The effectiveness of a 0.05 blood alcohol concentration (BAC) limit for driving in the United States

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Abstract

The National Transportation Safety Board recently recommended that states establish a *per se* blood alcohol concentration (BAC) limit of 0.05 or lower for all drivers who are not already required to adhere to lower BAC limits in a national effort to reduce alcohol-impaired driving. There is strong evidence for adopting this recommendation. A comprehensive review of the literature on BAC limits was conducted. The research indicates that virtually all drivers are impaired regarding at least some driving performance measures at a 0.05 BAC. The risk of being involved in a crash increases significantly at 0.05 BAC and above. The relative risk of being killed in a single-vehicle crash with BACs of 0.05–0.079 is 7–21 times higher than for drivers at 0.00 BAC. Lowering the BAC limit from 0.08 to 0.05 has been a proven effective countermeasure in numerous countries around the world. Most Americans do not believe a person should drive after having two or three drinks in 2 hours. It takes at least four drinks for the average 170-pound male to exceed 0.05 BAC in 2 hours (three drinks for the 137-pound female). Most industrialized nations have established a 0.05 BAC limit or lower for driving. Progress in reducing the proportion of drivers in fatal crashes with illegal BACs has stalled over the past 15 years. Lowering the BAC limit for driving from the current 0.08 to 0.05 has substantial potential to reduce the number of people who drink and drive in the United States and get involved in fatal crashes.

Keywords

Alcohol impairment; blood alcohol concentration; crash risk; driving performance; illegal BAC limit

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INTRODUCTION

On 14 May 2013, the National Transportation Safety Board (NTSB), an independent federal agency dedicated to promoting transportation safety, issued a report recommending, among other measures, that states should lower the illegal blood alcohol concentration (BAC) limit

for driving from 0.08 to 0.05 [1]. The NTSB provided a sound rationale and concluded that lowering the BAC limit to 0.05 or lower has a strong evidence-based foundation. Most industrialized nations have already enacted a 0.05 illegal BAC limit.

The American Beverage Institute, funded by the alcohol and hospitality industries, countered the recommendation stating that it was 'ludicrous' and 'criminalizing perfectly responsible behavior' [2]. There was also a lack of enthusiastic support from some organizations, such as Mothers Against Drunk Driving, who questioned of the potential benefit of a 0.05 BAC law. This raises the issue for debate as to whether enactment of a law reducing the illegal BAC limit for driving to 0.05 will be an effective strategy in the United States. In our experience with lower BAC limits in the United States, the following issues have typically been raised by opponents.

ISSUES

Issue: there is little increase in crash risk at 0.05 BAC

A review of the literature by researchers from the Pacific Institute for Research and Evaluation examined the effects of various BACs on driving and crashes [3]. The review revealed important reasons why a 0.05 illegal BAC limit is a sound strategy. The risk of being involved in a crash of any severity increases at each positive BAC level, but the risk rises rapidly and is statistically significant after a driver reaches or exceeds 0.05 BAC compared to drivers with no alcohol in their blood systems [4]. Recent studies indicate that the relative risk of being killed in a single-vehicle crash for drivers with BACs of 0.05–0.079 is at least seven times that of drivers at 0.00 BAC (no alcohol). These risks are significant [5,6].

Issue: many people are not impaired at 0.05 BAC

Laboratory evidence shows that most adults are significantly impaired at 0.05 BAC [7–9]. For example, Moskowitz & Fiorentino [8] reviewed 112 scientific papers regarding the effects of alcohol on driving-related skills published between 1981 and 1997. They concluded that, by the time subjects reach 0.05 BAC, the majority of experimental studies examined reported significant impairment. After testing 168 drivers in another study, Moskowitz *et al*. [9] concluded that most of the driving population is impaired in at least some important measures at BACs as low as 0.02 BAC.

Issue: heavy drinkers are not impaired at 0.05 BAC

Drivers with 0.05–0.07 BACs are also much more likely to be involved in a fatal crash than drivers who have not been drinking [6]. The driving performance of virtually all drivers is impaired at 0.05 BAC. Laboratory and test track research shows that most drivers, even experienced drinkers who typically reach BACs of 0.15 or greater, are impaired at 0.05 BAC regarding critical driving tasks [9]. There are significant performance decrements in areas such as braking, steering, lane-changing, judgement and divided attention at a 0.05 of BAC. Some studies report that inadequate, reduced or compromised performance decrements in some of these tasks are as high as 30–50% at 0.05 BAC compared to the same drivers at 0.00 BAC [7–10].

Issue: lowering the limit to 0.05 will have little effect on fatal crashes

Lowering the illegal BAC limit to 0.05 is a proven effective countermeasure that has reduced alcohol-related traffic fatalities in other countries, most notably Australia (see Table 1). Although studies in Europe and Australia each use a different methodology to evaluate these effects, the evidence is consistent and persuasive that fatal and injury crashes involving drinking drivers decrease at least 5–8% and up to 18% after a country lowers their illegal BAC limit from 0.08 to 0.05 illegal BAC (e.g. [11–17]). If all states were to adopt the 0.05 illegal BAC limit, and it was enforced, an estimated 500–800 lives could be saved each year in the United States [18,19]. When the BAC limit was lowered in states in the United States from 0.10 to 0.08, numerous studies showed that it reduced impaired-driving fatal crashes [18–22].

Issue: countries most like us, Britain and Canada, still have 0.08 BAC limits

Most other industrialized nations around the world have set illegal BAC limits at 0.05 BAC or lower. Most Canadian provinces have a 0.05 'warn range' limit at which officers may suspend the driver's license for 1–7 days. In a recent study, the 0.05 warn range in British Columbia in Canada (a 3-day administrative license suspension for driving with a BAC from 0.05 to 0.07) was associated with a 40% decrease in alcohol-related fatal crashes [23]. In Britain, a national *per se* BAC limit of 0.08 was enacted in 1967, a full 16 years before any state in the United States adopted that limit. Many states in the United States that had BAC limits in 1967 set them at 0.15. Establishing the 0.08 *per se* BAC limit, coupled with a strong enforcement effort, produced a marked reduction in alcohol-related crashes in Britain [24].

All states in Australia now have a 0.05 illegal BAC limit. Austria, France, Germany, Italy and Spain have lowered their limit to a 0.05 illegal BAC; and Japan, Norway, Russia and Sweden have set their limit at 0.02 illegal BAC [25].

Issue: the US public will not support a 0.05 limit

A reasonable standard to set is 0.05 illegal BAC. A 0.05 illegal BAC is not typically reached with a couple of beers after work or with a glass of wine or two with dinner. It takes at least four drinks for an average 170-pound male to exceed 0.05 BAC in 2 hours on an empty stomach (three drinks for a 137-pound female). The illegal BAC level reached depends upon a person's age, gender and weight, as well as the food in their stomach and their metabolism rate [26]. No matter how many drinks it takes to reach 0.05 BAC, people at this level are too impaired to drive safely.

The public supports levels below 0.08 BAC. The National Highway Traffic Safety Administration (NHTSA) national opinion surveys show that most people would not drive after consuming two or three drinks in an hour and believe the limit should be no higher than the BAC level associated with that amount of drinking [27], which would be 0.05 BAC or lower for most drivers.

Issue: police will have difficulty enforcing the 0.05 BAC limit

Several studies, including a NHTSA-sponsored study in Illinois [20], have looked at the impact of lowering the BAC limit from 0.10 to 0.08 on enforcement efforts and the criminal justice system. These studies have not found any significant problems for the police or for the court systems in adjusting to a lower limit. The same should happen when the limit is lowered from 0.08 to 0.05 BAC. There will be a slight increase in driving while impaired (DWI) arrests, but not enough to overburden the criminal justice system. Lowering the *per se* limit to 0.05 does not place an unnecessary strain on police officers. They must still have probable cause to stop drivers and to determine if they are impaired. The horizontal gaze nystagmus (HGN) test of the three Standardized Field Sobriety Tests (SFSTs) is just as valid at 0.05 BAC as it is at 0.08 BAC and 0.10 BAC [28].

Issue: drivers under age 21 years, who are at highest risk for being involved in a crash, will not be affected by the 0.05 law because they are already under the 0.02 zero-tolerance law

At least two studies have shown that lowering the BAC limit for adults to 0.08 also reduced underage drinking drivers in fatal crashes by 8% [29,30].

Issue: the 0.05 law will not affect the high-BAC hard-core drinking drivers

Legislation lowering the BAC limit has been shown to significantly reduce drinking drivers in fatal crashes at all BAC levels (BACs > 0.01; 0.05; 0.08; 0.15) [12,18,19,21,22]. In one study, lowering the illegal BAC limit from 0.10 BAC to 0.08 BAC was associated with an 18% decrease in the proportion of fatal crashes with a fatally injured driver whose BAC was 0.15 or greater [22]. As shown in Fig. 1, during the last 30 years impaired driving laws and enforcement in the United States have contributed to reductions of impaired drivers in fatal crashes (BACs ≥ 0.08). In addition, laws such as lowering BAC limits for driving have also resulted in reductions of drivers in fatal crashes with very high BACs (0.15 or greater) [18,19,22].

The proportion of drivers in fatal crashes with illegal BACs (≥ 0.08) has been reduced significantly from 35% in 1982 to 20% in 1999 (*P* < 0.05), a 43% decrease in that proportion. In addition, the proportion of drivers in fatal crashes with very high BACs (≥ 0.15) has also decreased significantly, from 23% in 1982 to 13% in 1999 (*P* < 0.05), also a 43% reduction in that proportion.

Issue: the US impaired-driving enforcement system is working well

Progress to reduce impaired driving has stalled over the past 15 years (see Fig. 1). Between 1982 and 1997, there was a 43% reduction in the proportion of drivers involved in fatal crashes with BACs ≥ 0.08 and with BACs ≥ 0.15. Since then, there has been no progress in those measures. Further progress is needed to reduce alcohol-impaired driving in the United States. It has been 30 years since the first two states adopted a 0.08 illegal BAC limit (Utah and Oregon in 1983) and 13 years since federal legislation provided a strong incentive to adopt a 0.08 illegal BAC limit [31]. Lowering the illegal BAC limit from 0.08 to 0.05 has substantial potential to reduce alcohol-impaired driving and save lives.

Issue: few scientific and safety organizations are supporting a 0.05 BAC limit

The World Medical Association, the American Medical Association, the British Medical Association, the European Commission, the European Transport Safety Council, the World Health Organization, the Canadian Medical Association, the Centre for Addiction and Mental Health and the Association for the Advancement of Automotive Medicine all have policies supporting a 0.05 BAC or lower as the illegal limit *per se* for drivers aged 21 years and older. At least 91 countries around the world have adopted a 0.05 illegal BAC or lower limit for driving, while 54 countries use limits from 0.06 to 0.12 illegal BACs [25].

SUMMARY

The driving performance of virtually all drivers is impaired at 0.05 BAC, and the risk of being involved in a crash increases significantly at 0.05 BAC. Lowering the illegal *per se* limit to 0.05 BAC is a proven effective countermeasure that has reduced alcohol-related traffic fatalities in other countries. A 0.05 BAC limit is a reasonable standard to set: it is not typically reached with a couple of beers after work or with a glass of wine or two with dinner. The American public supports levels below 0.08 BAC. Surveys show that most people would not drive after consuming two or three drinks in an hour, which would be 0.05 BAC or lower for most drivers. Most other industrialized nations around the world have set BAC limits at 0.05 BAC or lower. Further progress is needed in reducing alcohol-impaired driving in the United States. Legislation such as lowering the BAC limit for driving typically reduces drinking drivers in fatal crashes at all BAC levels (BACs > 0.01; 0.05; 0.08; 0.15).

The major criticisms of a 0.05 BAC limit have been addressed. It is our opinion that the evidence is quite clear—lowering the BAC limit to 0.05 has saved lives in other countries and can do so in the United States. It is time we learned some lessons from our European and global partners in achieving further declines in impaired-driving fatalities [32]. Lowering the illegal BAC limit for driving can serve as the impetus in further reducing alcohol-impaired traffic fatalities in this country.

Acknowledgements

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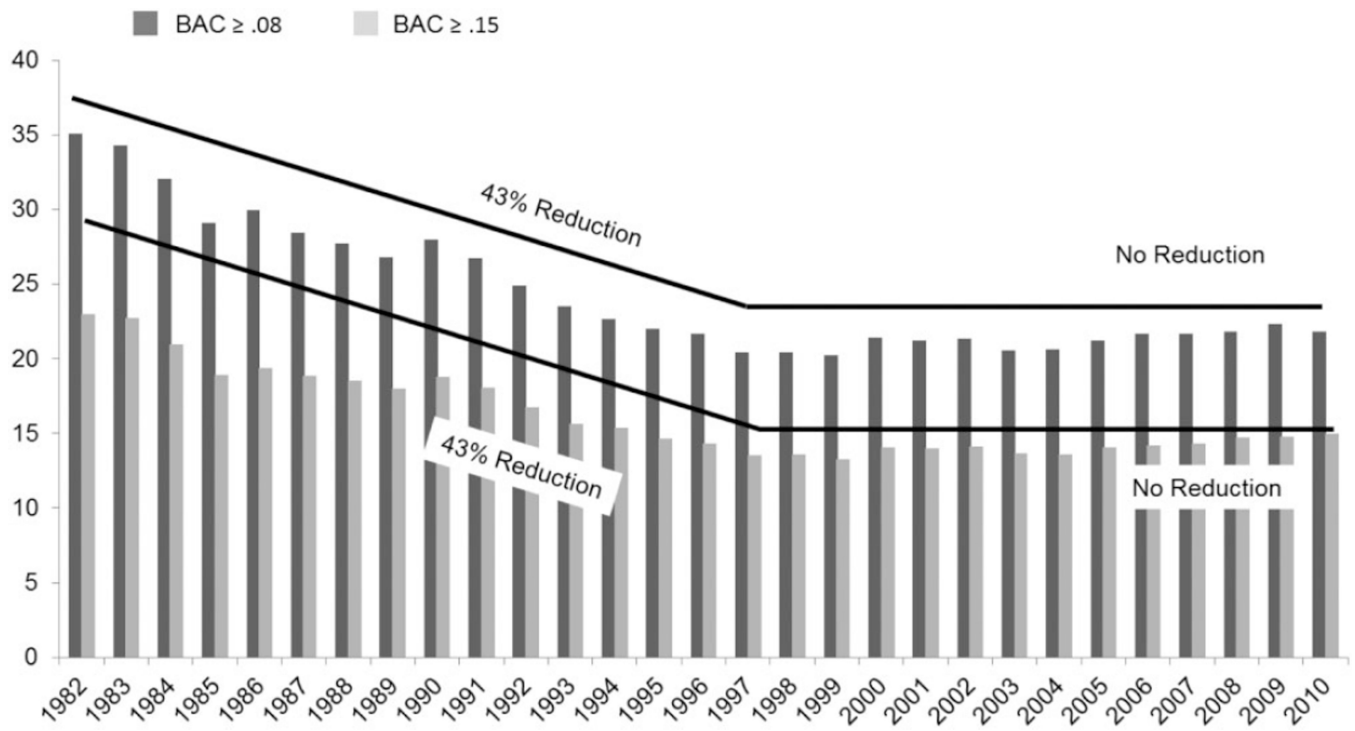
Figure 1.
Proportion of all drivers involved in fatal crashes with blood alcohol concentrations (BACs) 0.08 and with BACs 0.15, 1982–2010 [source: National Highway Traffic Safety Administration (NHTSA), Fatality Analysis Reporting System (FARS) [26]]

Table 1

Studies of the effects of lowering the illegal blood alcohol concentration (BAC) limit to 0.05 g/dl in various countries.

Study	Results
Noordzij (1994) [15] 'Decline in drinking and driving in the Netherlands'	Percentage of drivers with BACs 0.05 g/dl from roadside surveys decreased from more than 15% in the years before the 0.05 limit to 2% in the first year and then leveled off at 12% for 10 years after the law change
Bartl and Esberger (2000) [11] 'Effects of lowering the legal BAC limit in Austria'	Found 9.4% decrease in alcohol-related crashes. 'Lowering the legal BAC-limit from 0.08% to 0.05% in combination with intense police enforcement and reporting in the media leads to a positive short-term effect'
Henstridge *et al*. (1995) [13] 'The long-term effects of random breath testing in Adelaide'	Queensland (Australia) experienced an 18% reduction in fatal crashes and a 14% reduction in serious crashes associated with lowering the BAC limit to 0.05 g/dl. These results were not confounded with the effects of random breath testing. New South Wales showed an 8% reduction in fatal cases, a 7% reduction in serious crashes, and an 11% reduction in SVN crashes associated with lowering the BAC limit to 0.05 g/dl.
Smith (1988) [16] 'Effect on traffic safety of introducing a 0.05% blood alcohol level in Queensland, Australia'	Significant 8.2% reduction in night-time serious injury crashes and a 5.5% reduction in night-time property damage crashes associated with lowering the limit from 0.08 to 0.05 g/dl. Partly the result of increased enforcement
Brooks and Zaal (1992) [12] Effects of a reduced alcohol limit for driving'	From random breath testing, a reduction of 90% in drivers with BACs = 0.05–0.08 and a 41% reduction drivers at BACs = 0.15+. Additionally, a 35% reduction in number of drivers in crashes with BACs = 0.10+
Homel (1994) [14] 'Drink-driving law enforcement and the legal blood alcohol limit in New South Wales'	0.05 law in New South Wales reduced fatal crashes on Saturdays by 13%. RBT reduced fatal crashes by 19.5%
Deshapriya and Iwase (1998) [17] 'Impact of the 1970 legal BAC 0.05 mg% limit legislation on drunk-driver-involved traffic fatalities, accidents, and DWI in Japan'	BAC limit lowered to 0.05 in 1970 in Japan. Alcohol-related traffic deaths declined from 1336 in 1969 to 1004 in 1977 (−34%) and to 458 in 1994 (−66%)

DWI = driving while impaired; RBT = random breath testing; SVN = single-vehicle night-time.