and a measure specifically designed to deter alcohol-impaired driving. Provision for an immediate, believable, and highly meaningful sanction, automatic license revocation, probably strengthens the deterrent effect of TADRA. Teen drivers in Georgia quickly learned that their parents could not help them evade the legal consequences of violating the law. Anecdotally, the loud complaints of the first young drivers who lost their license constituted the best publicity TADRA received. It is important to acknowledge that because the many provisions of TADRA were enacted as a package, it is impossible to dissect which particular aspect had the greatest effect.

Nevertheless, it appears that enactment of TADRA resulted in an immediate and substantial decline in driver fatal crash rates in Georgia. The impact was greatest among 16-year-old drivers, but notable among 17-year-old drivers as well. Fatal crashes were not displaced to 18-

year-olds and older age groups. Interestingly, there is preliminary evidence that drivers reaching age 21 under TADRA may be driving more safely than their predecessors did.

State governments interested in duplicating Georgia's success should consider adopting a similarly comprehensive package of legislation. Successful replications in other States would provide compelling evidence that TADRA's multi-faceted approach is effective. Georgia's experience suggests that it is possible to facilitate a safe and orderly transition from adolescence to adult driving. Graduated licensing is a key component of that process, but States should consider strengthening it with additional provisions aimed at deterring high-speed driving, DUI, and other dangerous behaviors. Such laws, backed up by meaningful enforcement, and certain sanctions, may help more adolescent drivers and passengers reach adulthood.

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References

1. National Highway Traffic Safety Administration. (1993). Addressing the safety issues related to younger and older drivers: A report to Congress. Washington, DC.
2. Liu, J. Y., Mooney, D. P., Meyer, M. M., & Shorter, N. A. (1998). Teenage driving fatalities. *Journal of Pediatric Surgery*, 33(7), 1084-1088; discussion 1088-1089.
3. McKnight, A. J., & McKnight, A. S. (2000). The behavioral contributors to highway crashes of youthful drivers. *Annual Proceedings. Association for the Advancement of Automotive Medicine*, 44, 321-333.
4. O'Malley, P. M., & Johnston, L. D. (2003). Unsafe driving by high school seniors: National trends from 1976 to 2001 in tickets and accidents after use of alcohol, marijuana and other illegal drugs. *Journal of Studies on Alcohol*, 64(3), 305-312.
5. Ulmer, R. G., Williams, A. F., & Preusser, D. F. (1997). Crash involvements of 16-year-old drivers. *Journal of Safety Research*, 28(2), 97-103.
6. Williams, A. F. (2003b). Teenage drivers: patterns of risk. *Journal of Safety Research*, 34(1), 5-15.
7. Mayhew, D. R., Simpson, H. M., & Pak, A. (2003). Changes in collision rates among novice drivers during the first months of driving. *Accident Analysis & Prevention*, 35(5), 683-691.
8. Phebo, L., & Dellinger, A. M. (1998). Young driver involvement in fatal motor vehicle crashes and trends in risk behaviors, United States, 1988-95. *Injury Prevention*, 4(4), 284-287.
9. Martinez, R. (2005). Teen crash victims: Who are these people and why are they here? *Annals of Emergency Medicine*, 45(2), 155-156.
10. Waller, P. F. (2003). The genesis of GDL. *Journal of Safety Research*, 34(1), 17-23.
11. Shope, J. T., & Molnar, L. J. (2003b). Graduated driver licensing in the United States: evaluation results from the early programs. *Journal of Safety Research*, 34(1), 63-69.
12. Simpson, H. M. (2003). The evolution and effectiveness of graduated licensing. *Journal of Safety Research*, 34(1), 25-34.
13. Fildes, B., & Langford, J. (2002). Graduated licensing programmes and young-driver crashes. *Lancet*, 359(9308), 725-726.
14. Insurance Institute for Highway Safety. (2005). U.S. licensing systems for young drivers: Laws as of January 2005. Available: http://www.hwsafety.org/safety%5Flaws/us_licensing_systems.pdf Accessed March 8, 2005.

15. Agent, K., Steenbergen, L., Pigman, J, McCoy, C., & Pollack, S. (2001) Impact of the Graduated Driver License Program in Kentucky on teen motor vehicle crashes. Lexington, KY: Kentucky Injury Prevention and Research Center.
16. Foss, R. D., Feaganes, J. R., & Rodgman, E. A. (2001). Initial effects of graduated driver licensing on 16-year-old driver crashes in North Carolina.. *JAMA*, 286(13), 1588-1592.
17. Hyde, L. K., Cook, L. J., Knight, S., & Olson, L. M. (2005). Graduated driver licensing in Utah: Is it effective? *Annals of Emergency Medicine*, 45(2), 147-154.
18. Office of the Governor's Highway Safety Representative, Ohio Department of Public Safety. 2001. Evaluation of Ohio's graduated driver license program. Available: <http://www.publicsafety.ohio.gov/news/gdlreport.pdf> Accessed March 8, 2005.
19. Shope, J. T., Molnar, L. J., Elliott, M. R., & Waller, P. F. (2001). Graduated driver licensing in Michigan: early impact on motor vehicle crashes among 16-year-old drivers.. *JAMA*, 286(13), 1593-1598.
20. Ulmer, R. G., Preusser, D. F., Williams, A. F., Ferguson, S. A., & Farmer, C. M. (2000). Effect of Florida's graduated licensing program on the crash rate of teenage drivers. *Accident Analysis & Prevention*, 32(4), 527-532.
21. 40 OCGA 5 §22, 24,57.1
22. 14 Georgia State University Law Review 203 (December, 1997).
23. Firestone, D. (March 14, 2001). Bid to Raise Driving Age Is Roiling Rural Georgia. *New York Times*, p. A12.
24. State of Georgia. Governor's Office of Highway Safety. (1999). Ed. A. M. Rios, *Georgia Highway Safety 1999 Fact Book: A Report on Highway Safety in Georgia*. Atlanta, GA: Governor's Office of Highway Safety. 8-9.
25. 40 OCGA 5 § 26 and 40 OCGA 6 § 391
26. 18 Georgia State University Law Review 205 (Fall, 2001)
27. State of Georgia. Governor's Office of Highway Safety. (2000). Ed. A. M. Rios, *Young Drivers in Georgia: The Teenage and Adult Driver Responsibility Act, A Supplement to the Georgia Highway Safety 2000 Fact Book*. Atlanta, GA: Governor's Office of Highway Safety.
28. U.S. Department of Transportation. Federal Highway Administration. Highway Statistical Series. *Report identifying state driver licenses and fees*. Available: <http://www.fhwa.dot.gov/ohim/hsguide/ch4.pdf> Accessed March 29, 2005.
29. University of Georgia. Cooperative Extension Service. Survey Research Center. (2002) *Georgia Governor's Office of Highway Safety, Occupant Protection Survey*. (unpublished report).

30. Loeb, P. D. (1993). The effectiveness of seat belt legislation in reducing various driver-involved injury rates in California. *Accident Analysis & Prevention*, 25(2), 189-197.
31. McKnight, R. H., & Dawson, S. K. (1996). Seat belt use in Kentucky -- a comparison of five measures. *Journal of the Kentucky Medical Association*, 94(3), 110-114.
32. Beck, K. H., Shattuck, T., Raleigh, R., & Hartos, J. (2003). Does graduated licensing empower parents to place greater restrictions on their newly licensed teens' driving? *Health Education & Behavior*, 30(6), 695-708.
33. Simons-Morton, B. G., & Hartos, J. L. (2003). How well do parents manage young driver crash risks? *Journal of Safety Research*, 34(1), 91-97.
34. Williams, A.F., & Mayhew, D.R.. (2003) Graduated Licensing: A Blueprint for North America. Arlington, VA: Insurance Institute for Highway Safety, Highway Loss Data Institute.

Appendix 1

Peer-Reviewed Evaluations of State Graduated Licensing Laws

State	Date Enacted	Time Periods Evaluated	Populations Studied	Effect Size Reported
Florida (Ulmer, 2000)	7/1996 Amended 2001	1995 vs. 1997	<i>Primary Group:</i> 17-year-old drivers, with analyses of 15-, 16-, and 18-year-olds <i>Comparison Groups:</i> 25- to 54-year-old drivers; Florida data compared to similar age groups in Alabama	Fatal or injury crashes for 16-year-old drivers: 1995: 5,570/172,554 population estimate for 16-year-olds 1996: 5,781/182,640 population estimate for 16-year-olds 1997: 5,388/185,689 population estimate for 16-year-olds Post-enactment decrease per 1,000 16-year-old drivers: -10%
Kentucky (Agent, 2001)	10/1996	1993-1995 vs. 1997-1999	<i>Primary Group:</i> 16-17-year-olds <i>Comparison Groups:</i> 19-year-olds and above	Post-enactment decreases per 1,000 16-year-old drivers: Crashes: -30% Injury Crashes: -33% Fatal Crashes: -31%
Michigan (Shope, 2001)	4/1997	1996 vs. 1998 and 1999	<i>Primary Group:</i> 16-year-olds <i>Comparison Group:</i> Drivers 25 and older	Driver fatal crashes for 16-year-olds: 1996: 54/1,000 population 1998: 41/1,000 population 1999: 37/1,000 population Adjusted risk of a fatal crash among 16-year-old drivers: -25%
North Carolina (Foss, 2001)	12/1997	1999 vs. 1996 1999 vs. 1997	<i>Primary Group:</i> 16-year-olds <i>Comparison Group:</i> Drivers 25 to 54 years old	Driver fatal crashes for 16-year-olds: 1996: 5/1,111 all crashes per 10,000 population 1997: 5/1,181 all crashes per 10,000 population 1999: 2/855 all crashes per 10,000 population Post-enactment decrease in fatal crash rate per 1,000 16-year-old drivers: -57%
Ohio (Kilgore, 2001)	10/1997 Amended 2004	1988-1999 Subanalyses for 1999 vs. 1996 and 1997	<i>Primary Group:</i> 16-year-olds <i>Comparison Group:</i> Drivers 25 to 54 years old	Driver fatal crashes for 16-year-olds: 1996: 57/10,000 registered drivers 1997: 49/10,000 registered drivers 1999: 47/10,000 registered drivers 1988: 64/10,000 registered drivers Post-enactment reduction in fatal crash rate per 1,000 16-year-old drivers: -17.5%
Utah (Hyde, 2004)	7/1999	1/1996-6/1999 7/1/1999- 6/30/2001	<i>Primary Group:</i> 16-year-olds	Post-enactment crashes per 1,000 16-year old drivers: Total crashes: -5% Injury Crashes: no significant difference

Appendix 2

Comparisons of Key Features of the Graduated Licensing Laws for the States of Georgia, Alabama, Tennessee, and South Carolina

(As of August 31, 2004)

Specific Feature of Law	Georgia		Alabama	Tennessee	South Carolina
	1997	2001 <i>Revised</i>	2002	2001	1998
Learners' Permits					
Driving permits can be issued to persons as young as 15	X	X	X	X At 14 if a "hardship" situation is proven	X
Written parental consent required to secure a permit (legal guardians and other legally recognized family members over 21 may consent as well)	X	X	X	X With proof of insurance	X
Graduated License Process					
Written parental consent required to secure a conditional license (legal guardians and other legally recognized family members over 21 may consent as well)	X	X	X	X With proof of insurance	
Conditional license issued after specified number of months	X 12 months	X 12 months	X 6 months		X 6 months
Conditional license issued after documented number of hours of behind-the-wheel with licensed parent or guardian		X 40 hours (6 at night)	X 30 hours	X 50 hours (10 at night)	X 40 hours (10 at night)
Conditional license issued after documented successful completion of a high school drivers' education class or a State-authorized driving school to fulfill behind-the-wheel experience		X	X		X
Age of driving instructor limited to 21 or older (parents, guardians, or other instructors)		X			
Conditional license issued after the successful completion of a written test	X	X	X	X	X
Passenger Restrictions					
Restrictions regarding the number of passengers in vehicle of conditional license holder	X Not more than 3	X Not more than 3	X More than 4	X More than 1	X More than 2
During the first six months of a conditional license, only immediate family members can be transported by the driver		X			

Specific Features of Law	Georgia		Alabama	Tennessee	South Carolina
	1997	2001 <i>Revised</i>	2002	2001	1998
Curfews					
Holders of a conditional license are subject to a curfew period when they are not allowed to drive	X 1-5 a.m.	X Curfew extended to Midnight – 6a.m.	X Midnight – 6a.m.	X 11p.m. – 6a.m.	X Midnight – 6a.m.
Suspension of License – Linkage to Secondary Education					
Provisions to address and link school suspension and expulsion information from State Dept. of Education to suspension of conditional license by DMV	X	X			X
Conditional license issuance and rights linked to school attendance and/or successful secondary school completion (e.g., graduation or GED)	X	X		X	X
Suspension of License – Moving Violations					
Written request for revocation of license may be made by parent, guardian or other legally recognized adult				X	
Conditional drivers with 4 or more points on their licenses for moving violations will have their license suspended. (Such violations include reckless driving, not wearing a seatbelt, leaving the scene of an accident, hit-and-run, and resisting or eluding law enforcement officers.)	X	X	X	X 6 points required, rather than 4 points	
Conditional drivers with 2 suspensions of their licenses will have their licenses revoked, and have to undergo a period revocation and re-testing/re-application		X	X	X	
Suspension of License - DUI					
“Zero tolerance” for any drivers under 21 with a BAC greater than .02 g/dL that will lead to immediate suspension of their licenses	X	X			X

Specific Features of the Law	Georgia		Alabama	Tennessee	South Carolina
	1997	2001 <i>Revised</i>	2002	2001	1998
Conditional drivers arrested for DUI with a BAC of less than .08 will suffer a six-month revocation of their licenses	X	X			
Conditional drivers arrested for DUI with a BAC of greater than .08 will have their licenses revoked and will have to undergo a retest of on-road driving skills		X			
Suspension of License – DUI continued					
Conditional drivers arrested for DUI will spend a minimum of 1 day in jail, perform 40 hours of community service		X			
Exemptions					
Individuals who are 16 or older, who are married, emancipated minors, or heads of household, are exempt from the conditional licensing process	No	No	Yes	No	No
Behind-the-wheel driving experience may be waived at the request of parent or guardian	No	No	Yes	No	No
Exemption to conditional licensing process for high school graduates younger than 18	No	No	No	Yes	No
Exemptions regarding the number of passengers for occasions when conditional license holder is transporting parent or guardian, or going to and from school with siblings.	No	No	Yes	Yes	Yes
Modifications to increase the number of passengers may be requested and granted upon petition of parent, guardian, or school official	No	No	Yes	No	Yes

Specific Feature of the Law	Georgia		Alabama	Tennessee	South Carolina
	1997	2001 Revised	2002	2001	1998
Curfew exceptions for conditional license holders allow them to drive if: they are driving to and from work, in an emergency situation, to or from a religious event, with parent or guardian in car	Yes	Rescinded	X	X Written note required Hunting/fishing trip included too	X Also includes travel for opportunity for employment
Exemptions to this law for military personnel	No	No	Yes	Yes	Yes
Exemptions to this law for drivers from other States, with valid licenses	No	No	Yes	Yes	Yes
Exemptions for the driving of agricultural vehicles by minors	Yes	Yes	Yes	Yes	Yes
Insurance Institute of Highway Safety's Rating of State GDL law (Williams and Mayhew, 2004)	n/a	Good	Fair	Good	Marginal

Appendix 3

Legal Sources Consulted

Alabama		
Source		
Code of Alabama	Title 32 – Motor Vehicles and Traffic	
	32-5A-195	Driver’s license, cancellation, suspension or revocation
	32-6-2	Exemptions
	32-6-3	Examinations; renewal
	32-6-7	Issuance; persons not eligible
	32-6-7.2	Age restrictions
	32-6-8	Learner’s license
	Title 16 - Education	
	16-28-41	Written guidelines
54 Alabama Law Review 1473 (Summer, 2003)		Survey of the 2002 Alabama Legislation
Georgia		
Source		
Official Code of Georgia Annotated	Title 40 – Motor Vehicles and Traffic	
	40-5-21 (2002)	Exemptions generally
	40-5-22 (2002)	Persons not to be licensed; minimum ages for licensees; school attendance requirements
	40-5-24 (2002)	Instruction permits; graduated licensing and related restrictions; temporary licenses
	40-5-26 (2004)	Applications of minors; distinctive licenses for persons under 21
	40-5-27 (2002)	Examination of applicants
	40-5-57.1 (2002)	Suspension of licenses of persons under 21 for certain offenses; suspension of licenses of persons under 18 for certain point accumulations; issuance of a new license following suspension
	40-6-391 (2004)	Driving under the influence of alcohol, drugs, or other intoxicating substances; penalties; publication of notice of conviction for persons convicted of endangering a child
14 Georgia State University Law Review 203 (December, 1997)		
18 Georgia State University Law Review 205 (Fall, 2001)		

South Carolina		
Source		
South Carolina Code Annotated	Title 56 – Motor Vehicles	
	56-1-175 (2003)	Issuance of conditional driver’s license
	56-1-176 (2003)	Conditions for issuance of conditional driver’s license and special restricted driver’s license
	56-1-180 (2003)	Special restricted licenses for certain groups
Tennessee		
Source		
Tennessee Code Annotated	Title 55. Motor and Other Vehicles. Chapter 50. Driver Licenses.	
	55-50-301 (2004)	License-required – Requirements--Exception
	55-50-302 (2004)	Classes of licenses --Endorsements
	55-50-303 (2004)	Persons not eligible for licensing
	55-50-304 (2004)	Persons exempt from licensing
	55-50-311 (2004)	Learner permit – Intermediate license
	55-50-312 (2004)	Licensing of minors
	55-50-322 (2004)	Examination of applicants
	Title 49. Education. Chapter 6. Elementary and Secondary Education. Part 30. Attendance.	
	49-6-3017 (2004)	Minors withdrawn from secondary school— Denial of motor vehicle license or permit

Appendix 4 Data Tables

Table 1
Georgia Drivers in Fatal Crashes
Before and After Enactment of TADRA*
(Number and Rate per 100,000 Population)

Driver Age	Before		After		Percent Change In Rate	Chi Square	P-Value
	Number	Rate	Number	Rate			
16	317	57	230	36.1	-36.8	28.55	<.0001
17	306	54.8	284	44.4	-19.1	6.64	0.0100
18	339	62.6	385	60.4	-3.5	0.23	0.6328
19	316	55.2	335	50.8	-7.8	1.09	0.2974
20	306	53.2	324	49.3	-7.2	0.88	0.3475
21-24	1,300	55.8	1,228	49	-12.1	10.50	0.0012
25+	7,882	32.1	8,991	32	-0.5	0.12	0.7239

(*Before: January 1992 to June 1997; After: July 1997 to December 2002)

Table 2
Drivers in Speeding-Related Fatal Crashes in Georgia
Before and After Enactment of TADRA*
 (Number and Rate per 100,000 Population)

Driver Age	Before		After		Percent Change In Rate	Chi Square	P-value
	Number	Rate	Number	Rate			
16	113	20.3	66	10.3	-49.12	19.76	<.0001
17	78	14	67	10.5	-25.12	3.04	0.0813
18	82	15.2	100	15.7	3.63	0.06	0.8109
19	85	14.8	65	9.9	-33.52	6.23	0.0126
20	86	14.9	66	10.1	-32.75	5.95	0.0147
21-24	373	16	244	9.7	-39.12	37.08	<.0001
25+	963	3.9	965	3.4	-12.63	8.83	0.0030

(*Before January 1992 to June 1997, after July 1997 to December 2002 *Speeding* consisted of “Driving too Fast for Conditions or In Excess of Posted Speed”)

Table 3
Drivers in Alcohol Involved Fatal Crashes in Georgia
Before and After Enactment of TADRA*
 (Number and Rate per 100,000 Population)

Driver Age	Before		After		Percent Change in Rate	Chi-Square	P-value
	Number	Rate	Number	Rate			
16	23	4.1	10	1.6	-62.12	7.10	0.0077
17	26	4.7	21	3.3	-29.59	1.44	0.2294
18	48	8.9	54	8.5	-4.4	0.05	0.8204
19	59	10.3	46	7	-32.22	3.96	0.0466
20	76	13.2	67	10.2	-22.74	2.38	0.1225
21-24	381	16.3	273	10.9	-33.31	26.47	<.0001
25+	1,521	6.2	1,428	5.1	-18.14	29.62	<.0001

(*Before: January 1992 to June 1997; After: July 1997 to December 2002

Alcohol involvement was from the FARS variable "Driver Drinking" from the assessment by investigating officers at the crash scene.)

Table 4
Time of Day of Crash for Drivers Age 16 in Fatal Crashes in Georgia
Before and After Enactment of TADRA*
 (Number and Rate per 100,000 Population)

<i>Time Period</i>	Before		After		Percent Change
	N	%	N	%	
12-2:59 a.m.	17	5.38	14	6.14	-17.6
3-5:59 a.m.	11	3.48	7	3.07	-36.4
6-8:59 a.m.	36	11.39	16	7.02	-55.6
9-11:59 a.m.	18	5.70	14	6.14	-22.2
12-2:29 p.m.	32	10.13	29	12.72	-9.4
3-5:59 p.m.	83	26.27	62	27.19	-25.3
6-8:59 p.m.	58	18.35	46	20.18	-20.7
9-11:59 p.m.	61	19.30	40	17.54	-34.4
<i>Total</i>	316	100.0	228	100.0	-27.8

*Before: January, 1992 to June, 1997; After: July, 1997 to December, 2002

Table 5
Seat Belt Use by Drivers and Passengers in Fatal Crashes in Georgia
Before and After Enactment of TADRA*
 (Number and Percent Belted)

Driver Age		Before		After		Change in Percent	Chi Square	P-value
		Number Belted	Percent Belted	Number Belted	Percent Belted			
16	Driver	109	34.4	125	54.3	19.9	21.70	<.0001
	Passenger	102	29.4	128	52.7	23.3	36.56	<.0001
	Total Occupants	211	31.8	253	53.5	21.7	53.90	<.0001
17	Driver	94	30.7	167	58.8	28.1	47.09	<.0001
	Passenger	84	30.2	123	50.8	20.6	22.94	<.0001
	Total Occupants	178	30.5	290	55.1	24.6	68.98	<.0001
18	Driver	86	25.4	185	48.1	22.7	39.60	<.0001
	Passenger	66	22	166	62.2	40.2	94.31	<.0001
	Total Occupants	152	23.8	351	53.8	30	122.51	<.0001
Over 24	Driver	2911	36.9	4998	55.6	18.7	587.06	<.0001
	Passenger	1281	32.2	2324	46.1	13.9	178.64	<.0001
	Total Occupants	4192	35.3	7322	52.2	16.9	737.10	<.0001

*Before: January, 1992 to June, 1997; After: July, 1997 to December, 2002

Table 6
Drivers in Fatal Crashes
Before and After Enactment of TADRA

(*Number and Rate per 100,000 Population / Before January 1992 - June 1997, After July 1997 - December 2002)

	Before			After			Percent Change in Rate	Chi-Square	P-value
	Population	Number	Rate	Population	Number	Rate			
Georgia									
16	555,849	317	57.03	638,024	230	36.05	-36.79	28.55	<.0001
17	557,993	306	54.84	640,103	284	44.37	-19.09	6.64	0.0100
18	541,423	339	62.61	637,158	385	60.42	-3.49	0.23	0.6328
19	572,815	316	55.17	658,934	335	50.84	-7.84	1.09	0.2974
20	575,712	306	53.15	656,951	324	49.32	-7.21	0.88	0.3475
21-24	2,331,907	1,300	55.75	2,505,619	1,228	49.01	-12.09	10.50	0.0012
25+	24,531,405	7,882	32.13	28,135,895	8,991	31.96	-0.54	0.12	0.7239
Alabama									
16	337,896	232	68.66	344,089	183	53.18	-22.54	6.71	0.0096
17	353,025	235	66.57	358,083	201	56.13	-15.68	3.16	0.0755
18	341,222	206	60.37	354,695	264	74.43	23.29	5.09	0.0240
19	356,925	257	72.00	363,441	274	75.39	4.70	0.28	0.5964
20	355,836	253	71.10	361,162	242	67.01	-5.76	0.44	0.5093
21-24	1,402,550	916	65.31	1,356,391	806	59.42	-9.01	3.83	0.0503
25+	14,911,945	5,838	39.15	15,838,143	5,788	36.54	-6.65	13.79	0.0002
South Carolina									
16	286,289	120	41.92	300,453	132	43.93	4.81	0.14	0.7092
17	298,994	133	44.48	317,600	168	52.90	18.92	2.23	0.1349
18	291,490	197	67.58	318,643	224	70.30	4.02	0.16	0.6867
19	309,390	175	56.56	333,955	211	63.18	11.70	1.17	0.2787
20	311,976	204	65.39	335,888	234	69.67	6.54	0.44	0.5082
21-24	1,258,835	747	59.34	1,244,555	775	62.27	4.94	0.88	0.3469
25+	12,873,265	4,478	34.79	14,237,855	5,664	39.78	14.36	45.13	<.0001
Tennessee									
16	399,159	239	59.88	423,456	231	54.55	-8.89	1.54	0.2156
17	402,611	268	66.57	430,360	242	56.23	-15.52	3.63	0.0567
18	389,264	289	74.24	426,157	332	77.91	4.93	0.36	0.5492
19	408,101	291	71.31	437,879	321	73.31	2.81	0.12	0.7322
20	408,573	285	69.76	435,493	302	69.35	-0.59	0.01	0.9433
21-24	1,641,313	1,021	62.21	1,651,956	994	60.17	-3.27	4207.16	<.0001
25+	18,550,441	6,407	34.54	20,369,597	6,783	33.30	-3.59	4.40	0.0360

Table 7
Characteristics of Drivers Age 21 in Fatal Crashes in Georgia After Enactment of TADRA
Compared With Drivers Age 21 in 1997 Before TADRA Enactment*
 (Number and Rate per 100,000 Population)

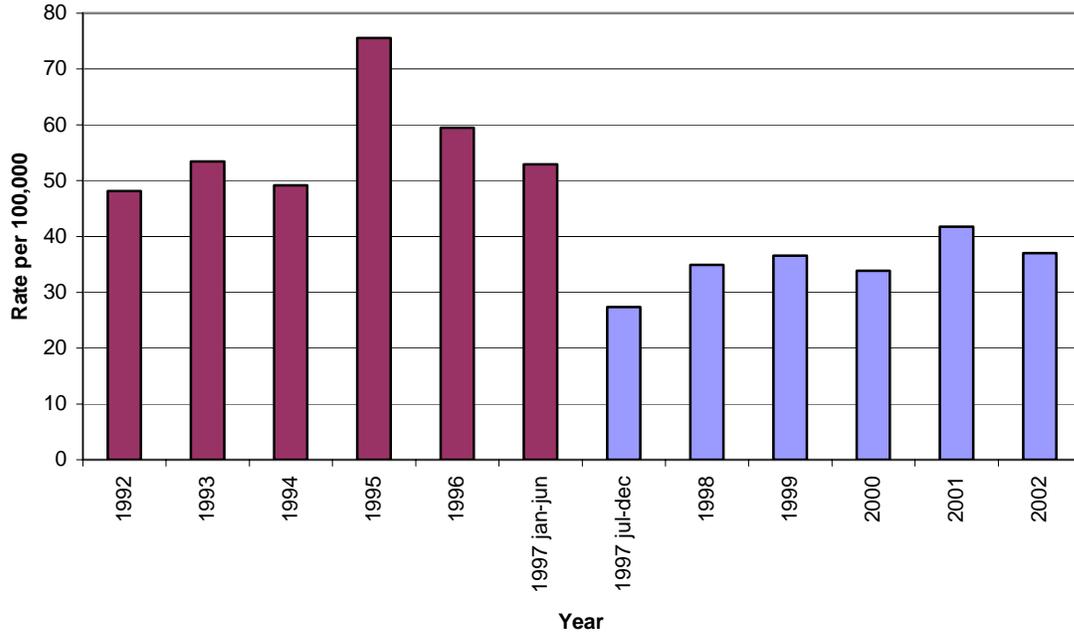
	Before		After		Percent Change in Rate	Chi Square	P-Value
	Age 21 in 1997		Age 21 in 2002				
	N	Rate	N	Rate			
Driver History							
Speeding Convictions	51	50.1	25	19.5	-61.1	16.06	<.0001
Alcohol Convictions	7	6.9	2	1.6	-77.3	--	0.0453 ¹
Other Convictions	29	28.5	12	9.4	-67.1	11.64	0.0006
License Suspensions	26	25.3	9	7	-72.5	12.78	0.0004
Driver Crash Event							
Crashes	72	70.7	56	43.7	-38.2	7.45	0.0064
Speeding Crashes	24	23.6	15	11.7	-50.4	4.71	0.0299
Alcohol Crashes	27	26.5	9	7	-73.6	13.78	0.0002

*Before: January, 1992 to June, 1997; After: July, 1997 to December, 2002

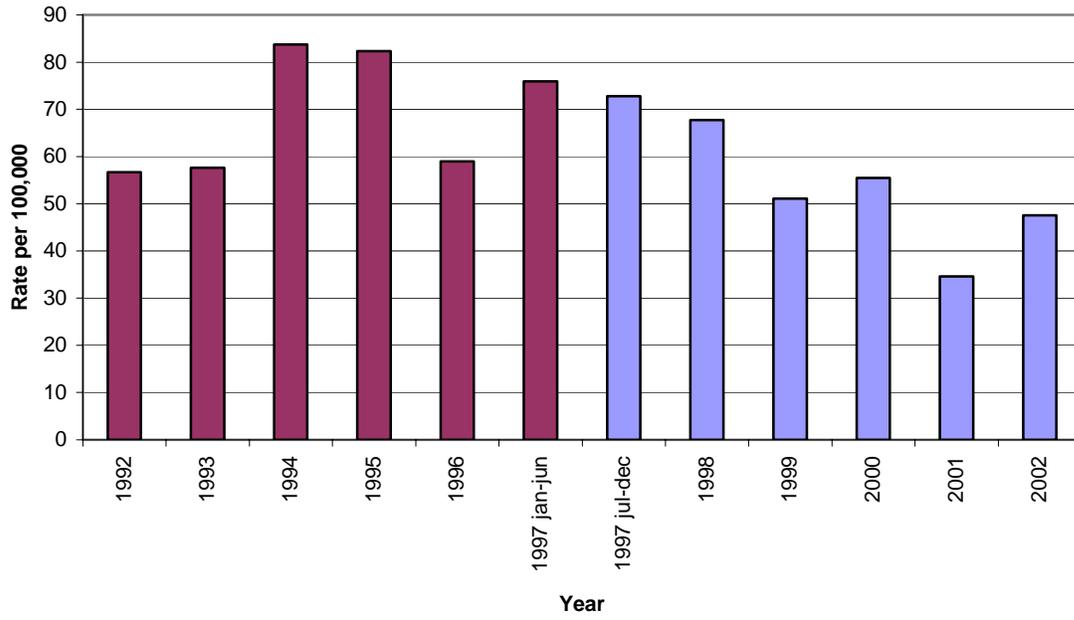
¹. Fisher's Exact Test p-value

Appendix 5
Year-by-Year Teen Fatal Crash Rates for
Georgia, Alabama, South Carolina, and Tennessee: 1992 – 2002

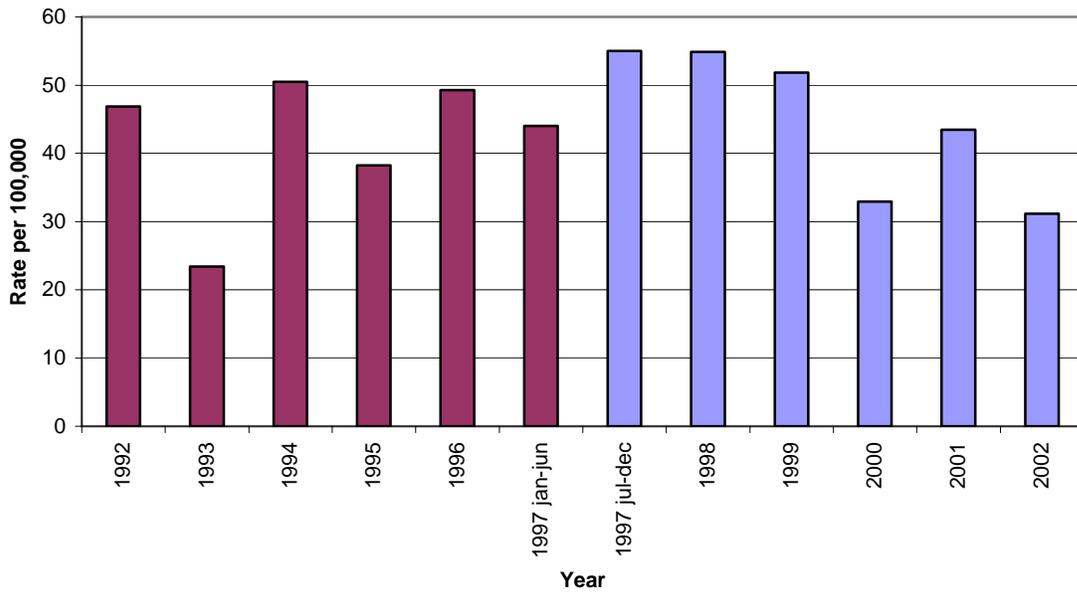
Fatal Driver Crash Rates for 16-year-old Georgia Drivers



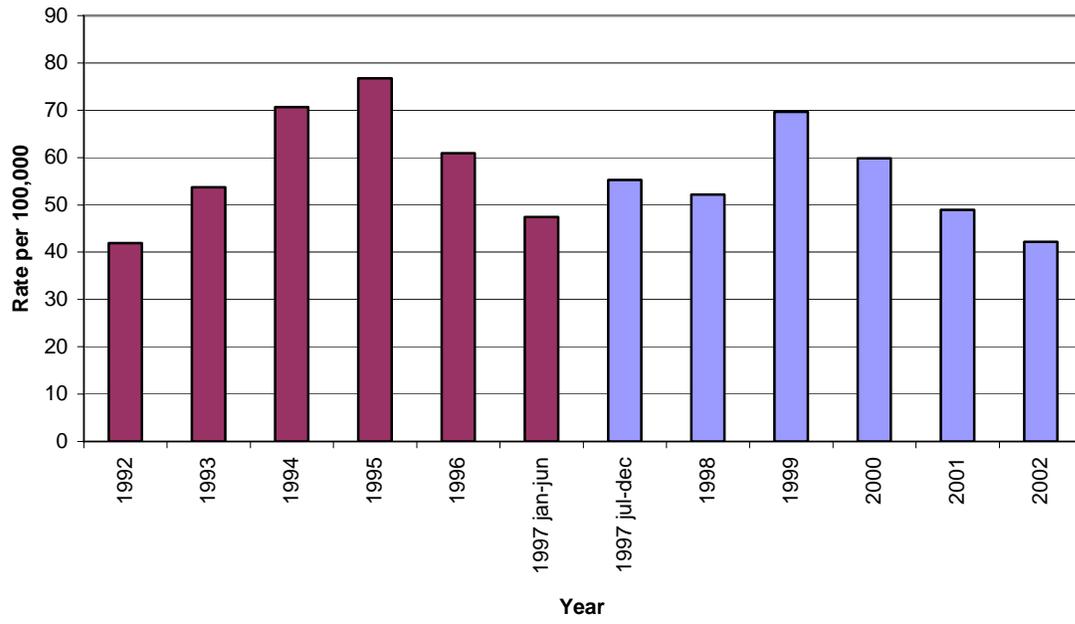
Fatal Driver Crash Rates for 16-year-old Alabama Drivers



Fatal Driver Crash Rates for 16-year-old South Carolina Drivers



Fatal Driver Crash Rates for 16-year-old Tennessee Drivers



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