
Lower Legal Blood Alcohol Limits for Young Drivers

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This article is dedicated to 15-year-old Stephen B. Ross, a pedestrian in Gloucester, MA, who died December 11, 1993, in a crash involving a 20-year-old driver alleged to have been intoxicated. Stephen's death focused public attention on alcohol-impaired driving and contributed to the May 1994 passage of an .02-percent legal blood alcohol limit in Massachusetts for persons ages 21 and younger.

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Synopsis

To reduce the involvement of young drivers in alcohol-related crashes, 29 States and the District of Columbia have established lower legal blood alcohol limits for drivers younger than age 21 than for adult drivers. Of these, 12 lowered the legal limit for young people prior to 1991. To assess the impact, these 12 States were paired for comparison with 12 nearby States matched for legal drinking age and timing of changes in that law.

Among drivers ages 15–20, fatal crashes involving a single vehicle at night are three times more likely than other fatal crashes to be alcohol-related.

Whether the proportion of fatal crashes that involved single vehicles at night declined more among young drivers targeted by lower blood alcohol limits than among young drivers of the same age in comparison States was examined. The maximum available equal number of pre- and post-law years were compared in each pair of States.

During the post-law period, the proportion of fatal crashes that involved single vehicles at night declined 16 percent among young drivers targeted by lower blood alcohol laws, whereas it rose 1 percent among drivers of the same age in comparison States where blood alcohol limits were not changed ($P < .001$).

Among adults, the proportion of fatal nocturnal crashes that involved single vehicles declined 5 percent in the group of States with the lowered levels for young people during the period after the law was enacted and 6 percent in the group of neighboring comparison States.

The proportion of fatal crashes that involved single vehicles at night declined 22 percent among drivers in States with .00 percent limits, whereas it declined only 2 percent among drivers of the same age in comparison States ($P < .003$). Among those targeted by .02 percent BAL limits, the proportion of fatal crashes that involved single vehicles at night declined 17 percent. It rose 4 percent in comparison States ($P = .005$). No significant difference appeared between States that lowered blood alcohol levels to the range of .04–.06 percent relative to comparison States.

If all States adopted .00 or .02 percent limits for drivers ages 15–20, at least 375 fatal single vehicle crashes at night would be prevented each year.

ALL STATES HAVE ESTABLISHED 21 as the minimum age at which alcohol can be purchased. State minimum age laws have been found to reduce both the consumption of alcohol and the involvement of persons younger than 21 in fatal automobile crashes (1,2). The National Highway Traffic Safety Administration credits increases in the legal drinking age

with preventing close to 1,000 traffic deaths annually (3).

Nonetheless, many persons younger than age 21 continue to drink alcoholic beverages. Enforcement of the age law varies in intensity from State to State (4). The Insurance Institute for Highway Safety, in a recent study, found that 97 out of 100 outlets in

Washington, DC, sold alcohol to 17- and 18-year-olds (5). In Minnesota, women judged to be ages 17 or 18 were successful in nearly half (47 percent) of 366 attempts to purchase alcohol (6). A national survey of high school seniors indicated that 77 percent consumed alcohol in the past year, and 28 percent consumed five or more drinks at one time in the 2 weeks prior to the survey (7).

Even a blood alcohol level (BAL) of .02 percent affects driving ability and increases the likelihood that drivers will be involved in fatal crashes (8). A comparison of drivers involved in single vehicle fatal crashes with drivers stopped in a national roadside survey revealed that each .02-percent increase in blood alcohol level nearly doubled the risk of fatal crash involvement among drivers of all age groups (9). Drivers ages 16–20 have a greater single vehicle fatal crash risk than older drivers even at .00 percent BAL, and their fatal crash risk has been found to increase more than drivers ages 21 and older with each .02-percent increase in BAL (9,10).

Partly because many persons younger than age 21 continue to drink, and alcohol consumption produces even greater fatal crash risks among drivers in that age category, traffic accidents account for 40 percent of all deaths to persons ages 15 to 20, making it the leading cause of death in that age group. According to the National Highway Traffic Safety Administration, although 7 percent of licensed drivers are ages 15–20, 15 percent of drivers in fatal crashes are in that age group, and 21 percent of deaths in crashes involve a 15–20-year-old driver. In 1992, an estimated 2,252 (42 percent) of traffic fatalities in the 15–20 age group were alcohol-related (11).

A total of 29 States and the District of Columbia have lowered the legal blood alcohol limit for drivers younger than age 21 to reduce their involvement in traffic crashes. The age groups targeted and the legal BAL limits vary (table 1). Currently, 7 additional States are considering legislative proposals to lower legal BALs for young drivers. An analysis of the first four States to reduce legal blood alcohol limits for young drivers revealed a 34-percent decline in night fatal crashes among adolescents targeted by lower BAL levels, a one-third greater decline than was observed in four nearby comparison States (12). Among adults in both sets of States, only a 9- to 10-percent decline in night fatal crashes was observed.

This study extends and improves on the earlier analysis by

1. examining the effects of lower BAL laws for young drivers in the 12 States where a law has been in place for at least 1 year,

Table 1. States with lower blood alcohol levels (BAL) for adolescents

State	Age group	Effective date	Legal BAL limit	Comparison State
Maine.....	16–21	7/83	.02	Massachusetts
North Carolina.....	<18	9/83	.00	Virginia
Wisconsin.....	<19	7/84	.00	Minnesota
New Mexico...	<18	7/84	.05	Colorado
California.....	<18	1/87	.05	Texas
Maryland.....	16–21	6/89	.02	Pennsylvania
Oregon.....	<18	10/89	.00	Washington
Ohio.....	<18	7/90	.02	Indiana
Rhode Island..	<18	7/90	.04	Connecticut
Arizona.....	16–21	10/90	.00	Utah
Georgia.....	<18	1/91	.06	Alabama
				New Hampshire
Vermont.....	<18	7/91	.02	Hampshire
Utah.....	16–21	7/92	.00	...
New Jersey ...	<21	12/92	.01	...
New Hampshire ..	16–21	1/93	.04	...
Arkansas.....	16–21	6/93	.02	...
District of Columbia....	<21	5/93	.00	...
Minnesota.....	<21	6/93	.00	...
Nebraska.....	<21	6/93	.02	...
Tennessee....	<21	7/93	.02	...
Texas.....	<21	9/93	.07	...
Virginia.....	<21	4/94	.02	...
Massachusetts	<21	5/94	.02	...
West Virginia..	<21	6/94	.02	...
Idaho.....	<21	7/94	.02	...
Washington...	<21	7/94	.02	...
Michigan.....	<21	11/94	.02	...
Illinois.....	<21	1/95	.00	...
Oklahoma.....	<18	7/95	.02	...

NOTE: Since the analysis years listed, New Mexico (1/94), Ohio (5/94), Oregon (10/91), and Rhode Island (7/90) have expanded the ages covered by their laws to include all drivers younger than age 21. California lowered its BAL to .01 in January 1994.

2. comparing the effects of lowering the legal BAL for young drivers to .00 percent, .02 percent, or to .04–.06 percent,

3. exploring fatal single-vehicle crashes at night that are even more likely to involve alcohol in the 15–20 age group than such crashes in any other age group.

Methods

Each State that lowered the legal BAL limit for young drivers prior to 1991 was compared to a nearby State that did not lower the legal limit for youth. Table 1 identifies the law and comparison States, the new BAL limit, the effective date of the law, as well as the age groups targeted. Whenever possible, an adjacent State was selected, but in some cases (California, for example) no nearby State offered an appropriate comparison. Texas was chosen for comparison with California.

Table 2. Data collection periods for lower blood alcohol level (BAL) States and comparison States before and after enactment of BAL law

Lower BAL and comparison States	Before	After	Years
Maine-Massachusetts...	7/75-6/83	7/83-6/91	8
North Carolina-Virginia ..	9/75-8/83	8/83-8/91	8
Wisconsin-Minnesota	7/76-6/84	8/84-6/92	8
New Mexico-Colorado ...	7/76-6/84	8/84-6/92	8
California-Texas.....	1/81-12/86	1/87-12/92	6
Maryland-Pennsylvania ..	6/86-5/89	6/89-5/92	3
Oregon-Washington	10/86-9/89	10/89-9/92	3
Ohio-Indiana.....	7/88-6/90	7/90-6/92	2
Rhode Island-			
Connecticut.....	7/88-6/90	7/90-6/92	2
Arizona-Utah.....	10/88-9/90	10/90-9/92	2
Georgia-Alabama	1/89-12/90	1/91-12/92	2
Vermont-New Hampshire	7/90-6/91	7/91-6/92	1

'Partly because many persons younger than age 21 continue to drink, and alcohol consumption produces even greater fatal crash risks among drivers in that age category, traffic accidents account for 40 percent of all deaths to persons ages 15 to 20, making it the leading cause of death in that age group.'

Comparison States had the same BAL limit for youth as for adults. Comparison States were matched as closely as possible for legal drinking age and timing of changes in that law. Arizona, North Carolina, Oregon, and Wisconsin have established a .00 percent BAL limit. Arizona was compared with Utah, North Carolina with Virginia, Oregon with Washington, and Wisconsin with Minnesota. Maryland, Maine, Ohio, and Vermont have .02 percent statutes. Maryland was compared with Pennsylvania, Maine with Massachusetts, Ohio with Indiana, and Vermont with New Hampshire. During the years of this analysis, California, Georgia, New Mexico, and Rhode Island had legal BAL limits for youth between .04 and .06 percent. California was compared with Texas, Georgia with Alabama, New Mexico with Colorado, and Rhode Island with Connecticut.

For each law and comparison State, an analysis year was defined as the 12-month period beginning with the month the reduced BAL law was enacted. We use the term adolescent to refer to the ages covered by these laws when they were first

implemented because the specific age of adolescent drivers covered by lower BAL laws varies across the 12 State pairs. The U.S. Department of Transportation Fatal Accident Reporting System (FARS) provided data on fatal crashes. Our analysis examined all available post-law years and an equal number of pre- and post-law years from each State pair (table 2). In Maine and North Carolina, the first States to lower BAL's for youth, the most recent full year after the law was not examined because data were not available in FARS for an equal number of pre-law years. These data also were not available from each State's own records.

Because 52 percent of fatal single-vehicle crashes at night among drivers ages 15-20 involve alcohol compared with only 17 percent of all other fatal crashes—and not all States comprehensively test for alcohol in fatal crashes—we focused on single-vehicle fatal crashes between 9 p.m. and 7 a.m. as a proxy for alcohol-related fatal crashes. We hypothesized that the proportion of fatal crashes involving single vehicles at night would decline more among drivers in the age groups and States targeted by lowered BAL limits than among persons of the same ages in comparison States. We examined the total number of fatal crashes in the denominator to control for factors other than alcohol that may influence fatal crash trends.

Because drinking and driving is declining nationwide among adolescents as well as older drivers, however, it would be inappropriate to attribute all of the decline in nighttime fatal crashes among this younger group to the reduced BAL limit. Therefore, we also looked at fatal crashes involving adult drivers ages 21 and older in each set of States. We also hypothesized that if reduced BALs for youth have an effect, the proportion of fatal crashes that involved single vehicles at night should decline more among young drivers in those States than among older drivers. Further, if the lower BAL States and comparison States are similar on other factors that affect traffic safety, the post-law trends in the proportion of fatal crashes that involved single vehicles at night with adult drivers should be similar both in States that lower BALs for youth and those that do not.

Log linear analysis with time (pre- and post-BAL law), State type (BAL reduction or comparison) and the interaction between these two items as independent variables was used to test the significance of differential shifts in the proportion of fatal crashes that involved single vehicles at night. Two-sided tests and a significance level of .05 were used. Four separate analyses were performed. The first examined

Table 3. Proportion of fatal crashes that involved single vehicles at night before and after reduced blood alcohol (BAL) limits for adolescents

States	Before	Proportion	After	Proportion	Change	Percent
Teens:						
Low BAL.....	1,707 of 5,907	.289	1,174 of 4,843	.242	Down	12.16
Comparison	2,010 of 6,726	.299	1,576 of 5,206	.303	Up	1
Adults:						
Low BAL.....	15,152 of 52,226	.290	14,108 of 51,897	.272	Down	6
Comparison	15,537 of 47,883	.325	13,053 of 42,179	.310	Down	5

¹ $P < .001$; teens in low BAL States versus comparison States.

² $P < .001$ Teens in low BAL States versus adults in low BAL States.

all 12 States with lower BAL limits and all 12 comparison States. Then in separate analyses, we examined States that lowered the BAL to .00 percent, .02 percent, and .04-.06 percent and their respective comparison States. We hypothesized that the lower the legal BAL was set, the greater would be the decline in the proportion of adolescent fatal crashes that involved single vehicles at night.

Results

Table 3 presents fatal crash data from all 12 State pairs. Among adolescents in the age groups targeted by States that lowered the BAL limit for youth the proportion of fatal crashes that involved single vehicles at night declined 16 percent from .289 to .242 during the post-law period, and it rose 1 percent among same-age adolescents in comparison States from .299 to .303 ($P < .001$).

In lower BAL States, among adults ages 21 and older, the proportion of fatal crashes that involved single vehicles at night declined 6 percent from .290 to .272 across the study period. In comparison States, the decline was 5 percent from .325 to .310 (not significant). Thus, the decline in the proportion of fatal crashes among adolescents that involved single vehicles at night in lower BAL States was 10 percent greater than among adults in those same States—16 percent versus 6 percent ($P < .001$). Further, the decline was also 17 percent greater than observed among adolescents in comparison States, and 11 percent greater than observed among adults in comparison States.

Table 4 is a summary of the results of individual analyses for each of the 12 State pairs. Although analyses of individual States do not always show significance, 8 of the 12 law States experienced a decline in the proportion of fatal crashes among adolescents that involved single vehicles at night relative to comparison States.

Table 5 is a summary of results of analyses that estimate separate effects of the law that correspond to

Table 4 Proportion of fatal crashes that involved single vehicles at night among teens before and after reduced blood alcohol level limits of .00, .02, .04-.06

States	Before	After	Percent change
.00 Law:			
North Carolina .....	.313	.215	Down 31
Wisconsin.....	.335	.271	Down 19
Oregon.....	.240	.263	Up 10
Arizona.....	.259	.254	Down 2
.02 Law:			
Maine.....	.407	.291	Down 29
Maryland.....	.317	.300	Down 5
Ohio.....	.218	.184	Down 16
Vermont.....	.375	1.00	Up 167
.04-.06 Laws			
New Mexico.....	.299	.294	Down 2
California.....	.241	.220	Down 9
Rhode Island.....	.083	.250	Up 201
Georgia.....	.204	.217	Up 6
Total.....	.289	.242	Down 16
Comparison:			
Virginia.....	.341	.316	Down 7
Minnesota.....	.285	.264	Down 7
Washington.....	.175	.256	Up 46
Utah.....	.231	.277	Up 20
Massachusetts.....	.395	.364	Down 8
Pennsylvania.....	.278	.341	Up 23
Indiana.....	.142	.188	Up 32
New Hampshire.....	.333	.375	Up 13
Colorado.....	.253	.256	Up 1
Texas.....	.271	.285	Up 5
Connecticut.....	.379	.296	Down 22
Alabama.....	.238	.235	Down 1
Total.....	.299	.303	Up 1

the BAL levels of .00 percent, .02 percent, and .04-.06 percent. States with either a .00-percent or .02-percent BAL limit showed the greatest law effects. States with .04-.06-percent limits showed little law effect.

States with a .00-percent limit showed a 22-percent reduction in the proportion of fatal crashes among adolescents that involved single vehicles at night—from .313 to .244 relative to a 2-percent decline in comparison States ($P < .003$). Among adults, the

Table 5. Proportion of fatal crashes that involved single vehicles at night among teens before and after reduced blood alcohol level limits of .00, .02, and .04–.06

States	Before	Percent	After	Percent	Percent change
.00 Law:					
North Carolina.....	283 of 903	...	185 of 859	...	...
Wisconsin.....	386 of 1,152	...	199 of 734	...	...
Oregon.....	36 of 150	...	25 of 95	...	...
Arizona.....	77 of 297	...	69 of 272	...	...
Total.....	782 of 2,502	.313	478 of 1,960	.244	Down 22
.02 Law:					
Maine.....	153 of 376	...	84 of 289	...	...
Maryland.....	155 of 489	...	112 of 373	...	...
Ohio.....	57 of 262	...	42 of 228	...	...
Vermont.....	3 of 8	...	1 of 1	...	...
Total.....	368 of 1,135	.324	239 of 891	.268	Down 17
.04–.06 Laws:					
New Mexico.....	110 of 368	...	77 of 262	...	...
California.....	398 of 1,655	...	335 of 1,524	...	...
Rhode Island.....	1 of 12	...	3 of 12	...	...
Georgia.....	48 of 235	...	42 of 194	...	...
Total.....	557 of 2,270	.245	457 of 1,992	.229	Down 7
Comparison:					
Virginia.....	193 of 566	...	163 of 516	...	...
Minnesota.....	243 of 854	...	151 of 572	...	...
Washington.....	26 of 149	...	35 of 137	...	...
Utah.....	30 of 130	...	31 of 112	...	...
Total.....	492 of 1,699	.290	380 of 1,337	.284	Down 2
Massachusetts.....	573 of 1,450	...	357 of 981	...	...
Pennsylvania.....	341 of 1,228	...	306 of 898	...	...
Indiana.....	30 of 211	...	33 of 176	...	...
New Hampshire.....	3 of 9	...	3 of 8	...	...
Total.....	947 of 2,898	.327	699 of 2,063	.339	Up 4
Colorado.....	97 of 384	...	89 of 348	...	...
Texas.....	408 of 1,507	...	355 of 1,244	...	...
Connecticut.....	25 of 66	...	13 of 44	...	...
Alabama.....	41 of 172	...	40 of 170	...	...
Total.....	571 of 2,129	.268	497 of 1,806	.275	Up 3

¹ $P < .01$.

proportion of fatal crashes that involved single vehicles at night declined 8 percent in lower BAL States from .298 to .273, and 4 percent from .309 to .296 in comparison States (not significant).

Among targeted adolescents in States lowering limits to .02 percent, there was a 17-percent decline in the proportion of fatal crashes that involved single vehicles at night from .324 to .268, and there was a 4-percent increase observed in comparison States ($P = .005$). Among adults in .02-percent States, there was a 1-percent decline in the proportion of fatal crashes involving single vehicles at night from .299 to .296, compared with a 7-percent decline in comparison States, .330 to .307 (not significant). Thus in States that lowered legal blood alcohol limits

for adolescents to .00 percent or .02 percent, the decline in the proportion of fatal crashes that involved single vehicles at night involving adolescents was at least 20 percent greater than shifts observed among same-aged youth in comparison States.

States with .04–.06 percent limits showed a nonsignificant decline in the proportion of fatal crashes that involved single vehicles at night among adolescents, down 7 percent from .245 to .229 in lower BAL States, up 3 percent, from .268 to .275, in comparison States. Among adults in lower BAL States, there was a 6-percent decline in the proportion of fatal crashes that involved single vehicles at night. In comparison States, there was a 3-percent decline

(not significant). Thus the lower the BAL limit was set the greater the decline in the proportion of adolescent fatal crashes involving single vehicles at night.

Discussion

After BAL limits were lowered for adolescent drivers, the proportion of fatal crashes in that age group involving single vehicles at night dropped 16 percent in lower BAL States and increased 1 percent in comparison States. These findings are consistent with earlier results based on the first four States to lower BAL limits for young drivers, but extending the analysis over more States and a longer post-law experience strengthens the earlier finding. Also the use of single vehicle night fatal crashes as a proxy for alcohol-involved fatal crashes strengthens confidence in the results because among 15–20-year-olds, single vehicle night fatal crashes are 3 times more likely to involve alcohol than other fatal crashes.

Further, the results indicate that the greatest declines in the proportion of adolescent fatal crashes that occurred at night were observed when the BAL limits were lowered to .00 or .02 percent. Little effect was seen at .04–.06 percent. It may be that .00 and .02 percent provide a much clearer message to teenage drivers. At these levels it is illegal to drive after any drinking, whereas at .04–.06 percent some drinking is permissible before driving. Analyses in Maine, and more recently in Maryland, underscore the importance of educating adolescents about the content of the laws and the penalties for violating the laws (12,13).

We examined whether States that lowered BAL limits for adolescents and their comparison States were similar with respect to other laws that could influence alcohol-related traffic deaths (table 6). It should be noted that States that adopted lower BAL limits for teenagers were similar to comparison States with respect to six of eight laws examined. During the analysis period, however, more States with lower BALs for youth also have administrative license revocation laws as well as lower BAL limits for adult drivers. It is possible that some of the greater reduction in adolescent single vehicle night fatal crashes may have resulted from these other laws. Even during the pre-law years the States that lowered teen BAL levels had a smaller proportion of fatal crashes that involved single vehicles at night for both adolescent and adult drivers.

To assess this possibility, we stratified analyses to examine pairs of States where only the lower BAL State had an administrative license revocation law

Table 6. Number of States with other legislation that may influence alcohol-related traffic deaths

Law	Low BAL States	Comparison States
.08 BAL limit for adults.....	4	1
Safety belt law.....	10	10
Criminal per se law ¹	11	11
Administrative per se law ²	11	6
PBT laws ³	7	6
Mandatory jail:		
1st offense.....	3	5
2nd offense.....	12	11
Age 21 throughout analysis ⁴ ..	7	6

¹ Driving with the BAL above the legal limit is a criminal offense per se. That the driver was impaired need not be proved.

² An operator's license can be suspended administratively for drivers exceeding the legal BAL without a court hearing.

³ Police can use nonevidentiary breath-testing results as probable cause for administering sobriety and evidentiary alcohol breath tests in the field.

⁴ The legal age for purchasing alcohol remained 21 in those States throughout the entire time of this analysis.

'... the data support the hypotheses that lowering the legal blood alcohol limit for young drivers reduced single vehicle night fatal crashes among adolescents, the type of crash most likely to involve alcohol, and that the lower the limit is set, the greater the reduction.'

and those where both the lower BAL States and comparison States had administrative license revocation laws. The proportion of fatal crashes among adolescent drivers that involved single vehicles at night declined in lower BAL States relative to comparison States in both groupings—down 17 percent, up 2 percent in the pairs of States where only the lower BAL but not the comparison State had administrative license revocation; down 15 percent, no change in States where both had administrative license revocation.

We also stratified State pairs where the lower BAL State had .08 percent BAL for adults, but the comparison State had .10 percent BAL for adults; and State pairs where both the lower BAL State and comparison States had a .10-percent BAL for adults. Again, in both sets of States there were greater post-law declines among adolescents in the proportion of fatal crashes that involved single vehicles at night. In States that lowered BAL limits for youth relative to comparison States, the proportion of fatal crashes involving single vehicles at night decreased 14 percent versus 2 percent for their counterparts. In

States with low BAL for teens and .10-percent BAL for adults, the proportion of fatal crashes involving single vehicles at night with teen drivers were down 18 percent and up 5 percent in comparison States. Further, the declines in the proportion of fatal crashes that involved single vehicles at night among adults was very similar in lower BAL and comparison States, suggesting that the States were evenly matched on factors that might reduce alcohol-impaired fatal crashes of adults during the post law period.

Thus the data support the hypotheses that lowering the legal blood alcohol limit for young drivers reduced single vehicle night fatal crashes among adolescents, the type of crash most likely to involve alcohol, and that the lower the limit is set, the greater the reduction. To date we estimate that lower BAL limits have resulted, in aggregate, in approximately 290 fewer fatal single-vehicle night crashes than would have occurred in the absence of these laws. Further, nationwide in 1992 there were 1,960 fatal single-vehicle night crashes involving drivers ages 15–20.

Lowering BALs for adolescents to .00 or .02 percent reduced the proportion of fatal crashes that involved single vehicles at night among adolescents by at least 20 percent more than in comparison States. If all States were to lower BAL limits to .00 or .02 percent for adolescents, at least 375 fatal single-vehicle night crashes could be prevented each year among drivers ages 15–20. This law warrants consideration in all States.

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