

Standing Committee on Alcohol, Other Drugs, and Transportation (ANB50)
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The History of Impaired Driving and the Role of the Transportation Research Board Committee on Alcohol, Other Drugs, and Transportation

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As the Transportation Research Board celebrates its centennial, it is a timely moment to review the activities of the Alcohol and Other Drugs Committee: what it has accomplished since its inception in the early 1970s, how it has evolved along with the field, and what challenges and opportunities it confronts going forward. While the committee's mandate includes all modes of transportation, we have focused primarily on road traffic, as it is on the road that most deaths and injuries occur.

Alcohol- and drug-impaired driving are major problems around the world and the subject of significant research. According to the National Highway Traffic Safety Administration, in 2017, there were 10,874 fatal motor vehicle crashes involving drivers with BACs of .08g/dL or higher in the United States. The proportion that involves alcohol-impaired drivers has remained steady for many years, representing about a third of all fatal crashes. Reliable statistics on drug-impaired fatal crashes are not as readily available; however, the most recent U.S. roadside survey of drivers indicated the prevalence of drugs (either illegal, prescription, or over the counter) in drivers' blood or saliva was about 22%. For illegal drugs, prevalence ranged from about 9% during the day to 13% at night, with THC (the main psychoactive metabolite in cannabis) being the most frequently detected drug. For medications, prevalence rates ranged from almost 11% during the day to over 7% at night. Concerns regarding drugs and driving are increasing as the prevalence of drugs in traffic has increased, but most especially as laws regarding the use of cannabis have become increasingly liberalized in the U.S. and other countries.

HISTORY OF THE FIELD

In the area of alcohol and drugs in transportation, it is particularly useful to look back in order to appreciate how far we have come. When dealing with the day-to-day frustration of examining ambiguous research findings or dealing with underutilized effective strategies, it can help us to recognize the tremendous progress that has been made.

Motor vehicle crashes became a problem in the beginning of the 20th century. Alcohol has been associated with this problem from the beginning, as is indicated by publication of the first scientific report on the effect of drinking by operators of "motorized wagons" in 1904 – years before the inception of TRB. States in the U.S., beginning with New York in 1910, all passed impaired-driving laws.ⁱ

The classical work of Widmark in Sweden was the first to establish the basic relationship between alcohol consumption and blood alcohol concentration (BAC).ⁱⁱ With this research accomplishment, the field was both aware of the impact of alcohol on driving and had a model for measuring alcohol consumption. Based on Widmark's work, Norway passed the first blood alcohol law in 1936 setting the BAC limit at .05 g/dL. Robert Borckenstein invented the first

practical alcohol breath-testing device for use by police officers in 1954. Borkenstein's "Breathalyzer" made the enforcement of impaired driving laws based on BAC measurement more practical. Borkenstein further contributed to the field when he published the "Grand Rapids Study" in 1964.ⁱⁱⁱ This study established the clear relationship between BAC and crash risk.

William Haddon, a public-health physician active in alcohol research, further enlarged understanding of traffic crashes when he described a matrix approach to traffic safety.^{iv} He described three elements involved in crashes—the driver, the vehicle, and the environment (roadway). He pointed out that safety programs could be developed for each element in three periods of time—pre-crash, crash, and post-crash. This model highlighted the complexity of the crash problem, showed that crashes were caused by more than chance and stressed the opportunity for research to produce effective interventions.^v

While needed research and tools for enforcing laws against alcohol-impaired driving were in place, there was a lack of public understanding and concern regarding the specific problem presented by drinking and driving and traffic crashes in general. During the first half of the 20th century, crashes tended to be attributed to driver error. They were referred to as "accidents," implying they were chance events.^{vi}

The publication of *Unsafe at Any Speed* by Ralph Nader helped to show that other factors besides driver behavior contributed to crashes and injuries.^{vii} The book made clear that limitations in vehicle design played a significant role in highway injuries and was an important factor in moving the Congress to establish the National Highway Safety Bureau (NHSB, the precursor to the National Highway Traffic Safety Administration [NHTSA]) as part of the new Department of Transportation (DOT) in 1966^{viii}.

The establishment of NHTSA was accompanied by the enactment of the Highway Safety Act, which provided funds to the states to implement traffic safety laws and policies and for NHTSA to undertake demonstration programs to test the effectiveness of existing and new safety concepts. This infusion of support resulted in testing and validation of laws such as per se illegal BAC levels, lowering the illegal BAC limit from .15 to .10, implied consent laws that required breath tests of arrested drivers, and the verification of the effectiveness of policies such as sobriety checkpoints and mandatory treatment/education programs for DUI offenders.

Despite this availability of evidence-based programs and a theoretical framework for understanding impaired driving, the general public in the U.S. did not become concerned and involved until around 1980 when Mothers Against Drunk Driving (MADD) and other victim advocacy groups were formed. In response to their advocacy activities, media coverage of alcohol safety issues increased substantially, stimulating a rapid growth in the number of impaired driving laws adopted in the states. Of prime importance were laws establishing an illegal blood alcohol content as well as laws allowing for the administrative suspension of driving licenses of offenders.^{ix}

The scientific community and policy makers, led by Surgeon General Dr. C. Everett Koop in 1988, additionally began to recognize that laws regarding the sales and service of alcohol were also important for preventing impaired driving. The lowering of state drinking age laws in response to the national reduction in voting age at the time of the Vietnam War demonstrated the risk involved in sales to minors. The establishment of a national minimum legal drinking age was instrumental in reducing crashes among young drivers, as well as in demonstrating the importance of alcohol regulation as a traffic safety and public health measure.

IMPAIRED DRIVING PROGRESS

In the U.S., as well as many other wealthy countries, the combination of scientific understanding, public awareness and concern, and political will have contributed to significant reductions in impaired driving crashes. In the U.S., for example, the proportion of fatal crashes involving alcohol declined by 35-40% in the 1980s and 1990s. This is very gratifying progress and has resulted in saving many thousands of lives and preventing many more serious injuries.

The picture is not as bright when it comes to low- and middle-income countries (LMIC). The death rate per 100,000 inhabitants is about 24 in the African region, about 18 in South-East Asia and the Western Pacific regions, and about 10 in the European region, varying from fewer than 5 in some European countries to more than 30 in some African, Asian, Central American and South American countries.^x If comparing the number of traffic fatalities per 10,000 motor vehicles, the differences are even larger. Because alcohol use is increasing in many LMIC, it is also expected that alcohol-related crashes will increase. In addition, as the economic situation in some middle-income countries is improving, more people can afford to buy a motorcycle or car, which in itself will increase the number of crashes. Knowledge about the risks associated with DUI of alcohol is less widespread than in wealthier countries. The police in many LMIC have no or few breathalyzers, and the police often prioritize other criminal acts in their enforcement efforts.^{xi}

FUTURE TRENDS AND CHALLENGES

Dramatic progress has been made in the science and public awareness and concern about impaired driving, especially in wealthier countries. A framework of laws and policies, based largely on evidence, has been implemented in most countries around the world. Social norms about drinking and driving have evolved towards more responsible behavior. Most importantly, the toll of deaths and injuries due to impaired driving has decreased. Challenges remain, however. The committee has worked to anticipate and respond to these challenges.

One area that has been a concern is the complacency that often occurs in the public and in policy makers as progress is recognized. While dramatic reductions in impaired driving were observed in the decades between 1980 and 2000, there has been a leveling off of the progress and some backsliding. The committee has addressed this issue in workshops and sessions regarding the barriers to adoption of scientific knowledge into public policy.

The role of the availability, sales and service of alcohol in traffic safety has been increasingly recognized. Threats to laws and policies that have increased safety remain even as more research indicates the importance of these measures. The committee has addressed topics related to alcohol policy in countries around the world.

Another concern is the increased prevalence of drugs other than alcohol in traffic. While the role of drugs in crashes is still unclear and does not appear to match that of alcohol, the changing legal status of cannabis raises the possibility of a traffic safety threat due to cannabis impairment. The committee has sponsored a series of workshops and sessions devoted to understanding the science of drug impairment in traffic and monitoring ongoing trends.

The committee has historically attracted to its annual and summer meetings foreign researchers involved in alcohol and drug safety issues, providing a pathway to the study of foreign laws and programs. We also recognize the need to help lower-income countries achieve progress. Our work has been directed at understanding the situation in these countries. Specifically, this work has been to adapt successful strategies to broader economic, cultural, and

social environments; and to develop new strategies specifically designed for these environments. The committee has sponsored and co-sponsored sessions and workshops to address these areas.

The rapid development of technology to take over more and more driving functions from the driver and automate them within the vehicle raises hopes for decreasing crashes resulting from impairment but also raises concerns about built-in weaknesses in technology that do not take driver impairment into account. The committee recently sponsored a Human Factors Workshop devoted to this topic.

The committee is prepared to take on other opportunities and challenges as they arise in the impaired driving field and in the transportation field more generally. For example, in recent years, the concept of Vision Zero has become a major force for changing traffic environments. (See, for example, visionzeronetwork.org.) The goal is to take into account all aspects of traffic, including roadway design, speed limits, vehicles, and driver behavior, to achieve zero deaths and serious injuries in traffic. This concept has a growing literature base and can certainly be approached by the committee as an additional tool for study.

THE COMMITTEE ON ALCOHOL, DRUGS AND TRANSPORTATION IN THE NEXT CENTURY

Great progress has been made in the field of alcohol, drugs and transportation. New technologies and new concepts may change the nature of the field fundamentally going forward. But many challenges remain. As TRB enters its second century, the committee is committed to making further progress possible. We intend to stay ahead of emerging issues by adding needed expertise to committee membership, by tackling challenges as they present themselves, by adding new activities and strategies to enhance our impact, by cultivating the next generation of researchers by involving young scientists. In this way, we intend to improve transportation safety for many years to come.

Committee Activities

Committee activities have been designed to address the impaired-driver issue in a variety of ways to enhance scientific interchange, synthesize knowledge, and foster communication among scientists and between researchers and policy makers. These activities include the following:

Sessions at the annual meetings. Each year, the committee sponsors at least two technical sessions at the annual meeting. The Committee also jointly sponsors technical sessions with other committees on cross-cutting issues. These sessions have ranged in content across the spectrum of issues related to alcohol, other drugs, and transportation. One other popular format has been sessions devoted to presentations by young scientists. The committee will continue to find ways to include young scientists in the committee's activities including additional special sessions for them to present research.

Human Factors Workshops. The committee has organized workshops on important themes, most recently including issues surrounding cannabis and driving as well as technology and automation of vehicles. This is a useful format for bringing more in-depth discussions on these topics.

Mid-year meetings. A very important activity of the committee has been the mid-year meetings, which include a technical workshop on specific themes of great interest to the field. Between 30

and 50 invited participants attend the meetings, including a mix of committee members and experts from outside the committee. These meetings are deliberately kept small in order to facilitate interaction and discussion among participants. The meetings have been held at both the Beckman Center in Irvine and the Johnson Center in Woods Hole. These meetings each have a similar format: background papers on the specific topics related to the overall theme are commissioned; invited discussants prepare comments on the papers; and presentations are made by authors and sometimes discussants. Ample time is left in the agenda for general discussion of the topics. The background papers, commentaries, and a summary of the discussion are often later published as a TRB Circular.

Published papers. Most of the presentations at the annual meetings are not submitted formally as papers for publication by TRB. This enables us to organize a more coherent yet diverse and up-to-date program without the lag times and review processes inherent in the publication process. We do, however, call for papers, carry out reviews, and include papers in our program at the annual meetings.

Coordination with other Committees. The committee recognizes that there are other committees and subcommittees with cross-cutting areas of interest. We have coordinated with these other committees over the years in co-sponsoring sessions and workshops. Most recently we have co-hosted sessions and events with the ANB60 committee on safe mobility of older persons and their subcommittee on aging, gender and transportation. Additionally we work closely (and have member representation) with ANB45 (occupant protection committee), ANB40 (traffic law enforcement), AND30 (committee on motorcycles and mopeds), ANB30 (young driver committee), ABE70 (women's issues in transportation committee), and ANB20 (committee on safety data, analysis and evaluation). We intend to continue and broaden these activities to include committees focused on other modes of transit (rail, aviation, truck/bus, marine) as well as other vulnerable road users (pedestrians, cyclists) in the upcoming years.

Enhancing communication among committee members and friends. Continual efforts are made to engage more interest and participation in the committee's activities. Toward this, members and supporters are actively recruited to assist with organizing session, reviewing papers, and generally helping to communicate and publicize the committee's work. Quarterly meetings have recently been institutionalized, and in 2019 the committee intends to host a variety of webinars on topics of interest to the committee's members and friends as well as outside the committee.

Relationships outside TRB. Strong relationships have also been established with boards outside the committee. For example, the committee has worked closely with the International Council on Alcohol Drugs and Traffic Safety (ICADTS). Typically, the ICADTS board has met during the annual January meeting as so many members and supporters bridge interests across both groups. The ICADTS President usually provides an update on the organization's activities at the January Committee meeting. Other boards and conferences supported by the committee include Lifesavers, the Research Society on Alcoholism, the Prevention Research Society, and the College of Problems on Drug Dependence.

Committee Identified Research Needs

Over the years, the committee has sponsored workshops and activities to identify research needs in the changing environment of traffic safety. The purpose of these are multifold. First, the needs identify areas needing research attention and priority. They are used to guide conference session topics, workshops, as well as calls for papers. And finally, these research needs are used to advance research ideas for funded requests for proposals (e.g., via the Behavioral traffic Safety Cooperative Research Program).

A list of research needs were recently developed by the committee in 2018-19. These needs were separated by highest to lowest priority. Among issues of the highest priority included those around drugs other than alcohol. These include recreation, illegal, and prescription and over-the-counter drugs. Given the very limited reliable data available, the impaired driving community struggles with not only documenting its prevalence, but understanding the crash risk. Further, poly-drug use contributes to the limited understanding of individual drug risks, as do drugs combined with alcohol. As over 30 U.S. states have now legalized cannabis either medicinally or recreationally, we rush to understand how to accurately assess driving impairment by cannabis and determine appropriate metrics to measure trends in use and in motor vehicle fatalities. Research areas that states need to address as they seek to improve their enforcement tactics include developing and evaluating their drug driving prevention efforts, and adapting their adjudication procedures. Other drugs on the horizon gaining public interest include amphetamines and methamphetamines, as well as opioids and benzodiazepines.

Although drugs other than alcohol are identified as highest priority, the committee recognized the importance of alcohol's continued contribution to motor vehicle crashes. Research needs have been identified to continue efforts examining specific subgroups – teen drivers, older drivers, women, adults who drive impaired with young children, and various ethnic/racial groups. Another research area concerns the issue that many effective strategies to reduce alcohol-impaired driving have been underutilized in the United States. These include sobriety checkpoints and lowering the BAC limit for driving to .05 g/dL. Further, DUI arrests in the United States have declined from 1.4 million in 2010 to under 1.0 million in 2017. The reasons for this need to be determined. Beyond motor vehicle fatalities is the increase in alcohol-related pedestrian deaths, as well as increases in non-motorized vehicles and recreational vehicles. It has been suggested that we look to other modes of transportation (aviation, rail, marine) to explore possible prevention and intervention strategies.

New vehicle technologies for advancing driving safety and autonomous vehicles receive considerable public attention. However their safety potential (and consequences) with regard to impaired driving need investigation, as do the newest forms of alternative transportation (ride sharing, autonomous shuttles, etc.). We also prioritized continued research that evaluates and advances alcohol interlock systems including efforts such as the Driver Alcohol Detection System for Safety (DADSS).

Finally, there are a host of lessons to be learned from countries outside the United States, European and Asian countries as well as Canada and Australia have provided leadership in many of the most-effective prevention strategies. By sharing information and experience with colleagues around the globe, we can advance the progress being made. We intend to continue to update and refine these efforts.

CONCLUSION

The century since the founding of TRB has seen changes that could not have been imagined by those transportation research pioneers. The years ahead will likely bring even more fundamental shifts in the way we move from place to place and the issues we face in promoting safety. Vehicles will evolve, technology will advance, the role of the driver will change. The committee is ready to build on framework of research and experience that we have helped to establish and to venture into new areas that show promise for preventing tragedies and increasing the safety of all travelers.

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APPENDIX: TOPICS OF MID-YEAR MEETINGS AND RELATED TRB CIRCULARS

Transportation Research Board (2019). Drug-Impaired Driving: Research Needs. *Transportation Research Circular*. Number E-C250

Transportation Research Board (2013). Countermeasures to Address Impaired Driving Offenders, Toward an Integrated Model: A symposium. *Transportation Research Circular*. Number E-C174

Transportation Research Board (2009). Young impaired drivers: The nature of the problem and possible solutions. *Transportation Research Circular*, Number E-C132.

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Transportation Research Board. (2006). Drugs and Traffic: A symposium. *Transportation Research Circular*, Number E-C096.

Transportation Research Board. (2005). Implementing Impaired Driving Countermeasures: Putting research into action. *Transportation Research Circular*, Number E-C072.

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