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Effects of Maine's 0.05% Legal Blood Alcohol Level for Drivers with DWI Convictions

S Y N O P S I S

Objective. To determine whether a Maine law lowering the legal blood alcohol limit (BAL) from 0.10% to 0.05% for people convicted of driving while intoxicated (DWI) reduced the involvement of this group in fatal crashes.

Methods. The authors calculated changes in the proportions of fatal crashes involving drivers with prior DWI convictions from the six-year period before enactment of the law to the six-year period following enactment of the law, comparing Maine with the other New England states.

Results. In Maine, the proportion of fatal crashes involving drivers with recorded prior DWI convictions declined 25% following passage of the 0.05% DWI law, while the proportion rose in the rest of New England during the same years.

The proportion of fatal crashes involving drivers with recorded prior DWI convictions and illegal alcohol levels also declined significantly in Maine, as did the proportion of fatal crashes involving fatally injured drivers with recorded prior DWI convictions and illegal alcohol levels. Most of the latter decline was due to a decline in alcohol-related fatalities of previously convicted drivers with very high BALs, of 0.15% or higher, at the time of the fatal crash. Each of these declines in Maine was significant relative to the rest of New England.

Conclusion. Other states should consider instituting 0.05% BAL limits for convicted DWI offenders.

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Each year, 1.4 million people are arrested in the United States for driving while intoxicated (DWI).¹ One million people are injured and approximately 17,000 people die annually in alcohol-related traffic crashes.²

Nationwide, approximately one-third of drivers arrested or convicted for DWI each year are repeat offenders.³ A 1994 study found that fatally injured drivers involved in alcohol-related fatal crashes were eight times more likely to have had DWI convictions in the previous five years than drivers randomly selected from the general population of licensed drivers.⁴ In 1996, 16.6% of drivers with positive blood alcohol levels (BALs) who died in traffic crashes had been convicted of driving while intoxicated during the three previous years.¹

The legal standard for BALs in drivers is set at 0.10% in most states, yet research has shown that driver impairments begin at BALs well below this level.⁵⁻⁷ For example, impairments in divided attention, reaction times, visual functioning, information processing, and judgment have been identified at BALs of 0.05% or lower.² A 1991 study found that in all age and sex groupings, the fatal crash risk at BALs of 0.05%-0.09% was at least nine times the risk at zero BAL.⁸

The American Medical Association has publicly endorsed lowering the legal BAL for all drivers to 0.05%.⁹ While 17 states have lowered the legal blood alcohol limit from 0.10% to 0.08% since 1983, no state has adopted a 0.05% limit for all drivers.

In 1983, Maine became the first U.S. state to adopt a "zero tolerance" law for drivers younger than age 21, making it illegal for them to drive after drinking any alcoholic beverages. In response to declines in teenage fatal crashes associated with zero tolerance laws,^{10,11} all 50 states have since adopted such laws for under-21 drivers. (Japan adopted a "zero tolerance" law for drivers of all ages in 1970. Between 1970 and 1995, the number of licensed drivers in Japan doubled, the number of motor vehicles tripled, and per capita alcohol consumption doubled, bringing it close to the level of the United States, yet alcohol-related fatal crashes declined from nearly 1500 to fewer than 500.¹²)

In August 1988, Maine became the only U.S. state to lower the legal blood alcohol limit (BAL) from 0.10% to 0.05% for people with prior DWI convictions. While according to data from the Fatality Analysis Reporting System of the U.S. Department of Transportation, the proportion of fatal crashes that involved alcohol had been similar in Maine and the rest of New England during the five years before the law was enacted, Maine had had a

higher percentage of fatal crashes involving drivers with prior DWI offenses. This may in part have prompted passage of the stricter law for convicted offenders.

Under the 1988 law, the licenses of first-time DWI offenders could be reinstated after a mandatory suspension of two months on the condition that they not drive with BALs at or above 0.05% for one year. Second-time offenders had their licenses reinstated after a one-year suspension on the condition that they not drive with BALs at or above 0.05% for 10 years. If convicted DWI offenders were apprehended with a BAL of 0.05% or above, their licenses would be administratively revoked for one year; they could also face court-imposed penalties. If they refused to submit to chemical tests despite probable cause that they were driving at 0.05% or higher, their licenses would be suspended for not less than two years.

One way of measuring the effectiveness of laws lowering BAL limits in changing the behavior of convicted DWI offenders is to look for pre-law to post-law changes in the extent to which convicted DWI offenders are involved in fatal crashes. For the present study, we analyzed data on fatal crashes in Maine for the six years preceding and the six years following passage of Maine's 0.05% DWI law and then compared Maine's experience to that of the other New England states during the same time period. We examined pre-law to post-law changes in the proportions of fatal crashes that involved drivers with recorded prior DWI convictions and changes in the proportions of fatal crashes involving drivers with recorded prior DWI convictions who had alcohol levels that were deemed illegal under the new law.

METHODS

We analyzed fatal crash data for the six New England states from the U.S. Fatality Analysis Reporting System (FARS) for the period from August 1, 1982, through July 31, 1994—six years preceding and six following passage of Maine's 0.05% DWI law. FARS records DWI convictions for up to three years prior to drivers' involvement in fatal crashes.

To determine the effects of the Maine DWI law, we compared Maine with the rest of New England in terms of: (a) changes from pre-law to post-law in the proportions of fatal crashes involving drivers with recorded prior DWI convictions; (b) changes from pre-law to post-law in the proportions of fatal crashes involving drivers with prior recorded DWI convictions and illegally elevated BALs; (c) changes from pre-law to post-law in the proportions of alcohol-involved and non-alcohol-involved fatal

crashes involving drivers with recorded prior DWI convictions.

We looked at the *proportion* of fatal crashes involving drivers with prior DWIs instead of the absolute number in an effort to control for exogenous variables that might influence the total number of fatal crashes, such as the economy, safety characteristics of vehicles and highways, and the price of fuel. Because of the small number of these crashes in Maine, the year-to-year variation in these measures is relatively large and time series analyses were not practical. To obtain more stable estimates, for purposes of statistical testing we collapsed data into two categories: data for the six years before and the six years following passage of Maine's 0.05% DWI law.

Fatal crashes involving drivers with recorded prior DWI convictions. First, we examined the pre-law to post-law change in Maine and the other New England states in the proportions of fatal crashes involving drivers who had had DWI convictions during the three years prior to the crash. The pre-law to post-law change can be represented in terms of relative risk—that is, the ratio of the post-law to pre-law proportions of fatal crashes involving drivers with recorded prior DWI convictions. Thus a relative risk less than 1.0 shows a reduction in the proportion of fatal crashes involving drivers with recorded prior DWI convictions, while a relative risk greater than 1.0 shows an increase.

Changes from pre-law to post-law can also be expressed in terms of percentage change, which we calculated as follows:

$$\text{Percentage change} = (p_{\text{post}} - p_{\text{pre}}) / p_{\text{pre}} \times 100\% = (RR - 1) \times 100\%.$$

We used the lower and upper bounds of the confidence intervals (CIs) for the RR to calculate the CIs for percentage change.

We then compared pre-law to post-law changes in Maine to changes in the rest of New England (Connecticut, Massachusetts, New Hampshire, Rhode Island, and Vermont). We calculated the *adjusted relative risk* for Maine (the risk in Maine relative to the risk in the rest of New England) as the ratio of the two relative risks. Subtracting 1 from this ratio gives the *adjusted percentage change* for Maine (the percentage change in Maine adjusted for the percentage change in the rest of New England, which can be conceptualized as the extent to which the change observed in Maine "goes beyond" the change observed in the rest of New England).

Fatal crashes involving drivers with recorded prior DWI convictions and illegally elevated BALs. We repeated the above analyses, comparing Maine with the rest of New England in terms of pre-law to post-law changes in the proportions of fatal crashes involving drivers who had both recorded prior DWI convictions and illegally elevated alcohol levels at the time of the fatal crash.

We defined illegally elevated BALs as BALs of 0.05% or higher as indicated by test results or, in the absence of test results, as indicated by police officers reporting the presence of alcohol or issuing an alcohol violation.

We initially focused on fatally injured drivers in fatal crashes because they were more likely to be given blood alcohol tests than drivers who survived fatal crashes. (In Maine during the pre-law period, according to FARS, 81% of fatally injured drivers were given blood alcohol tests, as were 89% during the post-law period. In the rest of New England, 78% of fatally injured drivers were tested in the pre-law period and 83% in the post-law period. Thus the testing rates were high and relatively constant in both Maine and the rest of New England during the pre-law and post-law periods.)

We then looked at all fatal crashes involving drivers with recorded prior DWI convictions and illegally elevated BALs. This analysis was performed because according to FARS fewer than half of drivers in fatal crashes are fatally injured.

Alcohol-involved versus non-alcohol-involved fatal crashes involving drivers with recorded DWI convictions. To separate out declines in fatal crash involvement specific to drivers with recorded prior DWI convictions from general declines in alcohol-involved fatal crashes, we stratified fatal crashes into those that were and were not alcohol-involved. We defined as alcohol-involved those crashes in which the driver had a BAL of at least 0.05% or, in the absence of testing, police reported alcohol involvement. We evaluated changes from pre-law to post-law for each of these types of crashes in the proportion involving drivers with recorded prior DWI convictions.

R E S U L T S

During the pre-law period, the proportion of fatal crashes that involved drivers with recorded prior DWI convictions were 0.089 (107/1200) in Maine and 0.036 (307/8630) in the rest of New England. The proportions of fatal crashes involving fatally injured drivers with

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recorded prior DWI convictions and illegally elevated alcohol levels were 0.054 (65/1200) in Maine and 0.015 (133/8630) in the rest of New England.

Fatal crashes involving drivers with recorded prior DWI convictions. In Maine, the proportion of fatal crashes involving drivers with recorded prior DWI convictions declined 25% (95% CI 0%,43%) from 0.089 (107/1200) for the six years before passage of the 0.05% DWI law to 0.067 (74/1104) for the six years following passage of the law (Figure 1). In contrast, in the rest of

New England, the proportion of fatal crashes involving drivers with recorded prior DWI convictions rose 46% (95% CI 26%,69%) from 0.036 (307/8630) to 0.052 (358/6910).

The adjusted percentage decline for Maine relative to the rest of New England was 48% (95% CI 29%,63%; $P < 0.001$).

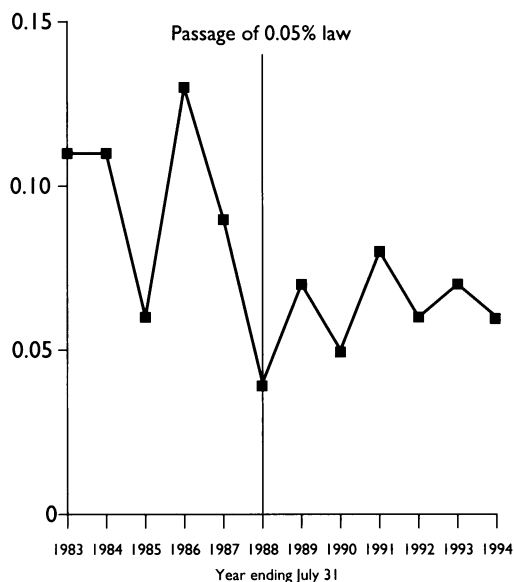
Fatal crashes involving drivers with recorded prior DWI convictions and illegally elevated alcohol levels.

Drivers fatally injured. In Maine, the proportion of fatal crashes that involved *fatally injured* drivers with recorded prior DWI convictions and illegally elevated alcohol levels declined 31% (95% CI -1%,53%) from 0.054 (65/1200) for the six years before passage of the 0.05% DWI law to 0.037 (41/1104) for the six years following passage of the law. In contrast, in the rest of New England the proportion rose 40% (95% CI 10%,76%) from 0.015 (133/8630) to 0.022 (149/6910). The adjusted percentage decline for Maine relative to the rest of New England was 51% (95% CI 23%,69%; $P < 0.002$).

Of note, most of this pre-law to post-law decline in Maine was due to a decline in the proportion of fatal crashes involving fatally injured drivers who had both recorded prior DWIs and very high BALs, of 0.15% or higher. This proportion declined 35% (95% CI 0%,58%) from 0.043 (52/1200) to 0.028 (31/1104) ($P = 0.05$). In contrast, in the rest of New England the proportion rose 45% from 0.011 (98/8630) to 0.016 (114/6910) (95% CI 11%,90%). The adjusted percentage decline for Maine relative to the rest of New England was 55% (95% CI 25%,73%; $P < 0.002$).

Overall. The pattern was very similar for fatal crashes involving all drivers with recorded prior DWI convictions and illegally elevated alcohol levels. In Maine, from pre-law to post-law, the proportion of such crashes declined

Figure 1. Proportions of total fatal crashes that involved drivers with prior DWI convictions; Maine; August 1, 1982, through July 31, 1994



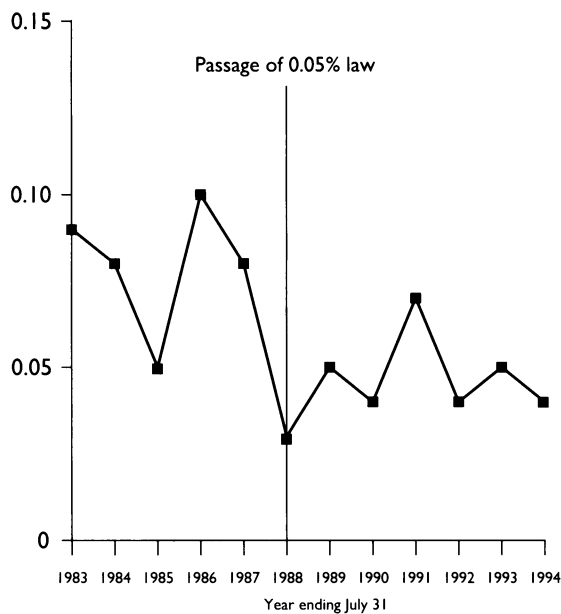
NOTE: Information on prior DWI convictions was available for only three years prior to the fatal crash.
DWI = driving while intoxicated

31% (95% CI 4%,51%) from 0.070 (84/1200) for the six years preceding passage of the 0.05% DWI law to 0.048 (53/1104) for the six years following passage of the law (Figure 2). In contrast, in the rest of New England, the proportion rose 40% (95% CI 17%,68%) from 0.024 (211/8630) to 0.034 (237/6910).

Alcohol-involved versus non-alcohol-involved fatal crashes involving drivers with recorded DWI convictions. There was no change in Maine pre-law to post-law in the proportion of non-alcohol-involved fatal crashes (0.027) involving a driver with recorded prior DWI convictions. (See Table.) The proportion increased in the rest of New England, but the difference between Maine and the rest of New England was not significant (adjusted percentage change -31%, 95% CI -65%,35%).

In contrast, there was a 14% decline in Maine in the proportion of alcohol-involved crashes involving drivers with recorded DWI convictions, while this proportion increased 60% in the rest of New England (adjusted percentage decline 46%, 95% CI 23%,63%; $P = 0.001$).

Figure 2. Proportions of total fatal crashes that involved drivers with prior DWI convictions and illegally elevated alcohol levels; Maine; August 1, 1982, through July 31, 1994



NOTE: Information on prior DWI convictions was available for only three years prior to the fatal crash.
DWI = driving while intoxicated

D I S C U S S I O N

Our findings show that after passage of Maine's 0.05% DWI law, fatal crashes involving drivers with prior DWIs and illegally elevated BALs declined in Maine as a percentage of total crashes while increasing in the rest of New England.

Several factors may have led us to underestimate the effect of the Maine law. First, Maine and the New England comparison states enacted other policies during the study period that might also have reduced alcohol-impaired driving. At the time that it was implementing the 0.05% DWI law, Maine also lowered the legal blood alcohol limit for adult drivers from 0.10% to 0.08%. Also, in the early 1990s, New Hampshire, Vermont, and Massachusetts adopted 0.08% laws for all adult drivers. Between 1989 and 1996, Massachusetts, New Hampshire, Rhode Island, and Vermont adopted zero tolerance laws (making it illegal for drivers under 21 to drive after any consumption of alcoholic beverages), and in 1994 Massachusetts adopted administrative license revocation for all drivers with illegal BALs.

Zero tolerance laws, 0.08% BALs, and administrative license revocation have all been found to reduce alcohol-related fatal crashes.^{10,13-15} But we found significant, disproportionately greater, declines in Maine in fatal crash involvement of drivers with recorded DWI convictions and elevated BALs even though, as can be seen in the Table, the numbers of fatal crashes in Maine and the rest of New England declined from pre-law to post-law and the proportion of fatal crashes involving all drivers with elevated BALs declined in Maine during the post-law period.

Second, some drivers in fatal crashes in Maine are not Maine residents. We repeated the analysis comparing Maine residents with nonresidents and found comparable post-law fatal crash declines involving prior DWI offenders. (Data available upon request.) Ninety percent of fatal crashes in Maine in both the pre- and post-law periods involved Maine drivers.

Third, the U.S. Fatality Analysis Reporting System records drivers' DWI convictions for only the three years prior to their involvement in fatal crashes. Maine's 0.05% law covered drivers with repeat DWI convictions up to 10 years prior to their involvement in fatal crashes. Thus we were able to assess the impact of the law on only a subgroup of drivers involved in fatal crashes who had prior DWI convictions.

Fourth, the percentage of drivers involved in fatal crashes in Maine whose BALs were tested increased

Table. Number of fatal crashes involving drivers with prior DWI convictions for the six years before and six years following passage of Maine's 0.05% BAL law

Category	Maine				Connecticut, Massachusetts, New Hampshire, Rhode Island, Vermont				Maine vs rest of New England	
	Pre-law	Post-law	RR	CI	Pre-law	Post-law	RR	CI	Adjusted relative risk	CI
Non-alcohol-involved fatal crashes										
Driver with recorded prior DWI conviction	19	20	1.00	0.54,1.85	99	124	1.45	1.12,1.88	0.69	0.35,1.35
Driver without recorded prior DWI conviction	<u>677</u>	<u>714</u>			<u>5123</u>	<u>4386</u>				
Total	696	734			5222	4510				
Alcohol-involved fatal crashes										
Driver with recorded prior DWI conviction	84	53	0.86	0.63,1.18	200	226	1.60	1.34,1.93	0.54	0.37,0.77 ^a
Driver without recorded prior DWI conviction	<u>420</u>	<u>317</u>			<u>3208</u>	<u>2174</u>				
Total	504	370			3408	2400				

NOTE: Alcohol-involved crashes were defined as crashes in which the driver had an elevated BAL of 0.05% or higher, as indicated by test results, as well as crashes in which, in the absence of test results, police officers reported the presence of alcohol or issued an alcohol violation.

^aSignificant reduction in Maine relative to the rest of New England, *P* < 0.001

DWI = driving while intoxicated
 BAL = blood alcohol level
 RR = relative risk
 CI = confidence interval

significantly (from 57% to 74%) after passage of the 0.05% law while in the rest of New England the proportion remained constant at 45% from the pre-law to post-law period, according to FARS data. Also, after the 0.05% law was enacted, a smaller proportion of the drivers involved in fatal crashes in Maine had illegally elevated BALs and recorded DWI convictions even though a larger percentage of such drivers were tested for alcohol during the post-law period.

In addition to the above caveats, other factors should be considered to avoid overinterpreting the effects of Maine's 0.05% law. First, while the New England states we compared with Maine are more likely than the rest of the nation to share weather patterns and certain economic trends with Maine that may influence the incidence of fatal crashes, these states differ from the rest of the nation in some ways. According to FARS, the New England states other than Maine had a lower proportion of fatal crashes involving drivers with DWI convictions during the previous three years and illegally elevated BALs than either Maine or the rest of the

United States during the study period. (Data available on request.) Also, during the study period the New England states other than Maine experienced greater increases in fatal crashes involving convicted DWI offenders with illegally elevated BALs than the rest of the nation. (Data available on request.)

From the pre-law period to the post-law period, the proportion of fatal crashes involving drivers with prior DWI convictions and illegally elevated BALs *who were fatally injured* did not change in the U.S. states outside New England, but the proportion of such crashes declined 31% more in Maine than in the rest of the U.S. states outside New England, a statistically significant decline but nonetheless smaller than the decline in Maine relative to the other New England states.

Second, we did not survey Maine drivers with DWI convictions to determine whether they actually expected to lose their licenses if they drove with BALs at or above 0.05%. Maine Department of Motor Vehicles records indicate that 834/60,978 drivers with any prior DWI convictions or 0.08% or 0.10% law violations subse-

quently had their license suspended between 1988 and 1995 as a result of the 0.05% law. Those drivers were apprehended with BALs between 0.05% and 0.079%. Drivers with alcohol levels of 0.08% and above were prosecuted under Maine's 0.08% criminal *per se* law.

Third, declines on our study outcomes began in Maine the year before the 0.05% law passed. In Maine and other jurisdictions, pre-law declines in alcohol-related fatal crashes have been observed during the year immediately preceding implementation of other drunk driving laws.^{16,17} This may reflect the effects of publicity about the dangers posed by alcohol-impaired driving as the new laws were debated. Also, some drivers may have believed that the law being debated was in effect.

Finally, while Maine affords the only experience of a U.S. state with a 0.05% law for convicted DWI offenders, Maine is a small state with less than one million of the nation's 177 million licensed drivers, and the analysis needs to be replicated in larger states if they also adopt 0.05% laws.

Despite these caveats, the benefits of the 0.05% law appear to be substantial. The 0.05% law was associated with reductions in fatal crash involvement not only among drivers with BALs in the 0.05% to 0.14% range

but also among those with BALs at or above 0.15%. Opponents of lowering legal blood alcohol limits argue that these measures have no effect on drivers with high BALs or prior DWI convictions. This and other studies^{15,18} indicate that lowering legal blood alcohol limits reduces fatal crashes among drivers with very high BALs, of 0.15% and above.

In 1995 Maine became the first state to adopt a "zero tolerance" law for convicted offenders, making it illegal for them to drive after drinking any alcoholic beverages. Whether the reductions in fatal crashes involving convicted DWI offenders that occurred in Maine as a result of the 0.05% law have been further enhanced by the zero tolerance law for convicted DWI offenders warrants study.

Based on our findings, we believe that other states should consider instituting 0.05% BAL limits for convicted DWI offenders.

This study was supported by grant number R01 AA 101 71 from the National Institute on Alcohol Abuse and Alcoholism and with funding from Join Together, a Program of the Robert Wood Johnson Foundation.

This article is dedicated to the memory of 23-year-old Rhonda Shearouse, who was struck and fatally injured on August 14, 1987, by a driver with a blood alcohol level of 0.41% driving the wrong way on an interstate highway.

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