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HIGHWAY SAFETY

Effectiveness of State .08 Blood Alcohol Laws

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The Honorable John McCain
Chairman
The Honorable Ernest F. Hollings
Ranking Minority Member
Committee on Commerce, Science,
and Transportation
United States Senate

The Honorable Bud Shuster
Chairman
The Honorable James L. Oberstar
Ranking Democratic Member
Committee on Transportation and Infrastructure
House of Representatives

In 1997, someone in the United States died in an alcohol-related motor vehicle crash every 32 minutes. For years, the Congress and the states have grappled with and sought solutions to the problem of drunk driving. Most states have laws making it illegal for people to drive with a specified level of alcohol in their blood, usually set at .10 blood alcohol concentration (BAC)—the level at which a person's blood contains 1/10th of 1 percent alcohol. However, 16 states have more stringent laws setting the limit at .08 BAC. In 1998, the Clinton administration endorsed a bill that would have required all states to enact and enforce .08 BAC laws or face reductions in federal highway funds. The Senate approved this bill; the House took no action.

The Transportation Equity Act for the 21st Century directed GAO to evaluate the effectiveness of state .08 BAC laws in reducing the number and severity of crashes involving alcohol.[1] To accomplish this objective, we reviewed (1) the policies and positions of the Department of Transportation's (DOT) National Highway Traffic Safety Administration (NHTSA) on .08 BAC laws and other drunk driving countermeasures and (2) seven published studies on the effect of .08 BAC laws on the number and severity of crashes involving alcohol, including three studies released on April 28, 1999.

[1]The Transportation Equity Act for the 21st Century also directed us to study the effectiveness of .02 BAC laws for drivers under 21 in reducing the number and severity of crashes involving alcohol. The National Highway System Designation Act of 1995 required all states to enact and enforce such laws or face reductions in federal highway funds. However, as agreed to by your staff, we will not address the impact of .02 BAC laws, since all 50 states and the District of Columbia now have laws establishing BAC levels of .02 or less for drivers under 21.

Results in Brief

Overall, the evidence does not conclusively establish that .08 BAC laws, by themselves, result in reductions in the number and severity of alcohol-related crashes. There are, however, strong indications that .08 BAC laws in combination with other drunk driving laws (particularly license revocation laws), sustained public education and information efforts, and vigorous and consistent enforcement can save lives. For example, while two studies have concluded that California's .08 BAC law was not directly associated with the decline in drunk driving deaths the state experienced in the early 1990s, these studies found that the .08 BAC law was effective when paired with the state's license revocation law, which took effect 6 months later.

Until recently, only four published studies examined the effectiveness of .08 BAC laws in five states and, while NHTSA characterized the studies as conclusively establishing that .08 BAC laws by themselves were effective, the studies had limitations and raised methodological concerns calling their conclusions into question or reported mixed results. In April 1999, three additional studies were released that were more comprehensive and showed many positive results but nevertheless fell short of providing conclusive evidence that .08 BAC laws were, by themselves, responsible for reductions in alcohol-related crashes and fatalities. It is difficult to accurately predict how many lives would be saved if all states enacted .08 BAC laws because whether a state sees reductions after enacting a .08 BAC law depends on a number of factors, including the degree to which the law is publicized, how well it is enforced, other drunk driving laws in effect, and public attitudes concerning alcohol. Despite the absence of a strong causal link between .08 BAC laws by themselves and reductions in traffic fatalities, other evidence, including medical evidence on drivers' impairment, should be considered when evaluating the effectiveness of .08 BAC laws.[2]

Background

It is illegal in every state and the District of Columbia to drive a motor vehicle while under the influence of alcohol. In addition, all states but two have blood alcohol "per se" laws—laws that make it unlawful for a person to drive a motor vehicle with a *specific* amount of alcohol in his or her blood. As figure 1 shows, 32 states and the District of Columbia have set that amount at .10 BAC. In 16 states, the per se limit is 20 percent lower, or .08 BAC.

[2]Because the Transportation Equity Act for the 21st Century directed us to review the effectiveness of .08 BAC laws in reducing the number and severity of crashes involving alcohol, we did not evaluate the medical impairment evidence.

Figure 1: State Blood Alcohol "per Se" Laws

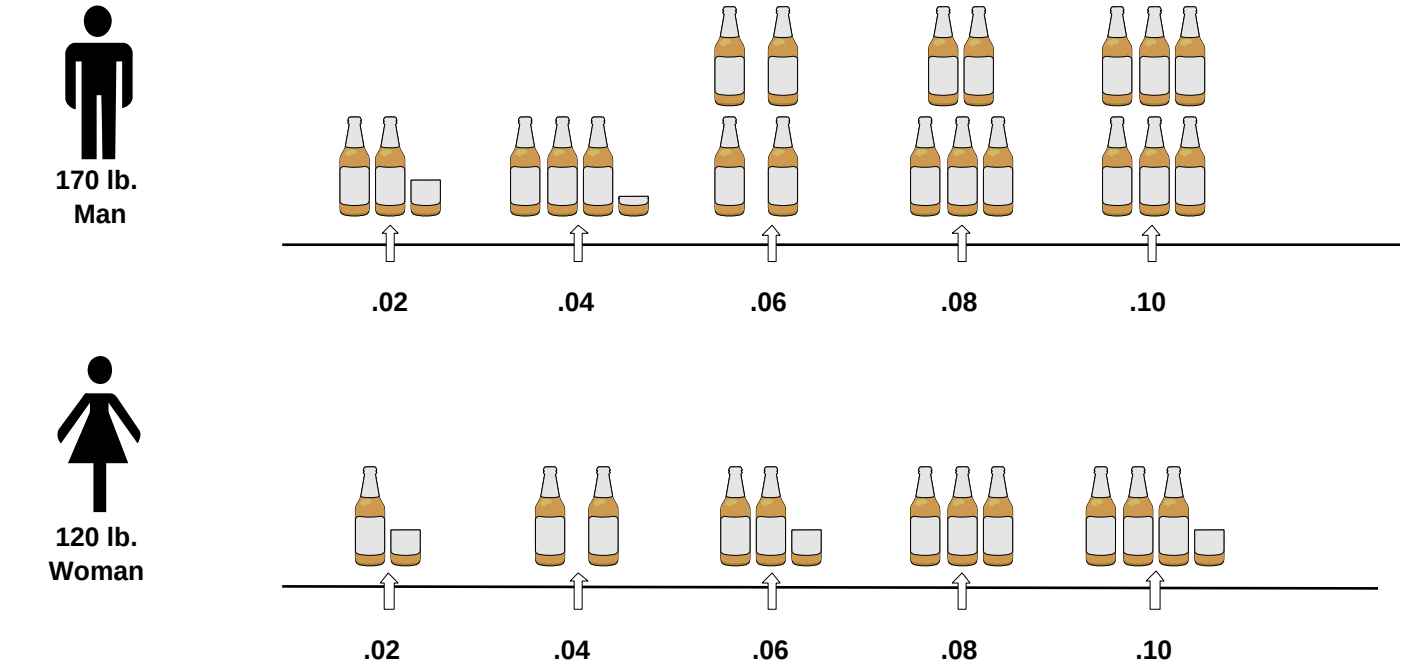
Note: States with .08 BAC laws are shown with the year the law became effective.

Source: GAO's illustration based on information from NHTSA.

On average, according to NHTSA, a 170-pound man reaches .08 BAC after consuming five 12-ounce beers (4.5-percent alcohol by volume) over a 2-hour period. A 120-pound woman reaches the same level after consuming three beers over the same period. NHTSA publishes a BAC estimator that computes the level of alcohol in a person's blood on the basis of the person's weight and gender and the amount of alcohol consumed over a specified period of time. This estimator assumes average physical attributes in the population—in reality, alcohol affects individuals differently, and this guide cannot precisely predict its effect on everyone. For example, younger people have higher concentrations of body water than older people; therefore, after consuming the same amount of alcohol, a 170-pound 20-year-old man attains a lower BAC level on average than a 170-pound 50-year-old man.

As figure 2 illustrates, NHTSA's estimator shows that the difference between the .08 BAC and .10 BAC levels for a 170-pound man is one beer over 2 hours. The difference between the .08 BAC and .10 BAC levels for a 120-pound woman is one-half a beer over the same time period.

Figure 2: Alcohol Consumption and Blood Alcohol Levels



Source: GAO's illustration based on NHTSA's BAC estimator.

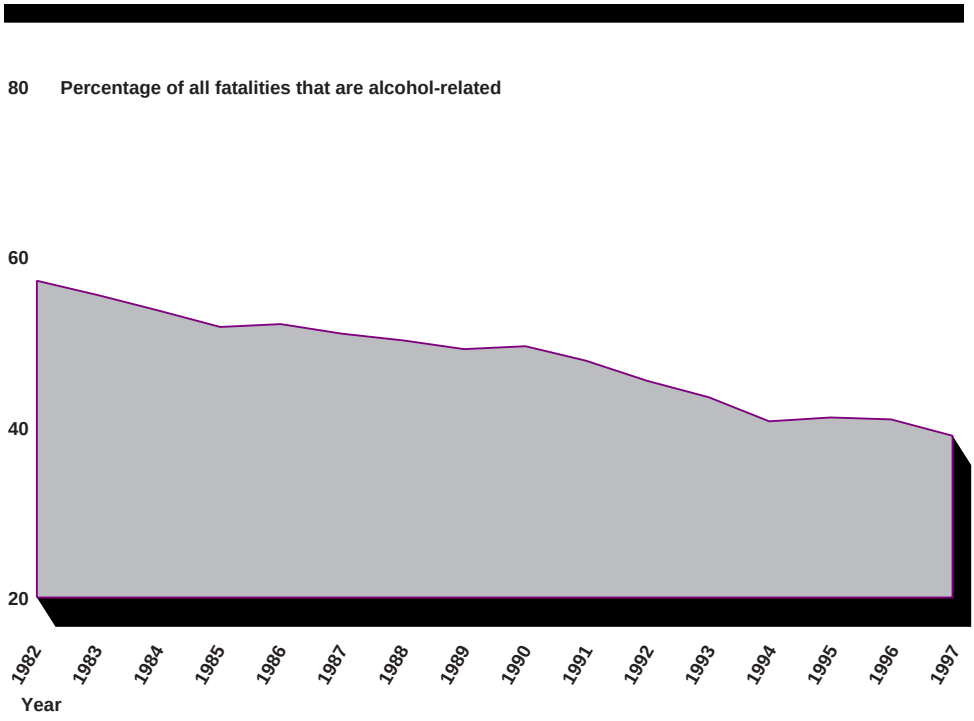
Alcohol use is a significant factor in fatal motor vehicle crashes. In 1997, the most recent year for which data are available, there were 16,189 alcohol-related fatalities, representing 38.6 percent of the nearly 42,000 people killed in fatal crashes that year. In the states with .08 BAC laws, alcohol was involved in 36 percent of all traffic fatalities, lower than the national average and the 39.5-percent rate of alcohol involvement in the

rest of the states.[3] Utah had the lowest level at 20.6 percent; the District of Columbia had the highest at 58.5 percent. Among the 10 states with the lowest levels of alcohol-related fatalities, 3 were states with .08 BAC laws and 7 were states with .10 BAC laws. Among the 10 states with the highest levels of alcohol-related fatalities, 2 were states with .08 BAC laws, 7 were states with .10 BAC laws, and 1 had no BAC per se law.

Although alcohol use remains a significant factor in fatal crashes, fatalities involving alcohol have declined sharply over the last 15 years. In 1982, 25,165 people died in crashes involving alcohol, 57.3 percent of the nearly 44,000 traffic fatalities that year. The proportion of fatal crashes that involved alcohol declined during the 1980s, falling below 50 percent for the first time in 1989. The involvement of alcohol in fatal crashes declined markedly in the early 1990s, from about 50 percent of the fatal crashes in 1990 to nearly 40 percent in 1994. During this time, the number of people killed in crashes involving alcohol declined by around 25 percent. The proportion of fatalities involving alcohol rose slightly in the next 2 years before falling, in 1997, to its lowest level since 1982, as figure 3 shows.

[3]This analysis excludes Idaho and Illinois, states that had .08 BAC laws take effect during 1997.

Figure 3: Alcohol-Related Fatalities, 1982-97



Source: GAO's illustration based on NHTSA's Traffic Safety Facts, 1997.

Each state reports, and NHTSA collects and publishes, data on fatal crashes through the Fatal Accident Reporting System (FARS), a comprehensive national database of all crashes in which a person dies within 30 days of the crash. These data include (1) the number of fatalities that occur in all crashes and (2) the number of drivers involved in fatal crashes. FARS also includes whether crashes involved drivers who had been drinking. However, FARS has limitations regarding alcohol involvement in crashes—for example, fewer than half of the drivers at the scene of fatal accidents are tested for alcohol. To address the missing data, NHTSA developed a statistical model, first used in 1982, to estimate alcohol involvement in cases in which data are not available. The model provides estimates in three broad categories—sober (.00 BAC), "low BAC" (.01- .09 BAC), and "high BAC" (.10 BAC and above).[4] Therefore, certain questions—such as how many fatal crashes involve drivers with .08 BAC

[4]When cataloguing fatalities in crashes in which more than one driver had been drinking, FARS uses the driver with the higher BAC.

levels versus other levels or what the average BAC of drunk drivers involved in fatal crashes is—cannot be reliably answered by this model. NHTSA plans to release a new model in 1999 that will estimate specific BAC levels.

NHTSA Believes All States Should Have Alcohol Deterrence Measures, Including .08 BAC Laws

NHTSA believes that the best countermeasure against drunk driving is a combination of laws, public education, and enforcement. Since 1970, NHTSA has espoused a "systems approach" to reducing drunk driving including enforcement, judicial, legislative, licensing, and public information components. In 1997, NHTSA published an action plan developed with other participants to reduce alcohol-related driving fatalities to 11,000 by the year 2005. This plan recommended that all states pass a wide range of laws, including ones establishing .08 BAC limits, license revocation laws—under which a person deemed to be driving under the influence has his or her driving privileges suspended or revoked, comprehensive screening and treatment programs for alcohol offenders, vehicle impoundment, "zero tolerance" BAC and other laws for youth, and primary enforcement laws for safety belts.[5] The plan also called for increased public awareness campaigns, with an emphasis on target populations such as young people and repeat offenders. Similarly, "The Presidential Initiative for Making .08 BAC the National Legal Limit," published by NHTSA in August 1998, contained a four-point plan that recommended the expansion of public education campaigns; the building of public-private partnerships; and active, high-visibility enforcement of several alcohol laws.

The value of public education and enforcement has been demonstrated in a number of studies. A recent NHTSA evaluation of a sobriety checkpoint program in Tennessee, a state with a .10 BAC limit, concluded that the program and its attendant publicity reduced alcohol-related fatal accidents in that state by 20.4 percent. A systems approach to traffic safety is not limited to preventing drunk driving. Our January 1996 report concluded that the states that have been most successful at increasing safety belt use among all drivers are the ones with primary enforcement laws, visible and aggressive enforcement, and active public information and education programs.[6]

[5]Primary enforcement laws permit officials to enforce safety belt requirements independently of other traffic safety laws, in contrast to secondary enforcement laws, which allow officials to enforce safety belt requirements only when other traffic safety laws are being enforced.

[6]Motor Vehicle Safety: Comprehensive State Programs Offer Best Opportunity for Increasing Use of Safety Belts (GAO/RCED 96-24, Jan. 3, 1996).

Since 1992, when it first recommended in a report to the Congress that all states have .08 BAC laws, NHTSA's position has changed from urging the states to pass .08 BAC laws to favoring that states be required to do so. The latter position was embodied in the President's endorsement of a Senate bill entitled the Safe and Sober Streets Act. This bill would have required all states to enact and enforce .08 BAC laws by October 1, 2001, or lose 5 percent of certain federal highway funds the first year and 10 percent each succeeding year. The Senate approved this bill on March 4, 1998, but the House took no action before the 105th Congress adjourned.[7]

As figure 4 shows, NHTSA has a number of reasons why it believes all states should adopt .08 BAC laws.

Figure 4: NHTSA's Reasons Why All States Should Adopt .08 BAC Laws

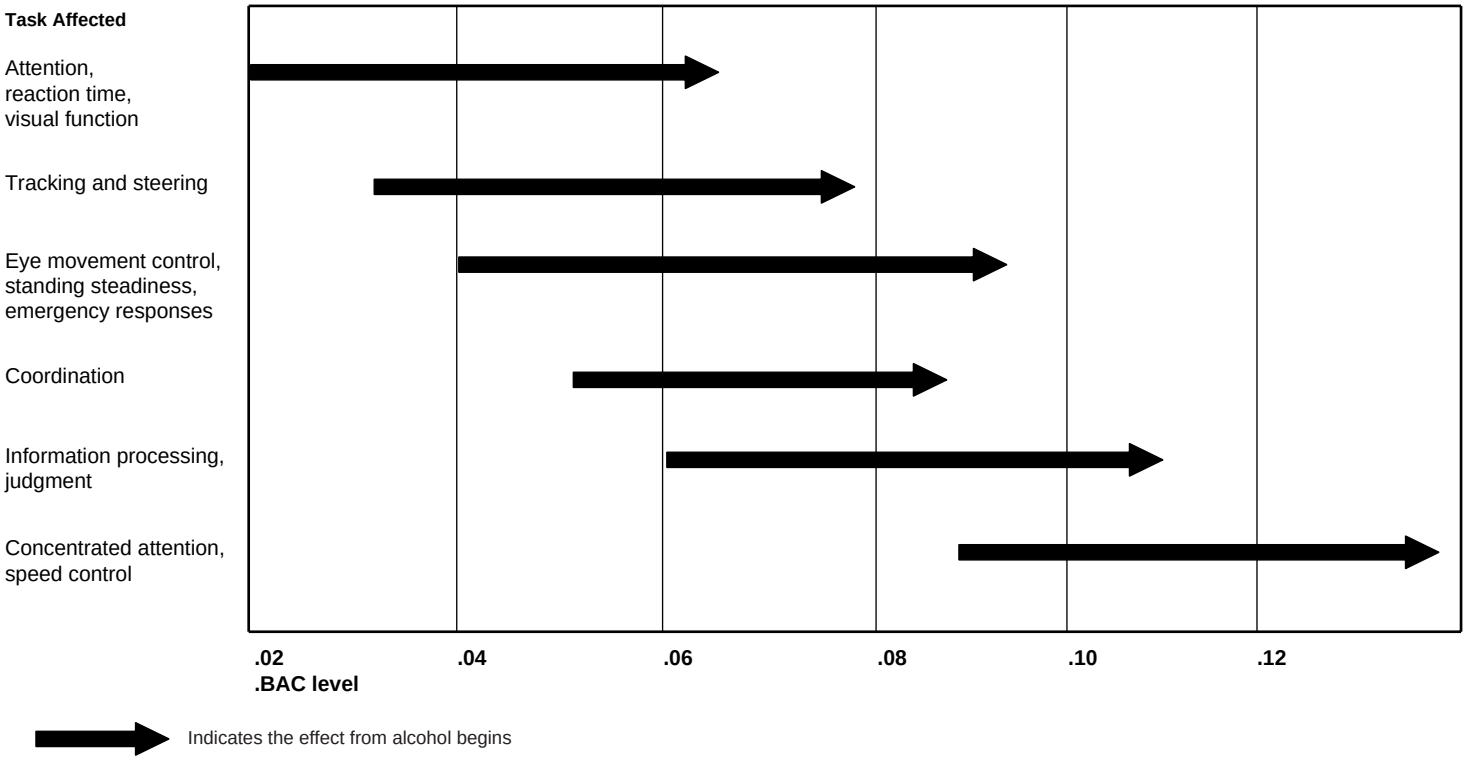
- Virtually all drivers are substantially impaired at .08 BAC with regard to critical driving tasks.
- The risk of being in a crash increases substantially when a driver reaches .08 BAC.
- .08 is a reasonable level to set the limit.
- The public supports lower BAC limits.
- Other industrialized nations have .08 or lower BAC laws.
- Lowering the limit to .08 is a proven effective countermeasure that will reduce crashes and save lives.

One of NHTSA's principal arguments for nationwide adoption of .08 BAC laws is that the medical evidence of drivers' impairment at that level is substantial and conclusive. According to NHTSA, and as shown in figure 5, reaction time, tracking and steering, and emergency responses are impaired at even low levels, and substantially impaired at .08 BAC. As a result, the risk of being in a motor vehicle crash increases when alcohol is involved, and increases dramatically at .08 BAC and higher levels. In contrast to NHTSA's position, industry associations critical of .08 BAC laws contend that .08 BAC is an acceptable level of impairment for driving a motor vehicle and that these laws penalize "responsible social drinking." These associations also believe that .08 BAC laws do not address the problem of drunk driving because many more drivers using alcohol are reported at the "high" BAC levels (above .10 BAC) than the lower BAC levels.

[7]The Senate approved this bill as an amendment to its surface transportation reauthorization bill. However, these provisions were not included in the House bill and were not included in the final version of the Transportation Equity Act for the 21st Century.

Because we were directed to review the impact of .08 BAC laws on the number and severity of crashes involving alcohol, we did not review the medical evidence on impairment or other arguments in favor of or in opposition to .08 BAC laws.

Figure 5: NHTSA's Position on Medical Evidence of Drivers' Impairment



Source: GAO's illustration based on information from NHTSA.

NHTSA also believes that lowering the BAC limit to .08 is a proven effective measure that will reduce the number of crashes and save lives. For example, in a December 1997 publication, NHTSA stated that "recent research . . . has been quite conclusive in showing the impaired driving reductions *already attributable to .08*, as well as the potential for saving additional lives if all states adopted .08 BAC laws" (emphasis added). In

May 1998, the NHTSA Administrator stated, "The traffic safety administration is aware of four published studies, . . . [and] each study has shown that lowering the illegal blood alcohol limit to .08 is associated with significant reductions in alcohol-related fatal crashes." In a fact sheet distributed to state legislatures considering these laws, NHTSA stated that the agency's "analysis of five states that lowered the BAC limit to .08 showed that significant decreases in alcohol-related fatal crashes occurred in four out of the five states *as a result of the legislation*" (emphasis added). NHTSA used these study results to encourage states to enact .08 BAC laws, testifying in one instance before a state legislature, "We conservatively project a 10-percent reduction in alcohol-related crashes, deaths, and injuries" in the state.

Seven Studies Have Examined the Effectiveness of .08 BAC Laws

Seven studies have been published assessing the effect of .08 BAC laws on motor vehicle crashes and fatalities in the United States. Four studies published between 1991 and 1996 assessed the effectiveness of .08 BAC laws in the five states that enacted them between 1983 and 1991. On April 28, 1999, NHTSA released three additional studies. Table 1 summarizes the seven studies that examine .08 BAC laws.

Table 1: Studies on the Effectiveness of .08 BAC Laws

Title of study	Released	Conducted by	Funded by	Scope
The Effects Following the Implementation of an .08 BAC Limit and an Administrative Per Se Law in California	1991	Research and Evaluation Associates	NHTSA	California
A Preliminary Assessment of the Impact of Lowering the Illegal BAC Per Se Limit to .08 in Five States	1994	NHTSA staff	NHTSA	California, Utah, Oregon, Maine, and Vermont
The General Deterrent Impact of California's .08% Blood Alcohol Concentration Limit and Administrative Per Se License Suspension Laws	1995	Department of Motor Vehicles, State of California	California Office of Traffic Safety	California
Lowering State Legal Blood Alcohol Concentration Limits to .08%: The Effect on Fatal Motor Vehicle Crashes	1996	Researchers from Boston University's School of Public Health	Grants, including ones from the National Institute on Alcohol Abuse and Alcoholism and the U.S. Centers for Disease Control and Prevention	California, Utah, Oregon, Maine, and Vermont
The Effects of 0.08 Laws	1999	Rainbow Technology Inc., and NHTSA's National Center for Statistics and Analysis	NHTSA	California, Utah, Oregon, Maine, Vermont, New Hampshire, North Carolina, Kansas, New Mexico, Florida, and Virginia.
Evaluation of the Effects of North Carolina's 0.08% BAC Law	1999	University of North Carolina	NHTSA	North Carolina
The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes	1999	Pacific Institute for Research and Evaluation	NHTSA	50 states and the District of Columbia

The First Four Published Studies Had Limitations and Raised Methodological Concerns

Although NHTSA characterized the first four studies on the effectiveness of .08 BAC laws as conclusively establishing that .08 BAC laws resulted in substantial reductions in fatalities involving alcohol, we found that three of the four studies had limitations and raised methodological concerns that called their conclusions into question. For example, while a NHTSA-endorsed Boston University study concluded that 500 to 600 fewer fatal crashes would occur each year if all states adopted .08 BAC laws, this study has been criticized for, among other reasons, its method of comparing states; and a recent NHTSA study characterized the earlier study's conclusion as "unwarranted." The fourth study reported mixed

results. Therefore, these studies did not provide conclusive evidence that .08 BAC laws by themselves have resulted in reductions in drunk driving crashes and fatalities. A task force of the New Jersey State Senate examined this evidence and, in a report issued in December 1998, reached a similar conclusion.[8]

The California Studies

NHTSA has cited California's experience as evidence of the effectiveness of .08 BAC laws. For example, in a publication promoting the need for .08 BAC laws, NHTSA stated that "alcohol-related fatalities significantly decreased after the state's BAC limit was lowered to .08 in 1990." In another publication, it said "California's .08 law was analyzed by NHTSA, [and] . . . the state experienced a 12% reduction in alcohol-related fatalities, although some of this can be credited to the new administrative license revocation law."

While NHTSA's 1991 study by Research and Evaluation Associates (see table 1) did find a 12-percent decline in alcohol-related fatalities after the .08 BAC law took effect, the study had important limitations. For example, the authors had available to them only 1 year of data for the period after the law went into effect, an unusually short period of time to analyze trends, and the authors acknowledged this limitation. California also had a license revocation law—under which a person deemed to be driving under the influence has his or her driving privileges suspended or revoked—take effect 6 months after the .08 BAC law. Although the authors concluded that this law had no effect, they stated that they were unable to accurately account for the separate effects of the two laws.

A more comprehensive, methodologically sound study of California was released by the state's Department of Motor Vehicles in 1995. In contrast to the 1991 review, this study was based on 4 years of data after the law became effective and found mixed results. The study concluded that the .08 BAC law was not associated with any statistically significant reductions in crashes resulting in fatalities or serious injuries in which drivers were reported to have been drinking, but that reductions did occur in accidents that took place during hours in which alcohol involvement is probable, such as nighttime crashes between 2 and 3 a.m. The study found

[8]State of New Jersey, Senate Task Force on Alcohol-Related Motor Vehicle Accidents and Fatalities, Dec. 11, 1998. Created by the leaders of the New Jersey State Senate, the task force was composed of elected officials and representatives from the state's judicial, medical, academic, and law enforcement communities. The task force was charged with, among other things, evaluating the available studies, and determining whether reducing the BAC limit to .08 would reduce the number of alcohol-related accidents and fatalities in New Jersey. The task force concluded that "the impact of laws that reduce the per se BAC level from .10 to .08, in isolation, is inconclusive" and that the effect of public education and awareness campaigns and license revocation laws "can be greater than changing the legal BAC."

reductions associated with the state's license revocation law—a 9 to 13 percent decline in crashes resulting in fatalities or serious injuries in which drivers were reported to have been drinking. However, given the 6-month time period separating the effective dates of the two laws, the authors concluded that .08 BAC and license revocation laws most likely worked together to lower fatalities.

Although the 1995 study was more comprehensive than the 1991 study, NHTSA's public statements and literature often quote the 12-percent reduction cited in the 1991 study and rarely refer to the 1995 study. California continued to experience a decline in alcohol-related fatalities through the 1990s—from 47 percent of fatalities in 1991 to 36 percent in 1997. California traffic safety and law enforcement officials believe that this progress is attributable to the combination of stronger laws, a sustained public information campaign, and vigorous enforcement.

The Boston University Study

A 1996 study by researchers from the Boston University School of Public Health published in the American Journal of Public Health compared the first five states to adopt .08 BAC laws with five "nearby" states that retained .10 BAC laws. It found a 16 percent greater decline in the proportion of alcohol-related fatalities among drivers in the states adopting the lower limit and concluded that if all states adopted .08 BAC laws, 500 to 600 fewer fatal crashes would occur annually. These study results were endorsed by NHTSA and often cited in the agency's literature and public statements. President Clinton cited the study in a March 1998 statement and said ". . . if all states lower their BAC to .08, it will result in 600 fewer alcohol-related deaths each year."

However, this study has been criticized by many traffic safety experts both inside and outside of NHTSA and has methodological limitations that call its results into question. For example:

- Many traffic safety experts question this study's method of comparing one state to another. The study does not explain the criteria used to select the comparison states. Using one state as a control to assess the impact of a new law in another state assumes that all other conditions are held equal except for the introduction of the law. One critic noted, for example, that one of the states with a .08 BAC law employs random roadside sobriety checkpoints and was compared to a state with a .10 BAC law that prohibits the practice. Changing the selection of comparison states can dramatically change this study's results. According to NHTSA, while other traffic safety studies have made single state comparisons, it is best to compare one state

to several or to the rest of the nation.

- Three of the five states had license revocation laws take effect within 10 months of their .08 BAC laws. This study made no effort to separately analyze the relative contribution of the two types of laws to any subsequent decline in fatal motor vehicle crashes in those three states. Thus, in at least three states, the authors' findings could as easily apply to the license revocation law as the .08 BAC law. The authors acknowledged this limitation, but it is rarely cited in NHTSA's literature and public statements endorsing this study and its findings.

- The study's conclusion that 500 to 600 fewer fatal crashes would occur annually if all states had .08 BAC laws is unfounded. The study does not explain how this estimate was derived or how the reduction could be credited to .08 BAC laws since the .08 BAC and license revocation laws went into effect within 10 months of each other in three of the five states. The authors told us that the estimate assumed that all states without .08 BAC laws would experience a reduction of up to 10 percent in alcohol-related crashes after enacting the laws. However, the study provides no basis for assuming that reductions of that magnitude would occur. Even this particular study found that while three of the five states experienced reductions greater than their comparison state, two of the five did not. NHTSA's April 1999 study of the effect of .08 BAC laws in 11 states (see table 1) characterized this conclusion as "unwarranted."

NHTSA Staff Study

In 1994, NHTSA staff conducted a study that examined FARS data in the first five states that enacted .08 BAC laws (see table 1). NHTSA has often cited this study as evidence of the effectiveness of .08 BAC laws. For example, a December 1997 publication with the National Safety Council said, ". . . significant reductions in alcohol-related fatal crashes were found in 4 out of the 5 states ranging from 4% to 40%. . . ."

The staff study examined 6 measures of alcohol involvement, ranging from fatal crashes involving drivers with high BACs to single-vehicle crashes late at night, in each of the five states (for a total of 30 measures) and found statistically significant decreases in 9 of the 30 measures. The study also had several important limitations, which the authors acknowledged. For example, as with the Boston University study, the staff study made no effort to separately account for the relative contributions of .08 BAC laws and license revocation laws in the three states that enacted them within a short period. The staff study cautioned that the results were preliminary and that they pointed to the need for further research. NHTSA's public

statements, however, were more definitive—conveying, for example, the impression that fatal crashes involving alcohol went down 40 percent in one of the five states. However, the 40-percent figure refers to only one of the six measures in Vermont, a state that experiences fairly significant year-to-year variations in fatal crashes. One of the authors told us he viewed the results as indicative of positive but not clear results.

Recent Studies Are More Comprehensive, but Results Are Mixed

On April 28, 1999, NHTSA released three studies that it sponsored (see table 1). These studies are more comprehensive than the earlier studies and show many positive results but fall short of conclusively establishing that .08 BAC laws by themselves have resulted in reductions in alcohol related fatalities. For example, during the early 1990s, when the involvement of alcohol in traffic fatalities declined from around 50 percent to nearly 40 percent—a trend in states with both .08 BAC and .10 BAC laws—eight states' .08 BAC laws became effective, and the recent studies disagree on the degree to which .08 BAC laws played a role. Two of the studies reached different conclusions about the effect of one state's .08 BAC law—one concluded that the law brought about reductions in drunk driving deaths in North Carolina, while another concluded that the state's reductions occurred as the result of a long-term trend that began before the law was enacted. In a statement releasing the three studies, NHTSA credited the nation's progress in reducing drunk driving to a combination of strict state laws and tougher enforcement and stated that "these three studies provide additional support for the premise that .08 BAC laws help to reduce alcohol-related fatalities, particularly when they are implemented in conjunction with other impaired driving laws and programs."

Eleven-State Study

An April 1999 NHTSA study of 11 states with .08 BAC laws (see table 1) assessed whether the states experienced statistically significant reductions in three measures of alcohol involvement in crashes after the law took effect: (1) the number of fatalities in crashes in which any alcohol was involved, (2) the number of fatalities in crashes where drivers had a BAC of .10 or greater ("high BAC"), and (3) the proportion of fatalities involving "high BAC" drivers to fatalities involving sober drivers. The study performed a similar analysis for license revocation laws and also modeled and controlled for any preexisting long-term declining trends these states may have been experiencing when their .08 BAC laws went into effect. The study found that 5 of the 11 states had reductions in at least one measure and that 2 of the 11 states had reductions in all three measures. Table 2 summarizes the states and measures for which the

study found statistically significant reductions after .08 BAC laws became effective.

Table 2: Results of the 11-State Study of .08 BAC Laws

		Statistically significant reduction occurred in		
State	**Year .08 BAC law became effective**	**Alcohol-related fatalities**	**Fatalities involving "high BAC" drivers**	**Proportion of fatalities involving "high BAC" drivers to those involving sober drivers**
Utah	1983	No	No	No
Oregon	1983	No	No	No
Maine	1988	No	No	No
California	1990	No	No	No
Vermont	1991	**Yes**	**Yes**	**Yes**
Kansas	1993	No	No	**Yes**
North Carolina	1993	No	No	**Yes**
Florida	1994	**Yes**	**Yes**	**Yes**
New Hampshire	1994	No	No	No
New Mexico	1994	No	No	**Yes**
Virginia	1994	No	No	No
Total		**2 of 11**	**2 of 11**	**5 of 11**

Note: "Yes" indicates a statistically significant reduction after the .08 BAC law became effective. "No" indicates no statistically significant reduction.

Reductions in all three measures of fatalities involving alcohol occurred in Florida and Vermont. Although alcohol involvement in fatal crashes began to decline in Florida before the .08 BAC law was enacted, it continued to do so after the law went into effect on January 1, 1994. According to FARS, the number of alcohol-related traffic deaths in Florida declined in 1994 by nearly 10 percent, while the proportion of fatalities involving alcohol fell from 44 to 39 percent—in 1997 it stood at around 34 percent. While the study noted that Vermont has experienced fluctuations in its fatal crash rates, it found that after Vermont's .08 BAC law took effect, it also experienced statistically significant reductions in both the number of fatalities involving alcohol and the proportion of fatalities involving drivers with high BACs to those involving sober drivers. In this study, Vermont was the only state of the first five states to enact .08 BAC laws that showed any reductions in alcohol-related fatalities associated with .08 BAC laws.

Three other states that enacted .08 BAC laws in 1993 and 1994—North Carolina, New Mexico, and Kansas—experienced statistically significant reductions in the proportion of fatalities involving drivers with high BACs to those involving sober drivers. According to one of the authors, this proportion is the most accurate indicator of the study's three measures—the study noted that if fatalities involving sober drivers decline along with alcohol-related fatalities, then some broader cause other than alcohol legislation is affecting all traffic fatalities. However, if the .08 BAC law operates as expected, alcohol-related deaths will decline while deaths involving sober drivers remain unaffected. In Kansas, the proportion of alcohol involvement declined because fatalities involving sober drivers increased while alcohol-related fatalities remained relatively stable, and in North Carolina, fatalities involving sober drivers increased markedly while fatalities involving drivers with high and low BACs continued their preexisting downward trend. The author stated that without the .08 BAC legislation, alcohol-related fatalities would have been expected to increase along with fatalities involving sober drivers.

In two states where no statistically significant reductions occurred after .08 BAC laws became effective in any category—California and Virginia—the study found that the .08 BAC laws were effective when paired with the states' license revocation laws. In both cases, the license revocation laws went into effect after the .08 BAC laws, and the study found that the reductions did not begin until the license revocation laws were in force.

Finally, the study found no statistically significant reductions in four states. Utah experienced no noticeable change in fatalities involving alcohol after enacting both its .08 BAC and license revocation laws in 1983. The authors noted that the rate of alcohol involvement in fatal crashes in Utah was substantially lower than the national average and that further reductions would have been difficult. Fatalities involving alcohol in Oregon showed little change after the .08 BAC law went into effect in 1983—the most dramatic change occurred over 6 years after the law's implementation. Maine experienced no significant reductions in alcohol-related fatalities after its .08 BAC law was implemented in 1988. New Hampshire experienced a decline in alcohol-related fatalities 2 years before its .08 BAC law went into effect in 1993 but saw no significant decline in fatalities associated with the .08 BAC law.

The study was careful to not draw a causal relationship between the reductions it found and the passage of .08 BAC laws by themselves. Rather,

it concluded that .08 BAC laws added to the impact that enforcement; public information; and legislative activities, particularly license revocation laws, were having. In addition to the two states where .08 BAC and license revocation laws were found to be effective in combination, the study noted that the five states with .08 BAC laws that showed reductions already had license revocation laws in place. One of the authors told us that this suggested that the .08 BAC laws had the effect of expanding the scope of the license revocation laws to a new portion of the driving public.

University of North Carolina Study

A NHTSA-sponsored study by the University of North Carolina concluded, in contrast to the 11-state study, that the .08 BAC law in North Carolina had little clear effect. The study examined alcohol-related crashes and crashes involving drivers with BACs greater than .10 from 1991 through 1995; compared fatalities among drivers with BACs greater than .10 in North Carolina with such fatalities in 11 other states; and compared six measures of alcohol involvement in North Carolina and 37 states that did not have .08 BAC laws at that time. The study controlled for and commented on external factors that could confound the results, such as the state's sobriety checkpoints, enforcement, and media coverage. The study found the following:

- No statistically significant decrease in alcohol-related crashes after passage of North Carolina's .08 BAC law in three direct and two "proxy" measures.[9]
- A continual decline in the proportion of fatally injured drivers with BACs equal to or greater than .10 but no abrupt change in fatalities that could be attributed to the .08 BAC law.
- Decreases in alcohol-related crashes in North Carolina and in the 11 other states studied. While North Carolina's decreases were greater, the study concluded that no specific effects could be attributed to the .08 BAC law.
- No statistically significant difference between North Carolina and 37 states without .08 BAC laws in four of the six measures. While reductions in police-reported and estimated instances of alcohol involvement were found to be statistically significant, these reductions happened 18 months before North Carolina lowered its BAC limit. The authors attributed these decreases, in part, to increased enforcement.

[9]Direct measures are actual observations, such as police reports of alcohol involvement in crashes, whereas proxy measures are not actual observations, but categories in which the involvement of alcohol is considered probable, such as nighttime crashes between 2 and 3 a.m.

The study concluded that the .08 BAC law had little clear effect on alcohol-related fatalities in North Carolina, and that a downward trend was already occurring before North Carolina enacted its .08 BAC law and that this trend was not affected by the law. The authors offered several possible explanations, including that (1) the effects of the .08 BAC laws were obscured by a broader change in drinking-driving behavior that was already occurring; (2) North Carolina had made substantial progress combating drunk driving and that the remaining drinking and driving population in North Carolina was simply not responsive to the lower BAC law; and (3) .08 BAC laws are not effective in measurably affecting the behavior of drinking drivers.

50-State Study

The third April 1999 NHTSA study did a complex regression analysis assessing the effect of three drunk driving laws, including .08 BAC laws.[10] It evaluated .08 BAC laws by comparing two groups—states with .08 BAC laws with states with .10 BAC laws, before and after the laws were passed. The study examined quarterly FARS data for all 50 states and Washington, D.C. from 1982 through 1997 and tested for reductions in the involvement of (1) "low BAC" drivers (.01 BAC through .09 BAC) and (2) "high BAC" drivers (.10 BAC and above) in fatal crashes. The study was more comprehensive than the prior multistate studies, having controlled for the effects of factors such as the number of licensed drivers, vehicle miles traveled, per capita beer consumption, unemployment rates, urban/rural composition, season, safety belt laws, and existing downward trends in alcohol-related fatal crashes. This study concluded that states that enacted .08 BAC laws experienced an 8-percent reduction in the involvement of drivers with both high and low BACs when compared with the involvement of sober drivers. The study estimated that 274 lives have been saved in the states that enacted .08 BAC laws and that 590 lives could be saved annually if all states enacted .08 BAC laws.

While more comprehensive than other studies, the study used a method to calculate the 8-percent reduction that is different, and thus not directly comparable, to those for fatality estimates reported in other studies and publications. In particular, this method can produce a numerical effect that is larger than other methods. In the past, NHTSA's statistics and other studies measured differences either (1) in the number of alcohol-related fatalities or the number of drivers reported to have been using alcohol (termed "alcohol-involved" drivers) or (2) in the proportion of such

[10]Regression analysis is a statistical technique used to describe and analyze relationships between a dependent variable (e.g. fatal crashes involving alcohol) and one or more independent variables (e.g. .08 BAC and license revocation laws).

fatalities or drivers as a percentage of all fatalities or drivers. The 50-state study's 8-percent estimate is the change in the ratio of alcohol-involved drivers to sober drivers who are in fatal crashes. While this is not an inappropriate way to measure differences in crashes and fatalities, this method can increase the size of the effect because, rather than comparing fatalities or drivers involving alcohol to all fatalities or drivers, it compares the number of alcohol-involved drivers to just the number of sober drivers. This method produced a larger effect in this study because, since 1982, of the drivers involved in fatal crashes, the number reported to have been using alcohol has dramatically declined (by around 39 percent), while the number reported to have been sober has substantially increased (by around 25 percent). While the 11-state study also measured this ratio, that study did not report a numerical effect.

Table 3 illustrates the difference between these methods of portraying traffic statistics using NHTSA's FARS data on drivers involved in fatal crashes between 1995 and 1997. As the table shows, while the number of alcohol-involved drivers declined by about 6 percent, the ratio of such drivers to sober drivers declined by 9 percent.

Table 3: Drivers Involved in Fatal Crashes, 1995-97

	1995	1997	Difference
Alcohol-involved drivers	14,269	13,393	(6.1%)
Sober drivers	41,895	43,209	3.1%
All drivers	56,164	56,602	0.8%
Ratio of alcohol-involved drivers to sober drivers	34%	31%	(9%)

Source: GAO's analysis of FARS data.

Another reason why this study's results cannot be directly compared to other studies' is because it did not include data for drivers under 21. In 1997, drivers under 21 accounted for around 14 percent of the drivers in fatal crashes and about 12 percent of the drivers in fatal crashes involving alcohol. According to the authors, drivers under 21 were excluded from the analysis because other laws affect these drivers, such as minimum drinking age and "zero tolerance" BAC laws, and thus the primary effect of .08 BAC legislation would be expected to be on the population over 21 years old. While this argument may have merit, other arguments exist for including this population. First, NHTSA has stated that .08 BAC laws have a general deterrent effect on drinking and driving among all drivers. Also, young drivers violating .08 BAC laws have been prosecuted under those

laws without regard to age, suggesting that these laws do not affect only adults. For example, in California, 13,067 drivers under 21 were convicted under the state's .08 BAC law in 1997, compared with 11,517 drivers under 21 convicted under the state's "zero tolerance" BAC law. Finally, with the exception of the 1994 NHTSA staff study, all other studies of the effect of .08 BAC laws, including the recent 11-state and North Carolina studies, have included persons under 21 in their analyses.

Including persons under 21 years old would have changed these study results. In particular, the study would have found no statistically significant reductions associated with .08 BAC laws for drivers at low BAC levels. The findings regarding drivers at high BAC levels—a group that contains over 3 times as many drivers—would have remained substantially unchanged.

The study warns that "it is important to interpret estimates of lives saved due to any single law with considerable caution." In particular, as the study notes, factors such as public education, enforcement, and changes in societal norms and attitudes toward alcohol have produced long-term reductions in drunk driving deaths over many years. This study did more to control for extraneous factors than any of the other multistate studies, but this is inherently difficult to do, and in this case the authors estimate that 50 to 60 percent of the reductions in alcohol-related fatalities are explained by the laws it reviewed and the other factors it considered, a moderate level for statistical analyses of this type. Because of the uncertainties, the study's estimate of lives saved is also expressed as a range—and the number of lives saved in states with .08 BAC laws could have been as few as 88 or as many as 472.[11] Similarly, if the states without .08 BAC laws enacted them and experienced reductions comparable to those found in the study, the number of lives saved annually was projected to be as few as 200 or as many as 958. While the study reported results for the three laws it reviewed, including .08 BAC laws, the study also concluded that "the attribution of savings to any single law should be made with caution since each new law builds to some extent on existing legislation and on other ongoing trends and activities."

Conclusions

While indications are that .08 BAC laws in combination with other drunk driving laws as well as sustained public education and information efforts and strong enforcement can be effective, the evidence does not

[11]The study made range estimates at the 95 percent confidence level, meaning that one would expect these results to occur in 95 out of 100 cases.

conclusively establish that .08 BAC laws by themselves result in reductions in the number and severity of crashes involving alcohol. Until recently, limited published evidence existed on the effectiveness of .08 BAC laws, and NHTSA's position—that this evidence was conclusive—was overstated. In 1999, more comprehensive studies have been published that show many positive results, and NHTSA's characterization of the results has been more balanced. Nevertheless, these studies fall short of providing conclusive evidence that .08 BAC laws by themselves have been responsible for reductions in fatal crashes.

Because a state enacting a .08 BAC law may or may not see a decline in alcohol-related fatalities, it is difficult to accurately predict how many lives would be saved if all states passed .08 BAC laws. The effect of a .08 BAC law depends on a number of factors, including the degree to which the law is publicized; how well it is enforced; other drunk driving laws in effect; and the unique culture of each state, particularly public attitudes concerning alcohol.

As drunk driving continues to claim the lives of thousands of Americans each year, governments at all levels seek solutions. Many states are considering enacting .08 BAC laws, and the Congress is considering requiring all states to enact these laws. Although a strong causal link between .08 BAC laws by themselves and reductions in traffic fatalities is absent, other evidence, including medical evidence on impairment, should be considered when evaluating the effectiveness of .08 BAC laws. A .08 BAC law can be an important component of a state's overall highway safety program, but a .08 BAC law alone is not a "silver bullet." Highway safety research shows that the best countermeasure against drunk driving is a combination of laws, sustained public education, and vigorous enforcement.

Agency Comments and Our Evaluation

DOT provided comments on a draft of this report (see app. I). The Department generally agreed with the information presented in the report. DOT reiterated its long-standing commitment to a systems approach for combating drunk driving and stated that while no individual component, including .08 BAC laws, is effective in isolation, the overall evidence supports the effectiveness of .08 BAC laws. DOT stated that the four original studies provided positive, if not conclusive, results and formed a reasonable basis for supporting .08 BAC laws. The three recent studies added to this body of evidence, including the North Carolina study, which, while finding little clear effect of the state's .08 BAC law, did find

reductions. Consequently, DOT concluded that significant reductions have been found in most states, that consistent evidence exists that .08 BAC laws, at a minimum, add to the effectiveness of laws and activities already in place, and that a persuasive body of evidence is now available to support the Department's position on .08 BAC laws.

Overall, we believe that DOT's assessment of the effectiveness of .08 BAC laws is fairly consistent with our own. We agree with DOT on the importance of a systems approach to combating drunk driving; we have noted examples in this report such as the state of California, where .08 BAC laws were not effective until other complementary measures were put into place. DOT did not disagree with our discussion concerning the limitations and methodological concerns for three of the first four studies or with our assessment that recent studies reach different conclusions about the effectiveness of .08 BAC laws; we believe those study results must be viewed in the context of their limitations and conclusions. Although DOT stated that studies showed significant reductions in most states, the 11-state study demonstrated reductions associated with .08 BAC laws in a minority of states (5 of 11) and a minority of the measures (9 of 33) it studied. In addition, many of the results DOT cited as consistent evidence supporting its position were reductions that study authors determined not to be statistically significant—thus, no conclusions on the effectiveness of .08 BAC laws can be drawn from them. Although we characterize the strength of the study results differently, we and DOT reach essentially the same conclusion regarding the effectiveness of .08 BAC laws, both by themselves and in combination with other measures.

Scope and Methodology

To determine the effect of .08 BAC laws on the number and severity of alcohol-related crashes, we analyzed the body of research published between 1991 and 1999. Of the seven studies, five were published by NHTSA, one by the state of California, and one by the American Journal of Public Health. We reviewed the studies' methodologies, findings, and conclusions and met with study authors at NHTSA, the Pacific Institute for Research and Evaluation, the California Department of Motor Vehicles, and Boston University's School of Public Health. We also discussed the studies and traffic safety issues with NHTSA officials in Washington, D.C., Boston, Massachusetts, and San Francisco, California; officials of the American Automobile Association, the Insurance Institute for Highway Safety, the National Sheriffs Association, Mothers Against Drunk Driving, the American Beverage Institute, the National Restaurant Association; and state traffic safety and law enforcement officials in California.

The scope of our study was limited to the effect of .08 BAC laws on the number and severity of alcohol-related crashes. We did not review several other arguments raised by both proponents and opponents of .08 BAC laws; for example, while we describe the medical evidence on impairment, we did not evaluate that evidence. In addition, our ability to review the severity of alcohol-related crashes was limited by the fact that the FARS database—used entirely by five of the seven studies and in part by a sixth—includes only fatal crashes. The .08 BAC laws reviewed may have had a greater or lesser effect on nonfatal crashes than it did on fatal crashes. Finally, section 2008 of the Transportation Equity Act for the 21st Century required us to review the effect of .02 BAC laws for drivers under 21 in reducing the number and severity of alcohol-related crashes. As agreed with your staff, we will not address those laws as all 50 states and the District of Columbia now have laws establishing BAC levels of .02 or less for drivers under 21 years of age.

We performed our work from August 1998 through April 1999 in accordance with generally accepted government auditing standards.

We will send copies of this report to cognizant congressional committees; the Secretary of Transportation; and the Administrator, National Highway Traffic Safety Administration. We will make copies available to others upon request. If you have any questions regarding this report, please contact me at (202) 512-3650 or Ronald Stouffer at (202) 512-4416. Key contributors are listed in appendix II.

Sincerely yours,

Phyllis F. Scheinberg
Associate Director,
Transportation Issues

Comments From the Department of Transportation

U.S. Department of Transportation

Assistant Secretary for Administration

400 Seventh St., S.W. Washington, D.C. 20590

June 8, 1999

Ms. Phyllis Scheinberg
Associate Director, Transportation Issues
U.S. General Accounting Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Ms. Scheinberg:

Enclosed are the Department of Transportation's comments on the GAO draft report, "Highway Safety: Effectiveness of State .08 Blood Alcohol Laws," RCED-99-179.

We appreciate this opportunity to review and comment on the draft report. Please contact Martin Gertel on (202)-366-5145 if there are any questions concerning our comments.

Sincerely,

Melissa J. Allen

Department of Transportation
Comments on the General Accounting Office (GAO) Draft Report
"Highway Safety: Effectiveness of State .08 Blood Alcohol Laws,"
RCED-99-179

The Department commends GAO for reaching the sound and accurate conclusion that a .08 blood alcohol concentration (.08 BAC) law can be an important component of a state's overall highway safety program. We agree that highway safety research shows that the best countermeasure against drunk driving is a combination of laws, including .08 BAC, sustained public education, and vigorous enforcement. The Department has consistently supported such a systems approach to reduce alcohol related driving fatalities. The .08 BAC laws are an important component of this system, as research has shown substantial evidence that performance in driving-related skills such as reaction time, tracking and steering, and emergency response is substantially impaired for all persons at .08 BAC. It is not the Department's position that .08 BAC laws, by themselves, are sufficient to address the issue of alcohol-impaired driving.

Systems Approach Most Effective for Reducing Alcohol Related Highway Deaths

GAO aptly recognizes in the draft report that the National Highway Traffic Safety Administration (NHTSA) has, since 1970, espoused a systems approach for reducing alcohol-impaired driving. This systems approach must include legislative, enforcement, judicial, licensing and public information components. In 1998, NHTSA further refined this concept with the publication of an action plan to further reduce alcohol related driving fatalities. This plan recommends that all states initiate a wide range of laws and programs including .08 BAC limits, administrative license revocation (ALR) laws, comprehensive screening and treatment programs for alcohol offenders, vehicle impoundment and zero tolerance BAC laws for youth.

While studies conducted for NHTSA have attempted to measure the effectiveness of individual components of such a systems approach to reducing alcohol related deaths, it is recognized that no component operates in a vacuum. All of the efforts to reduce alcohol-impaired driving over the past two decades have built upon and operated in the environment created by the totality of actions which have preceded it. Thus, new laws will be most effective when they complement other laws and activities. Consistent with this position, the Agency has often pointed out that .08 BAC laws are likely to be most effective when combined with ALR laws, and vice versa. The studies conducted to date convincingly support this position.

Studies Provide Consistent Evidence Supporting .08 BAC Law Effectiveness

There is consistent evidence supporting the effectiveness of .08 BAC laws in reducing alcohol-related fatalities. Six of the seven published studies, and one study completed but not yet published, were designed and executed in accordance with sound, well accepted scientific procedures. All of the studies conducted to date have been directionally consistent in demonstrating reductions in alcohol-related fatalities associated with .08 BAC laws. Significant reductions have been reported for most of the states studied. Studies which have pooled or averaged results across states have shown reductions in alcohol related fatalities ranging from 6-16 percent. Most variation in individual state outcomes has been among smaller or less populated states where the number of fatalities is small and as a result, relatively small changes in annual crash statistics can profoundly affect the measurement of results.

At a minimum, the study results available to date provide consistent evidence that .08 BAC laws add to the effectiveness of laws and other activities already in place, and result in reductions in alcohol-related fatalities. When all of the outcomes contained in all of the studies are considered in total, these results are consistent and persuasive. Particularly in the multi-state studies, the results consistently suggest that these laws are more frequently associated with significant reductions in alcohol-related crashes than was the case with minimum drinking age laws.

Thus, NHTSA agrees with GAO that there are strong indications that .08 BAC laws, in combination with other drunk driving laws and other programs, can save lives. This is particularly the case when .08 BAC laws are combined with the ALR laws already in place in most states.

Earlier Study Results Provided Reasonable Basis for Supporting .08 BAC Laws

Four early studies, three of which controlled for extraneous factors, provided consistent, if not conclusive, evidence of the benefit of .08 BAC laws. While all studies have limitations, these studies provided credible evidence of the impact of these laws, either alone or in combination with ALR laws. Nonetheless, NHTSA recognized the need for more replication on which to base conclusions. In addition, it recognized that in the two California studies, it was very difficult to isolate the effects of the .08 BAC and ALR laws, which were implemented within 6 months of each other. Thus, NHTSA initiated three new studies.

Three Recent Studies Strengthen Analytical Basis for Supporting .08 BAC Laws

NHTSA recently released the results of these three high quality studies of .08 BAC law effects, which provided additional evidence to support the effectiveness of these laws. When combined with the previously conducted studies, the three new studies provide additional confidence in the expectation that .08 BAC laws, when added to existing laws or programs, reduce alcohol-related traffic fatalities. A substantial body of directionally consistent evidence is now available to support the Department's position that .08 BAC laws are effective in reducing alcohol-related fatalities. The 50-state study, for example, controlled for more extraneous variables than any previous study and showed a significant reduction in the involvement of both low BAC and high BAC drivers in fatal crashes. The 11-state study found that .08 BAC laws were associated with reductions in alcohol-related fatalities in 7 of the 11 states studied, either alone or in conjunction with ALR laws. In the North Carolina study, which found no clear effect of its .08 BAC law, the majority of outcomes were directionally consistent with such an effect, over and above the sharp decline in alcohol-related fatalities that began before the law was enacted.

The methodologies used in these studies provide tools to make responsible estimates of how many lives would be saved if all states enacted .08 BAC laws. It is common and appropriate for such estimates to be made, based on average, pooled, or aggregated study results. Researchers that make such estimates are fully aware that there will be a range of results experienced by individual states. However, if such estimates are based on sound research and appropriate algorithms, it is reasonable to predict average effects which can be expected in states yet to adopt a particular program.

GAO Contacts and Staff Acknowledgments

GAO Contacts

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In addition to those named above, Steve Cohen, Amy Gleason Carroll, Sara Ann Moessbauer, Mitchell B. Karpman, and Allan Rogers made key contributions to this report.

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