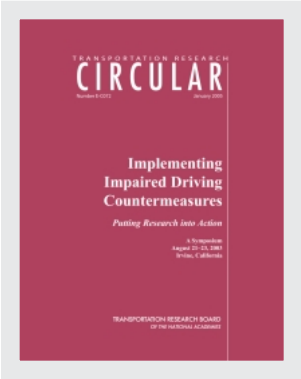

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A Symposium
August 21–23, 2003
Irvine, California

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Foreword

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The past few years have seen a disturbing reversal in the progress in preventing impaired driving crashes in the United States. This has occurred despite an ever-growing body of knowledge about what works. In response to this situation, the Alcohol, Other Drugs, and Transportation Committee of the Transportation Research Board held a symposium to discuss the implementation of research-based strategies and the challenges such implementation often faces. The symposium was held at the Beckman Conference Center on the campus of the University of California in Irvine, California, on August 21–22, 2003. This report provides an overview of the information presented and the discussions among the participants, as well as the background papers prepared for the symposium.

BACKGROUND AND STRUCTURE OF WORKSHOP

The past two decades have seen impressive reductions in alcohol-related traffic deaths in the United States and Canada as well as other parts of the world; recently this progress has been stalled, or in the case of the United States, reversed. Research and evaluation in traffic safety and policy have identified a variety of strategies with strong evidence of effectiveness. While some of the most effective strategies have been widely adopted and have most likely contributed to the progress that has been made, other strategies with significant potential have not been vigorously implemented. This workshop provided an opportunity for researchers, policy makers, trauma surgeons, advocates, and implementers to discuss issues regarding proven but underutilized strategies, such as sobriety checkpoints, alcohol policy, primary enforcement of seat belt laws, and vehicle sanctions for impaired driving offenders. These strategies vary with regard to the system responsible for their implementation: some must be enacted through legislation; some must be implemented by the judicial system or by administrative and regulatory bodies; some rely on law enforcement agencies. Participants discussed barriers to implementation and how researchers can play a role in overcoming these barriers.

The workshop was attended by committee members, other researchers, legislators, law enforcement personnel, judicial representatives, government policy makers, representatives of advocacy organizations, media experts, and others with knowledge and experience in traffic safety as related to alcohol impairment. A list of attendees appears in Appendix B.

Background papers were prepared by researchers on relevant topics, primarily impaired driving countermeasures. Authors of the papers made brief presentations followed by responses from invited discussants. Most discussants responded from the perspective of practitioners who have experience with the countermeasures presented in the papers. These invited responses were followed by general discussion.

Topics covered in the workshop were

- General theory on translating research into policy and practice;
- Legislative challenge: primary seat belt enforcement laws;

- Enforcement challenges: sobriety checkpoints and passive sensors and preliminary breath testers;
- Judicial and administrative challenges: vehicle sanctions and ignition interlock devices;
- Alcohol policy challenges: alcohol taxes, responsible beverage service, and other approaches;
- Case study: a system for putting research into practice—the Underage Drinking Enforcement Training Center; and
- Case studies: successfully implemented strategies—.08% blood alcohol concentration limits and graduated licensing for novice drivers.

The complete agenda of the workshop is included in Appendix A. The background papers and invited responses by discussants appear in the second section of this circular.

OVERVIEW OF DISCUSSIONS

The keynote presentation at the workshop put implementation issues into a broader theoretical context of diffusion of innovation. The theoretical framework specifies the characteristics of innovations that affect the likelihood that they will be adopted. In the impaired driving field, these characteristics deal, to a great extent, with how the innovation fits into the existing social, economic, cultural, and political contexts. Throughout the presentations and discussions that followed, participants referred to the theoretical framework and to the need for researchers to take context into account in a variety of ways.

Presentations by researchers described a variety of strategies that have been shown to be effective in experimental testing or in field implementations, the level of effect that has been demonstrated, and the level of implementation that has occurred across the country. Practitioners were able to describe the contextual barriers that can make implementation difficult and to indicate ways in which researchers could help overcome those barriers.

Several overall themes emerged from the discussion that shed light on the way strategies are adopted and the role researchers can play. These themes are outlined below.

Understanding and Dealing with Existing Systems

Researchers often carry out research projects to demonstrate scientific principles, build theoretical models, and test assumptions. Their findings may have practical applications, but often the applications are secondary to the scientific purposes as far as the researchers are concerned. Researchers, therefore, are not always fully aware of the real-world situations in which the strategies they design and test are applied. Any traffic safety strategy becomes part of a complex and interdependent system. Design and refinement of these systems require knowledge and experience that are quite separate from the knowledge and experience needed to carry out research. Changes in one part of the system can have negative consequences for other parts of the system. To anticipate these issues, researchers need to work with experts in how these systems operate.

Proposed changes in the system can engender resistance from a variety of quarters. Existing bureaucracies may resist changes that require restructuring standard procedures.

Changes may be contrary to organizational culture or norms or require moving away from long-held beliefs. For example, sobriety checkpoints are often resisted by enforcement agencies because of the belief that they require intensive use of manpower and usually yield few arrests. This resistance seems contrary to the goals of enforcement. The concept of deterrence, that is, preventing behavior before it occurs rather than punishing it after it occurs, is often not inculcated into law enforcement culture. Vehicle sanctions are another example of resistance coming from those systems that are supposed to implement the program. In this case, judges often find the penalties counter to their view of appropriate sanctioning or believe that the required monitoring will be too time-consuming.

One major issue that researchers do not always take into account is the active opposition that may be engendered by a particular strategy. In any strategy involving alcohol and traffic safety, opposition is common, sometimes strong, and usually fueled by economic interests. Increasing the price of alcoholic beverages is an excellent example of an effective strategy that elicits strong opposition, despite the body of evidence indicating that increasing the cost of alcohol (usually through taxation) decreases alcohol consumption and related problems, including impaired driving. Passing legislation to increase alcohol taxes at the federal, state, or local level is extremely difficult because of opposition from every segment of the alcohol industry, including manufacturers, wholesalers, retailers, and the hospitality industry, all of whom believe that they will lose business if taxes are increased.

It was noted that researchers who wish to see effective strategies implemented should work with others who understand the social and structural contexts in which the strategies must be carried out and the type of resistance that is likely to be generated by the strategies. In some cases, the strategies can be redesigned to avoid resistance (e.g., imposing vehicle sanctions administratively rather than through judicial processes). Researchers can also help to develop counterarguments that deal with the factors likely to generate opposition.

One way of averting some resistance is to work with policy makers and other implementers in designing research. In this way researchers can ensure that the strategies designed and tested are feasible and acceptable to the intended users.

The Problem of Priorities

Researchers carry out evaluations of strategies or cost–benefit analyses of strategy implementation, but often they are not aware of the competing priorities that policy makers and other implementers deal with. At one time, impaired driving problems and prevention were prominent in public awareness and were given high priority. This prominence has waned in recent years because state and local governments and agencies have many different issues vying for resources. Even strategies that do not require additional funding demand other types of resources: time, attention, or political capital. For example, legislators at the meeting said that traffic safety tended to be low on the list of priorities in legislatures. Attracting attention for traffic safety legislation can be difficult—even when legislative change would save money and lives. Similarly, enforcement agencies deal with a host of dramatic, attention-getting problems that make traffic safety problems seem mundane. This problem is particularly acute in the current environment, in which security issues have much greater prominence.

The identification of “champions” for new ideas is one effective way of gaining attention and precedence. These champions can be high-status individuals with the power or influence to make things happen or negotiators who work through others. Researchers can also help to gain

greater prominence for impaired driving issues and strategies by stating research findings in terms that vividly convey their importance in terms of tragedies averted and resources conserved.

Appropriate Roles of Researchers

Considerable discussion centered on the appropriate role for researchers in disseminating, promoting, publicizing, or advocating for their findings. It was pointed out that typical measures that define success for researchers (e.g., publications in professional journals, obtaining research funding) do not include whether the research findings are applied and implemented. Opinions and practices among researchers on their appropriate roles ranged widely. Traditionally, researchers disseminate findings through publications in professional journals and presentations at professional conferences. The nonresearch participants in the workshop emphasized that these venues are generally not accessible to practitioners, policy makers, advocates, and others who might wish to apply research findings to improve public health and safety. Some researchers go beyond these traditional venues by presenting findings to practitioner and policy groups (e.g., they may testify about their results at legislative hearings). Some researchers have worked to implement strategies at the community level to test their efficacy but have not expanded this activity beyond research sites. Other researchers are active participants in advocacy groups and engage in activities that foster the adoption of their findings into practice.

Some participants expressed concerns that it was not the role of researchers to advocate for the adoption of strategies that they researched and found to be effective and that taking an advocacy role diminished their credibility as unbiased observers. There was disagreement about the level of advocacy that could be engaged in by researchers who received federal funding.

The discussions demonstrated the need for clear, specific guidelines from funding agencies regarding acceptable activities of researchers. It was apparent from the discussions that different researchers had different levels of commitment to advocacy and different levels of skill in and comfort with promoting their findings among policy makers and practitioners.

Communicating Research Findings and the Need for Intermediaries

The discussions described above highlighted the need for a variety of communication strategies that would be accessible and appropriate for the intended users of research findings. Examples include presentations at meetings of policy makers and implementers as well as brief, easy-to-understand summaries of findings. These communication vehicles should be part of a communication plan that takes into account the needs and concerns of the audiences. Researchers are often not the best people to communicate findings in these contexts, and the discussions pointed out the need for intermediaries who can interpret research findings and express them in ways that provide clear guidance for policy and practice. This need is especially acute in light of the range of positions on the appropriate role of researchers in advocacy and the fact that many researchers do not have advocacy skills or feel comfortable in advocacy roles.

Several examples of intermediaries were discussed. One case study described a federally funded program of knowledge synthesis and dissemination in the area of underage drinking. Information from a wide range of relevant research was put into a variety of easily applied formats and disseminated to practitioners and policy makers in a variety of appropriate venues. An expert in public relations described how publicists could put scientific findings into compelling and vivid messages that could help change policy and practice. Advocacy organizations such as Mothers

Against Drunk Driving attempt to promote science-based strategies to policy makers but often need help in identifying and interpreting relevant findings.

The Need for Implementation Systems

Funding agencies are beginning to recognize the gap between science and practice and to develop systems that foster the dissemination of knowledge and the adoption of effective strategies. For example, the National Cancer Institute has begun to provide an extra year of funding for selected research projects to enable researchers to explore more fully the data they have collected and to publish papers based on the data. The leadership of the National Institutes of Health has a growing commitment to disseminating science-based information to a variety of audiences, including professionals, policy makers, and the public. The National Institute on Alcohol Abuse and Alcoholism now funds components of some of its center grants to promote wider dissemination of research results to a variety of interested audiences. These and other structural and funding changes can help ensure that the value of scientific findings is more fully reflected in public health and safety.

VARYING PERSPECTIVES ON IMPLEMENTATION

The workshop provided an opportunity for participants with varying perspectives on impaired driving and traffic safety to discuss implementation of effective strategies. Key participant groups included legislators, law enforcement officers, judges, advocates, and physicians. A brief summary of some of the ideas presented by each of these groups appears below.

Legislators

The legislators participating as well as those who worked with legislatures pointed out the importance of anticipating and understanding the opposition likely to be generated by a particular legislative proposal. Some opposition comes from economic interests, such as the alcohol industry. These interests have well-connected lobbyists and work hard to thwart legislation that they consider detrimental. Other opposition may come from other legislators who, for whatever reason, hold views contrary to the adoption of some strategies. If these legislators are in powerful positions—for example, chairs of committees—they may prevent legislation from being considered by the total legislative body.

Suggestions for overcoming opposition included putting research findings into easy-to-understand formats for legislators, for example brief fact sheets that distill essential information. These sheets can be most useful if tailored to the state or even the district of the legislator. Researchers can help legislators to maintain credibility by providing them with accurate information on research. Legislators emphasized that researchers could be part of a team, along with advocates, who could work in a particular state or community to bring about legislative change. They also discussed the importance of paid lobbyists who could promote the positions of advocates and the application of research findings.

Enforcement Officers

Law enforcement participants emphasized the need to consider changes in law enforcement practice from the perspective of enforcement officers. For example, impaired driving arrests often require a great deal of paperwork and time off patrol. This level of effort may lead to reluctance to emphasize impaired driving enforcement. Enforcement culture also may play a role in the success of sobriety checkpoints. Many agencies and officers view checkpoints as a less aggressive approach to enforcement than patrolling or responding to calls for service. There is a need to inculcate positive attitudes toward deterrence approaches such as checkpoints.

Suggestions for overcoming barriers include communicating with intended enforcement audiences through presentations at conferences of the International Association of Chiefs of Police and other professional organizations. Easy-to-read summaries of research results can also be published in law enforcement journals.

Judicial Officers

Working to encourage changes in judicial practices is particularly challenging. Judges are resistant to being told what to do. In addition, their packed court calendars deter them from adopting any procedure that is likely to lead to more trials, longer trials, or reappearances of offenders before them. In the case of implementation of vehicle sanctions, they are unlikely to impose sanctions if they do not believe them to be appropriate for the individual, regardless of what the law or research shows. Judges will not enthusiastically embrace any sanction (such as an interlock) that requires the court to monitor implementation or compliance.

Strategies for dealing with the judicial system included increasing the amount of training for judges in impaired driving issues so that they would be more willing and able to incorporate effective strategies. A key concept, however, was to work as much as possible within the administrative systems to avoid the need for judicially applied penalties.

Advocates

It is important to understand that advocates have limited time and money. In addition, since advocacy organizations are often volunteer based, the expertise of advocates as well as their access to research findings may also be limited. Thus it is important for relevant research findings to be made available to advocates in ways that allow them to understand their importance and application. When researchers are willing to provide information to advocates to bring about changes in laws, policies, procedures, and priorities, they can complement the emotional and human appeal of the advocates with the convincing data of research.

Trauma Physicians

Trauma physicians see the results of impaired driving crashes and are therefore often willing to work to prevent impaired driving. They can serve as credible communicators to draw attention to issues and emphasize the importance of taking appropriate actions as supported by research. They holde large meetings at which information about effective strategies can be disseminated, and they can become part of coalitions with others who wish to bring about change.

General Theory on Translating Research into Policy and Practice

General Theory on Translating Research into Policy and Practice

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University of New Mexico

This paper draws on the diffusion-of-innovations model for strategies to achieve a higher degree of research utilization, defined as the process through which research findings are put into use in the form of programs and policies. In every field, research utilization is a difficult process, in part because utilization has been conceptualized as an action that begins only after research is completed. Research utilization is more correctly seen as a process that occurs as an integral part of the research process through a two-way communication flow between researchers and practitioners. This paper draws on the diffusion-of-innovations model for strategies to speed up the implementation of research-based innovations in the transportation field.

GENERAL THEORY ON TRANSLATING RESEARCH INTO POLICY AND PRACTICE

In every field, including transportation research, a wide gap exists between what is known from scientific research and what is actually put into practice. How can research findings be more effectively diffused and implemented in the transportation field? Many research-based programs and policies are not implemented, at least for many years, while some programs and policies that are shown by research to be ineffective are widely used.

Here researchers draw on the theory of diffusion of innovations, a framework that has been applied in many fields. The purpose of the theory is to identify strategies to encourage research utilization, defined as the process through which research findings are put into use in the form of programs and policies. Many efforts to maximize research utilization begin too late, after the research is completed. Instead, research utilization is more likely when efforts for utilization begin as the research is launched or even earlier. Research and its utilization should be properly conceptualized as co-occurring in a two-way process. Research and practice need to be closely linked to achieve a high degree of research utilization. Even then, research utilization is difficult.

Diffusion-of-Innovations Model

Diffusion is the process by which (*a*) an innovation (*b*) is communicated through certain channels (*c*) over time (*d*) among the members of a social system (Rogers 2003). Diffusion is a special type of communication concerned with the spread of messages about new ideas, which necessarily represent a certain degree of uncertainty to an individual or organization. The four main elements in the diffusion of new ideas are (*a*) the innovation, (*b*) communication channels, (*c*) time, and (*d*) the social system.

An innovation is an idea, practice, or object perceived as new by an individual or other units of adoption. Why do certain innovations spread more quickly than others? The characteristics of an innovation as perceived by the members of a social system determine its rate of adoption. The characteristics determining an innovation's rate of adoption are

1. Relative advantage,
2. Compatibility,
3. Complexity,
4. Trialability, and
5. Observability.

Relative advantage is the degree to which an innovation is perceived as better than the idea it supersedes. It does not matter so much if an innovation has a great deal of objective advantage. What does matter is whether an individual perceives the innovation as advantageous. Compatibility is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters. Complexity is the degree to which an innovation is perceived as difficult to understand and use. Trialability is the degree to which an innovation may be experimented with on a limited basis. Observability is the degree to which the results of an innovation are visible to others.

Innovations that are perceived by individuals as having greater relative advantage, compatibility, trialability, and observability and less complexity will be adopted more rapidly than other innovations.

Mass media channels are more effective in creating knowledge of innovations, whereas interpersonal channels are more effective in forming and changing attitudes toward a new idea and thus in influencing the decision to adopt or reject a new idea. Most individuals evaluate an innovation not on the basis of scientific research by experts, but through the subjective evaluations of near peers who have already adopted the innovation. The innovation–decision process is the mental process through which an individual (or other decision-making unit) passes (*a*) from first knowledge of an innovation, (*b*) to formation of an attitude toward the innovation, (*c*) to a decision to adopt or reject, (*d*) to implementation of the new idea, and (*e*) to confirmation of this decision.

Innovativeness is the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a social system. The typical rate of adoption of an innovation approaches an S-shaped curve over time. A new idea spreads slowly per unit of time until a critical mass is reached. Critical mass is defined as the point at which enough individuals in a system have adopted an innovation such that the innovation’s further rate of adoption becomes self-sustaining.

Five adopter categories, or classifications of the members of a social system on the basis of their innovativeness, are (*a*) innovators, (*b*) early adopters, (*c*) early majority, (*d*) late majority, and (*e*) laggards.

Innovators are the first 2.5% of the individuals in a system to adopt an innovation. Their interest in new ideas leads them out of a local circle of peer networks and into more cosmopolitan social relationships. Early adopters are the next 13.5% of the individuals in a system to adopt an innovation. Early adopters are a more integrated part of the local system than are innovators. Whereas innovators are cosmopolites, early adopters are localites. Early adopters have the greatest degree of opinion leadership in most systems. Potential adopters look to early adopters for advice and information about the innovation. Several health interventions identified opinion leaders in a community of medical practitioners or members of the public and then introduced innovations through these opinion leaders, thus speeding up the diffusion process. Randomized controlled experiments consistently show the important role of opinion leaders in the diffusion process (for example, Lomas et al. 1991; Rogers 2003).

The early majority constitutes the next 34% of the individuals in a system to adopt an innovation. The late majority is made up of the next 34% of the individuals in a system to adopt an innovation. Laggards are the last 16% of the individuals in a system to adopt an innovation.

A consistent finding from hundreds of diffusion studies is that diffusion is a social process driven by people talking to their peers about a new idea. Thus the uncertainty associated with an innovation is gradually reduced, and the rate of adoption in a system speeds up.

Drug Abuse Resistance Education in the United States

An example of just how difficult research utilization can be is provided by the dismal record of attempts to introduce effective drug prevention programs to U.S. middle school children. Evaluation studies of the effects of the Drug Abuse Resistance Education (DARE) program, such as comparing the later rates of drug use by children taught the DARE curriculum versus equivalent children not taught the DARE curriculum, show that DARE has no lasting effect (Rogers 1993; Ennett et al. 1994). The research-based ineffectiveness of the DARE program has been widely known for more than a decade in the United States. Yet DARE is still everywhere.

A recent national survey of 1,905 middle schools in the United States found that 54% had implemented DARE, although schools had been ordered by the U.S. Department of Education, which provides funding for school adoption of substance abuse prevention programs, to adopt only programs of proven effectiveness (Ringwalt et al. 2002). Only 27% of the middle schools had adopted one of the 10 effective school-based prevention programs. Yet the schools seemed eager to prevent substance use by their students; half of the middle schools used three or more prevention programs. Here is a clear-cut example of the lack of utilization of research on substance abuse prevention programs. The most widely adopted program (DARE) was evaluated as ineffective, while only one-fourth of the schools adopted an effective program. The national survey report concluded, “Relatively few school districts consider research findings when selecting their prevention programs” (Ringwalt et al. 2002).

Everyone involved in the DARE program likes it. The policemen who come to the classroom to lecture school children on drug abuse are happy to be released from chasing criminals on the streets. Teachers are pleased with being released from their regular classroom duties. The middle school children are thrilled to meet a uniformed policeman with sidearm, handcuffs, and a squad car. Parents are excited because they believe that their children will not use drugs. So everybody loves DARE. The only problem is that research shows that it does not work. Here again, research utilization is a difficult process.

The Nature of Research Utilization

A number of institutional and structural factors may be responsible for current problems of research utilization:

1. Researchers are not rewarded for utilization and often lack the time and resources needed for research utilization activities. Many researchers think that they have contributed to utilization of their findings by reporting them in scholarly journal articles. This, however, is an ineffective means to promote research utilization (because practitioners in the field seldom read scholarly journals and possibly could not fully understand them if they did). In recent years, the National Cancer Institute has awarded an additional year of funding to selected grantees to

disseminate their findings to potential users. However, it is too early to know if this strategy is effective.

2. Links to connect research systems with user systems are lacking or are underfunded.
3. Users perceive research and researchers as irrelevant to their program concerns.
4. A concern with research utilization begins too late, only after the research is completed.
5. Funding for research on research utilization is lacking, so there is an inadequate knowledge base for planning research utilization.

Strategies that could be used to speed up the diffusion of research-based transportation innovations and to foster their utilization include these steps:

1. Change the perceived attributes of these innovations,
2. Use champions to promote these innovations,
3. Change the norms of the system regarding these innovations, and
4. Capitalize on peer networks to diffuse these innovations.

An example of creating interpersonal networks to aid the utilization of research findings by practitioners (in this case, drug abuse counselors) is the Clinical Trials Network (CTN) funded by the National Institute for Drug Abuse (NIDA) at about $100 million per year. CTN consists of 17 “nodes,” each consisting of a university-based research center connected with an average of five practitioner programs. The 17 nodes engage in 20 research projects. The topics for these research projects were negotiated by the university research centers with their participating practitioner programs. The CTN is intended to bring together researchers and practitioners to engage in joint research, with the hope that the research results will then be utilized by drug abuse programs. Further, the CTN gives a say in what research topics are studied to practitioners, and these practitioners are involved in the research, so the topics studied ought to be of relevance to practitioners. The CTN has been under way for only the past several years, and its impacts on research utilization are not yet known. One potential problem facing the CTN is that its eventual success in facilitating research utilization rests, in part, on effective communication between researchers and practitioners, who in this case are relatively unalike. Differences between researchers and practitioners often pose one barrier to research utilization. So the CTN requires “dancing with strangers” (Rawson et al. 2002).

What is the potential of practice guidelines in bringing about research utilization? Practice guidelines, based on research evidence, are typically identified by an expert committee, often at the national level, and then are disseminated to practitioners. Ideally, the practice guidelines are evidence based and thus represent a form of research utilization (Rimer et al. 2001). Today hundreds of guidelines have been distributed in almost every field. This large number of guidelines works against the effectiveness of any given guideline by causing information overload for practitioners (Rogers 2003; Davis and Taylor-Vaisey 1997). Undoubtedly practice guidelines have a potential for encouraging research utilization, especially if they are not seen as a one-way means of obtaining the use of completed research. If practice guidelines are simply mailed to potential users, as is often the case, little utilization of research-based findings occurs. But if the guidelines are incorporated into training workshops in which users are assisted in gaining skills to implement a research-based practice guideline, perhaps coupled with a demonstration of the research finding by a program, utilization is more likely.

What is the role of meta-analyses and other ways of bundling together research findings on a topic? A synthesis of research on a certain topic is more useful to practitioners than is just a single research publication. Such syntheses represent a thicker bundle of reeds in the sense that consistent research findings are more credible to practitioners. The National Center for Injury Prevention and Control of the Centers for Disease Control and Prevention (CDC) published syntheses of the research evidence on sobriety checkpoints in reducing alcohol-related crashes, on lower legal blood alcohol concentration limits, and on child safety seats. Several of these syntheses were published in a special issue of the *American Journal of Preventive Medicine*. The degree to which these syntheses are effective in facilitating research utilization, as in the case of practice guidelines, depends in part on the degree to which they are incorporated in workshops, demonstrations, and other follow-on activities. Behavior change requires knowledge of an innovation (which can be conveyed by a synthetic publication) plus involvement with the innovation, which is best encouraged by interpersonal communication (Rogers 2003).

An illustration of this key point comes from a randomized controlled trial by Lomas et al. (1991), who compared two interventions designed to gain the adoption of practice guidelines recommending vaginal birth delivery, and thereby to decrease the risk associated with cesarean delivery of babies. One intervention involved identifying opinion leaders among the 76 medical doctors in 16 community hospitals, who encouraged adoption of the guidelines. After 2 years, the opinion leader approach led to an 85% increase in the adoption of vaginal birth delivery.

Promising Approaches to Research Utilization

Several other approaches to research utilization have been found to be particularly promising:

1. Much recent research and writing has focused on how to find an ideal balance between fidelity and re-invention (also called adaptation and other terms) in implementing a research finding by a practitioner (Rogers 2003; Backer 2001). Reinvention is defined as the degree to which an innovation (a research finding) is changed or modified in the process of its adoption and implementation. Allowing at least a certain degree of reinvention in the adoption of a research finding permits the user to adapt or customize the finding to local conditions. Too high a degree of reinvention may mean that the research findings will not produce the impacts found in the original research (Rogers 2003). A certain degree of reinvention by users–practitioners encourages a higher degree of research utilization (Beyer 1997).
2. Champions are charismatic individuals who lend their support to an innovation (a research finding), and thus overcome indifference or resistance that the new idea may provoke in a user organization. Early research on champions identified them as powerful individuals, often the top executives in an organization. Later studies (Goodman and Steckler 1989), however, showed that many champions were middle managers or other individuals who did not necessarily have a high degree of power. Instead, they had a high degree of sociability and were in contact with a large number of others in their system. A recent study of champions in the diffusion of clean indoor air policies in the southwestern United States, based on biomedical research on the effects of second-hand smoke, showed that in several communities the champions were youths (Rogers and Peterson 2003). These champions played a key role in framing the clean indoor air policy as a public health issue rather than as an individual rights issue or as an economic issue. When champions are activated in the research utilization process, a higher degree of utilization results.

3. Encouraging a high degree of community and practitioner participation in designing and conducting research leads to a higher degree of research utilization (Bero et al. 1998; Green and Johnson 1996; Rogers 2003). The CTN funded by NIDA, discussed earlier, is one example of this participatory approach. Some research on research utilization analyzes an entire research and utilization system, which fits with the conception of effective research utilization. An illustration is Sullivan et al. (2001), who investigated the total system consisting of health researchers at the University of Washington and the potential users (practitioners in health programs) of their investigations. This study found that community participation in planning and in conducting research led to a greater degree of research utilization, in part due to the increased cultural appropriateness of the research findings. The notion of community participation in research implies that research utilization is a two-way process in which "users" have a say in what research topics are studied.

4. A critical mass occurs at the point in the spread of a new idea (a research finding) after which further diffusion becomes self-sustaining. This notion means that considerable efforts are required in the early stages of the diffusion process to obtain a relatively few adopters of a new idea. After the critical mass is reached, however, much less effort is needed to achieve further diffusion of the new idea. Approaches to research utilization that build on the critical mass can thus be more efficient (Rogers 2003). Clearly, achieving utilization of a research finding rests on getting to critical mass in the user system.

Research Utilization of Policy Innovations

Most of the discussion here has dealt with research utilization by practitioner programs. What is different when the research-based innovation calls for policy change? Here the agenda-setting framework (Deering and Rogers 1996) may be helpful to understand the process through which policy change occurs.

The agenda-setting process describes the way in which an issue is given priority by a system. Many of the hundreds of agenda-setting studies completed to date deal with how an issue such as the HIV/AIDS epidemic, traffic safety, and the war on drugs climbed the national agenda. The first step in the agenda-setting process typically occurs when some tragic event occurs (e.g., the deaths of Len Bias from drug abuse and Rock Hudson and Bryan White from AIDS and the Exxon Valdez oil spill). A tragic event leads to massive news coverage of the issue (this is the media agenda), which in turn leads to the public agenda (indexed as the percentage of the public that considers the issue as important) and finally to the policy agenda (policy elites initiate programs, make appropriations, and take other actions in response to the issue).

An illustration of this agenda-setting process occurred in New Mexico in the early 1990s. This state had suffered from the highest rates of alcohol-related vehicle crashes in the United States. This real-world indicator, however, had not led to a strong state policy on the driving while intoxicated (DWI) problem. Then, on Christmas Eve 1992, four members of a young family were killed in a drunk driving crash by a pickup truck driving at high speed down the wrong lane on an Interstate highway near Albuquerque. Massive media attention was given to this crash and the alcohol-related causes of the accident. The following month, in early 1993, the New Mexico legislature passed a tough DWI law that lowered the blood alcohol level to .08%. The new law went into effect on January 1, 1994.

What role can research and its utilization play in the agenda-setting process? Obviously, the research needs to be completed before the tragic event that triggers the agenda-setting process. One

of the important functions of Mothers Against Drunk Driving (MADD) is to link research results with DWI-related policy. The national MADD board's policy committee, which contains several leading scholars, will not support a DWI-related policy unless adequate research exists to support it. In New Mexico, the state legislature was being pressured to lower the blood alcohol level from .08% to .07% in 2001. The local MADD chapter in New Mexico opposed this change because there was an inadequate research basis for the policy shift.

CONCLUSIONS

This paper has been rather pessimistic about promising methods of improving the degree of research utilization. Certainly the study of this process has shown that research utilization is not easy. It requires a thorough understanding of the research utilization process, considerable resources, and skilled personnel. If these ingredients are present, effective research utilization is possible. Following strategies based on the diffusion-of-innovations model may make this difficult task more attainable. The conception of research utilization must be changed from a one-way process from researchers to practitioners. Instead, research utilization activities should parallel the research, with back-and-forth communication between researchers and practitioners.

REFERENCES

Backer, T. E. *Finding the Balance: Program Fidelity and Adaptation in Substance Abuse Prevention: Executive Summary of a State-of-the-Art Review*. Conference ed. Center for Substance Abuse Prevention, Washington, D.C., 2001.

Bero, L. A., R. Grilli, J. M. Grimshaw, E. Harvey, A. D. Oxman, and M. A. Thomson. Closing the Gap Between Research and Practice: An Overview of Systematic Reviews of Interventions to Promote the Implementation of Research Findings. *British Medical Journal*, Vol. 317, 1998, pp. 465–468.

Beyer, J. M. Research Utilization: Bridging a Cultural Gap Between Communities. *Journal of Management Inquiry*, Vol. 6, No. 1, 1997, pp. 17–22.

Davis, D. A., and A. Taylor-Vaisey. Translating Guidelines into Practice: A Systematic Review of Theoretical Concepts, Practical Experience, and Research Evidence in the Adoption of Clinical Practice Guidelines. *Canadian Medical Association Journal*, Vol. 157, No. 4, 1997, pp. 408–415.

Deering, J. W., and E. M. Rogers. *Agenda-Setting*. Sage, Thousand Oaks, Calif., 1996.

Ennett, S. T., N. S. Tabler, C. L. Ringwalt, and R. L. Flewelling. How Effective Is Drug Abuse Resistance Education? A Meta-Analysis of Project DARE Outcome Evaluations. *American Journal of Public Health*, Vol. 84, 1994, pp. 1394–1401.

Goodman, R. M., and A. Steckler. A Model for the Institutionalization of Health Promotion Programs. *Family Community Health*, Vol. 11, No. 4, 1989, pp. 63–78.

Green, L. W., and J. L. Johnson. Dissemination and Utilization of Health Promotion and Disease Prevention Knowledge: Theory, Research, and Experience. *Canadian Journal of Public Health*, Vol. 87 (supplement), 1996, pp. S12–S17.

Lomas, J., M. Enkin, G. M. Anderson, W. J. Hannah, E. Vayda, and J. Singer. Opinion Leaders vs. Audit and Feedback to Implement Practice Guidelines. Delivery After Previous Cesarean Section. *Journal of the American Medical Association*, Vol. 265, No. 17, 1991, pp. 2202–2207.

Rawson, R. A., P. Marinolli-Casey, and W. Ling. Dancing with Strangers: Will U.S. Substance Abuse Practice and Research Organizations Build Mutually Productive Relationships? *Addictive Behaviors*, Vol. 27, 2002, pp. 941–949.

Rimer, B. B., K. Glantz, and G. Rasband. Searching for Evidence About Health Education and Health Behavior Interventions. *Health Education and Behavior*, Vol. 28, No. 2, 2001, pp. 231–248.

Ringwalt, C. L., S. Ennett, A. Vincus, J. Thorne, L. A. Rohrbach, and A. Simons-Rudolph. The Prevalence of Substance Use Curricula in U.S. Middle Schools. *Preventive Science*, Vol. 3, No. 4, 2002, pp. 257–265.

Rogers, E. M. Diffusion and Re-Invention of Project D.A.R.E. In *Organizational Aspects of Health Communication Campaigns: What Works?* (T. E. Backer and E. M. Rogers, eds.), Sage, Thousand Oaks, Calif., 1993, pp. 139–162.

Rogers, E. M. *Diffusion of Innovations*, 5th ed. Free Press, New York, 2003.

Rogers, E. M., and J. C. Peterson. *Diffusion of Clean Indoor Air Ordinances in the Southwestern United States.* Department of Communication and Journalism, University of New Mexico, Albuquerque, 2003 (unpublished).

Sullivan, M., A. Kone, K. D. Senturia, N. J. Chrisman, S. J. Ciske, and J. W. Krieger. Researcher and Researched-Community Perspectives: Toward Bridging the Gap. *Health Education and Behavior*, Vol. 28, No. 3, 2001, pp. 130–149.

Commentary on "General Theory on Translating Research into Policy and Practice"

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I agree with many of Professor Rogers's points about putting research findings into use in the form of programs and policies, especially about the degree of difficulty that can be encountered. It is interesting to note, though not reassuring, that this difficulty in implementing research-based countermeasures to improve traffic safety is shared by all other fields.

However, as Professor Rogers points out, there are strategies that can be followed to bring about innovation that is based on research.

Simply knowing that something works does not make it easy to get it put in place. Just as frustrating are the policies that are put in place and do not work. Professor Rogers uses the DARE program as an example of the latter. Driver education programs are another example. His explanation of why an unsuccessful program can continue to be utilized has some good lessons.

But as the theme of this workshop asks, what can researchers do to improve the odds that the results of their work will lead to real world changes? In this field that means lives saved, injuries prevented, and tragedies avoided.

STRATEGIES

A variety of strategies can help implement research findings and assist researchers to play their roles most effectively:

- Fostering early communication between researchers and policy makers,
- Disseminating clearly understood results,
- Having a game plan for implementation,
- Striking when the iron is hot,
- Identifying champions and opinion leaders,
- Showing how a state or community will benefit, and
- Preparing model legislation or programs.

FOSTERING EARLY COMMUNICATION BETWEEN RESEARCHERS AND POLICY MAKERS

It certainly makes sense to conduct research that meets the needs of policy makers. Research results will be received more enthusiastically when policy makers have an interest in the subject and have had a role in the design of the research. Professor Rogers's point about early communication is an excellent one and should be practiced more widely.

DISSEMINATING CLEARLY UNDERSTOOD RESULTS

Professor Rogers said: “Many researchers think that they have contributed to utilization of their findings by reporting them in scholarly journal articles. This, however is an ineffective means to promote research utilization (because practitioners in the field seldom read scholarly journals and possibly could not fully understand them if they did).” This statement points out an important flaw in the entire process of implementing research-based countermeasures.

What can be done? Here are some specific recommendations to consider:

- Present research findings in formats and venues that are accessible to advocates, policy makers, and the general public. Professional journals and presentations at research conferences can go only so far. If the researchers themselves do not feel comfortable publishing findings in accessible venues, advocates should work with them to make sure that key findings are widely disseminated.
- Translate research findings into easily understood forms. The language of research is often difficult for policy makers or lay audiences to understand. Findings can and should be translated into clear and compelling messages.
- Be available to discuss findings where and when needed. Not all researchers feel comfortable in this role, but by testifying at hearings or presenting findings in other settings where policy action can be taken, researchers can serve as a powerful and credible voice for needed change.
- For every important research finding there is an anecdote that contradicts or undermines it. Everybody had a great uncle who smoked two packs a day and lived to be 99. Everybody knows someone who drinks and drives and has never had a crash. The power of these anecdotes is a constant frustration to researchers whose years of work can be dismissed by a single anecdote told to the right person. Advocates, with the help of researchers, must come up with their own anecdotes and techniques to indicate in the strongest and simplest possible terms the importance, effectiveness, and feasibility of the countermeasure under discussion.

Funding a grant or project for an additional period to disseminate research findings developed under the grant is an excellent initiative and should be considered more broadly.

HAVING A GAME PLAN FOR IMPLEMENTATION

Every campaign to implement an effective countermeasure needs a game plan or a strategy that outlines the steps that must be taken to achieve results. It always pays to put together a coalition of groups, agencies, companies, and individuals to work toward a common goal. Generally, different members of any coalition have different skills, resources, and abilities. Bringing them all to bear can greatly improve the chances of success.

STRIKING WHEN THE IRON IS HOT

When a tragic crash or event occurs, the media provide massive coverage that leads to the molding of public opinion—and to action by policy makers. A good strategy is to be ready for

such an event by seizing the opportunity to move forward on a research-based strategy that addresses the causes of the tragic event. Obviously, this takes some planning. But it can pay big dividends. This is a reactive society, more willing, and even eager, to act on something when the issue is prominent in the minds of the public and policy makers.

The National Transportation Safety Board (NTSB) has had excellent results by preceding its recommendations with examples of the type of tragedy that could be prevented if the recommended policy were implemented. It is like having a "hook" to hang the initiative on. That strategy has also worked well for Mothers Against Drunk Driving (MADD) and many others and has been successful in helping pass important traffic safety initiatives. There are many examples of this strategy; one good example is the NTSB recommendation to raise the minimum drinking age to 21. Its letter to each state governor began by citing the tragic collision of a train with a van driven by a teenager that claimed nine young lives. The event and the recommendation were a major impetus to beginning the national debate that led to the national adoption of this lifesaving policy.

IDENTIFYING CHAMPIONS AND OPINION LEADERS

I agree fully with Professor Rogers that champions and opinion leaders are vital to the implementation of good policy. Champions do not necessarily have to be at the highest levels of government, advocacy groups, or companies. Sometimes circumstances create champions. History books tell us of individuals who turned personal tragedies into societal gains. Examples include Candy Lightner and the many who followed her at MADD and the trauma nurse in Oklahoma who came upon her own son at the scene of a fatal car crash. These ordinary citizens turned their grief into action that improved the lives of many.

SHOWING HOW A STATE OR COMMUNITY WILL BENEFIT

In most research, when benefits are discussed, they are usually given in global terms. It is also important to provide the benefits at the state or even local level. If one is asking a legislator to pass a certain piece of legislation, it will be useful to provide the expected savings in lives and, in these difficult financial times, dollars to his or her state or district. The same recommendations applies when requesting a mayor or police chief to implement sobriety checkpoints. Presenting this type of information on fact sheets can be helpful in persuading policy makers to act.

PREPARING MODEL LEGISLATION OR PROGRAMS

There should be no need to reinvent the wheel whenever similar legislation is considered in a different jurisdiction. It is usually helpful if good model legislation is available for states to use as a basis for adopting their own laws. While some groups prepare such models, the most effective are those prepared by groups that have credibility with state legislators. One such group is the National Conference of State Legislatures (NCSL). Working with groups such as NCSL to develop good model legislation can pay big benefits.

CONCLUSION

Professor Rogers has presented a theoretical framework that closely matches what takes place in the real world. I hope the points I have made will prove useful for the discussions over the next few days at this symposium and will be taken into consideration by researchers, activists, and policy makers as future actions to improve traffic safety are examined.

Legislative Challenge

Primary Seat Belt Enforcement Laws

LEGISLATIVE CHALLENGE: PRIMARY SEAT BELT ENFORCEMENT LAWS

Minorities and Primary Versus Secondary Belt Use Enforcement

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Some states allow police to ticket a motorist solely for not using a safety belt, a practice known as primary or standard enforcement. Most states allow only secondary enforcement: a motorist must be stopped for some other violation before a belt ticket can be issued. Primary enforcement is associated with substantially higher belt use rates. Still, most states have been hesitant to allow primary enforcement in fear that it could provide more opportunity for police to stop, and presumably harass, motorists. Before-and-after comparisons are described with respect to race and ethnicity for five states that implemented a change from secondary to primary enforcement. Results indicated that, for minorities, primary enforcement is associated with higher belt use rates and proportionately equal or fewer belt use citations; secondary laws are associated with lower belt use rates and proportionally equal or more belt use citations. It is concluded that primary enforcement results in both a more uniform number of citations issued across racial groups and greater protection for motor vehicle occupants.

NEW YORK

New York passed the first statewide mandatory belt use law in 1984. This law permitted an officer to stop a motorist based on an observed belt use violation alone. New Jersey, later that same year, became the second state to pass a mandatory belt use law. The New Jersey law permitted an officer to issue a belt use citation only if the vehicle had first been stopped for some other infraction.

Belt use enforcement that permits the officer to stop a vehicle for an observed belt violation alone is referred to as primary or standard. Enforcement requiring the officer first to observe some other violation is referred to as secondary in that the belt use citation may be issued only as a secondary offense after the vehicle has been stopped for some other infraction. As of December 2002, 17 states and the District of Columbia had primary laws; 32 states had secondary laws. The belt use rate averaged across the primary states was 80% compared with 67% across the secondary states (Chaudhary et al. forthcoming).

Safety belts are effective in reducing fatalities and serious injuries in traffic crashes. When used properly, lap and shoulder belts reduce the risk of fatal injury to front seat passenger car occupants by 45% and the risk of moderate-to-critical injury by 50% according to the National Highway Traffic Safety Administration (NHTSA 2001).

Belt use saves lives. Primary belt laws are associated with substantially higher belt use rates. Why haven't all states authorized primary enforcement?

Secondary belt laws chiefly came about because of the harassment issue and were often supported by legislators representing minority constituents. It was argued that the police should not be given one more reason to stop motorists. There can be a belt law, but this law will not constitute a reason for a motor vehicle stop.

The thesis of this paper is that the laws designed to protect minorities have had the opposite effect. Minority belt use under secondary enforcement has been lower than nonminority belt use, which has resulted in greater injury rates for minority populations. And a greater proportion (or at best equal proportion) of minorities are cited for belt use violations under secondary than primary enforcement. That is, secondary laws have produced a double negative effect for minority populations: more injuries and proportionally more belt law citations.

NEW JERSEY

The first secondary enforcement law was enacted by New Jersey in 1984. As stated in the Insurance Institute for Highway Safety *Status Report* (1984), “Paul Wolcott, spokesman for Governor Thomas Kean, reported that bills to require seat belt use have been introduced in both houses of the legislature. Kean has said he would probably sign such a measure, although he has ‘substantial questions’ about the enforceability of belt laws and their infringement on individual rights.”

Secondary enforcement arose from these concerns and the concerns of legislators wanting to limit the possibility of police harassment. It was argued that the police should not be given yet another reason to stop a motor vehicle.

During the next few years, some states passed primary laws (Connecticut, Hawaii, Iowa, Minnesota, New Mexico, North Carolina, Oregon, and Texas), while the majority followed the lead of New Jersey by allowing only secondary enforcement. By November 1992, 29 states and the District of Columbia had a belt law allowing only secondary enforcement and eight states allowed primary enforcement (excluding states with a law but no fine). The median belt use rate in the primary states was 70% and 58% in the secondary states.

It was clear by this time that the secondary laws were substantially less effective in promoting belt use. They were difficult to enforce. They were not perceived as “real” laws by many police officers. And they sent a message to the public that belt use was not a serious traffic safety issue. Some states in 1992 were reconsidering their original choice of enforcement strategy. One of these states was California.

CALIFORNIA

California was the first state to make an uninterrupted change to primary enforcement when it implemented a new primary enforcement law on January 1, 1993. Consequently, it provided the first opportunity to measure, within a single state, the relative effect of the changed in enforcement from secondary to primary.

Ulmer et al. (1994) evaluated the change in California. On-street observations indicated that belt use rose from 58% to 76% when the primary law was implemented. In addition, nearly 3,500 drivers were surveyed at Department of Motor Vehicle offices soon after the law change. The survey asked drivers their race and ethnicity, their knowledge of the safety belt law,

perceptions of enforcement, and level of exposure to information regarding safety belts and their use. The responses of different racial and ethnic groups varied substantially across several survey questions, including large differences about perceptions of law enforcement. Many more Hispanics, the primary minority in California, perceived a “high likelihood” of receiving a ticket for not wearing a safety belt compared with whites (71% versus 45%). Hispanics were also more likely than whites to judge enforcement by the California Highway Patrol as “very strict” (58% versus 34%).

The survey results clearly indicated that minorities had a heightened sensitivity to safety belt enforcement, which immediately raises questions of differential treatment. Yet, when these same respondents were asked if they had ever received a safety belt ticket, no significant differences were found between racial categories; 13% said they had been cited for nonuse of their safety belt.

The California survey results were counterintuitive. The Hispanic minority held a perception of safety belt enforcement that apparently was not driven by direct and personal experience with safety belt enforcement (i.e., receiving a safety belt ticket).

LOUISIANA

On November 1, 1995, Louisiana became the second state to implement an uninterrupted change from secondary to primary enforcement. For the first time, the Louisiana law directly recognized and disallowed the main objection to primary enforcement: namely, providing officers with one more reason to stop, search, and, in the eyes of some, harass motorists. With the support of black legislators, the following language was added: “No vehicle, the contents of the vehicle, driver, or passenger in a vehicle shall be inspected, detained, or searched solely because of a violation of this Section.”

In effect, the officer could stop the vehicle for an observed belt law violation alone. However, if the belt law violation were the sole reason for the stop, then no other investigation could be conducted.

Preusser and Preusser (1997) evaluated the change in Louisiana. Comprehensive enforcement and publicity programs introduced Louisiana’s new law. In five study communities, belt use rose from 52% in 1994 to 68% in 1996. Statewide, the use rate increased from 50% to 68%, an increase of 18 percentage points. Belt use among white front-seat occupants was higher than nonwhite occupants in the five study communities after the change (69% versus 58%). However, this 11 percentage point white versus nonwhite difference was smaller than the 18 percentage point white versus nonwhite difference seen in the 1991 statewide belt use survey (42% versus 24%), the last previous time that racial information had been recorded in the statewide observations.

Nearly 2,500 drivers were surveyed at Office of Motor Vehicle offices soon after the change to primary enforcement. Minority respondents in Louisiana were chiefly black, whereas in California the minority population was mostly Hispanic. Black respondents in Louisiana perceived safety belt enforcement quite differently from whites. When respondents were asked the likelihood of receiving a ticket for noncompliance, responses to this question varied significantly by racial category. Thirty-four percent of blacks indicated that they would “always” get a ticket, compared with only 25% of whites. When respondents were asked about perceived strictness of state police and local enforcement, responses were also statistically different as a

function of race. Black respondents more than white respondents (37% versus 22%) indicated that the state police were enforcing the belt law "very strictly." Similarly, more black respondents than white respondents (30% versus 18%) felt that their local police enforce the law "very strictly." Eight percent said they had received a belt citation, with no statistical difference between racial categories.

The Louisiana study provided an additional source of data not available in California. Two communities, St. Tammany Parish and the city of Monroe, were able to identify race among those drivers receiving a belt use citation. In St. Tammany, 5% of the citations issued went to black drivers during the first few months following the implementation of the primary law. During comparable months in prior years, 12% of the tickets had been issued to black motorists. Similarly, in Monroe, 36% of the tickets went to black motorists during the first few months of primary enforcement versus 48% during comparable periods in earlier years. That is, black ticketing actually went down as a percentage of all citations issued following the implementation of primary enforcement.

The California and Louisiana studies provided evidence that the minority population in those states were more likely to believe that enforcement was strict. However, neither Hispanics in California nor blacks in Louisiana reported actually getting more belt use tickets than the general population. The next state to change from secondary to primary was Georgia, and again race was a focus of the Georgia evaluation.

GEORGIA

Georgia was the third state to go directly from secondary to primary enforcement when it implemented a law on July 1, 1996. Ulmer et al. (in press) evaluated the change in Georgia. The Georgia results indicated that, as in California and Louisiana, changing to primary enforcement increased belt use rates. Yet, in Georgia, gains in the use rate were not as impressive because during the summer of 1996, most media and enforcement attention there focused on the Olympics, which overshadowed publicity of the new belt law. Still, statewide belt use increased by an estimated 5 to 10 percentage points after the law change.

Nearly 1,100 drivers were surveyed in several Department of Motor Vehicles (DMV) offices around the state soon after the law change. As in Louisiana, the minority was predominantly black in Georgia. Patterns of response by racial category were similar to those found in California and Louisiana. Overall, 40% of respondents believed the chances of getting a safety belt ticket were "high." Black respondents were more likely to think so than whites (45% versus 36%). More blacks than whites thought that the state police enforce the law "very strictly" (34% versus 25%), and more blacks than whites thought that the local police enforce "very strictly" (29% versus 18%). Respondents were asked if they had ever received a safety belt ticket. There was no statistically significant difference between the races: 8% had received a belt ticket.

Police departments in the five study communities provided data on the numbers of safety belt citations issued. Citation data provided by three of the departments, Albany, Rome, and Thomasville, indicated whether the ticket recipient was white or black. Results for Rome were statistically significant. These data showed that before the law change, the percentage of tickets going to blacks fluctuated year to year but with no apparent trend (ranging from 36% to 46% of tickets issued). Following the law change, the percentage of cited blacks decreased considerably

(29% of tickets issued). Results from Albany and Thomasville showed that differences between ticketing and race were not statistically significant before versus after the change to primary enforcement.

OKLAHOMA

Oklahoma implemented a primary enforcement law on May 29, 1997. Soon after primary enforcement became effective, the statewide rate of belt use measured 56%, nine percentage points higher than the year before (47%). Statewide belt use data had not differentiated race before 1999. Race was measured in a sample of sites in spring 1999. At that time, the overall belt use rate was measured at 66%; white and nonwhite use rates were identical.

A survey of nearly 1,250 Oklahoma motorists was conducted at DMV offices soon after the law change. Again, respondents' perceptions of safety belt enforcement differed significantly by race. More blacks, the primary minority in Oklahoma, than whites (51% versus 38%) felt there was a "very high" likelihood to get a ticket for noncompliance. When asked to report strictness of local enforcement, a larger proportion of black respondents perceived "very strict" enforcement compared with white respondents (27% versus 19%), and when asked about perceived state police enforcement, a larger proportion of black respondents perceived enforcement as "very strict" compared with white respondents (29% versus 21%). There was no significant difference regarding race and reporting a safety belt citation; 9% said they had received a ticket. Citation data with race identification were not available in Oklahoma (Solomon and Nissen 2001).

MARYLAND

Maryland's primary belt law became effective on October 1, 1997. Close to 1 year after the change to primary enforcement, belt use measured 83% for the state, 12 percentage points higher than the year before the law change (71%). A survey of 944 drivers visiting Maryland DMV offices was conducted. Blacks, the primary minority in Maryland, more than whites (50% versus 42%) indicated feeling a "high likelihood" of receiving a ticket for being unbelted. When asked to report strictness of local enforcement, black respondents more than white respondents (40% versus 22%) perceived "very strict" enforcement. When asked to report strictness of state police enforcement, black respondents more than white respondents (42% versus 26%) perceived enforcement as "very strict." There was no significant difference regarding race and reporting ever having received a safety belt citation: 14% of these drivers said that they had received a citation for not wearing a safety belt.

Maryland's statewide judicial records system provided citation data that identified race. Additionally, citation data for three study counties, Anne Arundel, Baltimore, and Howard, were analyzed for differences in race. Statewide, during the year before the change to primary, the percentage of belt tickets issued to blacks was 27%. In the year following the change, the percentage had decreased to 26% of tickets issued. Statewide, the difference between ticketing and race was statistically significant. In Anne Arundel County, the percentage of tickets issued to blacks decreased from 17% to 16%; in Howard County, the percentage decreased from 24% to

23%: and in Baltimore County, the percentage remained the same (30%). None of these county differences was statistically significant (Solomon and Nissen 2001).

DISCUSSION OF RESULTS

Perhaps the most disturbing results from these evaluations was the substantial disparity between minority and nonminority respondents regarding perception of belt use enforcement. In every state studied, minorities more than others felt that enforcement was strict and that they would be stopped and ticketed. It was not surprising, then, for their legislative representatives to have opposed any additional authority for police to stop motor vehicles.

Belt use rates increased in every state following the change to primary enforcement. In general, where data were available, it was found that the increases among minority motorists were greater than among nonminorities. The pattern was for a substantially lower minority belt use rate before the change to only a somewhat lower rate after the change. Greater increases in minority belt use have also been found in response to concentrated belt use enforcement campaigns (Solomon 2002) and in a national belt use observation survey done during June 2002, immediately after a nationwide belt use enforcement mobilization (NHTSA 2003).

Increases in the belt use rate are certainly the right result. Meharry Medical College (1999) conducted a study of safety belt use among African Americans. It found that belt use among African Americans was lower than the national average. The study also confirmed that African Americans were more likely than whites to be killed in motor vehicle crashes. Similarly, hospital statistics also show the disparity between whites and blacks. A National Center for Health Statistics survey (Burt and Fingerhut 1998) of hospital emergency room visits showed that motor vehicle crashes accounted for 779,000 visits per year for African Americans, at a rate of 24 per 1,000 people compared with 14 per 1,000 for whites.

Secondary belt laws, as contrasted with primary, were originally adopted to limit the authority of police to stop motor vehicles. The secondary solution, however, created a non-standard and potentially highly discretionary type of law. The belt law violation was an add-on after police stopped a driver for some other violation. When secondary enforcement was replaced by primary, the percentage of all citations that were issued to minorities either decreased or remained the same. Was this because minority belt use rates increased more and thus there was less need to write tickets? Or was this because primary enforcement was being applied more uniformly across all motorists? Regardless, primary laws are seen as clearly superior. Evaluation results indicate that they produce both higher belt use rates for minorities and proportionally equal or fewer citations issued to minorities.

REFERENCES

Burt, C. W., and L. A. Fingerhut. Injury Visits to Hospital Emergency Departments: United States, 1992–1995. *Vital Health Statistics*, Vol. 133, No. 131, National Center for Health Statistics, Hyattsville, Md., 1998.

Chaudhary, N. A., M. G. Solomon. R. U. Ulmer, and L. G. Geary. *Evaluation of Michigan's, New Jersey's and Alabama's Safety Belt Law Change to Primary Enforcement.* Final report to National Highway Traffic Safety Administration. Forthcoming.

Insurance Institute for Highway Safety. *Status Report*, Vol. 19, No. 14. Sept. 1984, Arlington, Va.

Meharry Medical College. *Achieving a Credible Health and Safety Approach to Increasing Seat Belt Use Among African Americans.* Department of Occupational and Preventive Medicine, Meharry Medical College, Nashville, Tenn., 1999.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Motor Vehicle Crash Fatality and Injury Estimates for 2000*. 2001.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Safety Belt Use in 2002—Demographic Characteristics*. 2003.

Preusser, D. F., and C. W. Preusser. *Evaluation of Louisiana's Safety Belt Law Change to Primary Enforcement*. Final report to the National Highway Traffic Safety Administration. Report DOT HS 808 620. Sept. 1997. Available from NTIS, Springfield, Va.

Solomon, M. G. *Evaluation of NHTSA's Click It or Ticket Campaign, May 2001*. Final report to the National Highway Traffic Safety Administration. Report DOT HS 809 404. Jan. 2002. Available from NTIS, Springfield, Va.

Solomon, M. G., and W. J. Nissen. *Evaluation of Maryland, Oklahoma and the District of Columbia's Seat Belt Law Change to Primary Enforcement*. Final report to the National Highway Traffic Safety Administration. Report DOT HS 809 213. March 2001. Available from NTIS, Springfield, Va.

Ulmer, R. G., C. W. Preusser, and D. F. Preusser. *Evaluation of California's Safety Belt Law Change to Primary Enforcement*. Final report to the National Highway Traffic Safety Administration. Report DOT HS 808 205. Dec. 1994. Available from NTIS, Springfield, Va.

Ulmer, R. G., C. W. Preusser, and D. F. Preusser. *Evaluation of Georgia's Seat Belt Law Change to Primary Enforcement*. Final report to the National Highway Traffic Safety Administration. In process.

LEGISLATIVE CHALLENGE: PRIMARY SEAT BELT ENFORCEMENT LAWS

Commentary on "Minorities and Primary Versus Secondary Belt Use Enforcement"

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Responding to this paper is quite easy because there is virtually nothing in it that is not supported by existing data. But it is desirable to expand upon the paper's findings and to suggest some additional research.

The paper developed by David Pruesser, Mark Solomon, and Linda Cosgrove concludes that primary enforcement (involving both laws and actual enforcement) is associated with substantially higher seat belt use rates among racial minorities (primarily African Americans and Hispanic Americans) without resulting in proportionally greater citation rates for these groups (relative to the citation rates for whites). This clearly seems to be the case, and these researchers have conducted most of the research on this issue. But there is more to the story.

First, as the authors point out to some extent, blacks and Hispanics (compared with whites) also appear to be both more aware of changes in legislation and primary enforcement and have a greater "respect" for these changes in that they perceive that they will lead to a greater increase in the intensity of enforcement and the number of citations.

At the same time, however, telephone surveys conducted by a variety of organizations in a variety of circumstances uniformly report that blacks and Hispanics also support primary laws and enforcement to a greater extent than whites and they are more likely to conclude that primary enforcement (or intensified enforcement) is the correct way to increase safety belt use.

This response reviews briefly these issues of sensitivity and support and discusses implications for additional research that may be needed. Admittedly, the observations provided come from a mixture of studies of changes in laws (i.e., upgrading from primary to secondary) and changes in levels of enforcement (i.e., crackdowns, special traffic enforcement programs, etc.). However, they are relevant to the primary law issue in that they all relate to the measured support for such laws among minority communities.

MINORITY GROUP RESPONSE TO ENFORCEMENT CAMPAIGNS

Data from a variety of sources and programs suggest that African Americans and Hispanics almost always increase their safety belt use to a greater extent following intensified enforcement activities. These increases tend to be greater for minorities in primary law states than in secondary law states despite the fact that when baseline levels are higher (as they generally are in primary law states), there is less room for change. The most likely reason for this reaction is that minorities are more aware of such events or efforts.

MINORITY GROUP AWARENESS OF CHANGES IN LAWS AND ENFORCEMENT LEVELS

The above hypothesis is supported by the fact that telephone surveys conducted by the National Highway Traffic Safety Administration (NHTSA), the Air Bag and Seat Belt Safety Campaign (ABSBSC), and several states all confirm that minorities, particularly blacks and Hispanics, are more aware of changes in enforcement levels or seat belt laws than is the general population. This awareness is likely related to the fact that these groups, relative to whites, regularly report greater perceived changes in the level of enforcement associated with primary laws or enforcement campaigns. It is likely that these perceptions, in turn, are tied to perceptions regarding differential enforcement. In any case, these findings are very consistent, and they come from a variety of surveys conducted by NHTSA [e.g., Motor Vehicle Occupant Safety Surveys (MVOSS)], the Air Bag Campaign (i.e., McInturff Surveys), and several states (e.g., North Carolina, Michigan, South Carolina).

REDUCTIONS IN THE DIFFERENCES BETWEEN MINORITIES AND WHITES IN BELT USE

One thing that seems clear is that the primary law upgrades and the frequent mobilizations over the past several years have reduced the difference in belt use rates between blacks, Hispanics, and whites. Primary laws in particular appear to have evened the playing field with regard to seat belt usage. A 2001 report from the Insurance Institute for Highway Safety, for example, documents the fact that there are fewer differences in safety belt use among blacks, Hispanics, and whites in primary law states than in secondary law states.

MINORITY GROUP SUPPORT FOR PRIMARY LAWS AND ENFORCEMENT

One of the most interesting aspects of this whole racial–ethnic–primary enforcement interaction is that survey after survey has shown that minorities support primary laws and enforcement more than whites. Further, this support is greater among minorities (and whites) who reside in primary law states than among minorities (and whites) who live in secondary law states. These data come from the National MVOSS surveys, from ABSBSC surveys, and from a variety of state surveys.

IMPLICATIONS

The findings of the Preusser et al. paper presented here are that primary enforcement leads to higher usage rates among minorities and it does so without any evidence of adverse changes in differential enforcement. This response adds to the paper's conclusions by pointing out that, despite their increased sensitivity to primary enforcement (likely due to their fear of differential enforcement), minorities are consistently more supportive than whites.

Ironically, despite this higher level of support among minorities, one of the most significant obstacles to primary enforcement legislation today is minority opposition (more accurately, opposition purportedly on behalf of minorities).

Some obvious questions follow:

1. Are conclusions about minority support for primary enforcement valid? If not, how can one make them more valid (i.e., how can one get the correct answer?)?
2. If these (consistent) findings are valid, how can one better package them and use them to convince minorities (and legislators purportedly trying to protect minorities) that primary laws will increase seat belt usage and save lives without causing or exacerbating differential enforcement?

It seems ironic that there is so much positive information about the relationship between primary enforcement and minorities (particularly about their support for such activities) and yet this issue is perhaps the most significant obstacle to progress in this area.

Surely, the serious issues of differential enforcement and the fear among minorities of such activity is a major causative factor in the present situation. It is also an issue over which the research community may have limited control. However, it should be possible to point out in a more effective way that although differential enforcement may exist in some environments, primary laws and their enforcement do not contribute to it. Further, one should be able to use what is known to point out to those who are actively opposing primary belt laws that most of the people whom they are purportedly trying to protect support these laws and their enforcement.

Enforcement Challenges

ENFORCEMENT CHALLENGES

Putting Research into Action
Sobriety Checkpoints Save Lives

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There is substantial and consistent evidence from research that highly publicized, highly visible, and frequent sobriety checkpoints reduce impaired driving fatal crashes by 18% to 24%. Sobriety checkpoint programs, when conducted appropriately, save lives. However, only 11 states in the United States conduct sobriety checkpoints on at least a weekly basis. Lack of police resources and funding, lack of support by task forces and citizen activists, and the perception that checkpoints are not productive or cost-effective are the main reasons for their infrequent use. These barriers can be overcome through education and training. Enlightened task forces and citizen activists can provide the motivation to use this effective enforcement tool. With the national focus on homeland security, the timing is ideal for increased traffic enforcement in America. The public has always supported the increased use of sobriety checkpoints and should support their increased use to check not only for impaired drivers but also for valid driver's licenses and identification and for any illegal activity. Checkpoints have been shown to detect not only impaired drivers but also drivers not wearing safety belts, drivers with suspended licenses, fugitives, illegal weapons, stolen vehicles, and numerous other violations. It is recommended that the National Highway Traffic Safety Administration (NHTSA) work with the International Association for Chiefs of Police (IACP), Mothers Against Drunk Driving (MADD), the U.S. Department of Justice, and the Department of Homeland Security to enhance the use of traffic enforcement programs, particularly sobriety checkpoints, to reduce impaired driving and other crimes.

BACKGROUND

Laws dealing with driving while intoxicated (DWI) or driving under the influence (DUI) and the enforcement of these laws in the United States serve as both general and specific deterrents to driving while impaired by alcohol. It is impossible for police to detect every impaired driver on the road. That is why it is important for enforcement strategies to increase the perceived risk of being caught to deter impaired driving in the first place.

Sobriety checkpoints have been used by police in the United States for at least the past two decades as a strategy to enforce impaired driving laws. At sobriety checkpoints, police stop all vehicles, or a systematic selection of vehicles, to evaluate drivers for signs of alcohol or other drug impairment. To minimize public concern about the activity and comply with court rulings, checkpoints are typically publicized in advance, and signs are posted at the approaches to the checkpoints warning drivers that a checkpoint is ahead. Police officers in uniform approach drivers and identify themselves, describe the purpose of the stop, and ask the driver questions

designed to elicit a response that will permit the officer to observe the driver's general demeanor. Drivers who do not appear impaired are immediately waved on, while those who show signs of impairment are usually detained in a safe holding area, where they are investigated further and either arrested or released.

Research has indicated that well-publicized sobriety checkpoints conducted frequently and having high public visibility can serve as a general deterrent to impaired driving. Studies in the early 1980s found significant decreases in alcohol-related crashes associated with sobriety checkpoint programs (Epperlein 1985; Lacey et al. 1986; Voas et al. 1985). Later studies (Levy et al. 1988; Levy et al. 1990; Wells et al. 1992) confirmed that frequent, highly publicized checkpoint programs substantially reduced alcohol-related crashes by 10% to 20%. A summary of the U.S. literature examined nine studies through the early 1990s and concluded that "the culmination of evidence supports the hypothesis that checkpoints reduce impaired driving" (Ross 1992a).

Three recent reports on the effectiveness of sobriety checkpoints have added convincing and consistent evidence that checkpoints may be even more effective than previous research indicated. A demonstration program in Tennessee (Checkpoint Tennessee) was sponsored by NHTSA to determine if highly publicized checkpoints conducted throughout the state on a weekly basis would have an effect on impaired driving. The evaluation of the program, using interrupted time series, showed a 20% reduction in alcohol-related fatal crashes extending at least 21 months after conclusion of the formal program (Lacey et al. 1999). The second report was a review of the latest literature on the effectiveness of sobriety checkpoints and random breath testing in reducing motor vehicle crash injuries (Peek-Asa 1999). Six studies were reviewed that met the study criteria of including an evaluation of checkpoints, with a control or baseline comparison. All six studies found that checkpoints were effective in reducing alcohol-related fatalities and injuries. The third study was conducted by the Centers for Disease Control and Prevention (CDC) and involved a systematic review of the evidence on interventions to reduce alcohol-impaired driving (Shults et al. 2001). Fifteen studies of the effectiveness of sobriety checkpoints were summarized, and a metaanalysis showed a median reduction of 20% in fatal and injury crashes associated with sobriety checkpoint programs. The authors conclude that these studies "provide strong evidence" that sobriety checkpoints are effective in preventing alcohol-related fatalities and injuries.

The legality of sobriety checkpoints have been challenged in U.S. courts. In 1990 the U.S. Supreme Court upheld the constitutionality of sobriety checkpoints in a case that challenged them under the Fourth Amendment to the Constitution, which protects against unreasonable searches and seizures (*Michigan v. Sitz* 1990). The Court held that the interest in reducing the incidence of alcohol-impaired driving was sufficient to justify the brief intrusion occasioned by a properly conducted sobriety checkpoint. However, 12 states report that sobriety checkpoints are illegal because of state law.

NHTSA has published numerous reports on the conduct of sobriety checkpoints. Research examining different alcohol-impaired driving law enforcement strategies showed that the proportion of all crashes involving alcohol declined an average of 28% in four communities that used publicized sobriety checkpoints compared with a 17% decline in communities that used only publicized roving patrols (or saturation patrols). There were no differences in effectiveness for checkpoint programs with small staffing levels (3 to 5 officers per checkpoint) compared with high staffing levels (8 to 12 officers) or for checkpoints that stayed in one location versus those that moved around (Stuster and Blowers 1995). In an effort to promote the use of sobriety

checkpoints in the states, NHTSA has issued guidelines to communities on conducting sobriety checkpoints (Compton 1983; NHTSA 1990) and has produced a law enforcement training video on sobriety checkpoints (NHTSA 1999a) and a how-to guide for planning and publicizing them (NHTSA 2000a). The agency also recently provided funding to several states to conduct demonstrations of sobriety checkpoints at least weekly throughout the state. Police and other officials have been skeptical of the cost benefit of sobriety checkpoints, but a recent study indicates that checkpoint programs can yield considerable cost savings (Miller et al. 1998).

Despite the evidence supporting the increased use of sobriety checkpoints and guidance on how to conduct them, many police agencies have been unenthusiastic. In a prior study, Ross (1992b) explored reasons for the sporadic use of checkpoints. The main reasons were that checkpoints yielded few arrests and were believed to be an inefficient use of police resources; that checkpoints required more resources than most departments could afford; that the checkpoint task was boring, was uncomfortable to do in inclement weather, and presented the risk of injury to police and motorists; that checkpoints inconvenienced innocent motorists; that it was not fair to take such extraordinary measures to contact drinking drivers who had not gotten in trouble on the roads; and that there was little political support for checkpoints. All these arguments were discussed and countered by Ross and have been addressed in an NHTSA (1993) brochure. Ten years later sobriety checkpoints are still underused, except in a minority of states.

WHY AREN'T SOBRIETY CHECKPOINTS WIDELY ADOPTED AS AN ENFORCEMENT STRATEGY IN THE UNITED STATES?

A recent study has contrasted states that use sobriety checkpoints frequently with states that use them infrequently (Fell et al. 2001). Information was collected from all 50 states plus the District of Columbia on the use of sobriety checkpoints. Thirty-seven states reported conducting sobriety checkpoints at least once or twice during the year. Only 11 states reported that checkpoints were conducted on a weekly basis. Thirteen states do not conduct checkpoints either because of legal or policy issues (**Table 1**). More detailed information was collected from five states that conducted checkpoints frequently and matched with information from five similar states that conducted checkpoints infrequently. States with frequent checkpoint programs had several common features such as program themes, support from task forces and citizen activist groups, use of a moderate number of police at the checkpoints, and use of all available funding mechanisms (federal, state, local) to support them. States with infrequent checkpoints blamed a lack of funding and police resources for not conducting more checkpoints, preferred saturation patrols over checkpoints because they were more "productive," and used many police officers at checkpoints (**Table 2**). Some barriers to checkpoints can be overcome through education and training and leadership from NHTSA and the International Association of Police Chiefs (IAPC). Enlightened task forces and citizen activist groups, such as MADD, can provide the motivation to use this effective enforcement tool.

Civilian state and local task forces appear to be an important factor encouraging checkpoints. In New York State, for example, local "Stop DWI" task forces manage and provide funding for checkpoints. The funding comes from fines and fees paid by drivers convicted of DWI. In Indiana the Governor's Council on Impaired and Dangerous Driving provides the leadership and training for checkpoints. The local Marion County Traffic System Partnership,

TABLE 1 Results of Sobriety Checkpoint Survey of U.S. States

Are sobriety checkpoints presently conducted in your state?	
Yes (37 states plus DC)	AL, AZ, AR, CA, CO, CT, DE, DC, FL, GA, HI, IL, IN,* KS, KY, ME, MD, MA, MS, MO, NE, NV, NH, NJ, NM, NY, NC, ND, OH, OK, PA, SC, SD, TN, UT, VT, VA, WV
No (13 states)	Checkpoints not conducted, but no legal impediment cited: AK Checkpoints illegal under state law: ID, LA,* MI, MN, OR, RI, TX, WA (violates state constitution); IA, MT, WY (statute authorizes roadblock stops for reasons that do not include sobriety checkpoints); WI (prohibited by statute)
How frequently are sobriety checkpoints conducted in your state?	
Weekly (11 states)	AR, GA, HI, IN, KY, MS, NY, NC, SD, VT, VA
Once/twice a month (13 states plus DC)	CA, CO, DC, FL, IL, KS, MO, NE, NV, NJ, NM, OK, PA, TN
Every other month (4 states)	DE, MD, NH, UT
Only during major holiday periods (4 states)	AL, AZ, MA, OH
Variable, depending upon resources available (5 states)	CT, ME, ND, SC, WV
Where in your state are sobriety checkpoints conducted?	
In every county/jurisdiction (20 states plus DC)	AL, AR, CA, DE, DC, GA, HI, IL, KS, KY, ME, MS, NY, NC, OK, SC, SD, TN, UT, VT, VA
Only in certain counties/jurisdictions (17 states)	AZ, CO, CT, FL, IN, MD, MA, MO, NE, NV, NH, NJ, NM, ND, OH, PA, WV
Which police jurisdictions conduct sobriety checkpoints?	
All (state, local, sheriff, etc.) (27 states)	AL, AZ, CA, CO, FL, GA, IL, IN, KS, KY, ME, MS, MO, NV, NM, NY, NC, OH, OK, PA, SC, SD, TN, UT, VT, VA, WV
State and local police only (6 states)	AR, CT, DE, MD, NH, NJ
State police only (2 states)	MA, ND
Local police only (1 state plus DC)	DC, HI
Local police and sheriff only (1 state)	NE

*Since this survey was conducted, two decisions have changed the status of the law. In July 2000, sobriety checkpoints were held to be legal under the Louisiana constitution; this overruled an earlier decision. In November 2000 an Indiana intermediate appellate court had held that sobriety checkpoints violate the Indiana constitution; this decision is on appeal.

consisting of police representatives, citizens, business representatives, and the like provides impetus to the checkpoint program in the Indianapolis area.

States with frequent checkpoint programs also have officials who understand the importance of deterring alcohol-impaired driving regardless of the arrest rate. They also have active citizens groups such as MADD to support the checkpoint effort and urge continuation and expansion of the program. Program themes are widely publicized and have high recognition, and there is perceived to be widespread public support for checkpoints. These appear to be the key ingredients associated with frequent use of checkpoints.

In contrast, states with infrequent checkpoints have few of these elements. Some of these states have DWI task forces, but they were not actively promoting checkpoints. None of these states appeared to receive much encouragement or pressure from citizen activist groups to

TABLE 2 Comparison of DWI Programs in States That Conduct Checkpoints Frequently and Infrequently

	Frequent-Use States (GA, IN, NY, NV, VA)	Infrequent-Use States (AL, OH, IL, AZ, MD)
Organization/ support	In 4 frequent-use states, task forces recommended and supported checkpoint programs. These were statewide task forces in GA and NY; local in NV and IN. Checkpoints are organized around a theme in all 5 frequent-use states.*	In OH, AZ, and MD, some counties did not conduct checkpoints for lack of official support (i.e., because their prosecutors would not prosecute offenders arrested at checkpoints or elected officials objected to checkpoints).
Manpower usage	In all 5 frequent-use states, checkpoints typically used a moderate number of officers (2–15).	In 4 states (OH, IL, AZ, and MD), 15 or more officers (30 in some instances) were typically used at checkpoints.
Funding/cost-effectiveness	In 4 states, all available funding from state, local, and federal sources was used to pay for checkpoints. Officials in all 5 states indicated they would conduct more checkpoints if additional funding were made available. Officials in all 5 states believed checkpoints were a cost-beneficial deterrent to DWI.	Lack of funding and insufficient police resources were cited most commonly in infrequent-use states as a reason checkpoints were not conducted more often. AL, OH, and AZ preferred "saturation patrols" to checkpoints because they were thought to be as effective a deterrent as checkpoints and probably "more productive." Officials in all 5 states believed checkpoints were effective and said they would do more checkpoints if they had more funding.
Public support	In all 5 states with frequent checkpoints, community coalitions and citizen activist groups like Mothers Against Drunk Driving (MADD) were highly supportive of checkpoints. Support for checkpoints among the general public was also very high (75%–95% in favor) in 4 states (GA, IN, NY, NV).	Community coalitions and citizen groups generally have not militated for more frequent checkpoints in these states. Only IL reported that a citizen's group, the Alliance Against Impaired Motorists (AAIM), supported the increased use of checkpoints.

*In each state, the themes were highly publicized and provided an impetus for maintaining checkpoint operations. The themes were: "Operation Zero Tolerance" (GA), "Operation Pull-Over" (IN), "Project Zero" (NY), "Joining Forces" (NV), "Smart, Safe & Sober" (VA).

conduct checkpoints. Several of the barriers to checkpoints elucidated in the Ross (1992b) study were not present, however. There was no mention by officials about injury risk for police officers at checkpoints or that they were unfair to drinking or nondrinking motorists or boring to the police as reasons why they were not conducted more frequently. In fact, none of the representatives of the 16 states included mentioned these as barriers to conducting checkpoints. There remains, however, the notion that checkpoints are unproductive because few are arrested and that saturation patrols result in more arrests and are thus a superior enforcement strategy. In fact, checkpoints can achieve arrest rates as high as or higher than other enforcement methods in addition to creating general deterrence (Voas 1989).

Lack of police resources and lack of funding were the main reasons given for not conducting more checkpoints. Many infrequent-use states are under the impression that 15, 20,

or even 30 officers are needed at each checkpoint, and they tend to use 15 or more officers per checkpoint. However, it has been shown that as few as two to five officers can handle checkpoints without loss of effectiveness. In the frequent-use states, smaller checkpoints, in terms of police resources, were the norm. There needs to be substantial educational effort in the police community on how sobriety checkpoints can be conducted safely, effectively, efficiently, and legally with a moderate number of police officers.

The funding issue was raised in both frequent-use and infrequent-use states. In states with few checkpoints, financial support was an issue. In states with many checkpoints, officials said they would do even more given financial resources. States with many checkpoints tended to use a combination of state, local, and federal funds, and this is one option. But in the short term, federal funding alone appears adequate to support sobriety checkpoint programs. Various funding mechanisms from the 1998 Transportation Efficiency Act for the 21st Century (TEA-21) include the general Section 402 grant money to the states for all traffic safety programs each year, Section 410 impaired driving grant money if states meet certain criteria, Section 163 grant money if states pass a 0.08% blood alcohol concentration per se law, and Section 403 demonstration program grants. In states that fail to enact open container laws and repeat-DWI-offender laws, a portion of highway maintenance funds will be transferred automatically to pay for highway safety programs. This money could be used to fund sobriety checkpoint programs (Sections 154 and 164). This amounts to millions of federal dollars available to the states each year for use in sobriety checkpoint programs. Thus, if states do not want to invest nonfederal funds in checkpoints, there is sufficient federal grant money that could be used, but states have to take the initiative. Federal funding for sobriety checkpoints was expected to be even more prominent when the TEA-21 legislation was reauthorized by Congress in fiscal year 2004. However, there is a danger in relying on these funds alone to support DWI enforcement efforts. Agencies may tend to rely solely on overtime pay to conduct such activities. When federal funding goes down, so may the enforcement effort. Therefore, efforts should continue to encourage enforcement agencies to incorporate checkpoints into their routine operations.

In summary, states with and without frequent checkpoints are distinguished by motivational factors and by their approaches to using financial and manpower resources. In the frequent-use states, the motivation for checkpoints comes from a combination of support by task forces, citizen activist groups, police officials who understand the power of checkpoints as a deterrence strategy, and the public. In these states, police resources generally are used efficiently, and various sources of funding are tapped. In states with infrequent checkpoints, available funds often are not sought and too many police officers are used at checkpoints. Some of the barriers to checkpoints can be overcome through education and training. Enlightened task forces and citizen activist groups can provide the motivation to use this effective enforcement tool.

RECOMMENDATIONS FOR INCREASED ENFORCEMENT

Highly Publicized and Frequent Enforcement

Research has clearly indicated that sobriety checkpoints that are well publicized and have high public visibility can serve as a general deterrent to impaired driving. A review of the latest literature on the effectiveness of sobriety checkpoints and random breath testing in reducing motor vehicle crash injuries was recently completed by CDC (Shults et al. 2001). Fifteen studies

that met the study criteria found that checkpoints were effective in reducing alcohol-related fatalities and injuries by 18% to 24%. While several communities in the United States conduct enforcement blitzes, only a handful of states have coordinated and concerted statewide sobriety checkpoint programs. Sobriety checkpoints probably have the greatest potential for immediately reducing impaired driving crashes in this country.

Every effort should be made in each state and each community to include highly publicized and highly visible sobriety checkpoints (or a similar enforcement program) as a routine enforcement strategy each week to deter drivers from driving impaired.

Enforcement of Underage Drinking

Laws for a minimum drinking age of 21 (MDA 21) and zero tolerance exist in all states and the District of Columbia. However, enforcement of these laws could be much better in most states. MDA 21 laws reduce the involvement of drinking drivers in fatal crashes of the affected age groups by about 13% and save an estimated 900 to 1,000 lives each year (NHTSA 1999b). Zero tolerance laws effectively reduce under-age-21 drinking-driver fatal crashes by up to 24% (Voas et al. 1999). If these laws were enforced to any great extent, their effectiveness would be even greater.

Many states have programs to reduce underage drinking and therefore underage drinking and driving. “Cops in shops” have been reported as successful in catching and eventually deterring young people from attempting to purchase alcohol by using undercover police officers posing as store clerks. “Stings” have been effective in catching and deterring alcohol beverage outlets from selling alcohol to persons under age 21 by using undercover underage police officers posing as patrons. But these and other compliance check programs are not used to any great extent in many states. TEA-21 has provided incentives to states to conduct these enforcement operations (Section 410) (NHTSA 2000b).

If all states conduct enforcement campaigns to deter underage drinking, significant gains could be made in reducing young-driver alcohol-related crashes. With the population of 15- to 20-year-old drivers continuing to grow in the United States and the reported increase in binge drinking for this age group increasing in recent years, a renewed emphasis on underage drinking enforcement is overdue.

Enforcement Technology

Technology can help the police detect impaired drivers and aid in the prosecution process: passive alcohol sensors (PASs) and in-vehicle video cameras. PASs are devices that detect alcohol on the breath of drivers without them actively blowing into a breath tester. Some of them are built into flashlights for police to use for dual purposes. Studies in the field show that these sensors substantially increase the rate of detection of intoxicated drivers’ blood alcohol concentrations (BACs) (BAC = .10+) by police during traffic stops or at checkpoints (Ferguson et al. 2000; Jones and Lund 1985). While they are relatively expensive and not used by many police officers in this country, PAS devices have the potential not only to increase DWI detection but also to deter drinking and driving in the first place if the public knows the police have them. PAS devices could be effective at sobriety checkpoints and in the enforcement of zero tolerance laws for youth. They can detect BAC levels of .02% to .05%, which are violations for drivers

under age 21, and are otherwise difficult to detect by police. TEA-21 encourages states to use PASs by providing incentives in Section 410 (NHTSA 2000b).

Many police agencies are equipping their patrol vehicles with in-vehicle video cameras. This allows them to video tape (*a*) the behavior of vehicles before they are stopped for a violation, (*b*) the actual traffic stop and assessment of the driver, and (*c*) the arrest process when the officer has probable cause to make an arrest. This videotaped evidence has helped prosecutors obtain guilty pleas for DWI from drivers and convictions if the case goes to trial. In-vehicle video cameras also have the potential to protect the public against any illegal or abusive stops by police. If all patrol vehicles were equipped with operational video cameras during all routine (and emergency) stops, the potential for abusive stops would be substantially reduced and the public would more strongly support DWI (and seat belt usage) enforcement. TEA-21 provides states with incentive grant funding to equip and use in-vehicle video cameras in police vehicles (NHTSA 2000b).

When police budgets are developed, these technologies should be factored into the process to improve overall enforcement efficacy and help detect and prosecute more impaired drivers.

Homeland Security

With the national focus on homeland security, the timing is ideal for increased traffic enforcement in America. The public has always supported the increased use of sobriety checkpoints and should support their increased use to check not only for impaired drivers but also for valid driver's licenses, identification, and any other illegal activity. Checkpoints have been shown to detect not only impaired drivers but also drivers with suspended licenses, fugitives, illegal weapons, stolen vehicles, and numerous other violations.

RECOMMENDED ACTIONS

1. Using NHTSA Regions III and IV sobriety checkpoint initiatives as models, NHTSA should facilitate concerted impaired driving enforcement programs in all 10 NHTSA regions. Emphasize sobriety checkpoints in states where they can be conducted. Use other checkpoints or similar traffic stop programs in states where sobriety checkpoints are unconstitutional. Provide states with resources and guidelines. Use paid advertising to publicize the checkpoints, where appropriate.
2. NHTSA and IACP should provide training on how checkpoints can be conducted efficiently and effectively with a small number of officers. Encourage multiple police agency participation to ease the burden on state police. Provide standardized field sobriety testing training as needed.
3. NHTSA and MADD should help to equip states with PASs and in-vehicle video cameras to enhance detection and prosecution of DUI and zero tolerance violations. NHTSA should develop and distribute guidelines on how to use these technologies.
4. MADD should provide leadership to establish state and local impaired driving task forces to provide citizen support for enforcement programs. MADD should also help to publicize the enforcement programs.

5. NHTSA and MADD should work together on media advocacy topics to provide interesting stories ("hooks") to publicize the checkpoint programs frequently throughout the year.

6. NHTSA and IACP should work with the U.S. Department of Justice to initiate traffic stop programs to reduce impaired driving and enhance homeland security.

If the public is serious about reducing the impaired driving problem in this country, one of the most effective tools is highly publicized and frequent sobriety checkpoints. If local police agencies are held responsible for impaired driving injuries and deaths in their community—just as they are held responsible for the incidence of other violent crimes such as rapes, assaults, armed robbery, and murders—maybe then sobriety checkpoints will become part of their routine fight against crime.

REFERENCES

Compton, R. *The Use of Safety Checkpoints for DWI Enforcement.* HS-806-476. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1983.

Epperlein, T. *The Use of Sobriety Checkpoints as a Deterrent: An Impact Assessment*. Arizona Department of Public Safety, Phoenix, 1985.

Fell, J., S. Ferguson, A. Williams, and M. Fields. *Why Aren't Sobriety Checkpoints Widely Adopted as an Enforcement Strategy in the United States*? Insurance Institute for Highway Safety, Arlington, Va., 2001.

Ferguson, S. A., A. F. Williams, and R. B. Voas. Workshop Introduction: Issues and Methods in the Detection of Alcohol and Other Drugs. *Transportation Research Circular E-C020: Issues and Methods in the Detection of Alcohol and Other Drugs,* Transportation Research Board, National Research Council, Washington, D.C., 2000, pp. A1–A5.

Jones, I. S., and A. K. Lund. *Detection of Alcohol-Impaired Drivers Using a Passive Alcohol Sensor*. Insurance Institute for Highway Safety, Washington, D.C., 1985.

Lacey, J., R. Jones, and R. Smith. *Checkpoint Tennessee: Tennessee's Statewide Sobriety Checkpoint Program*. HS-808-841. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1999.

Lacey, J., J. Stewart, L. Marchetti, C. Popkin, P. Murphy, R. Lucke, and R. Jones. *Enforcement and Public Information Strategies for DWI General Deterrence: Arrest Drunk Driving—The Clearwater and Largo, Florida, Experiences*. HS-807-066. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1986.

Levy, D., P. Asch, and D. Shea. An Assessment of County Programs to Reduce Driving While Intoxicated. *Health Education Research,* Vol. 5, 1990, pp. 247–255.

Levy, D., D. Shea, and P. Asch. Traffic Safety Effects of Sobriety Checkpoints and Other Local DWI Programs in New Jersey. *American Journal of Public Health*, Vol. 79, 1988, pp. 291–293.

Michigan Department of State Police et al. v. Sitz et al., 496 U.S. 444, 110 L.Ed.2d 412 (1990).

Miller, T., M. Galbraith, and B. Lawrence. Costs and Benefits of a Community Sobriety Checkpoint Program. *Journal of Studies on Alcohol*, Vol. 59, 1998, pp. 462–468.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *The Use of Sobriety Checkpoints for Impaired Driving Enforcement*. HS-807-656. 1990.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Sobriety Checkpoints: Point/Counterpoint*. HS-807-916. 1993.

National Highway Traffic Safety Administration, U.S. Department of Transportation. Law Enforcement Training Video on Sobriety Checkpoints. HS-808-990. 1999a.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Traffic Safety Facts—Alcohol 1998* (and 1997, 1996, 1995). DOT HS 808 950. National Center for Statistics and Analysis, 1999b.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Saturation Patrols and Sobriety Checkpoints: A How-To Guide for Planning and Publicizing Impaired Driving Enforcement Efforts*. HS-809-063. 2000a.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *TEA-21 Grants Information*. Washington, D.C., 2000b. http://www.nhtsa.dot.gov/nhtsa/whatsup/tea21/tea21programs/factsheet.

Peek-Asa, C. The Effect of Random Alcohol Screening in Reducing Motor Vehicle Crash Injuries. *American Journal of Preventive Medicine*, Vol. 16, No. 1S, 1999, pp. 57–67.

Ross, H. L. *The Deterrent Capability of Sobriety Checkpoints: Summary of the American Literature*. HS-807-862. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1992a.

Ross, H. L. Reasons for Non-Use of Sobriety Checkpoints. *Police Chief*, Vol. 59, 1992b, pp. 58–63.

Shults, R., R. Elder, D. Sleet, J. Nichols, M. Alao, V. Carande-Kulis, S. Zaza, D. Sosin, and R. Thompson. Reviews of the Evidence Regarding Interventions to Reduce Alcohol-Impaired Driving. *American Journal of Preventive Medicine*, Vol. 21, No. 4 (suppl.), 2001, pp. 66–88.

Stuster, J., and P. Blowers. *Experimental Evaluation of Sobriety Checkpoint Programs*. HS-808-287. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1995.

Voas, R. B. The Relative Effectiveness of Checkpoints. *Proc., 11th International Conference on Alcohol, Drugs, and Traffic Safety*, National Safety Council, Washington, D.C., 1989, pp. 76–80.

Voas, R. B., E. Rhodenizer, and C. Lynn. *Evaluation of Charlottesville Checkpoint Operations*. HS-806-989. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1985.

Voas, R. B., A. S. Tippetts, and J. C. Fell. The United States Limits Drinking by Youth Under Age 21: Does That Reduce Fatal Crash Involvements? *43rd Proceedings of the Association for the Advancement of Automotive Medicine*, Barcelona, Spain, 1999.

Wells, J. K., D. F. Preusser, and A. F. Williams. Enforcing Alcohol-Impaired Driving and Seat Belt Use Laws, Binghamton, New York. *Journal of Safety Research*, Vol. 23, 1992, pp. 63–71.

ENFORCEMENT CHALLENGES

The Passpoint System—Passive Sensors at Minicheckpoints

Bringing Australia's Random Breath Test System to the United States

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This paper describes a modified sobriety checkpoint program that uses passive sensors and can be implemented by small to moderate-sized communities to deter impaired driving at a level of effectiveness similar to the high level achieved by several Australian states in their random breath test (RBT) programs. The system envisages three to five traffic patrol officers coming together for a 1- to 2-h period to conduct minicheckpoints with passive sensors (Passpoints) as a regular feature of their patrol activity. The proposed procedures for establishing and conducting the program are described. It is suggested that the program offers an opportunity to institutionalize random screening of drivers in most U.S. communities.

BACKGROUND

Corporal Jeff McPeake and four fellow officers were about to shut down their minicheckpoint outside Beckley, West Virginia, at 1:30 a.m., when a woman driver who was being abducted by a kidnapper attracted the attention of the officers, which led to the arrest of the man who apparently intended to rape and kill her. "You go through your career hoping somewhere along the way you'll save someone's life. I really believe that we saved one this night," McPeake noted (Fox 2003). This example illustrates that sobriety checkpoints need not be massive affairs, involving as many as 30 or 40 officers and large numbers of police vehicles. Medium and small communities can mount checkpoints with fewer than six officers that deter drunk drivers while also providing an opportunity to apprehend other criminal offenders.

From 1980 to 1995, alcohol-related fatalities fell approximately 2% each year, for an overall reduction of 30% in the United States. Unfortunately, for the past few years, there has been no reduction at all. Several factors have been credited with contributing to the 15-year decline in fatalities, among them the founding of advocacy groups such as Mothers Against Drunk Driving (MADD) and the rapid buildup in alcohol safety legislation, including per se illegal laws, administrative license suspension laws, and particularly state minimum legal drinking age laws. All of these may have contributed to lowering the alcohol-related fatality rate. Notable, however, is that, in the 7 years since 1995, states have enacted a substantial number of significant safety laws that have been demonstrated to reduce alcohol-related fatalities, including lowering of the legal limit to 0.08% (Toomey et al. 1996), passage of zero tolerance laws (Shults et al. 2001), and passage of secondary and primary safety belt laws that reduced alcohol fatalities among drinking drivers (Voas et al. 2000). Thus, the factors credited with the progress from 1980 to 1995 are still in place, but progress has stalled. Yet the public still rates drunken driving as a high priority problem (Royal 2000). Why then has progress stalled?

It seems possible that, despite the passage of what appears to be more-restrictive legislation, deterrence of impaired driving has declined. FBI statistics demonstrated an increase in arrests for driving under the influence (DUI) in the late 1970s and early 1980s, but there was a decline later in the 1980s, and the national number of DUI arrests has remained static for more than a decade. Ross (1984) noted the tendency for the impact of enforcement programs to wear off over time. This may be occurring in the United States. Consequently, it might be an opportune time to consider how deterrence can be strengthened through new methods of enforcement.

It is generally agreed that the Australian RBT enforcement system has been among the most effective methods of deterring impaired driving (Shults et al. 2001; Peek-Asa 1999; Homel 1990, 1993; Homel et al. 1995). It has two basic features: the random stopping of vehicles and the assured testing of all drivers stopped. These two features contribute significantly to the deterrent effect because they undermine the drinking driver's belief that he or she can control (*a*) the risk of being apprehended by driving carefully to avoid being stopped and (*b*) the risk of detection by not appearing intoxicated to the officer when stopped. The RBT law empowers the police to stop any driver regardless of his or her driving behavior and requires the testing of every driver stopped regardless of appearance or evidence of drinking. This loss of ability to control the risk increases the perceived risk of apprehension.

In the United States, there has been relatively little interest in the RBT system because the 14th Amendment (which requires that searches and seizures be reasonable) appears to bar it. Stopping a vehicle is a seizure and, therefore, must be for a specific cause, not at random. However, this requirement was modified by the Supreme Court's decision in *Michigan Department of State Police v. Sitz* in 1990 to permit sobriety checkpoints in which cars can be stopped at random under specific conditions. Similarly, a preliminary breath test (PBT) such as that required by the RBT system is a search that requires some evidence of drinking before it can be used. However, the passive alcohol sensor (PAS) provides a substitute; although not as accurate as the PBT, it does not constitute a search because it analyzes air from in front of the suspect's face and does not require the suspect to use a mouthpiece or to blow into the device. PAS results have a strong relationship to PBT results. It will detect three of four drivers with a positive blood alcohol concentration (BAC), while giving a false-positive result in only three of 100 zero- BAC drivers (Farmer et al. 1999).

Thus, the combination of sobriety checkpoints with officers using passive sensors (Passpoints) offers the possibility of producing an enforcement impact in the United States similar to the RBT system used in Australia. Shults et al. (2001) found that the RBT system in Australia, Finland, and France reduced alcohol-related fatal crashes from 13% to 36%. The benefit of the combined checkpoint and passive sensor enforcement in the United States would be expected to be somewhat less effective because of the restrictions on the use of those two procedures and particularly because of the current limited implementation of sobriety checkpoints. Fell et al. (2003) noted that only 11 states reported that they conducted sobriety checkpoints at least once a week somewhere within the state. A feature required for maximum RBT effectiveness is a sustained high-level effort (Homel 1993; Miller et al. 2003). Homel (1993) noted that the Australian provinces where RBT was most successful were characterized by a "boots and all" approach involving a sustained high level of testing. In some areas, this amounted to conducting sufficient tests to cover half the licensed drivers in the locality. To achieve a deterrence level similar of the RBT program in Australia and New Zealand, U.S police departments not only will have to adopt the Passpoint system but also will have to implement it

as a regular part of their overall traffic enforcement system. This paper describes a procedure that should not only be effective but also within the capability of departments employing six to 10 traffic patrol officers. Smaller departments could carry out the procedure by cooperating with neighboring jurisdictions.

DESCRIPTION OF THE PASSPOINT SYSTEM

Fell et al. (2003) interviewed officials in states with high and low sobriety checkpoint usage rates and concluded that the two main impediments to checkpoint implementation were that they yielded few arrests and that they required many officers, making them expensive to conduct.

The proposed Passpoint system addresses the first issue by using the passive sensor at the front end of the driver interview to detect heavy drinkers who are sufficiently tolerant to alcohol so they are difficult to detect with only an interview. Several studies conducted by the Insurance Institute for Highway Safety (IIHS) (Ferguson et al. 1996; Lund and Jones 1987) have demonstrated that officers at checkpoints fail to detect half of the over-the-limit drivers they interview and that the use of passive sensors at checkpoints would increase the DUI arrest rate by approximately 50%. Voas et al. (1985) demonstrated that officers at checkpoints with passive sensors could cite more DUI offenders per hour than the same officers did during dedicated traffic patrol periods.

The Passpoint system also addresses the second issue by using a small number of officers for short periods so that the checkpoint program can be mounted with existing police manpower, without requiring overtime or other special pay. Stuster and Blowers (1995) demonstrated that checkpoints conducted by as few as two to five officers were as effective as checkpoints conducted by 15 or more officers. Basically, the Passpoint system calls for a small group of three to five officers on traffic patrol duty to converge on a preset site and conduct a minicheckpoint, returning to their standard patrol duties within 2 h. Within this framework, the Passpoint operation would become one of the standard DUI enforcement techniques regularly employed within the department's jurisdiction. As a standard traffic enforcement activity, the cost would be covered by the normal enforcement budget.

Checkpoint programs have tended to be resisted by many officers because they appear to be relatively passive activities not clearly focused on significant criminal activity and the motorists contacted may have not committed an offense. Conversely, aside from detecting impaired drivers, they frequently flush out more serious criminals, as illustrated by the anecdote that introduced this paper. Passpoint operations can appear more action oriented if observations related to other offenses such as invalid licenses, safety belt use, firearm and drug offenses, outstanding warrants, and stolen vehicles are conducted. When conducted on a regular but relatively infrequent (on a once or twice a week) basis, they can provide a break from routine patrol activities.

Further, they may provide an opportunity to train and motivate new officers to increase their DUI arrest activity. Typically, a department traffic control division will have a few officers with special interest and skills in apprehending impaired drivers. Where dedicated DUI patrols are employed, those officers are normally the ones selected for the duty. This often results in the members of the dedicated patrol making most of the impaired driving arrests, with the much larger group of regular patrol officers making few arrests. The Passpoint procedure uses these

regular patrol officers. At the Passpoint, experienced officers can assist the less experienced officers in sobriety testing and other procedures required for a valid DUI arrest.

STEPS IN IMPLEMENTING THE PASSPOINT SYSTEM

To minimize the cost and ensure maximum efficiency, the development of a Passpoint system should involve several steps.

Step 1. Assign Leadership

An experienced member of the traffic patrol force who has been active in DUI enforcement should be selected to manage the development of the Passpoint system.

Step 2. Select Passpoint Sites

To establish the minicheckpoint quickly, the preselected site should be related to impaired driving crashes. The locations of alcohol outlets can be obtained from the local agency responsible for regulating distribution of alcohol and plotted on a local map. Similarly, the locations of nighttime crashes and DUI arrests can be obtained from police records and plotted. From the resulting map, locations likely to be frequented by impaired drivers can be selected and surveyed for their suitability as Passpoint sites. Normally, between one and two dozen locations should be selected. Once the sites are selected, the placement of officers and the cones and traffic signs related to the minicheckpoint should be determined and marked on the pavement. Thus, the actual site setup can be done rapidly. Hourly traffic counts for each site should be obtained from the city traffic engineer’s office.

Step 3. Obtain Equipment

At least a half dozen PAS and a half dozen PBT devices will be required for the Passpoint operations, depending on the number of officers involved. At $500 per PAS and $300 per PBT, these testers will cost approximately $5,000, which may have to come from outside the departmental budget, either from a grant from the state highway safety office or from private contributions by local organizations such as MADD. Also required will be a vehicle to carry the checkpoint equipment to the site. Finally, depending on the distance from department headquarters, a portable evidential breath test (EBT) device may need to be brought to the site. EBT devices are available that can be operated in a patrol car.

Step 4. Organize Auxiliary Officers to Transport Equipment and Set Up Minicheckpoint

Most departments have a cadet or auxiliary corps of officers who can be assigned to set up and tear down the minicheckpoint site. This activity would require 3 to 4 h from two auxiliary members for no more than four or five times a week. This should not involve any substantial cost to the department. The auxiliary officers would place the traffic signs and cones at the premarked locations at the site selected for use on a given night. When the vehicle queues at the checkpoint

reach a predetermined size, the auxiliary officers would direct traffic around the site to avoid any significant delay of motorists using the roadway.

Step 5. Set Up Operational Plan

Each month, the coordinator would establish a schedule of Passpoint operations based on the number of officers on patrol at various times of the day and the traffic patterns at the preselected sites. Times and sites can be assigned based on the probability of encountering an impaired driver or selected at random to make it more difficult for drinkers to anticipate their time and location. When rain or some other event interferes with a planned Passpoint operation, the coordinator would be required to reschedule the minicheckpoint. Passpoints would be nominally scheduled for 2 h. However, participating officers will be drawn off the site when processing a DUI. When only one officer remains at the site, the minicheckpoint would be closed.

Step 6. Conduct Passpoint Interviews

The Passpoint interviews would proceed in the standard three-phase format: interview at the driver's window, field sobriety tests, and finally the PBT leading to the arrest decision. The PAS would provide an important novel addition to this standard procedure. If carefully used, it can provide an indication of the extent to which a driver has been drinking. When the PAS is turned on, the first light of a 10-bar ladder of lights comes on to show that it is operating. If the second bar lights up, the chances are three out of four that the driver has been drinking; if three additional bars light up, the probability that the driver has been drinking is 90%. Conversely, if the PAS has been properly used and no extra bars light up, there are only about three chances in 100 that the driver has been drinking (Farmer et al. 1999).

Thus, at the beginning of an interview, an officer can get a strong indication of whether the driver has been drinking. This is important because studies conducted by the IIHS (Ferguson et al. 1996; Lund and Jones 1987) indicated that officers missed up to half the over-the-limit drivers when limited to a short checkpoint interview. Little attention has been given to the potential negative impact of missing a heavy drinker at a checkpoint. If an over-the-limit driver is a naïve moderate drinker who has simply overconsumed on that particular occasion, the driver may interpret the failure of the officer to take action as a sign that, despite heavy consumption, he or she was not legally impaired. Conversely, the hard core drinker may believe that he or she can fool the officer and not be arrested even though over the limit. Thus, checkpoints allowing little time for an officer to examine the driver and not providing for passive sensing equipment run the risk of reducing their credibility and potentially misleading and miseducating high-risk drinkers. Even if heavy drinkers are not cited, they should not be allowed to leave the site under the misconception that the officer did not recognize their level of drinking.

The checkpoint should be an opportunity to conduct several enforcement actions. Observation of safety belt use and enforcement of safety belt laws are obvious actions that can be taken when a vehicle is stopped. Another action is the checking of license and vehicle registrations. Checking the license will lengthen the interview; consequently, in some localities such as California, there is concern that checking licenses will negatively affect public support for checkpoint operations. However, one of the most serious alcohol safety problems is the suspended DUI driver who continues to operate a vehicle illegally. Because there is no way to determine whether a driver is validly licensed without stopping the vehicle, checkpoints

represent a special opportunity to enforce the laws against suspended and revoked drivers. Thus, checkpoints should normally include safety belt and license checks. Experience has shown that other enforcement issues such as illegal weapons, illegal drugs, and stolen vehicles will be detected by an alert officer.

A limitation on the effectiveness of the PAS is that some officers feel it is necessary to disguise its true purpose to get a surreptitious check of the driver. This approach reduces the potential deterrent effect of the PAS because motorists may not be aware that they are being checked. As described below, the public information campaign that accompanies the Passpoint program should highlight the fact that the officers are equipped with a device that can "sniff" out drunks. The officer should call attention to a positive indication on the PAS light ladder and ask the driver how much he or she has had to drink to produce a verbal admission of drinking. In a majority of cases (80% to 85%), the PAS will show no indication of drinking, but the officer should still call attention to the device so that Passpoint participants will help publicize its use.

The availability of a quick screen for alcohol at the initiation of the driver interview provides the officer with a number of options for pursuing the investigation. If the PAS indicates no evidence of drinking and there are no other signs of impairment and if the driver is belted, the officer may wish to close the interview quickly by commenting positively on the use of safety belts and the absence of drinking. Because positive and negative rewards can influence behavior, it is important for the officer to compliment motorists on safe behavior. If safety belt use is lacking or drinking is detected, the officer may choose to request the driver's license and vehicle registration to lengthen the time for observation of the driver's behavior and to decide whether to issue a safety belt citation or warning. Obviously, the nonbelted driver should not be allowed to leave the interview site until the safety belt has been fastened. Drivers with previous DUIs are more likely to be drinking; therefore, detection of drinking should be a signal to check for a valid license.

Step 7. Conduct Passpoint Field Sobriety and PBT Testing

Technically, any indication of drinking or impairment can be considered a basis for requesting the driver to get out of the car for a field sobriety test. The PAS will detect drinking at levels considerably lower than .08% BAC. Consequently, the officer will not conduct a sobriety test on a driver showing less than three bars on the PAS, except when the driver is underage or there is another indication of impairment. A three-bar response indicates a better-than-50% chance that the driver has a BAC higher than .08% BAC (Farmer et al. 1999). Following the sobriety test, the officer should always request a PBT test because experienced drinkers may perform adequately on the field sobriety test and still have high BACs. The use of the PAS will detect drinking in drivers and result in the conduct of sobriety tests for individuals with lower or borderline BACs more often than would be the case for officers without such equipment.

PUBLICIZING AND GAINING PUBLIC SUPPORT FOR THE PASSPOINT SYSTEM

As is true of all enforcement programs, publicity is essential for their effectiveness. The Passpoint operations should be highly visible so that the public will become aware of them and publicize them through word-of-mouth reports. To be effective, Passpoint operations will need to be scheduled regularly and implemented continually to convince the driving public that it is really at risk of being stopped and checked with a PAS. The initial novelty of the PAS will attract the attention of the press and offer an opportunity to generate media coverage that will publicize the Passpoint program. However, the visibility of the Passpoint operations and the normal level of attention that can be expected from the press cannot be counted on to produce the level of deterrence needed to produce a measurable impact on alcohol-related crashes. Consequently, an active media advocacy campaign must accompany the Passpoint program, or paid advertising for it must be obtained.

The department's Passpoint coordination officer should seek the participation of a local citizen group (e.g., MADD) or service organization (e.g., Optimist Club) to support the enforcement effort. Local supporters can assist in publicizing both the Passpoint program and the need to support the police department's operations. The media advocacy program required to support a community enforcement program has been described elsewhere (Voas and Kelley Baker 2003). It differs from the typical public information effort that principally targets the drunk driver and methods for avoiding impaired driving.

A program such as Passpoint to support an enforcement effort should be designed to feature the police department and its officers and thereby encourage the department leaders—who are typically faced with more challenges than they can meet with their limited manpower availability—to assign sufficient resources to the program over a long period. News events covering the Passpoint should feature the line officers and the chief or captains who are the department managers. It also is important to include members of the community (such as a local official, a civic leader, a local resident driver, and perhaps a youth leader) to dramatize the message that the community is behind the police department in its efforts to deal with the impaired driving problem.

Over time, the novelty of the program will be diminished; therefore, development of new information to attract the press to news conferences and Passpoint operations is an important part of the process. One way to achieve this is to focus on different elements of the impaired driving problem every month or two. On one occasion, for example, it can be teenage drivers; on another occasion, 21- to 34-year-old drivers; and on still another, motorcyclists and so on. Volunteer groups can provide incentives for police officers to conduct Passpoints and for the press to cover such operations by providing coffee and donuts for the officers at the checkpoint site. Doing so will make the Passpoint operations more pleasant for the officers and motivate the press to cover it as a special citizens' activity.

INTEGRATING THE PASSPOINT SYSTEM WITH OTHER DRINKING DRIVER ENFORCEMENT PROCEDURES

It is difficult to capture and maintain a high level of public attention to DUI enforcement activities. It is also difficult to maintain a high level of DUI enforcement given the competition for resources within the typical police department, where traffic enforcement generally receives

only about 10% to 20% of the available person-hours. Ross (1984) studied high-intensity enforcement efforts in Europe, Australia, and the United States and demonstrated that over time their effectiveness in reducing alcohol-related crashes declined because the initial level of enforcement and publicity was not sustained. The use of the Passpoint system provides another enforcement technique that can be added to the standard traffic patrol and the dedicated patrol system currently employed by most police departments.

Other enforcement methods with special relevance to DUI enforcement are available to police departments. Impaired drivers, particularly underage drivers, are more likely to exceed speed limits (Lacey et al. 1988); therefore, radar speed enforcement can yield a special opportunity to apprehend DUI offenders, particularly if passive sensors are used. In addition, it is well established that impaired drivers are less likely to wear safety belts (Tippetts et al. 2003); thus, enforcing primary safety belt laws provides another opportunity to identify DUI offenders. Publicity campaigns built around each of these standard enforcement campaigns and emphasizing that officers will pay special attention to detecting drinking in unbuckled or speeding drivers can have a deterrent impact beyond the number of drivers stopped for those offenses.

By including several modes of enforcement in the department's overall DUI control system, managers can provide a varied set of activities for officers to break the monotony of standard patrol activities, while keeping potential DUI offenders off balance and deterred by different detection threats. The variety of methods also allows for fresh press coverage that publicizes different methods as well as different target groups.

SUMMARY

Although the Passpoint system described is never likely to be implemented as intensively as RBT has been in most of the Australian states, it still offers the possibility to add to the current DUI deterrence level in the United States. If it can be widely implemented in the 37 states currently operating checkpoints, the Passpoint system offers the possibility of intensifying DUI enforcement without relying on additional federal or state funds. It helps to objectify the DUI enforcement system by avoiding situations that might be conducive to profiling and by giving officers more information that will provide greater efficiency in the screening of drivers. Finally, it institutionalizes the use of random testing to create a basis for long-term deterrence of impaired driving.

REFERENCES

Farmer, C. M., J. K. Wells, S. A. Ferguson, and R. B. Voas. Field Evaluation of the PAS III Passive Alcohol Sensor. *Journal of Crash Prevention and Injury Control*, Vol. 1, No. 1, 1999, pp. 55–61.

Fell, J. C., S. A. Ferguson, A. F. Williams, and M. Fields. Why Are Sobriety Checkpoints Not Widely Adopted as an Enforcement Strategy in the United States? *Accident Analysis and Prevention*, Vol. 35, 2003, pp. 897–902.

Ferguson, S. A., W. A. Leaf, A. F. Williams, and D. F. Preusser. Differences in Young Driver Crash Involvement in States with Varying Licensure Practices. *Accident Analysis and Prevention*, Vol. 28, 1996, pp. 171–180.

Fox, A. Z. DUI Checkpoint Saves Woman Who Was Kidnapped. *Register-Herald*, Beckley, W.Va., Oct. 7, 2003.

Homel, R. Random Breath Testing and Random Stopping Programs in Australia. In *Drinking and Driving: Advances in Research and Prevention* (R. J. Wilson and R. E. Mann, eds.), Guilford Press, New York, 1990, pp. 159–202.

Homel, R. Random Breath Testing in Australia: Getting It to Work According to Specifications. *Addiction*, Vol. 88 (suppl.), 1993, pp. S27–S33.

Homel, R., P. McKay, and J. Henstridge. The Impact on Accidents of Random Breath Testing in New South Wales: 1982–1992. In *Proc., 13th International Conference on Alcohol, Drugs and Traffic Safety* (C. N. Kloeden and A. J. McLean, eds.), Adelaide, Aug. 13–19, 1995, Vol. 2, pp. 849–855. NHMRC Road Accident Research Unit, University of Adelaide, Australia, 1995.

Lacey, J. H., L. M. Marchetti, J. R. Stewart, C. L. Popkin, P. V. Murphy, R. E. Lucke, R. K. Jones, and P. A. Ruschmann. *Enforcement and Public Information Strategies for the General Deterrence of DWI: The Indianapolis, Indiana, Experience*. DOT HS 807 434. National Highway Traffic Safety Administration, U.S. Department of Transportation, July 1988.

Lund, A. F., and I. S. Jones. Detection of Impaired Drivers with a Passive Alcohol Sensor. In *Alcohol, Drugs and Traffic Safety 'T86* (P. C. Noordzij and R. Roszbach, eds.), *Excerpta Medica*, New York, 1987, pp. 379–382.

Michigan Department of State Police v. Sitz, 496 U.S. 444 (1990).

Miller, T. R., M. Blewden, and J.-F. Zhang. Cost Savings from a Sustained Compulsory Breath Testing and Media Campaign in New Zealand. *Accident Analysis and Prevention* (in press).

Peek-Asa, C. The Effect of Random Alcohol Screening in Reducing Motor Vehicle Crash Injuries. *American Journal of Preventive Medicine*, Vol. 16, No. 1S, 1999, pp. 57–67.

Ross, H. L. *Deterring the Drinking Driver: Legal Policy and Social Control*, rev. and updated ed. Lexington Books, Lexington, Mass., 1984.

Royal, D. *National Survey of Drinking and Driving: Attitudes and Behavior: 1999*. DOT HS 809 190—Vol. I: Findings. National Highway Traffic Safety Administration, U.S. Department of Transportation, 2000.

Shults, R. A., R. W. Elder, D. A. Sleet, J. L. Nichols, M. O. Alao, V. G. Carande-Kulis, S. Zaza, D. M. Sosin, R. S. Thompson, and Task Force on Community Preventive Services. Reviews of Evidence Regarding Interventions to Reduce Alcohol-Impaired Driving. *American Journal of Preventive Medicine*, Vol. 21, No. 4 (supplement), 2001, pp. 66–88.

Stuster, J. W., and M. A. Blowers. *Experimental Evaluation of Sobriety Checkpoint Programs*. DOT HS 808 287. National Highway Safety Administration, U.S. Department of Transportation, 1995.

Tippetts, A. S., J. L. Nichols, R. B. Voas, and J. C. Fell. The Relationship Between Increases in Safety Belt Use and Reductions in Alcohol-Related Traffic Fatalities. *Accident Analysis and Prevention* (under review).

Toomey, T. L., C. Rosenfeld, and A. C. Wagenaar. The Minimum Legal Drinking Age: History, Effectiveness, and Ongoing Debate. *Alcohol Health and Research World*, Vol. 20, No. 4, 1996, pp. 213–218.

Voas, R., and T. Kelley Baker. Underage Drinking: Changing Community Norms. *Journal of Addictive Diseases* (under review).

Voas, R. B., A. E. Rhodenizer, and C. Lynn. *Evaluation of Charlottesville Checkpoint Operations*. Final Report under DOT Contract DTNH-22-83-C-05088. National Traffic Safety Administration, U.S. Department of Transportation, 1985.

Voas, R. B., A. S. Tippetts, and J. C. Fell. The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes. *Accident Analysis and Prevention*, Vol. 32, 2000, pp. 483–492.

ENFORCEMENT CHALLENGES

Commentary on Enforcement Challenges

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This report states, "There is substantial and consistent evidence from research that highly publicized, highly visible, and frequent sobriety checkpoints reduce impaired driving fatal crashes by 18% to 24%."

The report cites the following as the main reasons for the infrequent use of sobriety checkpoints in those jurisdictions that can legally implement them:

1. Lack of police resources and funding,
2. Lack of support by task forces and citizen activists, and
3. Perception that checkpoints are not productive or cost-effective.

COMMENTS

The American law enforcement culture may play a significant role in the reluctance of many police officers and police agencies to conduct a significant number of sobriety checkpoints.

U.S. Law Enforcement Culture

- The culture is diverse, with significant differences from
  - East to West,
  - North to South,
  - Big cities to small towns, and
  - State police and highway patrols to local agencies.
- The culture may have some widespread (not universal) values and behavioral norms that contribute to reluctance to use checkpoints.
- Proactive police work
  - Is held in high esteem by managers and colleagues;
  - Is offensive rather than defensive in that
    - Offensive police work seeks out crime and the criminal and
    - Defensive police work responds to calls for service (derisively called "smile and wave" style); and
  - Perceives checkpoints as defensive, passive, and reactive.
- The culture
  - Values the individual, somewhat at variance with the paramilitary model;
  - Sees the "lone bullfighter" or "elephant hunter" as positive images; and
  - Views people like John Wayne, Annie Oakley, and Dirty Harry as iconic law enforcement figures.

- This mind-set is different from that of the fire service, which
  - Emphasizes teamwork,
  - Organizes under distinct specialties and duties, and
  - Fosters little independent decision making.
- It is also different from emergency medical service, which
  - Is a reactive-type response and
  - Uses a passive style of policing (waiting in the station for 911 calls).
- Officer-initiated arrests (sometimes called an OBS arrests) are seen as more prestigious than checkpoint arrests because
  - All arrests are not created equal;
  - They may be logged specifically as OBS; and
  - They may enhance personnel ratings (i.e., for promotions, desirous assignments).
- Checkpoint arrests are not perceived as prestigious because
  - They are viewed as analogous to an arrest in which a shoplifter is detained by security;
  - Little collegial prestige results for an officer;
  - They are not psychically satisfying for the officer, though they are still arrests; and
  - They are seen as the less exciting alternative in a particular fishing analogy (i.e., trout fishing in a rapid stream versus a fish farm).

Highway Patrol Versus Local Police

The highway patrol and local police have different priorities.

- Highway patrol officers
  - View traffic enforcement as the main priority,
  - See drug recognition expert training as highly important, and
  - Believe that traffic enforcement is the core function or raison d'être.
- Local police officers
  - View traffic only as only as one of many demands on its service, not the main priority;
  - See availability for immediate response to crime in progress as more important;
  - Place response to 911 calls ahead of traffic;
  - May not consider DUI to be a "real crime";
  - Believe that traffic enforcement is often less prestigious than SWAT, narcotics, and detective work; and
  - Comprehend "misdemeanor cop" as a derisive term.

DUI Enforcement Tools and Methods

There are three traditional phases of DUI detection:

- Vehicle in motion,
- Personal contact, and

- Pre-arrest screening (including standardized field sobriety tests).

The DUI arrest is individualized in that

- The officer makes more decisions and
- There is a single suspect (e.g., a violator is singled out).

The thrill of the unknown attracts many officers because of the possibility for

- Pursuits,
- Altercations, and
- Media coverage.

Many of the conditions are different with checkpoint duty:

- It is a group activity.
- It affords less officer-directed and individual activity, such as
  - In-motion activity;
  - Personal contact, which becomes only sporadic;
  - Chance for thrills;
  - The violator being singled out; and
  - Enhancement of officer skills.
- Officers perceive it as “messing with good citizens,” something to which most police are averse.
- It is, however, a great deterrent to DUI for good people.

Personnel at Checkpoints

Police officers and officials perceive checkpoints as labor intensive. Although one study points out that checkpoints can be staffed by only three to five officers, it does not fully acknowledge other administrative costs, such as those for planning, deployment, and equipment and those for postevent duties and reports.

In addition, officers assigned to checkpoints are more difficult to deploy rapidly to other situations, and some feel that this assignment may inadvertently demean those involved.

Other Miscellaneous Issues

The major miscellaneous issue here is officers’ inherent mistrust of “feds” and “academics” and their association of those two groups with this detail.

Possbile Solution and Options for Sobriety Checkpoint Personnel

A number of possible approaches might make checkpoints more palatable for police officers and therefore more effective for the community. Among these approaches are the following:

- Volunteers
  - Assigned by courts
  - Using the “immediate booking and release system” model
- Police Explorers
- Civilian employees
  - Traffic control officers
  - Others
- Reserve officers
  - May not have full police powers
  - May not receive compensation
  - May have little experience in court
  - May be looked down upon by “regulars”
- Officers in training (recruits)
  - Usually enthusiastic about everything
  - May learn communication skills
  - Victoria, Australia, model
    - Checkpoints part of training
    - Limited instruction on persuasive techniques
  - For probationary officers, involvement in planning of sobriety checkpoints may be a requirement to complete probation (e.g., often a year period with many milestones)
- Officers
  - Light duty (disabled) for logistics
  - Senior officers (may reverse “career burnout”)
  - Retirees (limited compensation possibility; may help keep peace officer standards and training certification status)

CONCLUSION

Police culture may work against checkpoint implementation. Persuading agencies and officers of the value of checkpoints may require adjustments in personnel selection. Creative teaching and training techniques may help officers to internalize values consistent with the use of checkpoints.

ADDITIONAL COMMENTS REGARDING PASSIVE ALCOHOL SENSORS

Police officers’ reliance on roadside instruments (such as portable breath testers) to determine alcohol impairment may result in a decrease in their ability to determine impairment from nonalcohol causes (such as other drugs). Their reliance on passive sensors may also cause a deterioration in impairment-detection ability. Personnel selection and training, thus, are critical.

Judicial and Administrative Challenges

JUDICIAL AND ADMINISTRATIVE CHALLENGES

Vehicle Sanctions for Repeat Driving While Intoxicated Offenders
Factors That Facilitate or Impede Their Adoption or Implementation

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Vehicle sanctions for driving while intoxicated (DWI) offenders, when applied, consistently show a significant reduction in recidivism among the population that experienced the sanction (DeYoung 2002). This paper examines some of the factors that impede, reduce, or are barriers to a greater or wider level of implementation of effective vehicle sanctions. Most states have at least one form of a vehicle sanction applicable to DWI offenders. These include vehicle impoundment, vehicle forfeiture, plate and registration impoundment, vehicle immobilization, and ignition interlocks. Yet in many of those jurisdictions the sanction is not applied, is applied at a low level, or, while applied broadly, is limited in actual application because of legal, practical, or policy obstacles. The following factors have been identified as limiting the application or effectiveness of vehicle sanctions.

VEHICLE REGISTRATION AVOIDANCE

One of the major impediments to the application of a vehicle sanction is the avoidance or recession of the sanction because the vehicle used by the offender in the violation that "triggered" the sanction was not registered in the offender's name (**Table 1**). This category is called "vehicle registration avoidance." The rate of registration avoidance is high. A review of vehicle sanction research indicates the following rates of vehicle registration avoidance by DWI and driver's license offenders.

Registration avoidance is accomplished in several ways. The offender can purchase a vehicle and, in states with a "plate with vehicle" registration system, intentionally refrain from transferring the title of the vehicle into his or her name. If the seller had purchased the annual tags shortly before the sale, the vehicle remains registered in the name of the seller until the current annual tags expire. Police on traffic patrol routinely conduct "rolling registration checks" of vehicles they observe being driven on the streets and highways. A rolling registration check consists of a police officer determining a vehicle's owner and the license status of the owner by running the vehicle's license plate numbers through the state's vehicle and driver's license databases, accessed through the police vehicle's in-car computer terminal. If the owner's license has been suspended or revoked, the officer can lawfully stop the vehicle to investigate the possible crime of driving after suspension. Revoked repeat DWIs know of this investigation tool and, through registration avoidance, try to remain "invisible" to law enforcement. If the repeat DWI offender–owner of the vehicle has engaged in registration avoidance, a rolling registration check by a police officer on patrol will indicate that the vehicle is owned by the seller, and the true owner, the DWI offender, who is often unlicensed, will remain invisible. If the offender's vehicle is stopped for some other reason and the driver–true owner is charged with a

TABLE 1 Percentage of Vehicles Registered in a Name Other Than Offender's

Oregon	41% (Unlicensed or suspended drivers) (Voas and Tippets 1994)
Minnesota	36% (3rd-time or greater DWI offenders) (Rodgers 1994)
Iowa	22% (1st-time DWI offenders) (Ross et al. 1996)
Nassau County, New York	65% (All-level DWI offenders; vehicle released because vehicle not registered to offender or vehicle subject to lien) (Lacey 2002).
California	75% (Repeat DWI offenders, information from Ray Peck, California Department of Motor Vehicles)

DWI and a vehicle sanction initiated, the offender can challenge the sanction by claiming that he or she is not the owner of the vehicle and consequently the vehicle is not subject to the sanction. This argument is often persuasive unless the state's vehicle sanction law broadly defines "owner" to include as an "actual" owner the person who purchased the vehicle, possesses it, and uses it on a regular basis.

This form of vehicle registration avoidance is difficult, but not impossible, to utilize in states with a vehicle registration system that is based on a "plate with person" system.

Another form of vehicle registration avoidance involves the purchase of a vehicle by a DWI offender who then registers it in the name of a spouse or friend. This is a common type of registration avoidance. The offender, when driving a vehicle so registered, is invisible to law enforcement when the vehicle is the subject of a rolling registration check. If a vehicle sanction is initiated as a result of a DWI offender using a vehicle registered in the name of another to commit a DWI offense that triggers a vehicle sanction, the sanction can be challenged by the registered owner because the owner of the vehicle is not the offender who was involved in the trigger incident.

Certain types of vehicle sanctions can be applied to the vehicle used by a DWI offender in a triggering violation, regardless of who the registered owner is, if the offender was unlicensed at the time of the triggering violation. Plate impoundment is an example of one such law that can apply even if the offender is not the registered owner. The applicability of this sanction to nonoffender-owned vehicles is based on the concept that a vehicle owner cannot legally allow an unlicensed person to operate his or her vehicle. All vehicle sanctions can legally be applied in this situation (unlicensed DWI offender driving a vehicle registered in the name of another). A vehicle forfeiture action may be defeated if the vehicle is registered in a name other than the offender's unless the state has a broad definition of ownership and the prosecutor can prove that the offender is the actual owner. Because of the frequency of registration avoidance, states need to have a constellation of vehicle sanction laws—a wide vehicle sanction net—to prevent repeat DWI offenders from avoiding vehicle sanctions.

RECOMMENDATIONS

The dynamic of vehicle registration avoidance has seldom, if ever, been specifically studied. States and the federal government are strongly encouraged to begin a systematic investigation of this dynamic. In addition to helping deter illegal driving, another important reason for investigating the nature and extent of vehicle registration avoidance is that states may be losing

hundreds of millions of dollars in sales and excise taxes that are not paid by offenders who purchase vehicles and purposefully avoid registering them in their names.

To reduce vehicle sanction avoidance based on registration avoidance, states should examine their vehicle registration laws and practices and adopt measures that make it more difficult for a DWI offender to purchase a vehicle and not register it in the offender's name. An example of this examination and law tightening occurred in 1999, when Minnesota, a "plate with vehicle" state, adopted a provision in its vehicle registration law [Minnesota Statute 168A.05 Subd.5(b)] that changed vehicle title documents so that newly issued title documents would have a tear-off postcard preaddressed to the Department of Motor Vehicles (DMV). The postcard has vehicle identification information on it and can be machine read. When a private party sells a used vehicle, the seller tears off the postcard from the title document before giving the document to the buyer. The seller then mails the postcard to the DMV, which electronically flags the vehicle registration file for that vehicle. If a title transfer does not occur within 30 days, the vehicle registration is canceled, and the vehicle cannot be legally operated on the street.

Additional laws should be adopted that clearly prohibit owners from allowing unlicensed persons to operate their vehicles. Such laws would allow prosecution of spouses and friends who allow DWI offenders to operate their vehicles.

States should adopt vehicle sanction laws, exclusive of forfeiture, that apply to vehicles used in the triggering violation regardless of ownership of the vehicle. States' vehicle forfeiture laws should include a broad definition of "owner" that would include a vehicle regularly used and possessed by the offender, even if the vehicle is registered in the name of another. Most states' vehicle sanctions law increase in severity and are cumulative as a DWI offender acquires additional convictions or license revocations. A DWI offender subject to forfeiture is also subject to the lesser degrees of vehicle sanctions in most states. Law enforcement should be trained to apply all vehicle sanctions available and applicable to a given offender. An example is issuing both forfeiture and impoundment orders for the same vehicle. If the forfeiture fails, the vehicle is still subject to the impoundment order. States should adopt laws that prohibit the sale or transfer of a vehicle used in a violation that triggers a vehicle sanction to a spouse, family member, or acquaintance.

JUDICIALLY BASED VEHICLE SANCTIONS

Vehicle sanctions that are judicially based can be imposed only after the initiation and completion of a court process. By their nature such processes are slow and complex. They are designed to protect individuals from wrongly being deprived of property or convicted of a crime. In many states a vehicle sanction can be imposed only after a criminal conviction for an underlying DWI offense. In such states postconviction vehicle sanctions are often bargained away by prosecutors in an attempt to resolve the criminal case. Vehicle sanctions that are judicial but not tied to a conviction are still slow and cumbersome. As such, they are much less frequently implemented by the courts. In addition, courts tend to exercise discretion much more frequently than administrative agencies. Courts, intentionally or through neglect, often do not apply a "mandatory" law, such as a vehicle sanction.

Two examples illustrate this. In Minnesota the vehicle sanction of plate impoundment was judicially based from 1988 to 1991. During that period the courts ordered plate impoundment in only 464 out of 8,626 eligible cases, a rate of 5%. In 1991, plate impoundment

was made administratively based. In the 21 months after January 1991, 3,136 plate impoundment orders were issued by law enforcement and the Department of Public Safety out of 4,593 eligible cases, a rate of 68%. Iowa's plate impoundment law for repeat DWI offenders was judicially based in the late 1980s. During that period fewer than 20 plate impoundment orders were issued by the courts (Ross et al.1996).

All vehicle sanctions up to and including forfeiture can be administratively based. In Minnesota vehicle forfeiture for repeat DWI offenders was judicially based up to 1999. During that period relatively few forfeitures were initiated, and, few if any forfeitures were initiated for older, low-value vehicles typically driven by repeat DWI offenders (Ross et al. 1996). The judicial process was lengthy, often taking up to 6 months. Vehicles had to be stored at state expense for these periods. The costs of these storage periods made forfeiture cost prohibitive for many jurisdictions. In 1999 the state adopted administrative vehicle forfeiture for repeat DWI offenders. This process is similar to the administrative type of forfeiture that has been in use for many years in drug cases. In a DWI administrative forfeiture, the officer serves a notice of forfeiture after a triggering incident. For repeat DWI offenders that would be a third administrative license revocation (ALR) within 10 years.

ALR is implemented at the time of arrest. Once the offender receives the notice of forfeiture, the legal burden is on him or her to initiate a challenge to the forfeiture. If no challenge is filed within 30 days, the state acquires the title to the vehicle. This policy limits storage to 30 days and, in unchallenged forfeitures, almost eliminates any court or attorney costs other than those related to filing the documents with the state to transfer the vehicle title to the prosecutorial entity that initiated the forfeiture. Seldom do repeat DWI offender owners of low-value vehicles initiate a judicial challenge to an administrative forfeiture.

The combination of judicially based vehicle sanctions with vehicle registration avoidance creates significant impediments to all vehicle sanctions and, in particular, vehicle forfeiture.

RECOMMENDATIONS

States should adopt administratively based vehicle sanctions. Vehicle sanctions should be tied to and based on ALR. States' ALR systems should allow immediate license revocation with postrevocation hearings so that ALR and subsequent vehicle sanctions can be imposed as close in time as possible to the triggering DWI incident.

STRUCTURAL DELAY IN IMPLEMENTATION OF VEHICLE SANCTIONS

The effectiveness of vehicle sanctions, even if administratively based, in reducing recidivism is decreased if the sanction is not implemented as quickly as possible. Illustrative of this dynamic is the observation in Minnesota that recidivism following plate impoundment implemented within 10 days of the triggering incident has been measured at 13% among third- and greater-level DWI offenders (Rodgers 1994). Recidivism following plate impoundment implemented more than 10 days after the triggering incident has been measured at 19% (Rodgers 1994). This is almost a 50% greater recidivism rate. A dynamic that causes delay in any vehicle sanction, from immobilization to forfeiture, is related to the type of implied consent test (breath versus blood or urine) that a DWI suspect takes when implied consent is invoked. ALR and vehicle sanctions

based on an implied consent test refusal or a breath test can and do occur at the time of test refusal or failure, in essence on the day of the arrest for the triggering DWI offense. However, if the implied consent test is a blood or urine test, administrative action (license or vehicle) cannot be implemented until the test sample has been analyzed and the results forwarded to the appropriate state agency that is empowered to initiate a vehicle sanction based on failure on an implied consent. This delay can often be 2 to 4 weeks. If the test results are not forwarded, the case gets lost in the system and no administrative sanctions are ever imposed. The ratio of breath to blood or urine tests is significant; in Minnesota it is approximately one to three.

Apart from the reduced effectiveness of a delayed vehicle sanction, the sanction may not be applied at all if it is delayed because the law enforcement or state agency pursuing the vehicle sanction will have lost access and control of the vehicle. This loss occurs if the offender–vehicle owner reclaims possession of the vehicle after it has been towed and before the sanction can be imposed.

RECOMMENDATIONS

In states where the officer can select the type of implied consent test offered, a breath test should be the choice unless there are significant reasons why the person cannot take a breath test. In states where the driver can choose the type of implied consent test to take, the law should be changed so that the officer selects the type of test.

COMPLEXITY OF VEHICLE SANCTION PROCESS

Illustrative of the dynamics in this area is the experience of Minnesota law enforcement officers in the early years of that state's administratively based plate impoundment law. The police were issuing impoundment orders to only one-third of the eligible DWI offenders.

While one limitation on the number of police-issued impoundment orders has been discussed above (ALR based on blood or urine test), another limitation on the number of police-issued impoundment orders was found to be the difficulty law enforcement officers had in analyzing an offender's driving record to determine if the offender was eligible for an impoundment order. Researchers investigating the cause of the low number of impoundment orders issued by the police in Minnesota interviewed police. They were consistently informed that the difficulty of analyzing an offender's driving record, accessed electronically, in an attempt to identify the necessary prior convictions or license actions often was the cause of no order being issued by the police (Ross et al. 1996). Even without a DWI suspect's driving record, police can, and in most cases do, charge a driver for DWI on the officer's observations alone, even without a test failure or refusal. Additional charges and the level of charges are left to the prosecutor downstream. While license and vehicle sanctions can be imposed downstream, as they often are in the blood and urine test situations or when the officer does not initiate an administrative sanction, their effect on recidivism is significantly reduced. Once this impediment was detected, Minnesota's driver's license database was changed so that now a law enforcement officer querying the driver's license database receives a text message, based on a software subsystem analysis of the driver's license record, indicating if the driver is eligible for plate impoundment at the next (i.e., the current) alcohol-related license action.

The more control a vehicle sanction requires, the more complex it is to administer. The degree of control increases from "zebra stickering" to plate impoundment to immobilization on the owner's property to immobilization on state property to forfeiture. The more complex a vehicle sanction is, the less likely it is to be widely implemented. Compare plate impoundment, a vehicle immobilization sanction that results in a vehicle being immobilized on the owner's property, with vehicle immobilization involving the state taking physical possession of the offender's vehicle and storing it. In Minnesota in 2002, police and the Department of Public Safety issued 18,492 plate impoundment orders. All of these vehicles were immobilized on the owner's property at almost no expense to the state. Consider the complexity of administering an immobilization sanction involving the storage of this number of vehicles in or on state storage facilities. Many highly urbanized communities attempting to implement a vehicle sanction program involving storage of vehicles report difficulty finding storage facilities (Lacey 2002).

RECOMMENDATIONS

States should structure their driver's license databases so that law enforcement officers can easily determine if an offender is subject to the state's vehicle sanctions. States should evaluate the complexity of existing or proposed vehicle sanctions and adopt vehicle sanctions that are not time-consuming or complex for law enforcement agencies to administer. States should analyze their vehicle sanction laws to determine if an adequate level of immobilization can be obtained with simpler laws that reduce the time required to implement them, eliminate the need for vehicle storage, and are less costly to administer. States may have to accept a certain level of noncompliance in a vehicle sanction program if the simplicity and low cost of the program increase its use. A good example would be plate impoundment versus vehicle immobilization through storage on state property. The offender can drive a vehicle subject to plate impoundment if stolen or substituted plates are installed on the vehicle. The offender cannot drive a vehicle impounded and stored by the state. Even with the increased certainty of immobilization through a state storage plan, the simplicity and low cost of implementing a plate impoundment program justifies the reduced control over the offender's vehicle.

COST OF IMPLEMENTING VEHICLE SANCTION

Several studies examining vehicle sanctions note the concerns of the state agency administering the sanction in relation to the costs involved in administering certain types of vehicle sanctions. These costs include vehicle storage related to temporary immobilization; long-term storage related to forfeiture; and attorney, clerical, and investigative staff time (Lacey 2002). Daily storage fees can quickly exceed the value of the typical vehicle (Ross et al.1996) used by repeat offenders who are subject to vehicle sanctions. Frequently the costs recovered from the owner of the vehicle, or from the sale of the vehicle itself, do not completely compensate the political entity that is pursuing the vehicle sanction. Vehicle forfeiture sanctions, if judicially based, proceed slowly and require a significant expenditure of administrative, investigative, and legal resources to prosecute (Lacey 2002). Consequently many jurisdictions make a cost–benefit economic decision not to pursue complex vehicle sanctions because of the excessive costs involved.

Some jurisdictions, including California, report successful cost containment and recovery, through careful design and administration of their vehicle sanction program. California reports a high level of cost recovery from vehicle owners in its program for impounding the vehicles of unlicensed and suspended drivers. That state requires payment of all costs before the vehicle is released to the owner when the vehicle is no longer subject to impoundment. Minnesota charges an additional fee for the issuance of a special plate and the return of regular plates after the plate impoundment period is over. The fee structure is such that it generates more money than it costs the state to administer the plate impoundment program.

RECOMMENDATIONS

States should adopt vehicle sanctions that are designed to minimize the cost incurred to implement them. A cost–benefit analysis should be conducted that involves determining the type of vehicle sanction (temporary immobilization through forfeiture) that the state desires to implement. It should then compare the different types of immobilization by calculating the administrative and storage costs, if any, and the likelihood of cost recovery from the different programs. Vehicle sanction programs should also include mandatory fees charged to the owner of the vehicle and against the vehicle itself that are set at a level to fund the implementation of the program adequately.

Most, if not all, states have created, by statute, a lien on a vehicle for the costs of towing and repairs to a vehicle. The typical lien law allows the vehicle tow or repair facility to retain possession of the vehicle if these costs are not paid. The lien holder may subsequently sell the vehicle at auction when the value of the tow or repairs or both equals the value of the vehicle and the owner, after notice and demand, fails to pay for the tow and repairs. This law can be used as an informal vehicle forfeiture procedure if a state structures vehicle sanctions so that vehicles subject to an immobilization sanction are not stored by the state. In this process a state would impose a vehicle sanction on the offender and vehicle while the state had possession of the vehicle. If the sanction is plate impoundment, the state notifies the owner to remove his or her vehicle (now without plates) from the state storage facility. If the vehicle is not removed from the storage facility, it is sold at auction when the combined value of the tow and storage equals the value of the vehicle. This dynamic frequently occurs when the offender has engaged in vehicle registration avoidance. Storage costs can be limited and in many cases recovered if a state structures its vehicle sanction law such that the offender is required to store the vehicle subject to the sanction. Zebra stickers, plate impoundment, and physically immobilizing a vehicle on the offender’s property all allow a vehicle to be immobilized on the offender’s property.

CONCERNS ABOUT THE EFFECT OF A VEHICLE SANCTION ON AN OFFENDER'S FAMILY

Several researchers identify concerns—not well documented—that legislatures and law enforcement personnel have about the harsh, if not devastating, effect a vehicle sanction could have on a single-vehicle family. The concern is that if a family has only one vehicle and that vehicle is immobilized or forfeited, the family has no means of transportation. This could prevent a nonoffender spouse from working or taking family members to school or to the doctor (NHTSA 2002). There are also concerns expressed that a vehicle sanction would prevent the offender from working. This is an implicit recognition that many offenders continue to drive after their license has been revoked for a DWI incident. The author of this paper heard these comments about the possible effect of forfeiture on the "innocent" members of the offender's family made in recent legislative hearings on a bill that was attempting to tighten Minnesota's forfeiture law. These concerns are more likely to be an impediment to the adoption of vehicle sanction than to the implementation of a vehicle sanction once adopted. After the adoption of a vehicle sanction, these concerns may be more prevalent among law enforcement personnel in rural areas, where there is a lack of anonymity and law enforcement personnel have a personal relationship with many offenders in the community.

RECOMMENDATIONS

Legislatures and law enforcement personnel need to be educated about the increased risk to traffic safety by repeat DWI offenders. The persons most at risk of harm from a repeat DWI offender who has access to a vehicle and has not dealt with his or her underlying chemical dependency issues are the offender's family. States need to structure their vehicle sanctions so that the sanction escalates as an offender acquires additional administrative license actions and convictions. Plate impoundment should be considered as a core vehicle sanction because plate impoundment laws allow the issuance of a special plate for the vehicle subject to plate impoundment. The availability of a special plate was key to the passage of Minnesota's plate impoundment law. The special plate allows the vehicle to be used by a member of the offender's family, if validly licensed, and the offender if the offender has a work permit. The special plate thus reduces, if not totally eliminates, the effect of the vehicle sanction on the employment of the offender's family and the offender. If special plates are part of a plate impoundment sanction, the issuance of the special plate should be conditioned on the agreement of the vehicle owner and any person who drives the vehicle to be stopped by law enforcement for the purpose of checking the license and impairment, if any, of the driver.

LACK OF INTEGRATION OF A STATE'S VEHICLE AND DRIVER'S LICENSE DATABASES

A vehicle sanction will be adopted and enforced only if it can be shown that it reduces the recidivism of repeat DWI offenders. Absent restructuring a state's driver's license and vehicle databases so as to include notation of the implementation of a vehicle sanction on an offender's driving record and on the record of the vehicle subject to the sanction, it will be extremely time-

consuming to determine who has been subject to a vehicle sanction and what vehicles the sanction applies to. Minnesota adopted administrative vehicle forfeiture in 1999. As a result of that change, and based on anecdotal information from prosecutors and law enforcement officials, several thousand vehicles appear to have been forfeited. However, it is almost impossible to analyze the effect of its administrative vehicle forfeiture law on the recidivism of the offenders who experienced forfeiture. This inability exists because no information indicating that the title was transferred as a result of a forfeiture is entered in that vehicle's registration file.

Minnesota's driver's license records are also structured so that, while not impossible, it is very labor intensive to evaluate the effect on recidivism of Minnesota's plate impoundment law. The evaluation conducted by Rodgers (1994) of Minnesota's plate impoundment law analyzed the effect of plate impoundment on recidivism by third-time-and-greater DWI offenders. Rodgers reports that his analysis was labor intensive. The plate impoundment law was amended several years ago to apply to second-time DWI offenders and DWI offenders with a blood alcohol concentration of .20% or greater, regardless of the offense level. Because of the structure of Minnesota's driver's license database, which does not contain any information about the issuance of and compliance with a plate impoundment order, it would be very difficult, time-consuming, and costly to evaluate the effect of this expanded plate impoundment law on recidivism.

RECOMMENDATIONS

States with vehicle sanction laws should create statewide integrated driver's license, vehicle registration, and vehicle sanction databases.

DYAMIC NATURE AND EVOLUTION OF VEHICLE SANCTIONS

The effectiveness and application problems of any newly adopted vehicle sanction law can be identified only through an evaluation of its implementation that focuses on and receives input from users. Many vehicle sanctions are limited in their application because no follow-up effort is made to identify the problems with the new law. Minnesota's plate impoundment law, initially adopted in 1988, has been monitored on a regular basis by researchers and practitioners. They have identified problem areas related to poor drafting or to defenses and avoidance practices raised by defense attorneys. These problem areas have been communicated to the legislature, which has extensively modified the plate impoundment law to improve its effectiveness. The key to this process is an organization of criminal justice system professionals and researchers that evaluates Minnesota's DWI laws and communicates recommendations to the legislature on how to improve them. Minnesota's plate impoundment law is seen as an evolving concept that constantly needs to be fine tuned to maintain its effectiveness. This organization has established credibility with the legislature through its nonpartisan and evenhanded approach to DWI legislation.

RECOMMENDATION

States should develop and maintain an organization of criminal justice system professionals that evaluates state DWI laws and communicates those evaluations to the legislature.

CONCLUSION

Because many of the factors discussed in this paper are interrelated, their effects are magnified. An example is complexity, which increases the cost of implementing a sanction and also delays the speed of application of the sanction.

Well-designed DWI offender vehicle sanction programs are cost-effective in reducing the recidivism of repeat DWI offenders. This paper has identified and discussed factors that impede the adoption or implementation of DWI vehicle sanction programs. It also has identified ways in which the impeding factors can be eliminated or controlled.

REFERENCES

DeYoung, D. J. Specific Deterrent Effects of Vehicle Impoundment on Suspended and Revoked Drivers in California. Presented at 81st Annual Meeting of the Transportation Research Board, Washington, D.C., 2002.

Lacey, J. H. Long Island, New York's First, and Multiple DWI Offense Vehicle Impoundment Programs. Presented at 81st Annual Meeting of the Transportation Research Board, Washington, D.C., 2002.

National Highway Transportation Safety Administration, U.S. Department of Transportation. *State Legislative Fact Sheet: Vehicle and License Plate Sanctions*. April 2002.

Rodgers, A. Effect of Minnesota's License Plate Impoundment Law on Recidivism of Multiple DWI Violators. *Alcohol, Drugs and Driving*, Vol. 10, No. 2, 1994, pp. 127–134.

Ross, H. L., S. Simon, and J. Cleary. License Plate Confiscation for Persistent Alcohol Impaired Drivers. *Accident Analysis and Prevention*, Vol. 28, No. 1, 1996, pp. 53–61.

Voas, R., and A. S. Tippets. Progress Report on the Evaluation of Vehicle Registration Cancellation Programs in Oregon and Washington. Presented at 73rd Annual Meeting of the Transportation Research Board, Washington, D.C., 1994.

JUDICIAL AND ADMINISTRATIVE CHALLENGES

Challenges to Ignition Interlock Program Implementation

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The idea of a vehicle that cannot be driven by someone whose ability to do so is impaired by alcohol has intrigued road safety professionals for more than three decades (e.g., Voas 1970). The development of such a system, however, has proved to be a considerable challenge. Performance-based interlock systems, which required the driver to perform a perceptual or motor task designed to detect impairment before driving, were sensitive to individual variations in performance and impairment but were incapable of discriminating between drivers with low to moderate blood alcohol concentrations (BACs) and those with higher BACs. Hence, this type of device was not feasible.

The development of small, accurate breath-testing devices changed the direction of interlock research. Alcohol interlock devices based on breath alcohol measurement proved considerably more reliable than performance-based devices in discriminating accurately between drivers above and below a specified threshold value. Although initially there was some concern about the possibility of circumventing the device, technological innovations introduced over the past several years have alleviated virtually all of these concerns. The result is a viable, practical, and reliable device that, when installed in a vehicle, prevents its operation by a driver whose BAC exceeds the specified threshold value.

Present alcohol interlock systems consist of a small breath-testing device linked to the vehicle ignition system that requires the driver to provide a breath sample every time an attempt is made to start the vehicle. The interlock device prevents the vehicle from being started unless the driver provides a breath sample that reveals an alcohol concentration below the present threshold value—typically .02% (20 mg/dl). In the event the breath sample reveals a BAC in excess of the threshold value, the interlock prevents the vehicle from starting, and the driver must wait a period of time before trying again.

At one level, the acceptability of interlocks depends on their ability to prevent a person with a high BAC from driving while at the same time allowing legitimate use of the vehicle by drivers who have a low or zero BAC. To ease these concerns, at least three government agencies have established standards or guidelines for interlock devices (Electronics Test Centre 1992; National Highway Traffic Safety Administration 1992; Standards Australia 1993). Devices that meet these standards provide assurance to both the public and users that the device performs as expected and desired. For example, the new generation of interlock devices have incorporated a sensor that is specific to alcohol (i.e., it eliminates false positive readings due to other organic hydrocarbons) and is capable of preventing ignition 90% of the time when the individual's actual BAC is .01% higher than the threshold BAC. Even under extreme conditions (e.g., temperature of –40°C), a person with a BAC of .06% would almost certainly be prevented from starting the vehicle 98% of the time.

Protection against potential circumvention of the device is also required by the standards. To meet these standards, interlock devices contain such features as temperature and pressure sensors (to guard against filtered or stored samples or samples introduced by mechanical

devices), a data logger (to record all attempts to start the vehicle as well as the driver's BAC), and a running retest requirement (to guard against bystanders providing a sample as well as extended periods of idling).

These features have helped to create an interlock device that does exactly what it is intended and expected to do, i.e., prevent drivers impaired by alcohol from operating the vehicle in which it is installed.

EFFECTIVENESS OF INTERLOCK PROGRAMS

Since the first interlock program was introduced in California almost 20 years ago, several studies have evaluated the effectiveness of using interlock programs as a means to incapacitate convicted driving while intoxicated (DWI) offenders and prevent repeat DWI offenses. **Table 1** summarizes the results of the evaluation studies of interlock programs published to date.

Despite the differences among studies and programs, the predominant pattern of results indicates that interlocks effectively prevent impaired driving while installed in the vehicle. It is equally apparent that there is little, if any, residual effect in preventing impaired driving after the device is removed. This latter finding has been somewhat disappointing to those who had expectations that the experience with an interlock device would provide a constant reminder of the problems associated with driving after drinking and reinforce sober driving, thereby creating a change in behavior that would persist after the interlock was removed. The existing studies clearly indicate that the reduction in recidivism among interlock participants is limited to the period of interlock installation.

The fact that most studies show that re-arrest rates return following removal of the interlock does not reflect on the efficacy of interlock programs, nor should it be used to discount or discredit the beneficial effects of interlock programs. First, it should be noted that even though the recidivism rate among interlock participants following the removal of the interlock device matches that of DWI offenders who did not participate in the program, the significant effect evident during the interlock period is not lost. For example, the three-year cumulative reoffense rate (minimum 2 years of the interlock program completion) for first-time offenders in the Alberta, Canada, interlock program was 15.3 offenses per 1,000 drivers compared with 43.8 for suspended drivers and 131.2 for drivers ineligible for the interlock program (Voas 2000). The 5-year cumulative reoffense rate for repeat offenders who participated in the interlock program is about half that of nonparticipants.

Second, the interlock device can prevent impaired driving only when it is installed in the vehicle. If the factors that give rise to the drinking and driving behavior do not change during the interlock period, it is likely that the behavior will reappear once the physical barrier (i.e., the interlock) preventing it is removed. Many DWI offenders who participate in interlock programs qualify for a clinical diagnosis of alcohol abuse or dependence. The installation of an alcohol ignition interlock does not change this situation; it merely prevents the individual from operating the vehicle after drinking. Interlocks were never intended as a treatment for alcohol abuse; therefore, it should not be expected that installation and use of an interlock device will, by itself, prompt a change in the extent of alcohol consumption.

A criticism of existing evaluation studies concerns low participation rates and the problem of recruitment or selection into interlock programs. In general, only a small portion of

eligible DWI offenders (generally less than 20%) choose to participate in an interlock program rather than remain fully suspended (Voas et al. 1999). This suggests that those who participate in

TABLE 1 Summary of Interlock Evaluation Studies

Authors/year	Jurisdiction	Characteristics of population	Findings: recidivism with interlock	Findings: recidivism after interlock	Comparison group
EMT Group (1990)	California	First & multiple	Interlock 3.9% Noninterlocks 5.9%	----------	Suspended
Elliott & Morse (1993)	Cincinnati, Ohio	First offenders over .20% BAC plus multiple offenders	Interlock 2.9% Noninterlocks 8.4%	Interlock 6.6% Noninterlocks 6.5%	Suspended
Jones (1993)	Oregon	Multiple offenders	Interlock 5% Noninterlocks 8%	Interlock 10.8% Noninterlocks 11.5%	Restricted
Popkin et al. (1993)	North Carolina	Second offenders	Interlock 2.7% Restricted 7.1% Suspended 9.8%	Interlock same or higher than noninterlock	Restricted license & suspended
Weinrath (1997)	Alberta	Multiple offenders	Interlock 10% Noninterlocks 25%	Interlock 7% Noninterlocks 11%	Suspended
Tippetts and Voas (1997)	West Virginia	First & second offenders	Interlock 1.6% Noninterlocks 6.4%	Interlock 10% Noninterlocks 10%	Licensed & suspended
Beck et al. (1999)	Maryland (random assignment)	Second offenders	Interlock 2.4% Noninterlocks 6.7%	Interlock 3.5% Noninterlocks 2.6%	Licensed
Voas et al. (1999)	Alberta	First & second offenders	(12 months) Interlock 0.1% Suspended 2.23% Ineligible 4.61%	Interlock 2.75% Reinstated 2.63% Still Suspended 2.48%	
			(24 months) Interlock 0.85% Suspended 8.08% Ineligible 18.72%	Interlock 7.05% Reinstated 7.32% Still suspended 3.94% Ineligible 10.52%	Suspended & ineligible
Vezina (2002)	Quebec	First & repeat offenders	1st (12 months) Interlock <0.5% Suspended 2% 2nd (24 months) Interlock <2% Suspended 6%	(24 months) Interlock 4% Suspended 5% (36 months) Interlock 4% Suspended 7%	Suspended
Frank et al. (2002)	Illinois	Multiple	Interlock 1.3% Restricted 6.8%	Interlock 1.7% Restricted 2.0%	Restricted

interlock programs might differ from those who elect to remain suspended on one or more critical dimensions (e.g., desire or need to drive, financial resources) that might affect reoffense rates. Whether participants volunteer for the interlock program or participate as a result of a judge's order, the process of selecting interlock participants may result in a bias that favors those with a lower likelihood of recidivism. Hence, it is possible that the lower rates of recidivism among interlock participants observed in evaluation studies may be attributable not to the program but rather to differences in the characteristics of those who do and those who do not participate in interlock programs.

Voas et al. (1999) suggested that the increase in recidivism rates among participants once the interlock was removed argued against the influence of an initial selection bias, at least in terms of the propensity to drive after drinking. Whatever differences may be created by the self-selection of offenders into the interlock program, these differences are not sufficient to account for the lower recidivism among interlock participants during the interlock period.

Only one study has been able to assign participants to an interlock program randomly (Beck et al. 1999). This design essentially ensured that DWI offenders assigned to the interlock program did not differ from those who were reinstated but with a zero alcohol restriction. The results were comparable with those of studies of programs in which participants were self-selected or ordered by a justice to install an interlock device, adding further evidence that the differences in recidivism are attributable to the interlock program and are not a consequence of differences in the characteristics of participants.

In summary, the evidence to date consistently shows a strong beneficial impact of interlock programs, at least while the device is installed. Once the device is removed, the recidivism rate among interlock participants does not differ from that among DWI offenders who did not participate in an interlock program. If there remain an expectation and desire for this beneficial effect of interlock programs to persist after the device is removed, then every effort must be made to change the individual's behavior, particularly the frequency and extent of alcohol consumption, during the period the offender is under the control of the interlock program.

LEVEL OF ADOPTION

Recent legislative initiatives in both Canada and the United States have given implicit federal approval to interlock programs and have spurred their development and expansion. In Canada, in 1999, the criminal code was amended to allow a reduction in the mandatory period of driving prohibition for a DWI conviction provided the offender participates in an alcohol interlock program for the remainder of the period of driving prohibition (Criminal Code of Canada 2002). In the United States, the Transportation Equity Act for the 21st Century (TEA-21) contained a financial incentive for states to strengthen their programs to control repeat DWI offenders; an alcohol ignition interlock program is one of the initiatives that qualifies for incentives (TEA-21).

At present, six Canadian jurisdictions and 43 American states have legislation that allows the installation of interlock devices in the vehicles of DWI offenders. Other countries (e.g., Sweden, Australia) have also initiated interlock programs. In Europe, a consortium of road safety research institutes recently completed a feasibility study regarding the implementation of alcohol interlock programs as part of the EU drinking and driving policies (Bax et al. 2001). Several

European countries have expressed an interest in conducting a demonstration interlock program; trials are currently under way in several countries.

Despite the number of jurisdictions with interlock legislation, the number of active interlock programs is considerably lower. For example, a state may have interlock legislation but have an interlock program operating only in specific counties or court jurisdictions.

The structure of interlock programs also varies considerably. For example, programs may be administered either by the courts or by the driver-licensing authority. That is, in some jurisdictions, interlocks are ordered by a judge as a condition of probation; in others, interlocks are a condition of license reinstatement. Interlock programs also differ in the level to which participation in the program is voluntary or mandatory. Some programs are mandatory for certain types of DWI offenders either as a condition of probation or a condition of license reinstatement. In others, participation is discretionary, on the part of either the court or the individual offender.

The degree of discretion involved in getting offenders into interlock programs is further complicated by the fact that even when interlock program participation is mandated by law, some judges will not order an offender to participate (DeYoung 2002). In voluntary programs, offenders must be encouraged to participate through incentives such as a reduction in the period of license suspension

Low participation rates plague interlock programs. It is estimated that there are currently about 70,000 interlocks in use throughout North America. Although this number is substantially higher than it was even a few years ago, it pales in comparison with the estimated 1.6 million drivers charged with a DWI offense in North America every year. Typically less than 10% of eligible DWI offenders participate in an interlock program. The type of interlock program, the degree of discretion, and other DWI countermeasures may play an important role in determining participation rates. For example, Voas et al. (2002) describe a judicial program in Indiana that coerces DWI offenders into installing interlocks by giving them a choice between jail or house arrest and participating in an interlock program. Even so, only 62% entered the interlock program. In a voluntary program in Quebec, offenders are offered a reduction in the length of mandatory period of hard suspension (from 12 months to three) if they participate in the interlock program. More than 20% of offenders choose the interlock program—higher than the typical 10% but considerably lower than what might be considered an optimal level of uptake. For interlock programs to achieve their maximum potential, increased participation among DWI offenders is an essential first step.

BARRIERS TO ADOPTION

For this paper, a distinction is made between judicial and administrative challenges to the adoption and implementation of interlock programs and the challenges associated with ensuring the program is utilized and effective. Admittedly, there is considerable overlap between the issues, but for the sake of focus and brevity, this section deals primarily with the former type of challenges and less with the latter.

Several of the major challenges are discussed separately below. The list is by no means exhaustive but is intended to capture the nature and extent of the primary obstacles that must be overcome in getting interlock programs implemented.

Legacy of Failure

It took a great deal of time and effort to get interlock technology to the point where a number of reliable devices with adequate anticircumvention features were commercially available. They utilize state-of-the-art electronics to ensure that drivers with a BAC above the specified threshold value will be unable to start the vehicle while at the same time allowing legitimate use of the vehicle by others. In the course of this evolution, many lessons were learned through field trials with interlock programs. The media were quick to pick up on the failures and limitations of early interlock devices. Some of these stories have become almost legendary. For example, a commonly cited story involves the tragic crash involving two little girls after their intoxicated father had one of them provide a breath sample into the interlock device so that he could drive. Some of these stories are no more than urban myths. For example, many people have undoubtedly heard about the man who claimed to have trained his dog to provide a breath sample into the interlock device.

These types of sensational media reports on ignition interlock devices highlighted the relative ease with which drivers could circumvent the interlock device, enabling them to operate a vehicle while under the influence. Such reports served to create the impression that “interlocks don’t work.” Although interlock manufacturers have introduced numerous features into the current generation of devices to reduce significantly the possibility of circumvention (e.g., temperature and pressure sensors), the legacy of failure lives on and serves as the basis of a belief system that is difficult to change.

Knowledge Gap

Legislators, judges, prosecutors, and administrators read newspapers but not research reports. Many of them also work at the level of individual cases and may never take the opportunity to step back and see the aggregate picture. Hence, it should not be surprising to learn that many of the people essential to the implementation of an interlock program are unaware of the research demonstrating the effectiveness of interlock programs. The required information has not been delivered to the right people or in a format that can be easily comprehended and assimilated into their belief system or perspective.

Research reports—and researchers themselves—are often difficult to understand. Both use jargon and make assumptions about the level of comprehension of the audience that may limit the acceptance of the message. Researchers are also a very cautious and skeptical lot. They invariably append a series of caveats to every statement that can complicate an otherwise simple message. There are always more questions that need to be answered and more research that needs to be done. Policy makers and administrators want the bottom line in plain, simple language. Even if the information is available, researchers are often unable to deliver it in a manner that maximizes its impact.

Standard of Proof

In discussing interlock programs with administrators and policy makers, interlock programs are often held to a more stringent standard of evidence than many other countermeasures. Despite evidence that clearly demonstrates interlocks are superior to license suspension in preventing recidivism, many people respond by pointing out that a small number of offenders will reoffend

while participating in an interlock program. The expectation for perfection in interlock programs does not seem to be applied to many other impaired driving countermeasure options.

The fact that recidivism rates among interlock program participants increase after the completion of the program has also been used to discredit interlock programs. To many, such evidence merely proves that “interlocks don’t work.” If repeat offense rates increase after interlocks are removed, the device is deemed to be of limited value. This same standard of proof is not applied to more traditional countermeasure programs such as license suspension or jail.

Alcohol ignition interlock devices are a form of incapacitation, that is, an electronic device intended to prevent a reoccurrence of drinking and driving behavior. By itself, there is little, if anything, to be gained in terms of rehabilitation. Expectations of a significant residual effect after the device has been removed are unrealistic. Although there was, and continues to be, some hope that participation in a comprehensive interlock program would have a longer-term beneficial impact on drinking and driving behavior, it has yet to materialize. Exploring how interlock programs can be combined with other countermeasures, such as rehabilitation and treatment programs, to enhance the overall impact of such programs has just begun.

Commercial Interest of Promoters

In one sense, interlock programs are distinct from many other countermeasure programs in that there is a commercial product associated with the program. There are a number of interlock devices available on the market, each of which has been developed, tested, and promoted by private interests. The manufacturers and vendors of interlock devices stand to profit from the implementation of interlock programs. Hence, when vendors approach a legislator, administrator, or judge regaling the benefits of the product, they are viewed with a certain degree of skepticism and suspicion.

To their credit, most vendors are committed to the cause of reducing the impaired driving problem. They believe in their product and its ability to prevent impaired driving. They are also the only people actively promoting this technology and encouraging the adoption and implementation of interlock programs. There are no pro-interlock society, no public interest group, and no mass media campaign promoting the virtues and benefits of interlock programs. There are few, if any, political parties or candidates who have interlock programs as a campaign or policy platform. Interlock programs remain a low profile issue, and the vendors are the only players in the game. Yet, because of their financial interest, they are viewed with suspicion.

Traditional Thinking

Perhaps the greatest barrier to the widespread adoption and implementation of interlock programs is the traditional criminal justice perspective on the DWI problem. Over the past two decades, unprecedented time and energy have been devoted to convincing the general public, legislators, administrators, policy makers, and judges of the seriousness of impaired driving behavior. One of the results of these efforts has been numerous legislative amendments increasing the sanctions for a DWI conviction. The association between more severe sanctions and the reductions in the number of deaths and serious injuries in alcohol-involved collisions during the 1980s has helped firmly entrench a criminal justice perspective on the problem and how to deal with offenders. Acceptance of interlock programs requires an adjustment to this criminal justice mind-set.

One of the hallmarks of the criminal justice system is that criminal behavior must be punished. The rationale is simple. The more serious the behavior, the stronger the sanction. The presumption is that if sanctions are severe enough, the offender will be less likely to engage in further instances of the behavior.

Within the criminal justice perspective, license suspension has become a common sanction for DWI offenses. Belief in license suspension as an effective sanction has fueled a continuous push in the direction of ever-increasing lengths of license suspension. There is little evidence of the optimal length of license suspension or the effectiveness of longer versus shorter periods of suspension. It would appear, however, that suspended drivers quickly learn that the probability of being caught driving while suspended is exceptionally low. Both the need and desire to drive are strong, and many suspended drivers elect to drive without a valid license. As evidenced by the reconviction rate among the control groups in interlock evaluation studies, far too many drink and drive as well.

Several jurisdictions offer offenders the option of participating in an interlock program in exchange for a reduction in the length of suspension. There is, however, a pervasive belief that the punitive value of license suspension will be diminished by reducing or replacing the length of hard suspension with a period of participation in an interlock program. Administrators, policy makers, and politicians are afraid of being perceived as “going soft” on DWI offenders. The public has come to expect tough sanctions, and the introduction of interlock programs is a political risk that officials are unwilling to take.

The successful adoption of interlock programs requires a change in the traditional criminal justice mind-set that views punishment as the ultimate societal response to criminal behavior. Interlock programs are not intended as a sanction for DWI behavior. Although there are punitive aspects of participating in an interlock program, the primary goal is incapacitation; that is, it serves to prevent subsequent offenses by placing a physical barrier between the drinker and the operation of the vehicle. Interlock programs can coexist with license suspensions. In fact, interlock programs can actually extend the period of time offenders are under some sort of supervision and control, either by the courts or the licensing authorities. At the same time, however, the interlock allows offenders to drive when they have not been drinking. It is this latter aspect of interlocks that violates traditional notions of crime and punishment.

Recent thinking suggests that punishment for DWI offenses needs to be balanced with incapacitation and rehabilitation. Interlock programs provide incapacitation and the opportunity for rehabilitation while the offender is under the control of the program. Allowing DWI offenders the opportunity to drive when they have not been drinking is often perceived as violating a sacred principle of the punitive approach to such behavior. Acceptance of interlock programs requires that administrators, judges, policy makers, and others relax their exclusive reliance on the criminal justice perspective for dealing with DWI offenders and focus less on punishing offenders and more on incapacitation, rehabilitation, and traffic safety.

ARGUMENTS OF OPPONENTS

There does not appear to be any organized group actively opposing the introduction of interlock programs. There are, however, numerous skeptics who readily dismiss interlocks or raise a variety of arguments as to why they will not work.

Cost Is Too Great

Among the most common arguments against interlock programs is the cost. It should be recognized that the cost to taxpayers is minimal. Interlock programs are typically run on a user-pay basis, and the only costs to government are administrative.

Others argue that many offenders do not have the financial resources available to afford the installation and regular monthly maintenance fees. Although the cost of participating in an interlock program appears large in aggregate, it works out to about $3 per day, about the cost of a drink or two. Interlock programs are certainly less expensive than jail ($50 per day) or electronic monitoring ($15 per day). Given that DWI offenders seem to have the resources available to drink and to operate a vehicle, $3 per day does not seem unreasonable.

Interlocks Do Not Work

The most prominent argument raised by skeptics is that interlocks do not work. This statement is in direct conflict with the research evidence. The interlock device operates exactly as it was intended; that is, it prevents the operation of the vehicle by someone who has had too much to drink. In addition, interlock programs reduce recidivism at least as long as the device is installed in the vehicle.

It is acknowledged that the impact of interlock programs is limited to the period during which the offender participates in the interlock program. The same is true of many other countermeasure programs. It is unreasonable to expect a longer-term impact in the absence of a more fundamental change in the drinking behavior of the offender. The integration of rehabilitation programs with enhanced interlock programs tailored to the needs of the individual have the potential for substantial benefit well beyond the period of participation in the interlock program.

Too Much Risk

There is a real fear among many administrators and policy makers about new programs. The introduction of any new program involves taking a personal and collective risk. There remains considerable skepticism concerning the effectiveness of interlock programs, and the possibility of program failure is simply not tolerable among many politicians and administrators. In addition, the introduction of an interlock program would involve a great deal of background work, organization of administration and logistical components, legal formalities, arrangements for service providers and service centers, follow-up procedures, changes to driver record systems, and enforcement issues. To some, the extent of the effort required to get an interlock program put in place exceeds the threshold of risk.

CONCLUSION

There remains a reluctance on the part of administrators and the courts to encourage the development of large-scale interlock programs. Despite the positive research evidence on the effectiveness of interlock programs that has accumulated to date, there is an overriding skepticism about the potential of this approach to have a substantial impact on offenders. The

legacy of failure combined with high expectations for a long-term impact typically leads to the conclusion that interlocks don't work.

Overcoming this mental roadblock remains a challenge. Researchers need to continue to provide evidence of the effectiveness of interlock programs, not only in terms of reduced recidivism but also in terms of reductions in the number of alcohol-related crashes. More needs to be done to enhance the impact of interlock programs through integration with other countermeasure programs, most notably rehabilitation.

The widespread adoption of interlock programs also requires a fundamental revision of the traditional criminal justice approach to dealing with DWI offenders. There is a need to move beyond the crime-and-punishment mentality that has been pervasive in this field for many years. More severe sanctions are not the answer. In this context, implementing an interlock program as yet another form of punishment for offenders misses the mark. The primary function of an interlock is an effective means of incapacitation—to prevent repeat occurrences of the behavior. Certainly there are punitive aspects to interlocks. They are inconvenient and impose a cost on the offender. An interlock program also requires some level of administrative control and monitoring. But interlocks work. At this point, further improvements in the overall magnitude of the drinking and driving problem may depend on the approach to dealing with offenders. An approach that incorporates a balance of sanctions, incapacitation, and rehabilitation appears appropriate. Interlocks can play a valuable role within this perspective. The key is to break through the belief systems that have become firmly entrenched in the traditional criminal justice model. This will take time and effort and will necessitate the involvement of other professionals.

BIBLOGRAPHY

Baker, E. A. *In-Car Alcohol Breath Analyzers—A Pilot Study*. Safety Education Center, University of Maryland, College Park, 1987.

Bard, A. E., A. Mozham, and P. A. Ryon. *Summary of Research Finding to Date Involving Guardian Interlock System (GIS) Participants*. Detroit, Mich., 1990.

Bax, C., O. Kärki, C. Evers, I. M. Bernhoft, and R. Mathijssen. *Alcohol Interlock Implementation in the European Union: Feasibility Study*. Project 69.916. SWOV, Leidschendam, Netherlands, 2001.

Beck, K., W. Rauch, E. Baker, and A. Williams. Effects of Ignition Interlock License Restrictions on Drivers with Multiple Alcohol Offenses: A Random Trial in Maryland. *American Journal of Public Health*, Vol. 89, 1999, pp. 1696–1700.

Beirness, D. J. Alcohol Ignition Interlocks: A Link Between Punishing and Helping Systems. Paper presented at the Transportation Research Board Human Factors Workshop on New Strategies for Dealing with the Persistent Drinking Driver, Washington, D. C., 1996.

Beirness, D. J., P. M. Marques, R. B. Voas, and S. Tippetts. Evaluation of the Alberta Ignition Interlock Program: Preliminary Results. *Alcohol, Drugs and Traffic Safety*, Vol. T97, 1997.

Beirness, D. J., P. M. Marques, R. B. Voas, and A. S. Tippetts. The Impact of Mandated Versus Voluntary Participation in the Alberta Ignition Interlock Program. *Proc., 15th International Conference on Alcohol, Drugs, and Traffic Safety* (CD Paper 902), Stockholm, Sweden, 2000.

Beirness, D. J., H. M. Simpson, and D. R. Mayhew. *Assessment of the Impact of the 1985 Amendments to the Drinking and Driving Section of the Criminal Code of Canada*. Department of Justice, Ottawa, Ontario, Canada, 1993.

Beirness, D. J., H. M. Simpson, and D. R. Mayhew. *Evaluation of the Administrative Licence Suspension and Vehicle Impoundment Programs in Manitoba*. Health Canada, Ottawa, Ontario, Canada, 1997.

Bodi, A., R. E. O'Connor, and M. J. King. Evaluation of a Drunk Driving Warning System. *Alcohol, Drugs, and Traffic Safety: Proc., 9th International Conference on Alcohol, Drugs, and Traffic Safety* (S. Kaye and G. W. Meier, eds.). National Highway Traffic Safety Administration, U.S. Department of Transportation, 1985.

Cobden, J. H., and G. L. Larkin. Effectiveness of Ignition Interlock Devices in Reducing Drunk Driving Recidivism. *American Journal of Preventive Medicine*, Vol. 16, 1999, pp. 81–87.

Collier, D. W. Field Test Experience with Breath Analyzed Ignition Interlocks: How Well Do They Work? Paper presented at the Lifesavers Conference, 1990.

Compton, R. P. *Potential for Application of Ignition Interlock Devices to Prohibit Operation of Motor Vehicles by Intoxicated Individuals*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1988.

DeYoung, D. J. An Evaluation of the Implementation of Ignition Interlock in California. *Journal of Safety Research*, Vol. 33, 2002, pp. 473–482.

Dubowski, K. M. *The Technology of Breath-Alcohol Analysis*. National Institute on Alcohol Abuse and Alcoholism, Rockville, Md., 1991.

Dussault, C., and M. Gendreau. Alcohol Ignition Interlock: One-Year's Experience in Quebec. *Proc., 15th International Conference on Alcohol, Drugs, and Traffic Safety* (CD Paper 905), Stockholm, Sweden, 2000.

Electronics Test Centre. *Qualification Test Specification for Breath Alcohol Ignition Interlock Devices (BAIID) for Use in the Province of Alberta*. Alberta Research Council, Edmonton, Alberta, Canada, 1992.

Elliott, D. E. *The Hamilton County-Guardian Interlock Evaluation Study*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1987.

Elliott, D. S., and B. J. Morse. *In-Vehicle BAC Test Devices as a Deterrent to DUI*. Final report. National Institute on Alcohol Abuse and Alcoholism, Washington, D.C., 1993.

EMT Group. *Evaluation of the California Ignition Interlock Pilot Program for DUI Offenders*. Final report. Sacramento, Calif., 1990.

Frank, J. F. *Further Laboratory Testing of In-Vehicle Alcohol Test Devices*. Report DOT HS 807 333. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1988.

Frank, J. F., R. Raub, R. E. Lucke, and R. I. Wark. Illinois Ignition Interlock Evaluation. *Proc., 16th International Conference on Alcohol, Drugs and Traffic Safety* (D. Mayhew and C. Dussault, eds.), Société de l'assurance automobile du Québec, Quebec City, Canada, 2002, pp. 105–109.

Jones, B. The Effectiveness of Oregon's Ignition Interlock Program. *Proc., 12th International Conference on Alcohol, Drugs and Traffic Safety* (H. D. Utzelmann, G. Berghaus, and G. Kroj, eds.). Verlag TUV Rhineland, Cologne, Germany, 1993.

Jones, B., and N. Wood. *Traffic Safety Impact of the 1988 Ignition Interlock Pilot Program*. Oregon Motor Vehicles Division, 1989.

Linnell, R. H., and S. Mook. *Ignition Interlock Devices: An Assessment of their Application to Reduce DUI*. AAA Foundation for Traffic Safety, Washington, D.C., 1991.

Marques, P. R. and R. B. Voas. Setting Performance Priorities for Breath Alcohol Ignition Interlock Devices. *Journal of Traffic Medicine*, Vol. 21, 1993, pp. 127–132.

Marques, P. R., R. B. Voas, and E. Taylor. Health and Social Service Coordination Adjuncts to the Alberta Alcohol Ignition Interlock Program: Research in Progress. *Proc., 13th International Conference on Alcohol, Drugs and Traffic Safety* (C. N. Kloeden and A. J. McLean, eds.), NHMRC Road Accident Research Unit, Adelaide, Australia, 1995.

Marques, P. R., R. B. Voas, A. S. Tippetts, and D. J. Beirness. Behavioral Monitoring of DUI Offenders with the Alcohol Ignition Interlock Recorder. *Addiction*, Vol. 94, 1999, pp. 1861–1870.

Marques, P. R., R. B. Voas, A. S. Tippetts, and D. J. Beirness. Predictors of Failed Interlock BAC Tests and Using Failed BAC Tests to Predict Post-Interlock Repeat DUIs. *Proc., Fifteenth International Conference on Alcohol, Drugs, and Traffic Safety* (CD Paper 907), Stockholm, Sweden, 2000.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Potential for Application of Ignition Interlock Devices to Prohibit Operation of Motor Vehicles by Intoxicated Individuals*. A Report to Congress. Prepared in response to Section 203: Public Law 100-17, April 1987, Highway Safety Act of 1987. 1988.

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Second Workshop on In-Vehicle Alcohol Test Devices*. Report DOT HS 807 299. 1988.

National Highway Traffic Safety Administration, U.S. Department of Transportation. Model Specifications for Breath Alcohol Ignition Interlock Devices (BAIIDs). *Federal Register,* Vol. 57, 1992, pp. 11772–11787.

Peck, R. C. *An Evaluation of California's Drunk Driving Countermeasure System: An Overview of Study Findings and Policy Implications*. Department of Motor Vehicles, Sacramento, Calif., 1987.

Popkin, C. L., J. R. Steward, C. Beckmeyer, and C. Martell. An Evaluation of the Effectiveness of Interlock Systems in Preventing DWI Recidivism Among Second-Time DWI Offenders. *Proc., 12th International Conference on Alcohol, Drugs and Traffic Safety* (H. D. Utzelmann, G. Berghaus, and G. Kroj, eds.), Verlag TUV Rhineland, Cologne, Germany, 1993.

Road Traffic Authority. *Second Submission to the Inquiry into the Management of Drivers Apprehended with High Blood Alcohol Levels Regarding the Use of In-Vehicle Interlocks*. The Social Development Committee of the Victoria Parliament. Road Traffic Authority of Victoria, Hawthorne, Australia, 1987.

Standards Australia. *Breath Alcohol Testing Devices for Personal Use*. Standards Association of Australia, Homebush, New South Wales, 1993.

Tashima, H. N., and C. J. Helander. *1999 Annual Report of the California DUI Management Information System*. Report CAL-DMV-RSS-99-179. California Department of Motor Vehicles, Sacramento, 1999.

Tashima, H. N., and C. J. Helander. *2000 Annual Report of the California DUI Management Information System*. Report CAL-DMV-RSS-00-185. California Department of Motor Vehicles, Sacramento, 2000.

Tippetts, A. S., and R. B. Voas. The Effectiveness of the West Virginia Interlock Program on Second Drunk-Driving Offenders. In *Proc., 14th International Conference on Alcohol, Drugs and Traffic Safety—T97* (C. Mercier-Guyon, ed.), Annecy, France, Sept. 21–26, 1997, Vol. 1, Centre d'Etudes et de Recherchers en Médecine du Trafic, Annecy, France, 1997, pp. 185–192.

U.S. Department of Transportation. *Alcohol and Highway Safety: A Report to Congress for the Secretary of Transportation*.

Vezina, L. The Quebec Alcohol Interlock Program: Impact on Recidivism and Crashes. *Proc., 16th International Conference on Alcohol, Drugs and Traffic Safety* (D. Mayhew and C. Dussault, eds.). Société de l'assurance automobile du Québec, Quebec City, Canada, 2002, pp. 97–104.

Voas, R. B. Cars That Drunks Can't Drive. Presented at the Annual Meeting of the Human Factors Society, San Francisco, Calif., 1970.

Voas, R. B. The Evidence for Program Effectiveness. Presented at the Montreal Workshop on Alcohol Interlocks, Montreal, Quebec, Canada, 2000.

Voas, R. B., K. O. Blackman, A. S. Tippetts, and P. R. Marques. Motivating DUI Offenders to Install Interlocks: Avoiding Jail as an Incentive. *Accident Analysis and Prevention,* in press.

Voas, R. B., P. R. Marques, A. S. Tippetts, and D. J. Beirness. The Alberta Interlock Program: The Evaluation of a Province-Wide Program on DUI Recidivism. *Addiction,* Vol. 94, 1999, pp. 1849–1859.

Voas, R. B., P. R. Marques, A. S. Tippetts, and D. J. Beirness. Circumventing the Alcohol Safety Interlock: The Effect of the Availability of a Non-Interlock Vehicle. *Proc., 15th International Conference on Alcohol, Drugs, and Traffic Safety* (CD Paper 909), Stockholm, Sweden, 2000.

Weinrath, M. The Ignition Interlock Program for Drunk Drivers: A Multivariate Test. *Crime and Delinquency,* Vol. 43, No. 1, 1997, pp. 42–59.

Wilson, C. B., and C. B. Stoke. *Motor Vehicle Ignition Interlocks: In-Vehicle Devices That Monitor Alcohol Levels of Motor Vehicle Operators*. Virginia Transportation Research Council, Richmond, 1990.

JUDICIAL AND ADMINISTRATIVE CHALLENGES

Commentary on "Vehicle Sanctions for Repeat Driving While Intoxicated Offenders" and on "Challenges to Ignition Interlock Program Implementation"

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The papers by Simon and Beirness provide comprehensive pictures of the judicial and administrative challenges facing vehicle sanctions and ignition interlock programs, respectively, for repeat driving while intoxicated (DWI) offenders. They both point out that offenders know that the probability of being caught driving while suspended is extremely low, especially if the offender obeys all rules of the road and is not involved in a crash. Neither stresses, however, the additional issue that vehicles are often "disposable" items to this population. The ready availability of inexpensive vehicles coupled with the various vehicle registration avoidance possibilities highlighted by Simon militate against the widespread success of any vehicle-based sanction.

Simon presents many suggestions for improved state laws with respect to vehicle sanctions. Although he ably describes weaknesses in the current approaches and associated recommendations for improvement, there are overriding factors in opposition to stricter (i.e., more effective) laws. One is clearly cost. In this era of budget cutbacks, anything that increases enforcement, judicial, or administrative workload is unacceptable. Another is the traditional thinking or stereotyping discussed by Beirness. This thinking is slow to change even in the face of compelling research results. One sensational counterproductive event can easily undermine a program that is supported by clear empirical measures of overall effectiveness and cost-effectiveness.

Simon's plea for better integration of state driver and vehicle databases was encouraging. Something clearly needs to be done in this arena if research is to proceed to a higher level of precision. Facilitating the use of these data for important research is certainly needed and would be a major enabling step in producing more and better research results. Once again, however, cost is a major stumbling block. Many states maintain driver, vehicle, and crash databases on legacy computer systems in virtually archaic computer languages. Modification is virtually impossible, and replacement comes at a significant cost. It must be remembered that longitudinal studies as well as some routine applications of sanctions require access to historical records. Thus, any new records system must be backwardly compatible with the legacy systems, which thereby complicates upgrades and adds to their cost.

Beirness repeatedly points out that interlocks are an incapacitation for drivers who often "qualify for a clinical diagnosis of alcohol abuse or dependence." He argues that the support for interlocks should not be diminished by their inability to deal with the underlying etiology of the problem. That is certainly true—not only of interlocks but of most DWI countermeasures. Beirness, however, does not even speculate on the potential effectiveness of interlocks if they were made mandatory in all vehicles. This would obviously be a "tough sell," but it is at least

worthy of consideration as interlock costs drop, vehicles become more computerized, and the present highway system evolves toward the intelligent transportation system.

Another area of potential research interest that was not mentioned in either paper and is particularly relevant to the operation of interlock-equipped vehicles by repeat DWI offenders concerns the driving ability of this aberrant population when sober. The increased crash risk of individuals with clinical alcohol problems when driving at elevated blood alcohol concentrations (BACs) may not, in fact, completely return to the norm if they are temporarily free of alcohol but still dependent on it. There is precious little information on the driving performance of alcohol-dependent people when they are sober. If their risk remains significantly elevated at low BAC levels that would pass an interlock, even though the risk is reduced from the levels at high BACs, the prescription of interlocks would be less attractive.

Although the notion of electronic monitoring is mentioned in passing, neither paper addresses the clear alternative of using technological countermeasures that are placed on the offender rather than the vehicle. This approach effectively negates the problems associated with the ready accessibility of low-cost replacements for any vehicle to which a sanction is applied. It also eliminates hardships to family members and vehicle owners who are not violators. Offender-mounted sanctions do not involve vehicle storage and can be fully paid for by fines levied on the convicted party.

One prototype offender-based sanction that I have been involved with is the problem driver detection system (PDDS) described in a short paper entitled “A Brief Introduction to the Problem Driver Detection System” that Charles Rodgers and I prepared for this symposium. The concept of the PDDS system is to give law enforcement personnel a tool to identify suspended drivers if they attempt to operate any vehicle. With a widely deployed PDDS system, the probability of being caught driving while suspended would be significantly elevated. To be sure, there are numerous administrative and legal barriers to overcome in fielding the PDDS. But it has most of the good characteristics of interlocks and vehicle sanctions with less administrative burden and low or no cost to the public, and it is vehicle independent. An offender is equally evident to the authorities regardless of the vehicle being driven. The PDDS can even be used to permit selective driving by some offenders (e.g., to and from work and to and from rehabilitation) by coding permitted hours and places of driving. Since the system employs the Global Positioning System, the location of any law enforcement encounter with a PDDS-wearing driver is known with extreme accuracy.

The PDDS solves some of the issues raised in these two papers, but it is not a panacea for the problem of continued driving by suspended DWI offenders. Factors such as the attitudes of legislators, judges, law enforcement personnel, and the general public must change quite dramatically before any innovative countermeasures will find widespread acceptance. Those in the research and development community can also do a better job of identifying systematic approaches rather than pointing to solutions and maintaining focus on the problem and not on an individual constituent within that problem. Drinking drivers recidivate primarily because the root cause of the DWI event—the underlying clinical alcohol problem—is left unaddressed. Problem drinking is difficult to cure and certainly outside the experience and purview of most motor vehicle administrators. Nevertheless, breakthroughs will be forthcoming only if the entire issue is considered. Even the PDDS, which has great potential to supplement and even supplant vehicle-based countermeasures, will not be widely successful if it must be repeatedly or permanently applied to a given driver. One cannot imagine even the most enlightened court sentencing a convicted DWI offender to a lifetime of wearing a PDDS. A reasonable approach is to couple all

the devices for incapacitation and detection of convicted and suspended DWI drivers with treatment for their underlying malady.

Where does this leave us? Should we abandon incapacitations such as interlocks and discard vehicle sanctions because they are only temporary measures? Of course not. Even temporary removal of an impaired driver from the road helps, as pointed out in the research cited by Beirness. But we cannot become so engrossed in solving the implementation problems associated with currently configured interventions that we lose sight of the enormous potential benefits of a coherent end-to-end solution.

JUDICIAL AND ADMINISTRATIVE CHALLENGES

The Problem Driver Detection System
A Brief Introduction

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The National Highway Traffic Safety Administration (NHTSA) estimates that costs for the nation's alcohol-related crashes reach more than $50 billion annually—accounting for medical treatment, lost productivity, property damage, and emergency services (NHTSA 2003). Repeat offenders of the driving while intoxicated (DWI) laws represent approximately one-third of the DWI convictions each year. Many of these repeat offenders have had their licenses suspended or revoked but continue to drive. They can do so essentially with impunity because it is very difficult for law enforcement officers to determine that the suspended or revoked driver is on the road so long as he or she does not become involved in a crash, commit a moving violation, or exhibit aberrant behavior.

One way of dealing with this problem would be a system to alert the police when a passing motorist might be driving with a suspended license. Such a system would have to provide the officers with key information about the suspended offender so that it would be unlikely that other (innocent) drivers would be stopped or otherwise inconvenienced. NHTSA therefore sponsored a study to assess, develop, and test a problem driver detection system (PDDS) as a countermeasure to continued driving by individuals whose licenses have been suspended because of violations of DWI or driving under the influence (DUI) laws. The study was accomplished in three phases.

PHASE I

The first phase involved an assessment of system feasibility and the development of requirements for a PDDS. In Phase I, it was concluded that a system on the offender rather than on the car was needed and that an active radio frequency tag was required. With the system on the offender, it is often necessary for the police officer to determine only the number of vehicle occupants to decide if a stop is required after the PDDS is detected. Since the majority of problem drinking drivers drive alone, the decision to make a stop will likely be objective for over half the PDDS encounters. The preliminary design that appeared to be the most reasonable included a watch-sized PDDS active transmitter that would broadcast a low-power signal containing data on the offender. This active tag would be attached to the offender with a tamper-evident band. A receiver in the police vehicle would receive the signal, display relevant identification data, and determine the direction to the offender's vehicle. Such a system was found to be technically feasible and acceptable to the police. In addition, a team of legal experts examined the legal issues—whether a PDDS signaling device may be imposed on a problem driver as a condition of probation, what actions the police may take after detecting a PDDS alarm, and what impact a PDDS device might have on the legal interests of innocent third

persons. The team concluded that there were no legal impediments to the use of PDDS. Also, in surveys of law enforcement, judicial, and civil liberties groups, no objections to an on-person device were voiced.

PHASE II

An engineering prototype system was developed for testing in Phase II. It consisted of a transmitter to be worn by the offender, a laptop computer installed in the police car, a receiver and antennae on the police car, and custom software. Tests were conducted on both the rural and urban courses of the Maryland State Police driver training facility in Sykesville, Maryland. Tests of the ability of the system to perform a remote update of the database were successfully performed in a classroom of the test facility before the highway tests. The highway tests involved vehicles traveling past stationary and moving law enforcement vehicles in various car groups and driver–passenger configurations. Vehicles traveled at either 40 or 50 mph. In some cases vehicles had no PDDS tags or their transmitters were sealed in a metal can so that transmission was completely blocked. In addition, some vehicles had transmitters wrapped in aluminum foil in an attempt to circumvent transmission. Overall, the PDDS alert matched the correct offender in 100% of the trials. At no time did the PDDS fail to report an alert or report an incorrect alert in trials when a tagged or attempted-circumvention offender passed the law enforcement vehicle.

PHASE III

Phase III involved a 3-month field test of production prototype equipment. The approach involved simulating a suspended driver adjudication system in Norwalk, Connecticut. Rather than wait many months for a sufficient number of suspended and revoked drivers who would be required to wear a PDDS, the city was saturated with a cadre of 138 pseudo-offenders, who were recruited to wear the prototype wristwatch transmitters as they traveled throughout the city. Research personnel performed simulated court and probation functions. All police procedures were realistic except that vehicles were stopped only when the officer was not sure about the identification of the offender (to avoid making excessive stops and disrupting traffic), and, of course, no follow-up arrests were appropriate for this simulated system. The police officer completed a postdetection questionnaire on the computer for each stop.

The Phase III PDDS design was a refinement of the design concept tested in Phase II. The Phase III design consisted of a transmitter in a wristwatch case worn by the offender, a central database of offender information, and a receiver and laptop computer installed in a police car. The transmitter continuously broadcast a number that was indexed to a database of PDDS offenders. When the receiver in the police car detected a PDDS transmitter, the laptop sounded an alert, described the offender by using synthetic voice, displayed a description and picture of the person whose transmitter was detected, presented any qualifiers to the individual’s sanction (e.g., permission to drive between specified hours, only on designated roads), showed the signal strength, and estimated the direction from the car to the transmitter. The officer’s task was then to use the provided information to locate the offender visually and to determine if the offender was driving illegally. The database of offenders in the police cars was kept up to date by

autonomous wireless downloads from the central server. The wireless capability also allowed near real-time exchange of encounter records and the revision of offender conditions.

The equipment was mounted in two Norwalk police cars—one was a special enforcement unit and one was a regular patrol vehicle. Nine police officers were trained to use the system. PDDS data were collected only when a trained officer manned the vehicle.

SUMMARY RESULTS

Two sets of data were available for analysis. One consisted of 1,664 detections logged on the remote server. Included in this data set were the time and date of the stop, the location of the stop, and the tag identification. The second data set consisted of a survey form completed by the police officer at the conclusion of each alert. This survey form captured such information as whether the officer attempted to locate the person shown in the alert and whether the officer decided that a stop should be made and, if not, why not. Because of technical problems in the use of the evaluation installation, survey data were obtained on only 746 detections.

The PDDS as tested in Phase III performed well in the field. The Phase III results, both quantitative and qualitative, showed clearly that the PDDS was fully capable of detecting tag holders throughout a city of significant size (population of 80,000). The only significant problem encountered by the participating patrol officers was excessive workload due to a high volume of alerts. Some of this workload was an artifact of the test because a cluster of tags was deployed near the city police headquarters. But the high alert rate led to the conclusion that the PDDS was efficient at finding tag-equipped drivers.

The basic interface approach of using an auditory alert coupled with a picture and a synthetic-voice-plus-text description of the tag wearer worked well. As expected, the search task of the officers was considerably easier when they were stationary than when they were in motion. Even in the closed course environment of Phase II, participants found it difficult to drive a car and simultaneously process an alert on the laptop. Unsurprisingly, use of the PDDS while moving in an active police vehicle with its almost constant radio communications and in real traffic proved to be a high workload endeavor. Nevertheless, the performance of the participating officers with the PDDS system in Norwalk during Phase III was uniformly good and a clear improvement over attempting the same task without the assistance of the PDDS.

Two results from Phase III are particularly noteworthy in describing the capabilities of the PDDS. First, 126 of the 138 tags that were worn by pseudo-offenders were detected during the 3-month test period. The fact that this was accomplished by two patrol cars operating significantly less than full time suggests that convicted offenders would have difficulty evading the system if they remained in a PDDS-equipped jurisdiction; that location would be a condition of their probation. Thus, a deployed PDDS should be an effective deterrent to driving after a suspension or revocation since the likelihood of being detected would be high. Second, more than 95% of the stops that the officers made during the Phase III test were of a vehicle that contained the pseudo-offender being sought. Thus, incorrect stops should not be a significant problem or cause for public opposition to the PDDS.

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REFERENCES

National Highway Traffic Safety Administration, U.S. Department of Transportation. *Traffic Safety Facts: Repeat Intoxicated Driver Laws, 2003.* Available at www.nhtsa.dot.gov/ people/injury/New-fact-sheet03/RepeatIntoxicated.pdf.

Alcohol Policy Challenges

ALCOHOL POLICY CHALLENGES

Preventing Alcohol-Related Problems
Public Policy Strategies

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National surveys consistently show that alcohol is by far the most frequently used and abused drug in the United States (Johnston et al. 2002; SAMHSA 2003). The social and personal costs associated with drinking may be enormous. Alcohol-related problems include health consequences (e.g., dependence and alcoholism, cirrhosis, fetal alcohol syndrome), trauma (e.g., alcohol-related traffic crashes, assaults, child and spousal abuse and neglect, homicide, suicide, other violent crime), and property damage. In monetary terms, it has been estimated that alcohol use and abuse cost the U.S. economy $185 billion in 1998 (Harwood 2000). This figure includes costs related to medical care, mental health care, property damage, social and victim services, lost productivity, and criminal investigation, adjudication, and sanctioning. Alcohol use, especially heavy episodic drinking, among underage drinkers is also associated with a wide variety of problems, including drinking and driving, crime, truancy, theft, assault, and precocious and risky sexual activities (Fergusson and Lynskey 1996; Fergusson et al. 1996; OJJDP 2000; Wechsler et al. 1999). For underage drinkers alone, the costs of alcohol use have been estimated to be as high as $52 billion annually (Levy et al. 1999). Prevention strategies that effectively reduce alcohol-related problems thus can have enormous payoff, both in human and in economic terms.

Traditionally, drinking prevention, especially for youth, has relied largely on educational and persuasive approaches. Such approaches focus on changing knowledge and beliefs, teaching new skills, or modifying other individual-level mediating factors. Educational and persuasive approaches, however, cannot provide a complete answer to the problem of drinking by young people. In part, this limitation arises because people are immersed in a broader social context in which alcohol is readily available and glamorized (Mauss et al. 1988). In contrast, policy approaches address (*a*) formal legal and regulatory mechanisms, rules, and procedures for reducing the consumption of alcohol or risky drinking behaviors and (*b*) enforcement of these measures (Grube and Nygaard 2001; Toomey and Wagenaar 1999). Policy approaches to prevention have considerable promise for addressing the problems associated with drinking by changing the legal and social environment. In particular, policy strategies can be used to reduce alcohol availability, directly deter drinking by increasing the personal costs associated with it, and communicate norms regarding acceptable and unacceptable drinking practices.

PUBLIC HEALTH VERSUS HARM REDUCTION STRATEGIES

In general, two policy orientations to preventing and reducing alcohol-related problems among youth are the population, or public health, approach and the harm reduction approach. The primary target of public health policies is to reduce overall consumption in the general population. Based on the distribution-of-consumption model, the public health approach assumes that reductions in overall or per capita consumption result in decreases in drinking not only among light and moderate drinkers but also among heavier drinkers and in risky situations (e.g., Bruun et al. 1975; Skog 1985). As a result, decreases in overall consumption should also lead to reductions in alcohol-related problems. By targeting overall consumption, the public health approach furthermore explicitly recognizes that many alcohol-related problems result not from chronic problematic drinkers, but rather from moderate drinkers who may engage in episodic heavy drinking or suffer adverse consequences at relatively low levels of consumption (e.g., Skog 1999; Stockwell and Gruenewald 2001).

Traditionally, public health policy approaches to reducing drinking have focused on reducing economic availability (e.g., pricing, taxes), retail availability (e.g., marketing practices, conditions of sale), and social availability (e.g., noncommercial sources) of alcohol. The purpose of public health alcohol policies is to increase the “full price” of alcohol by increasing economic and convenience costs of obtaining it (e.g., Chaloupka 1995; Laixuthai and Chaloupka 1993). Public health policies also focus on regulating or countering promotion (e.g., advertising restrictions) and on changing individual and community norms and beliefs about drinking. Many public health policies have deterrence functions. For example, minimum drinking age laws make it more difficult for young people to buy alcohol and may also include penalties for possession or consumption of alcohol by those who are underage.

Although there is some disagreement about what exactly constitutes a harm reduction approach to drug and alcohol use (e.g., Inciardi and Harrison 2000), in general harm reduction policies are intended to prevent or reduce heavy (risky) drinking, reduce drinking in risky situations, or moderate the relationship between drinking and problem outcomes without necessarily affecting overall consumption in the population (Riley and O’Hare 2000; Simpura 1999). As with public health policies, some harm reduction policies may rely on deterrence. The focus of the deterrence, however, is on specific problematic drinking behaviors (e.g., drinking and driving). Other harm reduction policies may depend not on deterrence but rather provide the means to avoid risky drinking situations (e.g., safe rides programs) or rely on other programs to discourage risky drinking and encourage responsible drinking. Even though they are often represented as two distinct approaches to reducing and preventing youth alcohol problems, clearly distinguishing between public health and harm reduction policies is often difficult. Some policies are implemented to reduce overall consumption but may also directly reduce heavy drinking or drinking in risky situations. Similarly, policies based on a harm reduction approach may also directly decrease overall consumption.

LEVELS OF POLICY

Under the 21st Amendment to the Constitution, regulation of alcohol distribution and sales takes place primarily at the state level. States differ considerably in their regulatory practices, ranging from those with completely state-run retail monopolies and distribution systems to those where

retail and wholesale alcohol sales and distribution are completely privatized. To some extent, retail alcohol sales can also be regulated at the local or municipal level through the use of local ordinances, conditional use permits, and the zoning process. Some states also allow for a local option by which municipalities or counties can place stricter limits on alcohol sales than those implemented at the state level. Alcohol policies can be implemented at the national level (e.g., federal excise taxes), the state level (e.g., mandated responsible beverage service training; minimum drinking age laws), or the local level (e.g., limiting alcohol outlet density).

POLICY STRATEGIES FOR REDUCING ALCOHOL-RELATED PROBLEMS

Economic Availability Through Taxation and Price

The primary policy mechanism for increasing price is through federal and state excise taxes. The cost of alcohol relative to other products has steadily declined since the 1950s (NRC/IOM 2003). This decrease is largely due to relative decreases in federal excise taxes on spirits and beer, which have not kept pace with inflation. Research generally finds that higher prices for alcoholic beverages are associated with decreased consumption and lower rates of alcohol-related problems (Chaloupka et al. 1998; Grossman et al. 1995). It has been estimated that doubling the federal excise tax on beer, for example, would lead to a 10% increase in the price of beer and a 3% reduction in sales (NCR/IOM 2003). There is some evidence that underage drinkers are more price responsive than adults. Coate and Grossman (1988), for example, found an inverse relation between the frequency of beer consumption by youth and the price of beer. Frequent drinkers were more affected by price increases than were infrequent drinkers. Similarly, Saffer and Grossman (1987a) estimate that a 100% increase in the real beer tax would reduce highway mortality by 27% among 18- to 20-year-old drivers. It has also been estimated that a 15% decline in traffic fatalities among this age group would result from simply increasing the excise tax on alcohol at the rate of inflation (Saffer and Grossman 1987b). Research using data from the U.S. National Longitudinal Survey of Youth (Pacula 1998) indicates that doubling the tax on beer alone would reduce alcohol consumption among young people between 3% and 6%. Overall, it has been estimated that increasing taxation to keep pace with inflation would lead to a 19% reduction in heavy drinking by youth and a 6% reduction in high-risk drinking by youth (Laixuthai and Chaloupka 1993).

Although taxation and price appear to be effective prevention strategies, the effects of price increases on consumption may be moderated by other factors. Thus, price increases may lead to changes in patterns of consumption such as switching to less-expensive beverages or purchasing and drinking alcohol in less-expensive venues without reducing overall consumption (Gruenewald et al. 2000). The price sensitivity of alcohol may also vary considerably across states and jurisdictions depending on preexisting drinking patterns and attitudes. As a result, it is difficult to estimate the effects of tax increases in any specific case (Babor et al. 2003). There is also considerable industry resistance to increasing taxes on alcohol, which makes implementation of such increases difficult.

Retail Availability

Minimum Legal Drinking Age

In 1984 the National Minimum Drinking Age Act required states to enact a minimum age of 21 years for purchase or public possession of alcohol or risk losing federal highway funds. Since 1987 the minimum legal drinking age (MLDA) in the United States has been 21 years in all 50 states and the District of Columbia. States, however, vary greatly in the scope of the restrictions they place on underage purchase, possession, and consumption of alcohol and on use of fraudulent identification to purchase alcohol. Moreover, some states allow parents and guardians to provide alcohol to minor children or married individuals to provide alcohol to a spouse who is a minor. In some cases, states allow underage drinking to take place in private residences or clubs if a minor is accompanied by a parent.

Despite these inconsistencies in MLDA laws, the available studies on underage drinking age uniformly show that increasing MLDA significantly decreased drinking and drinking problems among young people. A study based on survey data from New York State, for example, found alcohol use among 18-, 19-, and 20-year-olds declined as much as 25% immediately after the drinking age was raised to 21 (Yu et al. 1997). The effects of MLDAs on self-reported alcohol use among youth have also been studied through the use of national data from the Monitoring the Future (MTF) survey from 1976 to 1987 (O'Malley and Wagenaar 1991). Having a minimum drinking age of 21, rather than 18, was associated with a 5.5% lower prevalence of 30-day alcohol use and a 2.8% lower prevalence of heavy alcohol use among high school seniors and recent high school graduates. Similarly, increasing the drinking age from 18 resulted in a 13.8% decrease in frequency of 30-day alcohol consumption. Moreover, these lower levels of alcohol use persisted into the respondents' early 20s, even after they were of legal drinking age. That is, a higher minimum drinking age may moderate drinking beyond attaining legal age status. Similarly, in a pooled cross-section time series analysis using MTF data from 1977 to 1992, Dee (1999) reported that an MLDA of 18, relative to higher MLDAs, was related to a 3.5% higher prevalence of any drinking in the past 30 days, a 2.2% increase in the prevalence of moderate drinking, and a 3.1% increase in the prevalence of heavy drinking (five or more drinks in the past 2 weeks) among high school seniors.

Higher minimum drinking ages have also been associated with lower rates of driving under the influence (DUI), traffic crashes, and other mortality and morbidity. Klepp et al. (1996) found that implementation of the uniform MLDA of 21 in the United States reduced the overall prevalence of drinking and driving, especially among those young people who had a few drinks. Other studies (e.g., Saffer and Grossman 1987a, 1987b; Wagenaar 1981, 1986; Wagenaar and Maybee 1986) indicated that raising the MLDA from 18 to 21 years decreased single-vehicle nighttime crashes involving young drivers by 11% to 16% at all levels of crash severity. A 13% reduction in fatal nighttime crashes involving young drivers has also been reported in a study of 26 states when a higher drinking age law was enacted (DuMouchel et al. 1987). In a time series study using crash data from 1987 to 1992, a 9% to 11% reduction in total traffic fatalities and a decrease of 12% to 19% in nighttime fatal crashes were found as a result of raising the MLDA (Dee 1999). Overall, it has been estimated that the MLDA of 21 has saved 21,877 lives between 1975 and 2002 through reducing traffic fatalities (NHTSA 2003). Finally, having an MLDA of 21 rather than a lower MLDA has been associated with a 5.5% reduction in pregnancy rates

among African American teenagers (Dee 2001). No effects were observed on pregnancy rates for white teens.

Outlet Density Restrictions

Studies have found significant relations between outlet densities and alcohol consumption (Scribner et al. 2000), violence (Lipton and Gruenewald 2002; Gorman et al. 1998; Gorman et al. 1998; Scribner et al. 1999; Speer et al. 1998), drinking and driving (Gruenewald et al. 2002), car crashes (Scribner et al. 1994), and pedestrian injuries (LaScala et al. 2000). Different types of outlets may have distinct effects on problem outcomes. Violence, for example, has been found to be positively related to bar density and negatively related to restaurant density (Lipton and Gruenewald 2002), whereas the opposite may be true for drinking and driving incidents (Gruenewald et al. 2002). In one of the few published studies focusing on youth (Treno et al. 2003), on- and off-license outlet density was found to be positively related to frequency of underage driving after drinking and riding with drinking drivers among 16- to 20-year-old youths. These effects were stronger for younger adolescents and for females.

All of these studies, however, are cross-sectional. As a consequence, it is not possible to know if alcohol is a causative factor or whether the associations are the result of some third variable. It is also possible that the associations are the result of reverse causation, with increased consumption leading to higher outlet density in response to demand. Few longitudinal studies have been conducted. In one time series study in the United States, it was found that greater outlet densities increased wine and spirits sales, whereas wine and spirits sales did not affect outlet densities (Gruenewald et al. 1993). The findings, however, were inconsistent across different models, and the effects of outlet density on sales were relatively small and insignificant in some cases. Data from the Nordic countries provide stronger evidence about changes in drinking following dramatic changes in numbers of outlets. Perhaps the most striking example is from Finland. In 1969, changes in Finnish law allowed alcoholic beverages with up to 4.7% alcohol by volume to be sold in grocery stores. Previously, sales of alcohol above 2.8% by volume were allowed only in state-owned retail monopoly stores. The new law also allowed state-owned retail monopoly stores to be located in rural areas, a practice previously prohibited. The institution of this law led to a 46% increase in fully licensed restaurants and a 22% increase in retail monopoly stores. In addition, more than 17,000 retail food stores were licensed to sell the higher-alcohol beverages. These changes in availability were associated with a 46% increase in the volume of alcohol consumed (liters of absolute alcohol consumed per capita), a 63% increase in frequency of consumption, and a 20% increase in heavy consumption (e.g., Mäkelä et al. 1981; Mäkelä 2002; Mustonen and Sund 2001).

It appears that widespread and dramatic changes in outlet density can substantially affect drinking and drinking-related problems. Whether more-limited changes, such as those observed in most neighborhood or community settings, similarly affect drinking and drinking-related problems remains to be established. In such cases the reductions in availability entailed by the convenience costs of traveling a short distance to obtain alcohol may be minimal (Gruenewald et al. 2000). Finally, it has been suggested (Stockwell and Gruenewald 2001) that outlet density may have more substantive effects on problems such as violence and crashes than on more global problems such as heavy consumption.

Hours of Sale

Restricting the days and hours that alcohol sales are allowed is a commonly advocated policy strategy for reducing drinking and drinking-related problems, although the trend in recent years has been to liberalize such restrictions (e.g., Drummond 2000). From an availability perspective, increasing the hours or days of sales should increase access to alcohol and thus consumption. However, it can also be argued that increasing hours of sales might decrease some problems associated with consumption by slowing rates of drinking (i.e., extending consumption of the same quantities over a longer period) and avoiding large numbers of drinkers leaving establishments at the same time.

The findings from studies on restricting licensing hours have been mixed. Thus, a recent study in the United Kingdom failed to find increases in alcohol- or assault-related hospital admissions as a result of restricting hours of sale (Graham et al. 1998). A similar lack of effects has been reported for traffic crashes and property damage in Brisbane, Australia (Smith 1988a), when hours of sale were temporarily extended. Similarly, a temporary 6-month extension of closing hours in Fremantle, Australia, during the America's Cup yacht race was not associated with increases in consumption or heavy consumption (maximum drinks consumed) among young male drinkers (McLaughlin and Harrison-Stewart 1992). Likewise, changing closing hours for pubs and hotel bars in Scotland from 10 to 11 p.m. was found to be unrelated to increases in alcohol consumption, although a decrease in the hourly rate of consumption was observed: perhaps the longer trading hours reduced blood alcohol levels (BALs) (Bruce 1980). In contrast, other studies have found increases in drinking and drinking-related problems after extensions of opening hours. Thus, Smith (1988b) reported an 11.5% increase in casualty traffic crashes after pub closing hours were extended from 6 to 10 p.m. Monday through Saturday in Victoria, Australia. In a recent study in Perth, Australia, extended trading hours for hotels (pubs) were found to be related to an increase in assaults (Chikritzhs and Stockwell 2002). This increase was generally through increased purchases of high-alcohol-content beverages. Hotels with extended trading hours experienced a 70% relative increase in assaults compared with the period before extended trading hours were instituted. In one of the few studies focusing exclusively on youth, an 89% decrease in the number of young Americans crossing the border after 3 a.m. with a positive blood alcohol concentration (BAC) was found when closing hours in the Mexican city of Juarez were changed from 5 a.m. to 3 a.m. (Voas et al. 2002a). The number of pedestrians crossing the border with positive BACs between midnight and 3 a.m. did not change, and, as a result, the total number of BAC-positive pedestrians decreased. In sum, although the evidence is mixed, it appears that substantial changes in hours of service can have a significant impact on drinking and drinking-related problems. As with density restrictions, the effects of limiting hours of sale are probably dependent upon other contextual factors. The effects of such restrictions may be greatest when they are substantial, rather than relatively minor or temporary, and when the restrictions affect larger geographical units, making circumvention more difficult.

Dram Shop Liability

Dram shop liability laws allow individuals injured by a minor who is under the influence of alcohol or by an intoxicated adult to recover damages from the alcohol retailer who served or sold alcohol to the person causing the injury (Holder et al. 1993; Mosher 1979; Mosher et al. 2002; Sloan et al. 2000). In some jurisdictions, the retailer can be liable for the damages the

minor or drinker causes to him or herself. Owners and licensees can be held liable for their employees' actions under most or all dram shop liability laws (Mosher et al. 2002). Many dram shop liability statutes include a responsible business practices defense. This provision allows retailers to avoid liability if they can establish that they took reasonable steps to avoid serving minors and obviously intoxicated adults. Key to the defense is evidence that the retailer trained staff, including both servers and managers; and established management policies designed to deter irresponsible sales and service and that the training procedures and policies were fully implemented at the time of the sale or service. Research suggests that implementation of dram shop liability may lead to significant increases in checking age identification and greater care in service practices (e.g., Sloan et al. 2000). The available studies also indicate that dram shop liability laws can significantly reduce single-vehicle nighttime crash deaths, alcohol-related traffic crash deaths, and total traffic crash deaths among minors (Chaloupka et al. 1993; Sloan et al. 1994, 2000). Further, the research indicates that such laws also reduce alcohol-related traffic crashes, total traffic crashes, homicides, and other unintentional injuries in the general population (Chaloupka et al. 1993; Sloan et al. 1994, 2000). Overall, dram shop liability has been estimated to reduce alcohol-related traffic fatalities among underage drivers by 3% to 4% (Chaloupka et al. 1993). The perceived likelihood of being successfully sued under dram shop liability statutes may be important. Thus, two highly publicized successful dram shop liability lawsuits in Texas were found to be related to decreases of 6.5% and 5.3% in single-vehicle nighttime crashes (Wagenaar and Holder 1991). These decreases occurred presumably because owners, managers, and staff changed sales and serving practices as a result of the suits and accompanying publicity.

Social Availability

Keg Registration

Keg registration laws require purchasers of a keg of beer to complete a form that links their name to a number on the keg. Keg registration is seen primarily as a tool for prosecuting adults who supply alcohol to young people at parties. Keg registration laws have become increasingly popular in local communities in the United States. There is apparently only a single published study on the effectiveness of these laws. In that study of 97 U.S. communities, it was found that requiring keg registration was significantly and negatively correlated ($r = –.29$) with traffic fatality rates (Cohen et al. 2001). The evidence for the effectiveness of keg registration, however, is best considered inconclusive.

Social Host Liability

Under social host liability laws, adults who provide alcohol to a minor or serve intoxicated adults in a noncommercial setting can be sued through civil action for damages or injury caused by that minor or intoxicated adult. Social host liability laws may deter adults from hosting underage parties, purchasing alcohol for or providing alcohol to minors, and overserving. There is little research on the effectiveness of social host liability laws, and what evidence exists is conflicting. In one study across all 50 states for the years 1984 to 1995, the presence of social host liability laws was associated with decreases in alcohol-related traffic fatalities among adults but was unrelated to such deaths among minors (Whetten-Goldstein et al. 2000). It was not related to single-vehicle nighttime crashes for either group. Surprisingly, the presence of social host

liability laws was related to increases in total motor vehicle fatalities among minors. In a second study, however, using self-reported drinking data spanning the 1980s to 1995, the implementation of social host liability laws was associated with decreases in reported heavy drinking and in decreases in drinking and driving by lighter drinkers (Stout et al. 2000). The laws had no effect on drinking and driving by heavier drinkers. These conflicting findings may reflect the lack of a comprehensive program that ensures that social hosts are aware of their potential liability exposure. Social host liability may send a powerful message. However, that message must be effectively disseminated before it can have a deterrent effect (Holder and Treno 1997).

Promotion

Advertising Restrictions

Survey studies consistently find small, but significant, relationships between awareness of and liking of alcohol advertising and adolescents' drinking beliefs and behaviors (e.g., Casswell and Zhang 1998; Connolly et al. 1994; Grube and Wallack 1994; Wyllie et al. 1998). Preliminary analyses from other more recent studies (summarized in Martin et al. 2002) have replicated and extended these findings. In contrast, although a few econometric studies have found a positive relationship between advertising expenditures and overall consumption or alcohol-related mortality (e.g., Saffer 1997), most are negative or mixed in their findings (e.g., Calfee and Scheraga 1994; Duffy 1995, 2001; Fisher 1993; Nelson 1999, 2001; Nelson and Moran 1995).

Only a few studies have considered the effects of bans or restrictions on alcohol advertising. Saffer (1991), for example, investigated the effects of restrictions on broadcast alcohol advertising on alcohol consumption and alcohol problems (liver cirrhosis mortality, motor vehicle fatalities) in 17 European and North American countries with data from 1970 to 1983. The countries in the study were grouped according to whether they had no restrictions on broadcast alcohol advertising, partial restrictions (i.e., no televised liquor advertising), or a complete ban on televised alcohol advertising. In a series of analyses, it was found that countries with partial restrictions had alcohol consumption rates that were about 16% lower than countries with no restrictions, and countries with complete restrictions had consumption rates that were 11% lower than countries with partial restrictions. The corresponding figures for motor vehicle fatalities were 10% and 23%, respectively. No significant effects were observed for cirrhosis mortality rates. This study, however, has been criticized on a number of grounds. Most important, a reanalysis of the data suggested that there was evidence of reverse causation (Young 1993), with those countries experiencing low rates of alcohol problems being more likely to adopt alcohol adverting bans than were countries with high rates of alcohol problems. That is, both the institution of bans and lower rates of drinking problems may result from more conservative drinking cultures. More recently, a time series study of alcohol advertising restrictions in 20 countries over 26 years found that moving from no restrictions to partial restrictions or from partial restrictions to total bans reduced alcohol consumption between 5% and 8% (Saffer and Dave 2002). Other recent studies, however, have found no effects of advertising bans (Nelson 2001; Nelson and Young 2001). Apparently no studies addressed the effects of limits on local advertising and point-of-sale advertising.

Counteradvertising

Media campaigns are a commonly used approach to counter the overwhelming positive images of drinking presented through advertising and promotion. The 1988 U.S. surgeon general's workshop on drunk driving, for example, called for mass communication campaigns directed at the prevention of alcohol-related traffic deaths. The main objectives of counteradvertising campaigns are to increase general awareness of the risks associated with drinking, to change individual drinking behavior, and to rally public support for policy change (DeJong and Atkin 1995; DeJong and Hingson 1998). The most common strategy used in counteradvertising is the informational–testimonial approach. This approach provides basic facts or simply exhorts appropriate behavior (Slater 1999).

Few alcohol counteradvertising campaigns have been adequately evaluated. In one study it was noted that Gallup surveys offered strong evidence of a sharp drop in the number of impaired drivers on the road following the media campaigns implemented in response to the 1988 surgeon general's workshop on drinking and driving (DeJong and Hingson 1998). Further, from 1982 to 1996, a large decline in the number of alcohol-related traffic deaths also occurred (DeJong and Hingson 1998). To some extent, these decreases might be attributed to the campaign. Yet, determining the unique contribution of any single initiative to these outcomes is problematic. Co-occurring legal and programmatic initiatives (e.g., sobriety checkpoints, increased MLDAs), and other regulatory shifts affecting risky driving behaviors more generally also contributed to these reductions in crashes. A modest study of women in Manitoba (Casiro et al. 1994) found that after a television campaign on the dangers of alcohol consumption during pregnancy, more women believed that drinking would put their baby at risk. Moreover, they attributed this knowledge to television. Overall, however, there is little evidence to support alcohol counteradvertising and informational campaigns as a primary preventive intervention for changing drinking behaviors and drinking-related problems (Babor et al. 2003; NRC/IOM 2003).

Warning Labels

Health warning label legislation was implemented in the United States in 1989. This legislation requires all alcoholic beverage containers to bear a government warning of the risks associated with consuming alcohol while pregnant, driving a car, or operating machinery. The warning labels also target general health risks. Point-of-sale health warning signs also have been mandated in several states since the 1980s. An early evaluation of warning labels on alcohol beverage containers in the United States found that about one-fifth of respondents to a national survey remembered seeing the warnings 6 months after their introduction (Kaskutas and Greenfield 1992). Somewhat greater proportions of key target groups (e.g., heavy drinkers and young men at risk for drunk driving) remembered seeing the labels, but no changes in knowledge of the targeted health risks could be detected. Similarly, a study of U.S. adolescents found that there were increases in awareness of, exposure to, and memory of the labels after they were implemented but no substantial changes in alcohol use or beliefs about the risks targeted by the warning labels (MacKinnon et al. 1993). There is little evidence that alcohol beverage warning labels have any discernible effect on drinking behaviors, drinking attitudes, or knowledge of the risks of drinking. This lack of effects may be a result, in part, of inadequate implementation (e.g., using small inconspicuous labels and weak warnings).

Policies Targeting Risky Drinking

Lower BALs for Driving

It is illegal in every state and the District of Columbia to drive under the influence of alcohol. In addition, by 2002 all states but one had enacted per se laws that specified a BAC level above which it is illegal to drive. The Department of Transportation Appropriations Act of 2001 required states to enact 0.08% BAC per se laws by 2004 or begin losing federal highway funds. As of 2003, 39 states and the District of Columbia set their legal BAC level at 0.08%.

Initial evaluations of 0.08% legislation produced mixed results. In one study of the first five states to enact 0.08% laws, it was found that the lower BAC limits reduced alcohol-related fatal crashes by 16% (Hingson et al. 1996). Results of other studies tended to be more mixed (e.g., Apsler et al. 1999; Foss et al. 1998). In particular, inconsistencies in effects across states implementing 0.08% BAC levels were found, with some states showing significant reductions in alcohol-related crashes and other states showing no reductions (Apsler et al. 1999). Many of these initial studies on 0.08% BAC laws have been criticized on various grounds, including a failure to account adequately for other changes in drinking and driving laws, such as implementation of administrative license revocation laws (ALRs), use of inappropriate comparison states, not controlling for social and cultural differences across states, and overinterpretation of insignificant or inconsistent findings (Scheinberg 1999). More recently, with data from all 50 states from 1980 through 1997, it has been estimated that reducing the legal BAC limit from 0.10% to 0.08% was related to a 14% reduction in alcohol-related traffic fatalities (Villaveces et al. 2003). These effects were found even though changes in other laws (e.g., ALR, zero tolerance) were controlled. Similarly, it has been found that reducing the legal BAC level to 0.08% resulted in a 14% reduction in drinking drivers involved in fatal crashes in Illinois, whereas there was a 3% increase in such involvement in neighboring states (Voas et al. 2002b). This latter study is important because Illinois had an ALR law in place for 10 years when the 0.08% limit was implemented, thus ruling out a major confounding factor in earlier studies. Finally, in a study using data from all 50 states from 1982 through 1997, no effect of the 0.08% laws on alcohol-related fatalities was reported for drivers under the age of 21 after MLDA, zero tolerance, seat belt, and ALR laws were taken into account (Voas et al. 2002c). This latter finding should not be surprising given that the 0.08% laws do not especially apply to underage drinkers. Overall, the studies suggest that lower BAC limits can significantly decrease alcohol-related crashes and fatalities. Lower BAC laws may be most effective when combined with administrative penalties such as license revocation.

Zero Tolerance

Zero tolerance laws apply a lower legal BAC to underage drivers. Generally, these lower limits are set at the minimum BAC that can be reliably detected (e.g., 0.02%). Zero tolerance laws have been found to be very effective in reducing underage drinking and driving and related car crashes. Thus, for example, a study in the United States (Hingson et al. 1994) found a 17% net decline in nighttime fatal crashes involving young drivers in states instituting lower BALs for young people. A review (Zwerling and Jones 1999) of six studies on the effects of zero tolerance found that all of them showed a reduction in injuries and crashes after the implementation of the law. In three of the studies, however, the reductions were not statistically significant, possibly

because of a lack of statistical power. More recent empirical studies have provided additional evidence for the effectiveness of zero tolerance laws. A 19% reduction in self-reported driving after any drinking and a 24% reduction in driving after five or more drinks was found using MTF survey data from 30 states (Wagenaar et al. 2001). This latter study found that zero tolerance laws had no effect on overall consumption or on riding with drinking drivers but rather were specific to driving after drinking. In a study using time series data from all 50 states for 1982 to 1997, it was found that zero tolerance laws reduced traffic fatalities involving underage drinking drivers by 24%, even after accounting for the implementation of age 21 MLDA laws, ALR laws, and seat belt laws (Voas et al. 2002c). The combination of age 21 MLDA and zero tolerance laws was estimated to reduce such fatalities by 39%.

Differences in enforcement of zero tolerance laws have been identified as a key issue in understanding why some programs are less successful than others (Ferguson et al. 2000), as has lack of awareness on the part of young people (Balmforth 1999; Hingson et al. 1994). Impediments to the enforcement of these laws include (*a*) requiring that zero tolerance citations be supported by evidential BAC testing, (*b*) undue costs to police (e.g., paperwork, time, court appearances), and (*c*) lack of behavioral cues for stopping young drivers at low BACs. It has been suggested that the most effective zero tolerance laws are those that allow passive breath testing, are implemented in combination with DUI checkpoints or random breath testing (RBT), and involve streamlined administrative procedures (Ferguson et al. 2000). In addition, the use of media campaigns to increase young people's awareness of reduced BAC limits and of enforcement efforts can significantly increase the effectiveness of zero tolerance laws (Blomberg 1992).

Graduated Driver Licensing

Graduated driver licensing (GDL) laws place special restrictions on driving by young or new drivers. Typically, they include limits on nighttime driving, driving with young passengers, or driving without an adult in the car. Some GDL laws include specific zero tolerance provisions. Studies of GDL laws also routinely show that they are associated with reductions in car crashes among young people (Begg and Stephenson 2003; Boase and Tasca 1998; Langley et al. 1996; Shope and Molnar 2003; Smith 1986; Ulmer et al. 2000), self-reported drinking and driving (Mann et al. 1997), and alcohol-related crashes (Boase and Tasca 1998) among young people. In Connecticut, for example, a graduated licensing program led to a 14% net reduction in crash involvement among the youngest drivers (Ulmer et al. 2000). Similarly, in New Zealand, a 23% reduction in car crash injuries among novice drivers was found after implementation of a graduated licensing system (Langley et al. 1996). In Ontario, Canada, a 25% reduction in self-reported drinking and driving was found following the introduction of graduated licensing (Mann et al. 1997). A 27% reduction in alcohol-related crashes involving new drivers was also found in that province following implementation of the program (Boase and Tasca 1998). Among the youngest drivers (ages 16 to 19 years) the reduction in alcohol-related crashes was somewhat smaller (19%). Evaluations of lowered BAC levels for new drivers in three Australian states (South Australia, Tasmania, and Western Australia) indicated that GDL laws reduced injury crashes among these drivers by as much as 40% (Smith 1986). Other evaluations of the Australian graduated licensing program, however, have been less optimistic (Haworth 1994). A study from New Zealand using data from 1984 to 1998 indicated that graduated licensing reduced total traffic crashes, nighttime crashes, crashes with passengers, and alcohol-involved

crashes among young people (Begg and Stephenson 2003). Other evidence, however, suggests that GDL may have limited effects on alcohol use and alcohol-related crashes above and beyond that of zero tolerance laws (Shope et al. 2001). Nonetheless, GDL is useful on its own terms apart from its effects on drinking and driving and may be an important adjunct to zero tolerance laws, for example, providing cause for stopping young drivers who may be drinking.

RBT and Sobriety Checkpoints

In RBT programs, motorists can be stopped without cause and required to take a breath test to establish BAC levels. In Australia, RBT programs have been found to result in as much as a 24% reduction in nighttime crashes, especially in metropolitan areas (e.g., Cameron et al. 1992; Cameron et al. 1997; Drummond et al. 1992). Results from Finland (Dunbar et al. 1987a, 1987b) show an even more striking decrease of 50% in drinking and driving rates and a reduction in the rates of death and injury from alcohol-related traffic crashes after implementation of RBT.

Implementation and public awareness seem to be key to the success of these programs. Moore et al. (1993) found that males and those aged under 30 years perceived it was unlikely that they would be apprehended for drinking and driving despite RBT programs. However, the perceived likelihood of apprehension increased with exposure to RBT, notably when that exposure was recent. Additional studies (Armstrong and Howell 1988; Haworth 1994; Homel, 1988; McCaul and McLean 1990; Span 1989) discuss the reasons for differing results in different areas of Australia after the implementation of RBT laws. They conclude that lack of enforcement in areas showing low effect was one reason for the observed differences. In contrast, however, there is also some evidence, that drinking drivers may change their driving patterns and use minor and relatively less-safe roads when enforcement of RBT is intense and publicity is high, thus increasing their chances of a crash (Cameron et al. 1997). Generally, these results suggest that RBT is a promising strategy if it is well advertised and enforced. However, studies specifically focusing on the impact of RBT on young drivers apparently do not exist. Still, there is reason to believe that, when enforced, the efficacy of this approach also applies to young people.

Sobriety checkpoints in the United States can be implemented under proscribed circumstances as determined by state laws, often involving prenotification about when and where they will be implemented. Breath tests at such checkpoints can usually be given only if there is probable cause to suspect that a driver has been drinking (Peek-Asa 1999). Even under these restricted circumstances there is some evidence that the tests reduce drinking and driving and related traffic crashes. An evaluation of a Tennessee checkpoint program (Lacey et al. 1999), for example, found a 20% decrease in alcohol-related fatal crashes and a 6% reduction in single-vehicle nighttime crashes that were maintained up to 21 months after implementation of the program. Similarly, an evaluation of checkpoint programs in four California communities indicated that alcohol-involved injury and fatal crashes decreased between 9% and 40%, depending upon the community (Stuster and Blowers 1995). No significant changes were observed in non-alcohol-involved crashes or in a comparison community. Public awareness and publicity have been identified as important factors in the success of sobriety checkpoints. A recent study (Wells et al. 1996) concludes that as many as 62% of drivers with BACs at or above 0.08% are not detected or detained at sobriety checkpoints. That is, sufficient cues are not observed to allow police to administer breath tests based on probable cause. Nonetheless, a recent review of American and Australian studies (Peek-Asa 1999) concludes that the available

evidence consistently indicates that both RBT and sobriety checkpoints reduce alcohol-related crashes, injuries, and fatalities. No studies, however, appear to have addressed the effects these programs may have on drinking or drinking and driving among adolescents.

Responsible Beverage Service and Sales

Research indicates that servers of alcohol rarely intervene to prevent intoxication or refuse service to intoxicated patrons (Donnelly and Briscoe 2003). Similarly, despite a uniform MLDA of 21 in all 50 states and the District of Columbia, young people can and do purchase and use alcohol. Purchase surveys show that anywhere from 40% to 90% of outlets may sell to underage buyers, depending upon location (e.g., Forster et al. 1994, 1995; Preusser and Williams 1992; Grube 1997). A responsible beverage service and sales (RBS) program consists of the implementation of a combination of outlet policies (e.g., requiring clerks or servers to check identification for all customers appearing to be under the age of 30 years, requiring all servers to be older than 21 years of age), manager training (e.g., policy development and enforcement), and server training (e.g., teaching clerks and servers to recognize altered or false identification and to monitor numbers of drinks served). The purpose of these interventions is to reduce sales to minors, sales to intoxicated patrons, and overservice. RBS can be implemented at both on-license and off-license establishments.

Overall, some RBS programs have been shown to be effective in some circumstances. Thus, RBS has been found to reduce the number of intoxicated patrons leaving a bar (e.g., Dresser and Gliksman 1998; Gliksman et al. 1993; Saltz 1987, 1989) and reduce car crashes (e.g., Holder and Wagenaar 1994). Other studies, however, have been less successful in demonstrating effects of server training on service to seemingly intoxicated patrons, car crashes, numbers of bar patrons with BACs over .15%, or checking of identification (Lang et al. 1998; Saltz and Stanghetta 1997). Few studies have evaluated the effects of RBS programs on underage drinking. In one study of off-license RBS, voluntary clerk and manager training were found to have a negligible effect on sales to minors above and beyond the effects of increased enforcement (Grube 1997). Similarly, a study in Australia found that even after training, age identification was rarely checked in bars, although decreases in the number of intoxicated patrons were observed (Lang et al. 1996, 1998). In at least one study, however, RBS training was associated with an increase in self-reported checking of identification by servers (Buka and Birdthistle 1999). The apparent changes in behavior persisted among trained servers for as long as 4 years. Another study reported an 11.5% decrease in sales to minors and a 46% decrease in sales to intoxicated patrons following individual manager training and policy development (Toomey et al. 2001). Voluntary programs may be less effective than mandatory programs or programs using incentives such as reduced liability (Dresser and Gliksman 1998).

Policy development and implementation within outlets may be as important, if not more so, than server training per se in determining RBS effectiveness (Saltz 1997). Research indicates, for example, that establishments with firm and clear policies and a system for monitoring staff compliance are less likely to sell alcohol to minors (Wolfson et al. 1996a; Wolfson et al. 1996b). Key elements of successful outlet policies are

1. Minimum age of 21 for all servers and sellers,
2. Staff awareness of legal responsibility,
3. Staff awareness of outlet policies and consequences for staff violating those policies,

4. Identification required for all patrons appearing to be under 30 years of age,
5. Guidelines and training as to what constitutes acceptable service practices, and
6. Retailer-initiated compliance checks and enforcement of consequences for violation of policies.

In addition to problems in implementing RBS, evaluation of the general effectiveness of RBS is difficult because of the great variation in the quality and focus of available programs (Toomey et al. 1998). In particular, programs differ in the extent to which they include managers and owners, as well as staff, and emphasize policy development and implementation.

Designated Driver Programs

Designated driver programs are popular strategies to reduce drinking and driving. Designated driver programs usually comprise educational or persuasive interventions that encourage groups of drinkers to select a member who is not to drink and who can then drive safely. In some cases inducements are offered to designated drivers by the drinking establishment (e.g., free nonalcoholic drinks). Although designated driver programs are being strongly promoted in the United States, there is little available evidence of their effectiveness. There is some evidence that those who serve as designated drivers are heavier drinkers and are more likely to report drinking and driving and riding with drinking drivers than are drinkers who never serve as designated drivers (e.g., Caudill et al. 2000a). By the same token, those who use designated drivers are more likely to report driving after drinking, riding with drinking drivers, and being heavy drinkers than are drinkers who do not use designated drivers (Caudill et al. 2001). Thus, to some extent, designated driver programs appear to be reaching their target population. In one study more than one-third (37%) of drinkers reported using a designated driver in the past 30 days (Caudill et al. 2001). Unfortunately, other data indicate that drinkers may consume more on those occasions when they have a designated driver (DeJong and Winsten 1999). In addition, in a recent qualitative study (Nygaard et al. 2003), it was found that young people do not have a good idea of what constitutes a designated driver. Often they reported that the designated driver was the person in their group who had consumed the least alcohol, even though that may have been a significant amount.

Safe Rides

Safe rides programs offer drinkers low-cost or free transportation as an alternative to driving themselves. As with designated driver programs, there is little available research on their effectiveness. Similar to designated driver programs, those who use safe rides programs tend to be heavier drinkers, to report driving after drinking, and to report drinking somewhat more on occasions when they used safe ride programs (Caudill et al. 2000b; Harding et al. 2001). Moreover, safe rides programs are used relatively infrequently by drinkers (Harding et al. 2001). Nonetheless, the fact that they are used by heavier drinkers and those at risk for driving after drinking suggests they may be reaching their intended targets.

Enforcement

Enforcement appears to be a key element in the effectiveness of most policies to prevent alcohol-related harm. The deterrent effect of alcohol policies is affected by their severity, the probability of their imposition, and the swiftness with which they are imposed (e.g., Ross 1982). Although severe, penalties for many alcohol offenses are seldom enforced and thus generate only a modest deterrent effect. Arrests of minors for possession of alcohol, for example, are rare, in part, because of the burden of prosecuting them as a criminal violation and a reluctance of law enforcement and courts to enforce criminal penalties in such cases. Moreover, because criminal proceedings are often lengthy and removed in time from the infraction, the punishment is seldom swift or certain. Hingson et al. (1988a) found in their review of interventions to reduce drinking and drinking-related traffic fatalities that higher legal drinking age and per se legislation making it illegal in and of itself to drive with an alcohol concentration measured at or above the established legal level result in reductions in fatal crashes. However, absence of enforcement compromises any long-term effects. Another review by Hingson et al. (1988b) indicates that legislation or policies alone do not produce change. The authors found a decline in alcohol-related fatal traffic crashes after an increase in MLDA, but after a few years, media coverage declined and the number of fatal traffic crashes rose again. Finally, a report by Voas et al. (1998) on the enforcement of the zero tolerance law in California found only a small increase in enforcement intensity and no change among the target group members in the perceived risk of arrest, despite efforts to make the enforcement of the law easy. The study also found no reduction in involvement of young drinking drivers in fatal crashes. Once again, enforcement seems to play a major role in the efficacy of the law.

Compliance Checks

Minimum drinking age limits notwithstanding, minors can often purchase alcohol with little difficulty (Forster et al. 1994; Forster et al. 1995). Increasing enforcement against retailers who sell to minors, however, can have a substantial impact. Thus, a campaign focusing on issuing citations to clerks who sold alcohol or tobacco products to minors and giving commendations to clerks who refused to sell these products was able to raise the compliance with the laws from a pretest level of 17% to a posttest level of 67% (Lewis et al. 1996). Similar results have been reported by Grube (1997), who found that enforcement coupled with media coverage produced a net reduction in sales to minors of 30% to 35%. In a study in New Orleans, increased compliance checks increased compliance with alcohol sales laws from 11% to 39% (Scribner and Cohen 2001). The greatest gains in compliance occurred among those retailers who had been cited (51%), but substantial gains were also seen for those not cited but presumably aware of the enforcement campaign (35%). McKnight and Streff (1994) similarly found a rise in refusals of service to pseudo-patrons simulating intoxication from 17.5% to 54.3% and a decline in the percentage of drunk drivers arrested coming from bars and restaurants from 31.7% to 23.3% following increased enforcement of laws prohibiting sales to intoxicated patrons. Finally, Jeffs and Saunders (1983), studying the effect of a strict enforcement of licensing laws upon the incidence of public disorder arrests in an English seaside resort, found a significant drop in illegal behaviors.

Cops in Shops

Cops in Shops is a voluntary program developed by the Century Council, an alcohol industry–sponsored prevention organization. In a Cops in Shops program, police or alcoholic-beverage-control agents, pose as employees or customers in retail outlets in order to apprehend minors who attempt to buy alcoholic beverages or adults who attempt to purchase alcohol for them. The program often includes prominent signage warning minors that the establishment is participating in a Cops in Shops program. The participating officers can also use the Cops in Shops program to review a retailer's policies and procedures and identify risky practices. Case studies indicate that Cops in Shops programs can generate a large number of citations both against minors attempting purchase or using false identification and against adults who are purchasing for minors. The effects of Cops in Shops on underage drinking, however, is unknown. Critics suggest that Cops in Shops programs should used as a supplement to and not as a replacement for effective compliance check enforcement against retailers. Media coverage to increase public awareness again seems to be important for the success of these programs.

Shoulder Tap Interventions

Third-party transactions are a common means through which underage drinkers, especially older teens, obtain alcohol. This is the case, in part, because young people believe this method to be less risky than purchasing alcohol themselves. Often, young people wait outside outlets and approach strangers, whom they ask to buy alcohol. Shoulder tap interventions are a strategy to reduce third-party transactions of alcohol directly by enforcing laws prohibiting provision of alcohol to minors. Specifically, underage decoys who are working with the police wait outside outlets and ask randomly selected passing strangers to buy alcohol (usually beer) for them. A plainclothes police observer is stationed nearby to witness the transaction. If a stranger agrees to make a purchase, he or she is given money to do so by the decoy. The buyer is cited or warned for providing alcohol to a minor when he or she completes the transaction and gives the alcohol to the decoy. Although evidence for effectiveness is lacking, case studies suggest that such programs can generate a relatively large number of citations and thus may have a deterrent value. Such programs, when accompanied with sufficient media coverage, may also help set or reinforce community norms against buying alcohol for or providing alcohol to minors. Retailers should be involved in shoulder tap operations. In many states and locales, retailers can be held responsible for allowing minors to solicit adults to purchase alcohol within the immediate vicinity of their outlet. In such cases, the retailer has legal responsibility to curb such activities.

CONCLUSIONS

On the basis of the available evidence, the most effective alcohol policies appear to be

1. Taxation or price increases,
2. Increases in the minimum drinking age,
3. Lowered BAC for drinking and driving,
4. Zero tolerance,
5. Sobriety checkpoints, and

6. Graduated licensing.

Of these most effective policies, two target overall consumption, and four target risk behaviors. RBT, sobriety checkpoints, and dram shop liability also appear promising for reducing drinking and driving, on the basis of studies with the general population, although there is less evidence for their effectiveness specifically with young people. The evidence is growing for the effects of outlet license restrictions (e.g., outlet density, hours of sale). There is also some empirical support for RBS programs, particularly those that are mandated or motivated by reduction of liability and for dram shop liability. The evidence on advertising restrictions is conflicting, with some studies showing reductions in consumption and problems and others showing no effects of such policies. Evidence that designated driver programs, safe rides programs, warning labels, social host liability, and keg registration as effective strategies for preventing drinking or drinking problems among young people is largely lacking. For many other policy strategies, there is not sufficient research to evaluate their effects on drinking by young people. Such research should be conducted to inform policy or at least to evaluate policies as they are implemented.

Implementation, enforcement, and public awareness are essential to the success of any policy approach to preventing drinking problems. No policy can be effective unless it is adequately implemented, it is enforced, and there is awareness on the part of the intended targets of both the policy and the enforcement efforts (e.g., Grube and Nygaard 2001; Hingson et al. 1988a, 1988b; Voas et al. 1998). Awareness and knowledge of policies on the part of those charged with enforcement are also important for effective implementation (Findlay et al. 2002). Another potentially important element in effective policy is public support. The difficulty of implementing effective policies in the face of public opposition may be considerable given perceptions on the part of law enforcement officers and community leaders that there is little community support for such activities (Wagenaar and Wolfson 1994, 1995). Public support for policies may be greater for those policies that are least effective in reducing underage drinking and drinking problems. Surveys in Canada and the United States, for example, indicate that public support may be strongest for interventions such as reducing service to intoxicated patrons and treatment (e.g., Anglin et al. 2001; Giesbrecht and Greenfield 1999; Room et al. 1995). There is also considerable public support for policies targeting promotion, such as providing warning labels and banning or restricting alcohol advertising. These surveys indicate that there may be less support for more demonstrably effective policies targeting access, such as increasing taxes. Nonetheless, other recent research shows considerable support for policies targeting underage drinking (Wagenaar et al. 2000). Thus, a majority of Americans favor increasing taxes to fund prevention programs and limiting drinking in public places. The difficulty of implementing effective policies in the face of public opposition—or perceived public opposition on the part of policy makers—may be considerable. The strategic use of media, however, can help overcome such resistance and elicit public support for effective environmental interventions (e.g., Holder and Treno 1997).

ABBREVIATIONS

NHTSA	National Highway Traffic Safety Administration
NRC/IOM	National Research Council/Institute of Medicine
OJJDP	Office of Juvenile Justice and Delinquency Prevention
SAMUSA	Substance Abuse and Mental Health Service Administration

REFERENCES

Anglin, L., L. Kavangh, and N. Giesbrecht. Alcohol-Related Policy Measures in Ontario: Who Supports What and to What Degree? *Canadian Journal of Public Health*, Vol. 92, 2001, pp. 24–28.

Apsler, R., A. S. Char, W. M. Harding, and T. M. Klein. *The Effect of .08 BAC Laws*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1999. www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/1999/Effectsof08.pdf.

Armstrong, B. K., and C. M. Howell. Trends in Injury and Death in Motor Vehicle Accidents in Australia in Relation to the Introduction of Random Breath Testing. *Australian Drug and Alcohol Review*, Vol. 7, 1988, pp. 251–259.

Babor, T., R. Caetano, S. Casswell, G. Edwards, N. Giesbrecht, K. Graham, J. Grube, P. Gruenwald, L. Hill, H. Holder, R. Homel, E. Österberg, J. Rehm, R. Room, and I. Rossow. *Alcohol: No Ordinary Commodity—Research and Public Policy*, Oxford University Press, Oxford, United Kingdom, 2003.

Balmforth, D. *National Survey of Drinking and Driving, Attitudes and Behavior: 1997*. DOT HS 808 844. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1999.

Begg, D., and S. Stephenson. Graduated Driver Licensing: The New Zealand Experience. *Journal of Safety Research*, Vol. 34, 2003, pp. 99–105.

Blomberg, R. D. *Lower BAC Limits for Youth: Evaluation of the Maryland .02 Law*. DOT HS 807 860. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1992.

Boase, P., and L. Tasca. *Graduated Licensing System Evaluation: Interim Report '98*. Ministry of Transportation of Ontario, Toronto, Canada, 1998.

Bruce, D. Changes in Scottish Drinking Habits and Behaviour Following the Extension of Permitted Evening Opening Hours. *Health Bulletin*, Vol. 38, 1980, pp. 133–137.

Bruun, K., G. Edwards, M. Lumio, K. Mäkelä, L. Pan, R. E. Popham, R. Room, W. Schmidt, O.-J. Skog, P. Sulkenen, and E. Österberg. *Alcohol Control Policies in Public Health Perspective*. Finnish Foundation for Alcohol Studies, Helsinki, Finland, 1975.

Buka, S. L., and I. J. Birdthistle. Long-Term Effects of a Community-Wide Alcohol Server Training Intervention. *Journal of Studies on Alcohol*, Vol. 60, 1999, pp. 27–36.

Calfee, J. E., and C. Scheraga. The Influence of Alcohol Advertising on Alcohol Consumption: A Literature Review and an Econometric Analysis of Four European Nations. *International Journal of Advertising*, Vol. 13, 1994, pp. 287–310.

Cameron, M., A. Cavallo, and G. Sullivan. *Evaluation of the Random Breath Testing Initiative in Victoria, 1989–1991: Multivariate Time Series Approach*. Report 38. Monash University Accident Research Centre, Victoria, Australia, 1992.

Cameron, M., K. Diamantopoulou, N. Mullan, D. Dyte, and S. Gantzer. *Evaluation of the Country Random Breath Testing and Publicity Program in Victoria, 1993–1994*. Report 126. Monash University Accident Research Centre, Victoria, Australia, 1997.

Casiro, O. G., R. S. Stanwick, A. Pelech, V. Taylor, F. Friesen, M. Fast, D. Peabody, L. Alto, G. Edye-Mazowita, H. Dean, and A. Esquivel. Public Awareness of the Risks of Drinking Alcohol During Pregnancy: The Effects of a Television Campaign. *Canadian Journal of Public Health*, Vol. 85, 1994, pp. 23–27.

Casswell, S., and J. F. Zhang. Impact of Liking for Advertising and Brand Allegiance on Drinking and Alcohol-Related Aggression: A Longitudinal Study. *Addiction*, Vol. 93, 1998, pp. 1209–1217.
Caudill, B. D., W. M. Harding, and B. A. Moore. DWI Prevention: Profiles of Drinkers Who Serve as Designated Drivers. *Psychology of Addictive Behaviors*, Vol. 14, 2000a, pp. 143–150.
Caudill, B. D., W. M. Harding, and B. A. Moore. At-Risk Drinkers Use Safe Ride Services to Avoid Drinking and Driving. *Journal of Substance Use*, Vol. 11, 2000b, pp. 149–159.
Caudill, B. D., W. M. Harding, and B. A. Moore. DWI Prevention: Profiles of Drinkers Who Use Designated Drivers. *Addictive Behaviors: An International Journal*, Vol. 26, 2001, pp. 155–166.
Chaloupka, F. J. Public Policies and Private Anti-Health Behavior. *American Economic Review*, Vol. 85, 1995, pp. 45–49.
Chaloupka, F. J., M. Grossman, and H. Saffer. Effects of Price on the Consequences of Alcohol Use and Abuse. *Recent Developments in Alcoholism, Vol. 14: The Consequences of Alcoholism* (M. Galanter, ed.). Plenum Press, New York, 1998, pp. 331–346.
Chaloupka, F. J., H. Saffer, and M. Grossman. Alcohol Control Policies and Motor Vehicle Fatalities. *Journal of Legal Studies*, Vol. 22, 1993, pp. 161–186.
Chikritzhs, T., and T. Stockwell. The Impact of Later Trading Hours for Australian Public Houses (Hotels) on Levels of Violence. *Journal of Studies on Alcohol*, Vol. 63, 2002, pp. 591–599.
Coate, D., and M. Grossman. Effects of Alcoholic Beverage Prices and Legal Drinking Ages on Youth Alcohol Use. *Journal of Law and Economics*, Vol. 31, 1988, pp. 145–171.
Cohen, D. A., K. Mason, and R. A. Scribner. The Population Consumption Model, Alcohol Control Practices, and Alcohol-Related Traffic Fatalities. *Preventive Medicine*, Vol. 34, 2001, pp. 187–197.
Connolly, G., S. Casswell, J. F. Zhang, and P. A. Silva. Alcohol in the Mass Media and Drinking by Adolescents: A Longitudinal Study. *Addiction*, Vol. 89, 1994, pp. 1255–1263.
Dee, T. S. State Alcohol Policies, Teen Drinking, and Traffic Fatalities. *Journal of Public Economics*, Vol. 72, 1999, pp. 289–315.
Dee, T. S. Effects of Minimum Legal Drinking Ages on Teen Childbearing. *Journal of Human Resources*, Vol. 36, 2001, pp. 824–838.
DeJong, W., and C. K. Atkin. A Review of National Television PSA Campaigns for Preventing Alcohol-Impaired Driving, 1987–1992. *Journal of Public Health Policy*, Vol. 16, 1995, pp. 59–80.
DeJong, W., and R. Hingson. Strategies to Reduce Driving Under the Influence of Alcohol. *Annual Review of Public Health*, Vol. 19, 1998, pp. 359–378.
DeJong, W., and J. A. Winsten. Use of Designated Drivers by U.S. College Students: A National Study. *Journal of American College Health*, Vol. 47, 1999, pp. 151–156.
Donnelly, N., and S. Briscoe. Signs of Intoxication and Server Intervention Among 18- to 39-Year-Olds Drinking at Licensed Premises in New South Wales, Australia. *Addiction*, Vol. 98, 2003, pp. 1287–1295.
Dresser, J., and L. Gliksman. Comparing Statewide Alcohol Server Training Systems. *Pharmacology, Biochemistry, and Behavior*, Vol. 61, 1998, p. 150.
Drummond, A. E., G. Sullivan, and A. Cavallo. *An Evaluation of the Random Breath Testing Initiative in Victoria 1989–1990 Quasi-Experimental Time Series Approach*. Report 37. Monash University Accident Research Centre, Victoria, Australia, 1992.
Drummond, D. C. U.K. Government Announces First Major Relaxation in the Alcohol Licensing Laws for Nearly a Century: Drinking in the U.K. Goes 24-7. *Addiction*, Vol. 95, 2000, pp. 997–998.
Duffy, M. Advertising in Demand Systems for Alcoholic Drinks and Tobacco: A Comparative Study. *Journal of Policy Modeling*, Vol. 17, 1995, pp. 557–577.
Duffy, M. Advertising in Consumer Allocation Models: Choice of Functional Form. *Applied Economics*, Vol. 33, 2001, pp. 437–456.
DuMouchel, W., A. F. Williams, and P. Zador. Raising the Alcohol Purchase Age: Its Effects on Fatal Motor Vehicle Crashes in Twenty-Six States. *Journal of Legal Studies*, Vol. 16, 1987, pp. 249–266.
Dunbar, J. A., A. Penttila, and J. Pikkarainen. Drinking and Driving: Success of Random Breath Testing in Finland. *British Medical Journal*, Vol. 295, 1987a, pp. 101–103.

Dunbar, J. A., A. Penttila, and J. Pikkarainen. Random Breath Testing: An Effective Means of Reducing Drinking and Driving and Identifying Problem Drinkers. In *Alcohol, Drugs and Traffic Safety—T86* (P. C. Noordzij and R. Roszbach, eds.), Elsevier, Amsterdam, Netherlands, 1987b, pp. 517–520.

Ferguson, S. A., M. Fields, and R. B. Voas. Enforcement of Zero Tolerance Laws in the United States. Presented at the 15th International Conference on Alcohol, Drugs, and Traffic Safety, Stockholm, Sweden, 2000.

Fergusson, D. M., and M. T. Lynskey. Alcohol Misuse and Adolescent Sexual Behaviors and Risk Taking. *Pediatrics*, Vol. 98, 1996, pp. 91–96.

Fergusson, D. M., M. T. Lynskey, and L. J. Horwood. Alcohol Misuse and Juvenile Offending in Adolescence. *Addiction*, Vol. 91, 1996, pp. 483–494.

Findlay, R. A., M. C. Sheehan, J. Davey, H. Brodie, and F. Rynne. Liquor Law Enforcement: Policy and Practice in Australia. *Drugs: Education, Prevention and Policy*, Vol. 9, 2002, pp. 85–94.

Fisher, J. C. *Advertising, Alcohol Consumption, and Abuse: A Worldwide Survey*. Greenwood Press, Westport, Conn., 1993.

Forster, J. L., P. G. McGovern, A. C. Wagenaar, M. Wolfson, C. L. Perry, and P. S. Anstine. The Ability of Young People to Purchase Alcohol Without Age Identification in Northeastern Minnesota, USA. *Addiction*, Vol. 89, 1994, pp. 699–705.

Forster, J. L., D. M. Murray, M. Wolfson, and A. C. Wagenaar. Commercial Availability of Alcohol to Young People: Results of Alcohol Purchase Attempts. *Preventive Medicine*, Vol. 24, 1995, pp. 342–347.

Foss, R. D., R. J. Stewart, and D. W. Reinfurt. *Evaluation of North Carolina's 0.08% BAC Law*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1998. www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/Rpts/1998/NC08.pdf.

Giesbrecht, N., and T. K. Greenfield. Public Opinions on Alcohol Policy Issues: A Comparison of American and Canadian Surveys. *Addiction*, Vol. 94, 1999, pp. 521–531.

Gliksman, L., D. McKenzie, E. Single, R. Douglas, S. Brunet, and K. Moffatt. Role of Alcohol Providers in Prevention: An Evaluation of a Server Intervention Programme. *Addiction*, Vol. 88, 1993, pp. 1195–1203.

Gorman, D. M., E. W. Labouvie, P. W. Speer, and A. P. Subaiya. Alcohol Availability and Domestic Violence. *American Journal of Drug and Alcohol Abuse*, Vol. 24, 1998b, pp. 661–673.

Gorman, D. M., P. W. Speer, E. W. Labouvie, and A. P. Subaiya. Risk of Assaultive Violence and Alcohol Availability in New Jersey. *American Journal of Public Health*, Vol. 88, 1998a, pp. 97–100.

Graham, C. A., L. S. McLeod, and D. J. Steedman. Restricting Extensions to Permitted Licensing Hours Does Not Influence the Numbers of Alcohol or Assault-Related Attendances at an Inner City Accident and Emergency Department. *Journal of Accident and Emergency Medicine*, Vol. 15, 1998, pp. 23–25.

Grossman, M., F. J. Chaloupka, H. Saffer, and A. Laixuthai. Effects of Alcohol Price Policy on Youth: A Summary of Economic Research. *Alcohol Problems Among Adolescents: Current Directions in Prevention Research* (G. M. Boyd, J. Howard, and R. A. Zucker, eds.). Lawrence Erlbaum Associates, Hillsdale, N.J., 1995, pp. 225–242.

Grube, J. W. Preventing Sales of Alcohol to Minors: Results from a Community Trial. *Addiction*, Vol. 92, No. 2 (supplement), 1997, pp. S251–S260.

Grube, J. W., and P. Nygaard. Adolescent Drinking and Alcohol Policy. *Contemporary Drug Problems*, Vol. 28, 2001, pp. 87–131.

Grube, J. W., and L. Wallack. Television Beer Advertising and Drinking Knowledge, Beliefs, and Intentions Among School Children. *American Journal of Public Health*, Vol. 84, 1994, pp. 254–259.

Gruenewald, P. J., F. W. Johnson, and A. J. Treno. Outlets, Drinking and Driving: A Multilevel Analysis of Availability. *Journal of Studies on Alcohol*, Vol. 63, 2002, pp. 460–468.

Gruenewald, P. J., A. Millar, W. R. Ponicki, and G. Brinkley. Physical and Economic Access to Alcohol: The Application of Geostatistical Methods to Small Area Analysis in Community Settings. In *The Epidemiology of Alcohol Problems in Small Geographic Areas* (R. A. Wilson and M. C. Dufour, eds.). National Institute on Alcohol Abuse and Alcoholism, Bethesda, Md., 2000, pp. 163–212.

Gruenewald, P. J., W. R. Ponicki, and H. D. Holder. The Relationship of Outlet Densities to Alcohol Consumption: A Time Series Cross-Sectional Analysis. *Alcoholism: Clinical and Experimental Research*, Vol. 17, 1993, pp. 38–47.

Harding, W. M., B. D. Caudill, B. A. Moore, and K. C. Frissell. Do Drivers Drink More When They Use a Safe Ride? *Journal of Substance Abuse*, Vol. 13, 2001, pp. 283–290.

Harwood, H. J. *Economic Costs of Alcohol Abuse in the United States: Estimates, Update Methods, and Data*. NIH Publication 98-4327. National Institute on Alcohol Abuse and Alcoholism, 2000. www.niaaa.nih.gov/publications/economic-2000/.

Haworth, N. *Young Driver Research Program: Evaluation of Australian Graduated Licensing Scheme*. Federal Office of Road Safety, Canberra, Australia, 1994.

Hingson, R. W., T. Heeren, and M. Winter. Effects of Lower Legal Blood Alcohol Limits for Young and Adult Drivers. *Alcohol, Drugs and Driving*, Vol. 10, 1994, pp. 243–252.

Hingson, R., T. Heeren, and M. Winter. Lowering State Legal Blood Alcohol Limits to 0.08%: The Effect on Fatal Motor Vehicle Crashes. *American Journal of Public Health*, Vol. 86, 1996, pp. 1297–1299.

Hingson, R. W., J. Howland, and S. Levenson. Effects of Legislative Reform to Reduce Drunken Driving and Alcohol-Related Traffic Fatalities. *Public Health Reports*, Vol. 103, 1988a, pp. 659–667.

Hingson, R. W., J. Howland, S. Morelock, and T. Heeren. Legal Interventions to Reduce Drunken Driving and Related Fatalities Among Youthful Drivers. *Alcohol, Drugs and Driving*, Vol. 4, 1988b, pp. 87–98.

Holder, H. D., K. Janes, J. Mosher, R. F. Saltz, S. Spurr, and A. C. Wagenaar. Alcoholic Beverage Server Liability and the Reduction of Alcohol-Involved Problems. *Journal of Studies on Alcohol*, Vol. 54, 1993, pp. 23–36.

Holder, H. D., and A. J. Treno. Media Advocacy in Community Prevention: News as a Means to Enhance Policy Change. *Addiction*, Vol. 92, No. 2 (supplement), 1997, pp. S189–S199.

Holder, H. D., and A. C. Wagenaar. Mandated Server Training and Reduced Alcohol-Involved Traffic Crashes: A Time Series Analysis of the Oregon Experience. *Accident Analysis and Prevention*, Vol. 26, 1994, pp. 89–97.

Homel, R. Random Breath Testing in Australia: A Complex Deterrent. *Australian Drug and Alcohol Review*, Vol. 7, 1988, pp. 231–241.

Inciardi, J. A., and L. D. Harrison. Introduction: The Concept of Harm Reduction. In *Harm Reduction: National and International Perspectives* (J. A. Inciardi and L. D. Harrison, eds.). Sage, Thousand Oaks, Calif., 1999, pp. vii–xix.

Jeffs, B. W., and W. M. Saunders. Minimising Alcohol Related Offences by Enforcement of the Existing Licensing Legislation. *British Journal of Addiction*, Vol. 78, 1983, pp. 67–77.

Johnston, L. D., P. M. O'Malley, and J. G. Bachman. *Monitoring the Future National Survey Results on Drug Use: 1975–2001. Volume I: Secondary School Students*. NIH Publication 02-5106. National Institute on Drug Abuse, Bethesda, Md., 2002.

Kaskutas, L., and T. K. Greenfield. First Effects of Warning Labels on Alcoholic Beverage Containers. *Drug and Alcohol Dependence*, Vol. 31, 1992, pp. 1–14.

Klepp, K. I., L. A. Schmid, and D. M. Murray. Effects of the Increased Minimum Drinking Age Law on Drinking and Driving Behavior Among Adolescents. *Addiction Research*, Vol. 4, 1996, pp. 237–244.

Lacey, J. H., R. K. Jones, and R. G. Smith. *Evaluation of Checkpoint Tennessee: Tennessee's Statewide Sobriety Checkpoint Program*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1999.

Laixuthai, A., and F. J. Chaloupka. Youth Alcohol Use and Public Policy. *Contemporary Policy Issues*, Vol. 11, 1993, pp. 70–81.

Lang, E., T. Stockwell, P. Rydon, and A. Beel. Use of Pseudo-Patrons to Assess Compliance with Laws Regarding Underage Drinking. *Australian and New Zealand Journal of Public Health*, Vol. 20, 1996, pp. 296–300.

Lang, E., T. Stockwell, P. Rydon, and A. Beel. Can Training Bar Staff in Responsible Serving Practices Reduce Alcohol-Related Harm? *Drug and Alcohol Review*, Vol. 17, 1998, pp. 39–50.

Langley, J. D., A. C. Wagenaar, and D. J. Begg. An Evaluation of the New Zealand Graduated Driver Licensing System. *Accident Analysis and Prevention*, Vol. 28, 1996, pp. 139–146.

LaScala, E. A., E. Gerber, and P. J. Gruenewald. Demographic and Environmental Correlates of Pedestrian Injury Collisions: A Spatial Analysis. *Accident Analysis and Prevention*, Vol. 32, 2000, pp. 651–658.

Levy, D. T., T. R. Miller, and K. C. Cox. *Costs of Underage Drinking* (updated version). Pacific Institute for Research and Evaluation, Beltsville, Md., 1999.

Lewis, R. K., A. Paine-Andrews, S. B. Fawcett, V. T. Francisco, K. P. Richter, B. Copple, and J. E. Copple. Evaluating the Effects of a Community Coalition's Efforts to Reduce Illegal Sales of Alcohol and Tobacco Products to Minors. *Journal of Community Health*, Vol. 21, 1996, pp. 429–436.

Lipton, R., and P. Gruenewald. Spatial Dynamics of Violence and Alcohol Outlets. *Journal of Studies on Alcohol*, Vol. 63, 2002, pp. 187–195.

MacKinnon, D. P., M. A. Pentz, and A. W. Stacy. Alcohol Warning Labels and Adolescents: The First Year. *American Journal of Public Health*, Vol. 83, 1993, pp. 585–587.

Mäkelä, K., E. Österberg, and P. Sulkunen. Drink in Finland: Increasing Alcohol Availability in a Monopoly State. In *Alcohol, Society, and the State 2, The Social History of Control in Seven Countries* (E. Single, P. Morgan, and L. de Lint, eds.). Addiction Research Foundation, Toronto, Canada, 1981, pp. 31–60.

Mäkelä, P. Who Started to Drink More? A Reanalysis of the Change Resulting from a New Alcohol Law in Finland in 1969. *The Effects of Nordic Alcohol Policies: What Happens to Drinking and Harm When Alcohol Controls Change?* (R. Room, ed.). Nordic Council for Alcohol and Drug Research, Helsinki, Finland, 2002, pp. 71–82.

Mann, R. E., G. Stoduto, L. Anglin, B. Pavic, F. Fallon, R. Lauzon, and O. A. Amitay. Graduated Licensing in Ontario: Impact of the 0 BAL Provision on Adolescents' Drinking–Driving. *Alcohol, Drugs, and Traffic Safety: Volume 3* (C. Mercier-Guyon, ed.). Centre d'Etudes et de Recherches en Médecine du Trafic, Annecy, France, 1997, pp. 1055–1060.

Martin, S. E., L. Snyder, M. Hamilton, F. Fleming-Milici, M. Slater, A. Stacy, M.-J. Chen, and J. W. Grube. Alcohol Advertising and Youth. *Alcoholism: Clinical and Experimental Research*, Vol. 26, 2002, pp. 900–906.

Mauss, A. L., R. H. Hopkins, R. A. Weisheit, and K. A. Kearney. Problematic Prospects for Prevention in the Classroom: Should Alcohol Education Programs Be Expected to Reduce Drinking by Youth? *Journal of Studies on Alcohol*, Vol. 49, 1988, pp. 51–61.

McCaul, K. A., and A. J. Mclean. Publicity, Police Resources and the Effectiveness of Random Breath Testing. *Medical Journal of Australia*, Vol. 152, 1990, pp. 284–286.

McKnight, A. J., and F. M. Streff. Effect of Enforcement upon Service of Alcohol to Intoxicated Patrons of Bars and Restaurants. *Accident Analysis and Prevention*, Vol. 26, 1994, pp. 79–88.

McLaughlin, K. L., and A. J. Harrison-Stewart. The Effect of a Temporary Period of Relaxed Licensing Laws on the Alcohol Consumption of Young Male Drinkers. *International Journal of the Addictions*, Vol. 27, 1992, pp. 409–423.

Mosher, J. Dram Shop Law and the Prevention of Alcohol Related Problems. *Journal of Studies on Alcohol*, Vol. 40, 1979, pp. 773–798.

Mosher, J., et al. Liquor Liability Law. Matthew Bender, 2002. www.lexisnexis.com/ matthewbender/.

Mustonen, H., and R. Sund. Changes in the Characteristics of Drinking Occasions Resulting from Liberalization of Alcohol Availability: A Reanalysis of the 1968 and 1969 Finnish Panel Survey Data. *The Effects of Nordic Alcohol Policies: What Happens to Drinking and Harm When Alcohol Controls Change?* (R. Room, ed.). Nordic Council for Alcohol and Drug Research, Helsinki, Finland, 2001, pp. 83–94.

National Highway Traffic Safety Administration. *Traffic Safety Facts 2002: Alcohol.* DOT HS 809 470. National Center for Statistics and Analysis, Washington, D.C., 2003. www-nrd.nhtsa.dot.gov/pdf/nrd-30/NCSA/TSF2002/2002alcfacts.pdf.

National Research Council and Institute of Medicine. *Reducing Underage Drinking: A Collective Responsibility* (R. J. Bonnie and M. E. O'Connell, eds.). Committee on Developing a Strategy to Reduce and Prevent Underage Drinking; Board on Children, Youth, and Families; Division of Behavioral and Social Sciences and Education; National Academies Press, Washington, D.C., 2003.

Nelson, J. P. Broadcast Advertising in the U.S. and Demand for Alcoholic Beverages. *Southern Economic Journal*, Vol. 66, 1999, pp. 774–790.

Nelson, J. P. Alcohol Advertising and Advertising Bans: A Survey of Research Methods, Results, and Policy Implications. *Advertising and Differentiated Products*, Vol. 10, 2001, pp. 239–295.

Nelson, J. P., and D. J. Young. Do Advertising Bans Work? An International Comparison. *International Journal of Advertising*, Vol. 20, 2001, pp. 273–296.

Nelson, J. P., and J. R. Moran. Advertising and U.S. Alcoholic Beverage Demand: Systemwide Estimates. *Applied Economics*, Vol. 27, 1995, pp. 1225–1236.

Nygaard, P., E. D. Waiters, J. W. Grube, and D. Keefe. Why Do They Do It? A Qualitative Study of Adolescent Drinking and Driving. *Substance Use and Misuse*, Vol. 38, 2003, pp. 835–863.

Office of Juvenile Justice and Delinquency Prevention. *Insights from the 1997 National Household Survey on Drug Abuse: Underage Drinking and Binge Drinking*. Pacific Institute for Research and Evaluation, Rockville, Md., 2000.

O'Malley, P. M., and A. C. Wagenaar. Effects of Minimum Drinking Age Laws on Alcohol Use, Related Behaviors and Traffic Crash Involvement Among American Youths, 1976–1987. *Journal of Studies on Alcohol*, Vol. 52, 1991, pp. 478–491.

Pacula, R. L. Does Increasing the Beer Tax Decrease Marijuana Consumption? *Journal of Health Economics*, Vol. 17, 1998, pp. 557–585.

Peek-Asa, C. The Effect of Random Alcohol Screening in Reducing Motor Vehicle Crash Injuries. *American Journal of Preventive Medicine*, Vol. 16, 1999, pp. 57–67.

Preusser, D. F., and A. F. Williams. Sales of Alcohol to Underage Purchasers in Three New York Counties and Washington, D.C. *Journal of Public Health Policy*, Vol. 13, 1992, pp. 306–317.

Riley, D., and P. O'Hare. Harm Reduction: History, Definition, and Practice. In *Harm Reduction: National and International Perspectives* (J. A. Inciardi and L. D. Harrison, eds.). Sage, Thousand Oaks, Calif., 1999, pp. 1–26.

Room, R., K. Graves, N. Giesbrecht, and T. Greenfield. Trends in Public Opinion About Alcohol Policy Initiatives in Ontario and the U.S., 1989–91. *Drug and Alcohol Review*, Vol. 14, 1995, pp. 35–47.

Ross, H. L. *Deterring the Drinking Driver*. Lexington Books, Lexington, Mass., 1982.

Saffer, H. Alcohol Advertising Bans and Alcohol Abuse: An International Perspective. *Journal of Health Economics*, Vol. 10, 1991, pp. 65–79.

Saffer, H. Alcohol Advertising and Motor Vehicle Fatalities. *Review of Economics and Statistics*, Vol. 79, 1997, pp. 431–442.

Saffer, H., and D. Dave. Alcohol Consumption and Alcohol Advertising Bans. *Applied Economics*, Vol. 5, 2002, pp. 1325–1334.

Saffer, H., and M. Grossman. Drinking Age Laws and Highway Mortality Rates: Cause and Effect. *Economic Inquiry*, Vol. 25, 1987a, pp. 403–417.

Saffer, H., and M. Grossman. Beer Taxes, the Legal Drinking Age, and Youth Motor Vehicle Fatalities. *Journal of Legal Studies*, Vol. 16, 1987b, pp. 351–374.

Saltz, R. F. Roles of Bars and Restaurants in Preventing Alcohol-Impaired Driving: An Evaluation of Server Intervention. *Evaluation and Health Professions*, Vol. 10, 1987, pp. 5–27.

Saltz, R. F. Research Needs and Opportunities in Server Intervention Programs. *Health Education Quarterly*, Vol. 16, 1989, pp. 429–438.

Saltz, R. F. Prevention Where Alcohol Is Sold and Consumed: Server Intervention and Responsible Beverage Service. *Alcohol: Minimising the Harm: What Works?* (M. Plant, E. Single, and T. Stockwell, eds.). Free Association Books Ltd., New York, 1997, pp. 72–84.

Saltz, R. F., and P. Stanghetta. A Community-Wide Responsible Beverage Service Program in Three Communities: Early Findings. *Addiction*, Vol. 92, No. 2 (supp.), 1997, pp. S237–S249.

Scheinberg, P. *Highway Safety: Effectiveness of State .08 Blood Alcohol Laws.* GAO Report RCED-99-179. General Accounting Office, Washington, D.C., 1999. www.gao.gov/archive/ 1999/rc99179.pdf.

Scribner, R. A., and D. A. Cohen. The Effect of Enforcement on Merchant Compliance with the Minimum Legal Drinking Age Law. *Journal of Drug Issues*, Vol. 31, 2001, pp. 857–866.

Scribner, R. A., D. A. Cohen, and W. Fisher. Evidence of a Structural Effect for Alcohol Outlet Density: A Multilevel Analysis. *Alcoholism: Clinical and Experimental Research*, Vol. 24, 2000, pp. 188–195.

Scribner, R. A., D. A. Cohen, S. Kaplan, and S. H. Allen. Alcohol Availability and Homicide in New Orleans: Conceptual Considerations for Small Area Analysis of the Effect of Alcohol Outlet Density. *Journal of Studies on Alcohol*, Vol. 60, 1999, pp. 310–316.

Scribner, R. A., D. P. MacKinnon, and J. H. Dwyer. Alcohol Outlet Density and Motor Vehicle Crashes in Los Angeles County Cities. *Journal of Studies on Alcohol*, Vol. 55, 1994, pp. 447–453.

Simpura, J. Drinking Patterns and Alcohol Policy: Prospects and Limitations of a Policy Approach. *Nordisk alkohol- and Narkotikatidskrift* (*Nordic Studies on Alcohol and Drugs*), Vol. 16 (English supplement), 1999, pp. 35–45.

Shope, J. T., and L. J. Molnar. Graduated Driver Licensing in the United States: Evaluation of Results from Early Programs. *Journal of Safety Research*, Vol. 34, 2003, pp. 63–69.

Shope, J. T., L. J. Molnar, M. R. Elliott, and P. F. Waller. Graduated Driver Licensing in Michigan: Early Impact on Motor Vehicle Crashes Among 16-Year-Old Drivers. *Journal of the American Medical Association*, Vol. 286, 2001, pp. 1593–1598.

Skog, O. J. The Collectivity of Drinking Cultures: A Theory of the Distribution of Alcohol Consumption. *British Journal of Addiction*, Vol. 80, 1985, pp. 83–99.

Skog, O. J. Prevention Paradox Revisited. *Addiction*, Vol. 94, 1999, pp. 751–757.

Slater, M. D. Drinking and Driving PSAs: A Content Analysis of Behavioral Influence Strategies. *Journal of Alcohol and Drug Education*, Vol. 44, 1999, pp. 68–81.

Sloan, F. A., B. A. Reilly, and C. Schenzler. Effects of Prices, Civil and Criminal Sanctions, and Law Enforcement on Alcohol-Related Mortality. *Journal of Studies on Alcohol*, Vol. 55, 1994, pp. 454–465.

Sloan, F. A., E. M. Stout, K. Whetten-Goldstein, and L. Liang. *Drinkers, Drivers, and Bartenders: Balancing Private Choices and Public Accountability*. University of Chicago Press, Ill., 2000.

Smith, D. I. Effect of Low Proscribed Blood Alcohol Levels (BALs) on Traffic Accidents Among Newly Licensed Drivers. *Medical Science and the Law*, Vol. 26, 1986, pp. 144–148.

Smith, D. I. Extended Alcohol Trading Hours During the 1982 Brisbane Commonwealth Games and Traffic Accidents. *Australian Drug and Alcohol Review*, Vol. 7, 1988a, pp. 363–367.

Smith, D. I. Effect of Casualty Traffic Accidents of the Introduction of 10 p.m. Monday to Saturday Hotel Closing in Victoria. *Australian Drug and Alcohol Review*, Vol. 7, 1988b, pp. 163–166.

Span, D. B. E. *Enforcement of Drink-Driving Legislation: Perceptions of and Attitudes Towards Random Breath Testing: Selected Results from a Survey on the Topic of Drink-Driving and Random Breath Testing, March 1987*. Roads and Traffic Authority, New South Wales, Australia, 1989.

Speer, P. W., D. M. Gorman, E. W. Labouvie, and M. J. Ontkush. Violent Crime and Alcohol Availability: Relationships in an Urban Community. *Journal of Public Health Policy*, Vol. 19, 1998, pp. 303–318.

Stockwell, T., and G. Gruenewald. Controls on the Physical Availability of Alcohol. *International Handbook of Alcohol Dependence and Problems* (N. Heather, T. J. Peters, and T. Stockwell, eds.). Wiley, Chichester, England, 2001, pp. 699–719.

Stout, E. M., F. A. Sloan, L. Liang, and H. H. Davies. Reducing Harmful Alcohol-Related Behaviors: Effective Regulatory Methods. *Journal of Studies on Alcohol*, Vol. 61, 2000, pp. 402–412.

Stuster, J. W., and P. A. Blowers. *Experimental Evaluation of Sobriety Checkpoint Programs*. National Highway Traffic Safety Administration, U.S. Department of Transportation, 1995.

Substance Abuse and Mental Health Services Administration. *Summary of Findings from the 2002 National Survey on Drug Use and Health (NSDUH)*. Department of Health and Human Services, Rockville, Md., 2003. www.samhsa.gov/oas/nhsda/2k2nsduh/ Overview/2k2Overview.htm#chap1.

Toomey, T. L., G. R. Kilian, J. P. Gehan, C. L. Perry, R. Jones-Webb, and A. C. Wagenaar. Qualitative Assessment of Training Programs for Alcohol Servers and Establishment Managers. *Public Health Reports*, Vol. 113, 1998, pp. 162–169.

Toomey, T. L., and A. C. Wagenaar. Policy Options for Prevention: The Case of Alcohol. *Journal of Public Health Policy*, Vol. 20, 1999, pp. 193–212.

Toomey, T. L., A. C. Wagenaar, J. P. Gehan, G. Kilian, D. M. Murray, and C. L. Perry. Project ARM: Alcohol Risk Management to Prevent Sales to Underage and Intoxicated Patrons. *Health Education and Behavior*, Vol. 28, 2001, pp. 186–199.

Treno, A. J., J. W. Grube, and S. Martin. Alcohol Outlet Density as a Predictor of Youth Drinking and Driving: A Hierarchical Analysis. *Alcoholism: Clinical and Experimental Research*, Vol. 27, 2003, pp. 835–840.

Ulmer, R. G., S. A. Ferguson, A. F. Williams, and D. F. Preusser. *Teenage Crash Reduction Associated with Delayed Licensure in Connecticut. Insurance*. Institute for Highway Safety, Arlington, Va., 2000.

Villaveces, A., P. Cummings, T. D. Koepsell, F. P. Rivera, T. Lumley, and J. Moffat. Association of Alcohol-Related Laws with Deaths Due to Motor Vehicle and Motorcycle Crashes in the United States, 1980–1997. *American Journal of Epidemiology*, Vol. 157, 2003, pp. 131–140.

Voas, R. B., J. E. Lange, and M. B. Johnson. Reducing High-Risk Drinking by Young Americans South of the Border: The Impact of a Partial Ban on Sales of Alcohol. *Journal of Studies on Alcohol*, Vol. 63, 2002a, pp. 286–292.

Voas, R. B., J. E. Lange, and A. E. Tippetts. Enforcement of the Zero Tolerance Law in California: A Missed Opportunity? *42nd Annual Proceedings of the Association for the Advancement of Automotive Medicine*. Association for the Advancement of Automotive Medicine, Des Plaines, Ill., 1998, pp. 369–383.

Voas, R. B., S. Tippetts, and J. C. Fell. Assessing the Effectiveness of Minimum Legal Drinking Age and Zero Tolerance Laws in the United States. *Accident Analysis and Prevention*, Vol. 35, 2002c, pp. 579–587.

Voas, R. B., S. Tippetts, and E. P. Taylor. The Illinois .08 Law: An Evaluation. *Journal of Safety Research*, Vol. 33, 2002b, pp. 73–80.

Wagenaar, A. C. Effects of an Increase in the Legal Minimum Drinking Age. *Journal of Health Policy*, Vol. 2, 1981, pp. 206–225.

Wagenaar, A. C. Preventing Highway Crashes by Raising the Legal Minimum Age for Drinking: The Michigan Experience 6 Years Later. *Journal of Safety Research*, Vol. 17, 1986, pp. 101–109.

Wagenaar, A. C., E. H. Harwood, T. L. Toomey, C. E. Denk, and K. M. Zander. Public Opinion on Alcohol Policies in the United States: Results from a National Survey. *Journal of Public Health Policy*, Vol. 21, 2000, pp. 303–327.

Wagenaar, A. C., and H. D. Holder. Effects of an Alcohol Beverage Server Liability Law on Traffic Crash Injuries. *Alcoholism: Clinical and Experimental Research*, Vol. 15, 1991, pp. 942–947.

Wagenaar, A. C., and R. G. Maybee. Legal Minimum Drinking Age in Texas: Effects of an Increase from 18 to 19. *Journal of Safety Research*, Vol. 17, 1986, pp. 165–178.

Wagenaar, A. C., P. M. O'Malley, and C. LaFond. Very Low Legal BAC Limits for Young Drivers: Effects on Drinking, Driving, and Driving-After-Drinking Behaviors in 30 States. *American Journal of Public Health*, Vol. 91, 2001, pp. 801–804.

Wagenaar, A. C., and M. Wolfson. Enforcement of the Legal Minimum Drinking Age in the United States. *Journal of Public Health Policy*, Vol. 15, 1994, pp. 37–53.

Wagenaar, A. C., and M. Wolfson. Deterring Sales and Provision of Alcohol to Minors: A Study of Enforcement in 295 Counties in Four States. *Public Health Reports*, Vol. 110, 1995, pp. 419–427.

Wechsler, H., B. E. Molnar, A. E. Davenport, and J. S. Baer. College Alcohol Use: A Full or Empty Glass? *Journal of American College Health*, Vol. 47, 1999, pp. 247–252.

Wells, J. K., M. A. Greene, R. D. Foss, S. A. Ferguson, and A. F. Williams. *Drivers with High BACs Missed at Sobriety Checkpoints*. Insurance Institute for Highway Safety, Arlington, Va., 1996.

Whetten-Goldstein, K., F. A. Sloan, E. Stout, and L. Liang. Civil Liability, Criminal Law, and Other Policies and Alcohol-Related Motor Vehicle Fatalities in the United States: 1984–1995. *Accident Analysis and Prevention*, Vol. 32, 2000, pp. 723–733.

Wolfson, M., T. L. Toomey, J. L. Forster, A. C. Wagenaar, P. G. McGovern, and C. L. Perry. Characteristics, Policies and Practices of Alcohol Outlets and Sales to Underage Persons. *Journal of Studies on Alcohol*, Vol. 57, 1996a, pp. 670–674.

Wolfson, M., T. L. Toomey, D. M. Murray, J. L. Forster, B. J. Short, and A. C. Wagenaar. Alcohol Outlet Policies and Practices Concerning Sales to Underage People. *Addiction*, Vol. 91, 1996b, pp. 589–602.

Wyllie, A., J. F. Zhang, and S. Casswell. Positive Responses to Televised Beer Advertisements Associated with Drinking and Problems Reported by 18- to 29-Year-Olds. *Addiction*, Vol. 93, 1998, pp. 749–760.

Young, D. J. Alcohol Advertising Bans and Alcohol Abuse: Comment. *Journal of Health Economics*, Vol. 12, 1993, pp. 213–228.

Yu, J., R. Varone, and R. W. Shacket. *Fifteen-Year Review of Drinking Age Laws: Preliminary Findings of the 1996 New York State Youth Alcohol Survey*. Office of Alcoholism and Substance Abuse, New York, 1997.

Zwerling, C., and M. P. Jones. Evaluation of the Effectiveness of Low Blood Alcohol Concentration Laws for Younger Drivers. *American Journal of Preventive Medicine*, Vol. 16, No. 1 (supplement), 1999, pp. 76–80.

Case Studies

Success Stories

CASE STUDIES: SUCCESS STORIES

Measuring Successful Community Action in Alcohol Prevention

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This paper will discuss documentation of the success of local efforts supported by the Underage Drinking Enforcement Training Center (UDETC). The United States Department of Justice (DOJ) provides grants to states for prevention efforts targeting underage drinking; recipients spend these funds with a focus on community action. To coordinate these efforts, the DOJ created UDETC, with responsibility to assist communities in developing, implementing, and evaluating comprehensive approaches to prevention, including adoption of appropriate, research-based strategies. Measuring outcomes of this project can be challenging; results sometimes take years to manifest in survey data. To provide immediate documentation of local action, the center creates and distributes one-page success stories. The stories are developed from firsthand community experience and supporting evidence according to one of two criteria: a measurable reduction of alcohol-related problems and a significant change in policy likely to reduce underage drinking as determined by scientific research and analysis. Using those criteria, the center can measure and document success before statistical data on youth drinking becomes available. This paper presents the project structure and design, its implementation strategy, and success stories as a measure of outcome, with actual success stories as case studies.

BACKGROUND

In the early 20th century, America ended its experiment with prohibition by delegating authority for alcohol control and regulation to the separate states. In most of these states, the drinking age was set at or near 21. In the 1960s and 1970s, several states began lowering their drinking age, at a time when other thresholds—such as the voting age—were being lowered as well. These reductions led to increased concerns about alcohol-related harm among young people, and some states began raising their drinking ages in the mid-1970s. In the 1980s, the lowering trend was completely reversed by passage of national legislation setting the minimum drinking age at 21 years of age. This legislation has produced enormously positive results; for example, the National Highway Traffic Safety Administration (NHTSA) (2003) estimates that 19,121 lives have been saved by higher minimum-drinking-age laws since 1975. Despite this success, underage drinking continues to be a dire problem for communities across America. Aside from the minimum drinking age, states still retain the authority to regulate (or not) alcohol; this has created a patchwork of legislation and policies across the country. In most states, enforcement of the minimum drinking age has been relatively lax and ineffective and has lacked community support.

In 1998, Congress passed legislation allocating $25 million to combat underage drinking through the Office of Juvenile Justice and Delinquency Prevention (OJJDP) in the DOJ's Office

of Justice Programs. The funds were earmarked to "support and enhance efforts by States, in cooperation with local efforts, to prohibit the sale of alcoholic beverages to or the consumption of alcoholic beverages by minors" (McKinney 1999). Under the program, each state and the District of Columbia receives a block grant of $360,000. Each state's governor—or mayor, for the District of Columbia—designates an agency to be responsible for applying for and managing the grant funds.

The legislation that created the grants delineates three possible areas for which states may spend the money: enforcement, public education, and innovative programs. Furthermore, states are encouraged to join existing public and private efforts, such as coalitions sponsored by the American Medical Association, the Robert Wood Johnson Foundation, and Mothers Against Drunk Driving.

Included in the legislation was an allocation for discretionary grants and technical assistance and training. The discretionary grants are awarded to selected states through a competitive process, at $400,000 over 2 years. These moneys are earmarked for local community initiatives. For training and technical assistance, DOJ decided to spend more than $1 million of the allocation. The contract for training and technical assistance was awarded to the Pacific Institute for Research and Evaluation (PIRE), which created the UDETC.

PIRE was awarded the contract because of the organization's unique combination of research and practice. PIRE was formed in the early 1970s as a response to the dangers of widespread drug use with a commitment to the development and application of scientific knowledge. The orgranization was founded to develop and disseminate some of the earliest prevention strategies and has continued to follow its avowed mission "to promote, undertake, and evaluate activities, studies, and programs that improve individual and public health, welfare, and safety. . . [and] work to expand and disseminate knowledge" (PIRE 2002).

In the UDETC, PIRE fostered the convergence of development and application of knowledge. The center has the backing of PIRE's unique intellectual culture, enabling the staff to draw on a large body of scientific expertise. The staff itself includes experienced practitioners, law enforcement personnel, and policy specialists.

OJJDP funds the center to collect and analyze underage drinking-related data, to analyze drinking-related legislation, to conduct literature reviews, and to identify promising underage program strategies. Center work includes the production and dissemination of user-friendly prevention resources, on-site training, and technical assistance. The staff works closely with state coordinators to monitor activity and respond to the changing nature of the field. At the center's core is a commitment to the application of scientific knowledge.

To demonstrate the effectiveness of its work, the center must have a means of assessing the success of these strategies. As with many social programs, the results of an effective underage prevention program can take years to develop. Citizens and government agencies do not often have the patience required to watch these results unfold. Thus, the center requires a way of measuring success in the short term.

To measure and document results in the short-term, the center developed a program of success stories. In the course of extensive literature reviews of efforts to reduce underage drinking, the center identified strategies that are likely to be effective. While these reductions may be obvious only in long-term analysis, the implementation of these strategies suggests long-term success. Thus, by documenting successful changes in policy in the short term, the center can anticipate successful reduction of underage drinking in the long term. Documented changes in policy thus provide an immediate measure of successful community intervention.

IDENTIFYING SUCCESSFUL POLICIES

Upon its founding, the UDETC faced the immediate task of identifying and compiling strategies that were likely to be successful. This effort ultimately took shape in the OJJDP document *Strategies to Reduce Underage Alcohol Use: Typology and Brief Overview* (Stewart 2002). This document was the product of a thorough literature review encompassing strategies across the spectrum of prevention. The following discussion on development of the document is drawn from correspondence with Kathryn G. Stewart, the document's author.

Because most effects manifest themselves only years after an intervention, it is difficult to link prevention practices to outcomes. The distance between intervention and outcome can stymie any early attempts to quantify success. The central problem for identifying successful implementation is the lack of immediately measurable, meaningful results. However, there are strategies and policies that have been assessed in the past, and a significant body of literature exists on these strategies. Through a review of this literature, these strategies can be assessed for probability of success. If a given strategy is usually successful, implementation of that strategy is a reasonable immediate predictor of eventual success.

Accurate assessment of strategies is a crucial step in measuring success. The process of identifying successful strategies serves as a bridge between measurable empirical data and antecedent predictions of success. Those predictions are only as valid as the process by which the strategies were vetted. Therefore, it is essential that the process of identifying strategies be thorough and that the methodology be sound.

The literature review was as comprehensive as possible in examining dozens of papers. From these papers, the document's author assigned priority to the strategies on the basis of the strength of the research, the demonstrated results, and the experience of practitioners in the field. Practitioner experience is a key component of this assessment; strategies not only had to work under research conditions, but they also had to work in actual implementation. There were no quantitative criteria for ratings, but the study was rigorous enough to achieve sufficient certainty of the various strategies' effectiveness. The ratings were also reviewed by a group of prevention experts—scientists and practitioners—to ensure that the selected policies represented the best available knowledge on reducing underage drinking.

If a policy has been demonstrated to be successful, then its implementation by a state or community can be considered a preliminary success in reducing underage drinking. Since many of the strategies address the alcohol environment, the real success in implementation is often the fact that community advocates have been able to shape their environment. However, these strategies are ultimately expected to pay off through a real reduction in underage drinking. The apparent limitation of this measurement is that only empirically evaluated strategies can be included in measures of success. Novel strategies which may in the long run prove exceptionally successful are not recognized as such in the short term. In fact, many strategies available to prevention advocates have not been specifically analyzed. For strategies that were not specifically reviewed, the author developed a theoretical rationale for why they might or might not work.

This process took shape in the OJJDP document.

RECOMMENDED POLICIES

Strategies to Reduce Underage Alcohol Use provides a summary of policy options to reduce underage drinking. The document divides a number of possible policies into four categories—limitations on access, expressions of community norms, prevention of impaired driving, and strategies based in schools—and provides brief descriptions of those policies. The document also rates the strategies on their priority, ranging from low to very high. The document provides basic direction and rationale to guide prevention advocates as they shape programs to reduce underage drinking.

Limitations on Access

The availability of alcohol is an important factor contributing to underage drinking. Put simply, youths must be able to acquire alcohol before they are able to consume it. Thus, limitations on access are an essential subset of youth prevention strategies; any strategy that reduces the physical availability of alcohol can be classified as such.

The classic limitation strategy is compliance checks. Compliance checks—also known as alcohol purchase surveys—use minor decoys to ensure that retailers do not sell to underage buyers in compliance with minimum-drinking-age laws. Checks are conducted in a fair and honest manner to avoid the appearance of deceit or subterfuge on the part of the underage buyer, and frequently the checks are accompanied by fines or other official sanctions.

Compliance checks have been demonstrated repeatedly to reduce alcohol sales to minors. For example, Preusser et al. (1994) concluded that compliance checks “were successful in limiting the sale of alcohol to underage persons.” This conclusion has also been shown in actual practice. Considering this evidence of success, the center strenuously advocates the use of compliance checks as part of an overall strategy to reduce underage drinking.

Another example of a limitation-based strategy is increased taxation of alcohol. Studies have shown that alcohol is a particularly demand-elastic product and that price increases have a significant effect on young drinkers’ consumption. In a study looking at fatalities among 14 to 25 year olds during the period 1975 to 1981, Saffer and Grossman (1987) write: “A policy that fixed the federal beer tax in real terms since 1951 would have reduced the number of lives lost in fatal crashes by 15%, while a policy that taxed the alcohol in beer at the same rate as alcohol in liquor would have lowered the number of lives lost by 21%. A combination of the two tax policies would have caused a 54% decline in the number of youths killed.”

Likewise, Manning et al. (1995) write, “The estimates here clearly indicate that the demand for alcohol is responsive to price.” However, alcohol prices in the United States are at their lowest in decades, after adjustment for inflation. Low-end alcohol products are as cheap per serving as popular nonalcoholic soft drinks. Given this environment, the center considers increases in prices a “very high priority” strategy and advocates policy change to that effect.

Expression of Community Norms

Expression of community norms is the subset of prevention strategies that create or influence the general sense of acceptability of alcohol consumption and abuse among youth. Weak norms lead youths to believe that underage alcohol consumption is acceptable or even desirable. Strong norms tell youths that such behavior is not acceptable. Of all the typologies, normative strategies

are the most influenced by other kinds of strategies. For example, weak enforcement can undermine social norms and give underage drinking an air of permissibility.

Normative strategies include media advocacy campaigns. Such campaigns, especially counteradvertising, have been shown to be successful against tobacco use. It is reasonable to expect similar results with underage drinking. Other kinds of media campaigns can also be effective, especially when coordinated with complementary strategies. Media can be helpful in promulgating awareness of law enforcement campaigns and thus preempt problems before law enforcement ever deals with them.

The inverse of media campaigns is restrictions on advertising. Alcohol advertising has become a subject of national debate in the United States, with the decision of a major broadcast network to allow advertising for hard liquor. As a strategy, restrictions on advertising received only medium priority, since there was little in the literature concerning its effectiveness. However, Grube and Wallack (1994) did find that advertising affected drinking beliefs, knowledge, and intention among youths and suggested that restrictions on advertising could help reduce underage drinking.

Prevention of Impaired Driving

Impaired driving is the proximate cause of the primary alcohol-related harm befalling young people in America. Hundreds of American youths die each year in alcohol-related traffic crashes. Strategies to prevent impaired driving do not necessarily prevent underage drinking, but they do reduce the negative consequences from underage drinking.

Zero-tolerance laws have been demonstrated to be very effective in reducing alcohol-related crashes. The center considers these laws very high priority. For example, Blomberg describes Maryland's law as "a highly effective highway safety countermeasure," with a reduction in accident-involved drivers of 11% by conservative calculations (Blomberg 1993). Zero tolerance as concerns impaired driving means permitting no or only a minute measurable blood alcohol level (BAL). All states have such laws: some prohibit BALs in excess of .02% or .01%, while others prohibit any measurable amount of alcohol. Zero tolerance laws are important because young people lack experience with both driving and drinking and are dangerous at BALs below those allowed adult drivers.

Strategies Based in Schools

School is an important part of most young persons' lives. If not for academic reasons, students look to their schools for athletics, extracurricular activities, and social interaction. Thus schools can wield powerful influence over their student populations, and strategies based in schools use this fact to encourage positive decisions about alcohol use.

Until recently, the sole focus of school-based strategies has been delivery of prevention curricula. However, these strategies have not proven effective, showing at best weak effects on alcohol use. For example, Gorman (1996) finds mixed results among reviews of prevention curricula, and Donaldson et al. (1995) find a positive result only when the youths in question already believe it is not acceptable to drink. Because of the lack of support in the literature for these kinds of programs, the center considers prevention curricula a low-priority strategy.

More important are school policies regarding alcohol use on school property or at school events. Adoption and implementation of strong, unambiguous policies concerning alcohol use

has been effective in high schools and particularly in colleges and universities. Creating an environment in which negative behavior is understood to be unacceptable is an essential part of prevention of underage drinking on campus.

IMPLEMENTING STRATEGIES

An essential part of the center's mission is assisting states in implementing viable and successful strategies and not merely providing information to that end. Thus, the balance of the center's work focuses on implementation and follow-up for community and state groups.

This implementation began in 1999 with the National Leadership Conference. Following initiation of the Enforcing Underage Drinking Laws Program, many states found that they had resources to deal with underage drinking but no clear direction. In 1999, the center organized the First Annual National Leadership Conference to help set priorities and guide nationwide efforts to combat underage drinking.

The conference agenda was shaped primarily to elucidate and explore the document *Strategies to Reduce Underage Drinking*. Main sessions and breakouts roughly paralleled the structure of the document.

Following the conference, the center began offering training and support to state personnel as they developed programs to address underage drinking. Two primary curricula were developed for use by center trainers in the field: local policy options and law enforcement. The policy options curriculum focuses on shaping local ordinances and other mechanisms to develop community environments that foster positive decisions among youths. The law enforcement curriculum disseminates strategies to deal with youths and adults who violate underage drinking laws. Many curricula are based on the principle that underage drinking is an adult problem; youths are not the primary producers, promoters, distributors, sellers, and users of alcohol.

Training is conducted on-site in host states across the country. The center draws on a core of consultant trainers, in addition to regular staff, to ensure that training demands are fulfilled. Training typically takes 2 days. Following training, the center staff assists with follow-up technical assistance. One of the most important forms of technical assistance is document distribution; all of the nearly three dozen documents the center produces are available free upon request.

While center training and technical assistance focus on those strategies that have been proven effective, implementation of those strategies must be done with sensitivity to real-world factors. Some of the most successful strategies do not enjoy support among policy makers. For example, legislators are loath to raise taxes on alcohol despite the research indicating that increasing the price of alcohol can reduce related fatalities; in fact, there is currently a bill in Congress to cut excise taxes on beer by half. Thus, the center must consider both the efficacy of a given strategy, plus the viability of its implementation when helping states develop prevention programs.

Through technical assistance and other forms of follow-up, the center can ensure that strategies are successfully implemented.

SUCCESS STORIES

Assessing the implementation of these policies is essential to the center's mission. Because of increasing demands for accountability, the center and similar programs are required to produce results, often within the fiscal year. Unfortunately, public health issues are not malleable and readily solved. Effective programs can take years to manifest results, and even then the results are rarely overwhelming or blindingly obvious. Instead, subtle agglomerations of policies and programs develop into general trends away from problem activity, affecting both the specific behavior and the context in which it is measured.

The center mitigates this nuance by using policy change as one measure of success; for example, if a community implements a high-priority strategy, the center can count that as a success, since high-priority strategies can be reasonably expected to reduce youth access to and consumption of alcohol. Using this measure, the center has observed notable success in several communities across the United States. In these communities, advocates and activists have lobbied for and won changes in policy and regulation concerning alcohol use.

The center uses Success Stories to document and publicize these efforts. Success Stories are one-page narratives of successful community action and are distributed through the center mailing list of more than 1,600 recipient organizations and individuals. The goal in producing the stories is twofold: to applaud positive change in reducing underage drinking and to provide insight into implementing effective strategies. Ideally, readers of a given Success Story will use that document to assess and explore the potential efficacy of the documented strategy for implementation in their own community. As a resource, each story contains contact information so that the reader can communicate directly with someone who was involved in developing and implementing that program or strategy.

Success Stories also serve as documentation for the center's supervisory agencies. With stories in hand, the center can showcase accomplishments in the field to policy makers and administrators who may lack a thorough appreciation of the difficulty of underage drinking reduction. The center uses Success Stories to demonstrate its effectiveness to funding agencies and outside organizations alike.

The documents are not intended to serve as a definitive measure of reduction in underage drinking; they are not substitutes for empirical data, but rather complements to such data. The ultimate success of a given strategy or community action will be demonstrated in saved lives and money, to be determined when data to that effect becomes available.

In past 2 years, the center developed more than a dozen Success Stories. These stories deal with compliance check operations, implementation of keg registration, passage of an ordinance limiting local alcohol sales, and a range of other topics. Already, another dozen Success Stories are in development. This body of work will give the center concrete, tangible examples of successful community intervention.

MEASURING OUTCOMES

The UDETC uses Success Stories to document successful community action in youth prevention in the near term, in the absence of conclusive data. The stories serve as an immediate measure of community actions, highlighting changes in policy that are reasonably expected to lead to reductions in underage drinking. The center's confidence in developing and using these stories is derived from the methodology behind them.

That methodology is based on these principles: there exist in the prevention literature examples of proven strategies to reduce underage drinking; these strategies can be identified and prioritized; proven strategies are a good predictor of eventual success; and implementation of a proven strategy can be counted as a successful preliminary step toward the ultimate goal of reducing underage drinking.

REFERENCES

Blomberg, R. D. Lower BAC Limits for Youth: Evaluation of the Maryland .02 Law. In *Transportation Research Circular 413*, TRB, National Research Council, Washington, D.C., 1993, pp. 25–27.

Donaldson, S. I., A. M. Piccinin, J. W. Graham, and W. B. Hansen. Resistance-Skills Training and Onset of Alcohol Use: Evidence for Beneficial and Potentially Harmful Effects in Public Schools and in Private Catholic Schools. *Health Psychology*, Vol. 14, No. 4, 1995, pp. 291–300.

Gorman, D. M. Do School-Based Social Skills Training Programs Prevent Alcohol Use Among Young People? *Addiction Research*, Vol. 4, No. 2, 1996, pp. 191–210.

Grube, J. W., and L. Wallack. Television Beer Advertising and Drinking Knowledge, Beliefs, and Intentions Among Schoolchildren. *American Journal of Public Health*, Vol. 84, No. 2, 1994, pp. 254–259.

Manning, W. G., L. Blumberg, and L. H. Moulton. The Demand for Alcohol: The Differential Response to Price. *Journal of Health Economics*, Vol. 14, 1995, pp. 123–148.

McKinney, K. *Enforcing the Underage Drinking Laws Program.* Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice, Fact Sheet 107. May 1999.

National Highway Traffic Safety Administration. *1999 Youth Fatal Crash and Alcohol Facts.* Washington, D.C., 2002. www.nhtsa.dot.gov/people/injury/alcohol/1999%20YFCAF%20final%20web/index.html. Accessed Feb. 14, 2002.

Pacific Institute for Research and Evaluation. Mission Statement. www.pire.org/Mission.html. Accessed Feb. 14, 2002.

Preusser, D. F., A. F. Williams, and H. B. Weinstein. Policing Underage Alcohol Sales. *Journal of Safety Research*, Vol. 25, No. 3, 1994, pp. 127–133.

Saffer, H., and M. Grossman. Beer Taxes, the Legal Drinking Age, and Youth Motor Vehicle Fatalities. *Journal of Legal Studies*, Vol. 16, 1987, pp. 351–374.

Stewart, K. G. *Strategies to Reduce Underage Alcohol Use: Typology and Brief Overview*. Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice, and Pacific Institute for Research and Evaluation, Beltsville, Md., June 1999.

CASE STUDIES: SUCCESS STORIES

The Case for 0.08% Per Se Laws

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This paper examines research evidence on the effects of different blood alcohol levels on driving impairment and fatal crash risks and on the effects of lowering legal blood alcohol limits from 0.10% per se to 0.08% per se on alcohol-related fatal crash rates.

Studies available before the 1998 congressional vote not to withhold highway construction funds from non-0.08% law states were examined as were studies released after that vote but before the 2000 congressional vote to withhold highway funds from non-0.08% law states.

Before 1998, evidence from experimental laboratory studies, driver simulation and road course studies, roadside observational studies, and epidemiologic comparisons of drivers involved and not involved in fatal crashes demonstrated impairment in important driving tasks at levels below 0.08% blood alcohol content (BAC) as well as the heightened fatal crash risk at BACs of 0.08%. This evidence by itself prompted 11 states to lower legal BAC limits to 0.08% and the National Highway Traffic Safety Administration (NHTSA) to recommend this change in all states. Early studies of the effects of lowering the BAC limit from 0.10% to 0.08% in California and the first five states to adopt 0.08% laws showed postlaw reductions in alcohol-related traffic deaths but could not isolate the effects of 0.08% laws from administrative license revocation (ALR). These studies helped bring the total of states adopting 0.08% to 17 but did not convince Congress in 1998 to withhold highway funds from non-0.08% per se law states.

Studies were published after 1998 showing impairment on important driving tasks for all drivers at BACs of 0.08% or less and at least an 11-fold increase in single-vehicle fatal crash risk for drivers with BACs of 0.08% to 0.099%. Multistate studies showing reductions in alcohol-related fatal crashes independent of other laws such as ALR were also released. In October 2000, Congress passed legislation that withheld federal highway funds from states without 0.08% per se laws effective in 2003. As of August 2003, 44 states had passed 0.08% laws.

Studies of BAC levels and driver impairment and fatal crash risk did not by themselves prompt all states to adopt 0.08% per se laws. However, those studies did prompt 11 states to adopt 0.08% laws permitting studies of the effects of 0.08% laws on alcohol-related fatal traffic crash trends. When the later studies were able to isolate alcohol-related fatal crash reductions independent of ALR and other laws against driving while intoxicated (DWI), more states passed 0.08% laws; ultimately Congress voted to withhold highway funds from states not enacting 0.08% laws. A variety of single state, multistate, and multistate pooled results designs were used. The consistency of results despite a variety of designs and data analytic approaches ultimately prompted legislative action.

BACKGROUND

In October 2000, the U.S. Congress passed legislation that would withhold federal highway construction funds from states that have not adopted a legal BAC of 0.08%. The law required that the limit be 0.08% per se. That means it is illegal in and of itself to drive with a BAC of 0.08% or higher. If alcohol test results identify someone as driving at 0.08% or higher, no further evidence is needed to prove a person was DWI.

Utah was the first state to enact a 0.08% per se law, in August 1983. By July 1991, five states had such laws—Utah, Oregon, Maine, California, and Vermont. Six more states adopted these laws in 1993 and 1994—Kansas, North Carolina, New Mexico, New Hampshire, Florida, and Virginia—and four more had adopted the law by 1998 when Congress initially considered but rejected legislation that would withhold highway construction funds from states that did not have a 0.08% law—Hawaii, Alabama, Idaho, and Illinois. In 1999 and September 2000, three more states—Washington, Texas, and Kentucky—adopted 0.08% laws, bringing the total with those laws to 17. Then in October 2000 Congress passed legislation that would withhold federal highway construction funds from states that have not adopted 0.08% per se as the legal BAC, starting in 2003. By August 2003 the number of states that passed this legislation had increased to 44.

Most states that adopted 0.08% per se legislation already had per se legislation at 0.10% BAC and were thus reducing the legal level of intoxication by 20%. After equal amounts of alcohol are consumed, BAC content can vary considerably from person to person depending upon body weight, whether the person had been eating, gender, and speed of consumption. Nonetheless, it has been estimated that a 170-lb male who consumed four drinks in an hour on an empty stomach would reach a BAC of 0.08%, while a 137-lb female who consumed three drinks on an empty stomach would reach that level (NHTSA 1998). Over a 2-h period a 170-lb male who consumed five drinks on an empty stomach would reach a BAC of 0.08% as would a 137-lb female after four drinks (**Figure 1**).

Evidence supporting passage of 0.08% BAC laws derives from a variety of different types of studies regarding the effects of BAC at various levels on driving performance, as well as studies of the impact of lowering legal BACs from 0.10% to 0.08%.

This paper reviews the research studies that examined (*a*) the effects of BAC levels on driving performance and (*b*) the effects of 0.08% laws on traffic fatalities and how that research influenced adoption of 0.08% per se laws. It examines studies available before 1998, when Congress first considered but rejected withholding of highway funds from non-0.08% law states. Then it examines studies published after 1998 to October 2000, when Congress passed the withholding legislation, as well as some studies published after October 2000.

STUDIES AVAILABLE BEFORE 1998

BAC and Driver Impairment

In 1986, after reviewing 50 years of research literature on alcohol and driver impairment, the Council on Scientific Affairs of the American Medical Association recommended that all states

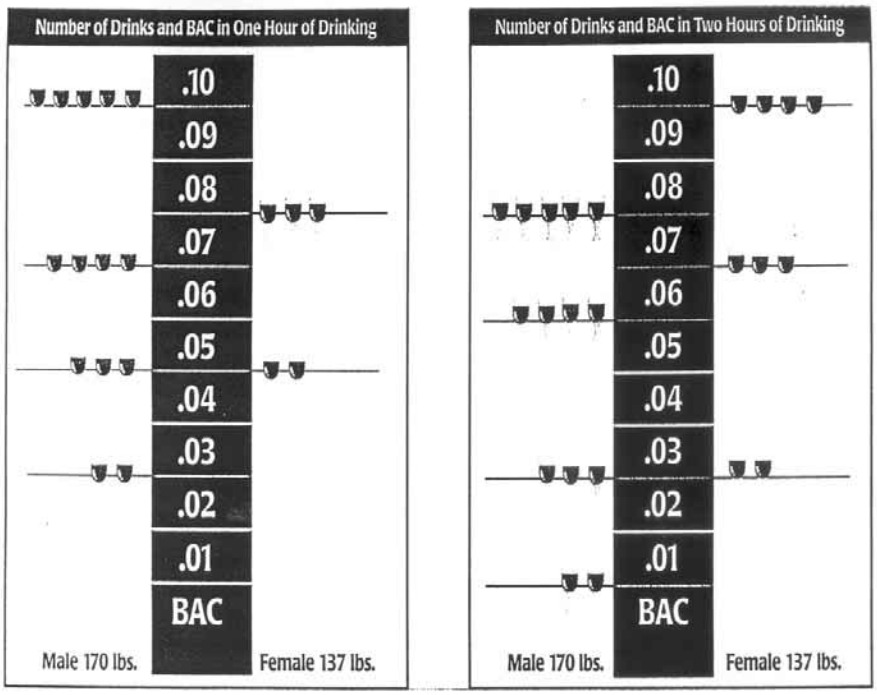

FIGURE 1 Relationship among gender, weight, number of drinks, drinking period, and BAC.

adopt 0.05% BAC as the criminal per se legal BAC (*Journal of the American Medical Association* 1986).

Four types of studies have identified impairment in physiologic responses needed for safe driving at BACs well below the prevailing 0.10% legal standard at that time.

First, experimental laboratory studies have shown that by the time a person reaches a level of 0.08%, there is

- Reduced peripheral vision,
- Poorer recovery from glare,
- Poor performance in complex visual tracking, and
- Reduced divided attention performance (Moskowitz and Burns 1990).

A driver's ability to divide attention between two or more visual stimuli can be impaired at BACs of 0.02% or lower (Starmer 1989; Howat et al. 1991; Moskowitz et al. 1985). Starting at BACs of 0.05%, drivers exhibit impairment in eye movement, glare resistance, visual perception, reaction time, certain types of steering tasks, information processing, and other driving components (Starmer 1989; Howat et al. 1991; Hindmarch et al. 1992; Finnegan and Hammersley 1992).

Second, driver simulation and road course studies have revealed poorer parking performance, poorer driver performance at slow speeds, and steering inaccuracy (Mortimer and Sturgis 1975).

Third, roadside observational studies have identified increased speeding and deterioration in braking performance (Damkot et al. 1975).

Fourth, an important study published in the *Journal of Studies on Alcohol* (Zador 1991) found that each 0.02% increase in the BAC of a driver nearly doubled the risk of being in a single-vehicle fatal crash. That study examined alcohol test results of drivers killed in single fatal crashes in states that tested at least 80% of fatally injured drivers. Those results were compared with breath alcohol samples from 2,850 drivers stopped in the same states as part of a national probability survey, 92% of the drivers stopped. To match driver fatalities to the roadside breath testing exposure, crash times, days, and roadway types were restricted to those used in the survey. In all age and sex groupings in the study at BACs of 0.05% to 0.09%, the likelihood of being a fatally injured driver was at least nine times greater than at zero BAC. For each 0.02% increase in BAC, the fatal crash risk increased even more for drivers under age 21 and for female drivers.

Thus, before 1998 a substantial literature indicated impairment in driving skills and increased fatal crash risk at BACs of 0.08% and below. There was evidence from laboratory studies, driver simulation and road course studies, roadside observational studies, and epidemiologic studies of fatal crashes. This evidence alone stimulated 11 states to lower their BAC legal limits from 0.10% to 0.08% and prompted NHTSA to recommend that all states adopt the 0.08% standard. In 1998 Congress enacted legislation providing financial incentives to motivate passage of 0.08% per se laws but defeated proposed legislation to withhold highway funds from states unwilling to adopt the 0.08% standard.

Effects of 0.08% Per Se Legislation

A second type of research that was considered by states debating whether to adopt 0.08% per se laws were studies of that law's effects on alcohol-related fatal or other injury crashes. Generally, two types of studies were conducted: analyses within individual states before and after they passed 0.08% per se legislation (often using interrupted time series analysis) and comparison of multiple states that passed 0.08% per se laws with multiple states that did not. These studies pooled data from multiple 0.08% law states and multiple comparison states when analyzing the effects of 0.08% laws.

The first pre- and post-study of 0.08% laws in the United States was conducted in California (Rogers 1995). California adopted 0.08% per se on January 1, 1990, followed by ALR on July 1, 1990. Time series analyses revealed declines in alcohol-related fatal crashes beginning even before the new laws. An Arima time series analysis examined trends beginning 5 years before the 0.08% laws and 4 years after that law. The authors noted that the close temporal contiguity of the two laws (implemented only 6 months apart) created a sensitivity problem in detecting intervention effects uniquely attributable to either law. Effects that appear to be associated with the ALR law might be attributable to the lingering effects of the 0.08% law. Effects attributable to 0.08% might actually be anticipatory effects of the ALR law, and it is possible that introduction of the ALR law sensitized people to the 0.08% law with a resulting synergistic effect of the two laws in the post-ALR period.

Four major crash outcomes were evaluated—had been drinking (HBD) crashes, fitting non-HBD crashes as the control; nighttime crashes, fitting daytime crashes as the control; single-vehicle nighttime crashes involving male drivers, fitting multiple-vehicle daytime crashes as the control; fatal and serious injury crashes between 2 to 3 a.m., fitting daytime crashes between 10 to

11 a.m. as the control. The number of California licensed drivers, monthly gasoline sales, California personal income, seasonal adjustments, and monthly unemployment rates were considered controls.

After passage of 0.08% per se, there was an immediate 7.2% reduction in nighttime fatal and severe-injury crashes, a 10.2% reduction in 2 to 3 a.m. fatal and total injury crashes, and a 16.5% decrease in 2 to 3 a.m. fatal and severe-injury crashes.

More highly significant effects were seen after introduction of ALR: a 9.4% reduction in fatal HBD crashes, a 13.4% reduction in severe-injury crashes, an immediate 12.7% reduction in HBD fatal crashes, and an 11.6% reduction in nighttime and severe-injury crashes. The authors concluded that the evaluation showed a significant general deterrent effect associated with the ALR law with somewhat less support for an effect associated with the 0.08% per se law.

Johnson and Fell (1995) examined the first five states to adopt 0.08% laws at equal time periods in each state before and after the law: in California and Maine, 2 years before and 2 years after; in Oregon, 21 months before and 21 after; in Utah, 17 months before and 17 after; and in Vermont, 18 months before and 18 after.

Six outcomes were examined: (*a*) any fatal crashes with alcohol at 0.01% or higher, (*b*) 0.10% or higher, (*c*) police-reported alcohol involvement, (*d*) single-vehicle night driver involvement, (*e*) single-vehicle night male driver involvement and suspected alcohol involvement, and (*f*) police-reported positive BAC or alcohol violations. In each time period they examined each of the five states as well as other states. For 9 of 30 comparisons, statistically significant reductions were found. Significant reductions of at least one measure were found in four of the five 0.08% law states. None of the comparisons using the same measures for the rest of the nation was found to be a statistically significant reduction. For 16 of the remaining measures, there was some nonsignificant reduction in alcohol-related fatal crashes.

This analysis did not analytically control for other legislative changes that might account for post-0.08% law declines in alcohol-related fatal crashes.

Hingson et al. (1996) expanded the time period analyzed in the first five states. Utah and Oregon were studied for 7 years before and 7 years after the 0.08% law, Maine 5 years before and 5 years after, California 4 years before and 4 years after, and Vermont 2 years before and 2 years after. Each state was compared with a nearby state—Utah with Idaho, Oregon with Washington, Maine with Massachusetts, California with Texas, and Vermont with New Hampshire.

The analyses focused on fatally injured drivers with BACs of 0.08% or greater and 0.15% or greater. During the analysis period 88% of fatally injured drivers in pre- and postlaw periods were tested for alcohol in 0.08% law states and 74% in comparison states. The proportions tested did not significantly change in each group of states from the pre- to postlaw periods. The proportions of fatal crashes with a fatally injured driver with a BAC 0.08% or higher and 0.15% and higher were monitored. Overall the pooled estimate of all five 0.08% law states revealed a 16% postlaw decline in the proportion of fatal crashes with fatally injured drivers with BACs of 0.08% or higher and an 18% decline with BACs of 0.15% or higher in states that adopted 0.08% laws relative to the comparison states.

All five 0.08% states had implemented ALR, three within 1 year of the 0.08% law: it was difficult to isolate the 0.08% law's effects specifically. ALR laws had in earlier studies been associated with a 5% decline in all fatal crashes and a 9% decline in alcohol-related fatal crashes (Zador 1989; Klein 1989). Subtracting the 9% ALR postlaw decline from the 16% decline reported in this study, the authors projected that if all states without 0.08% passed the law and

had the same post-0.08% law reductions, 500 fewer fatal crashes would occur annually. The study concluded that "0.08% laws particularly in combination with administrative license revocation reduce the proportion of fatal crashes involving fatally injured drivers with blood alcohol levels of 0.08% and higher and 0.15% and higher."

Some investigators noted that this paper did not adequately detail comparison state selection criteria and questioned whether selection of different comparison states would have altered the study's findings. They argued that the use of multiple comparison states or a national comparison would have been a preferable approach (Scopatz 1998; Apsler et al. 1999).

The California study and the two studies of the first five states to adopt 0.08% laws cited above were available for review when Congress debated but decided to provide financial incentives to pass 0.08% laws instead of withholding highway construction funds if states did not adopt the 0.08% standard.

Opposition to federal legislation to withhold highway funds if states did not adopt 0.08% laws and to adoption of 0.08% laws in state capitals was voiced by segments of the hospitality and alcohol industries. A vocal opponent was the American Beverage Institute (ABI), which argued that there was no credible evidence that 0.08% laws would reduce alcohol-related traffic deaths. Spokesmen for the ABI said that 0.08% laws target social drinkers, not high BAC—0.15% or higher—offenders who account for more than half of alcohol-related traffic crashes.

Mothers Against Drunk Driving (MADD), the leading advocate for 0.08% laws, was depicted as prohibitionist, and 0.08% laws were described as the first step on a "slippery slope to prohibition" by MADD opponents. The often-repeated statement of MADD officials that "impairment begins with the first drink" was cited as an indication of MADD's prohibitionist bent. The ABI maintained that MADD was more concerned with raising money than saving lives.

Each of the studies of the impact of 0.08% laws was challenged. For example, the Hingson et al. (1996) study was described as flawed because Texas, the "nearby comparison" state for California, was 1,000 mi away. Citing an analysis by Scopatz (1998), the ABI maintained that had California been compared with a "mythical" state combining Michigan, Ohio, and Pennsylvania, the post-0.08% law reductions in drivers in fatal crashes with positive BACs would no longer have been statistically significant.

The ABI further entered in testimony in several state legislatures the argument that only 2 of the 10 states with the lowest percentage of traffic fatalities that were alcohol related in 1996 had 0.08% legal limits: Utah and New Hampshire. They pointed out that Ohio, Maryland, New York, Nebraska, Idaho, New Jersey, and Arkansas were also in the group of 10 states with the lowest percentage of traffic fatalities that were alcohol related but those states had all maintained 0.10% as the legal BAC (see www.bacdebate.com).

The ABI also argued that 0.08% laws would clog courts with new cases of people arrested with BACs between 0.08% and 0.10%, and that, in turn, would cause more people to be sent to jail, thereby causing increased expenses and tax increases in 0.08% law states. Further, ABI pointed out that each year since 1983 more states defeated than passed 0.08% laws. The ABI argued that the issue was one of states' rights: states should be free to determine their own laws independent of federal legislative coercion.

Finally, they cited the law as unfair to social drinkers. As an illustration, they argued that a 120-lb woman could reach a BAC of 0.08% after only two drinks on an empty stomach.

STUDIES PUBLISHED IN AND AFTER 1998

BAC and Driver Performance

In April 2000, a review of 112 articles published between 1981 and 1997 on the effects of alcohol on driving-related skills was published by NHTSA (Moskowitz and Fiorentino 2000). This literature review provided strong evidence that impairment in driving skills begins with any departure from zero BAC. The majority of studies reported impairment by 0.05% alcohol. Further, the authors concluded, "All drivers can be expected to experience impairment in some driving related skills by 0.08% BAC or less."

An update of Zador's 1991 study of drivers in fatal crashes was published the same year in the *Journal of Studies in Alcohol* (Zador et al. 2000). Alcohol test results from drivers stopped in the 1996 National Roadside Survey of weekend night drivers in the 48 contiguous states were compared with alcohol involvement determined by NHTSA in 1995 and 1996 of drivers in weekend night single-vehicle fatal crashes. Relative to nondrinking drivers, drivers in all age and gender groups examined who had BACs between 0.08% and 0.99% had at least an 11-fold increased risk of dying in a single-vehicle crash. Male drivers age 16 to 20 had a 52-fold increased risk. This study supported lowering the limit to 0.08% by showing that driving at BACs under 0.10% is very dangerous.

Effects of 0.08% Per Se Law

After the 1998 congressional vote, several new 0.08% law studies were published. Foss et al. (1998) conducted a comprehensive analysis of the effects of North Carolina's 0.08% per se law. This included a time series analysis of alcohol-related fatal crashes from 1991 through 1996, before and after North Carolina adopted the 0.08% law in 1993. They did not find a statistically significant reduction in alcohol-related fatalities after the law. They also compared the proportion of drivers in North Carolina in fatal crashes with a BAC of 0.01% or higher during the 33 months before and the 39 months after North Carolina's 0.08% law with the proportion in the 37 states without a 0.08% law. Using an analytic approach similar to that used in the earlier paper by Hingson et al. (1996), Foss et al. (1998) found that North Carolina experienced a 6% greater decline during the postlaw period. A similar decline was found among drivers with a BAC of 0.10% or higher. Neither decline was statistically significant when compared with non-0.08% law states. Given the number of crashes in these states, an 8% greater postlaw decline in North Carolina would have been needed for statistical significance. The analysis of North Carolina's law had less than 80% power to detect a 10% postlaw reduction in study outcomes and less than 60% power to detect an 8% decline. In this context, statistical power describes the likelihood of detecting a true 0.08% law effect. Most researchers would argue that a study should have power of 80% or higher. Because no power calculations were presented for the time series analyses, these null findings were difficult to interpret. In studies of single states changing a traffic law, potentially meaningful postlaw reductions in alcohol-related traffic deaths may not reach statistical significance. The same magnitude of decline, however, if observed in multiple states adopting the law, could be statistically significant. The Foss et al. (1998) study was repeatedly cited by opponents of 0.08% laws as evidence that they did not achieve desired results.

Two multiple-state studies of 0.08% laws were published in 1999. Apsler et al. studied the first 11 states to adopt 0.08% laws (1999). They examined each state separately with intervention-model time series analysis of trends in the ratio of fatal crashes involving drivers with BACs of 0.10% or higher relative to fatal crashes with no driver alcohol involvement. Examining data from the Fatality Analysis Reporting System (FARS) from 1982 to 1997, they found that 0.08% laws either alone or in conjunction with ALR laws were associated with significant declines in seven states. In five of those states, declines were specifically associated with 0.08% laws alone. No comparison areas were included in the analysis to rule out regional or national secular trends. Apsler et al. concluded that "The data and analyses are clearly suggestive that 0.08% BAC laws have some deterrent effect, leading to reductions in drinking and driving, most notably in conjunction with the presence of other drunk driving laws, especially administrative license revocation."

Voas et al. (1999, 2000) conducted a national study from 1982 to 1997 and identified an 8% decline in the proportion of drivers with positive BACs involved in fatal crashes relative to other fatal crashes associated with 0.08% laws. Using regression models, they determined that this reduction was independent of other drinking while under the influence laws, such as 0.10% per se laws and ALR laws as well as safety belt laws; demographic, economic, and seasonal factors; and per capita alcohol consumption as measured by beer consumption. They projected that there would be 590 fewer deaths nationwide if all states adopted 0.08% laws. Although they analytically controlled for more potential confounding factors than other 0.08% law studies, they cautiously noted that the downward trend in alcohol-related fatalities over the past two decades may have been influenced by factors not in their analyses, e.g., increasing use of sobriety checkpoints. Further, they noted that "since factors such as alcohol policies, roadway and vehicle characteristics and economic conditions all interact in their influence on crashes, it is important to interpret estimates of lives saved due to any single law with considerable caution."

In a June 1999 review of all the 0.08% law studies cited above, the General Accounting Office (GAO) concluded "there are … strong indications that 0.08% BAC laws in combination with other drunk driving laws (particularly license revocation laws), sustained public education … and consistent enforcement efforts can save lives." However, the report also indicated that "the evidence does not conclusively establish that 0.08% BAC laws, by themselves, result in reductions in the number and severity of alcohol-related crashes."

In June 2000, Hingson et al. published an analysis of the impact of 0.08% laws in six states that adopted them between 1993 and 1994. They sought to address criticism of their earlier analysis of the first five states to adopt 0.08% legislation by (*a*) explicitly describing comparison state selection criteria, (*b*) comparing states with new 0.08% laws with matched individual comparison states as well as comparing them with all other states without 0.08% laws, and (*c*) conducting separate analyses of states adopting 0.08% laws and ALR in close time proximity and those that adopted 0.08% laws several years after they adopted ALR laws. This latter analysis was done to assess whether 0.08% laws have effects independent of ALR laws.

They sought to identify comparison states that (*a*) were contiguous, (*b*) had similar population size, (*c*) had 75% or more of fatally injured drivers tested for BAC, and (*d*) had similar pre-0.08% law trends in the proportion of fatal crashes that were alcohol related. Five of the six comparison states met all these criteria. New Hampshire, however, did not share a common border with a New England 0.10% law state. Vermont and Maine had 0.08% per se laws, and Massachusetts adopted a 0.08% ALR law in 1994. Consequently, New Hampshire was compared with Connecticut, the most populous state in New England that retained a legal BAC of 0.10%.

In each pair of states, they examined the maximum equal number of prelaw and postlaw years for which fatal crash data were available. They examined (*a*) the proportion of drivers in fatal crashes who had BACs at 0.10% or higher and (*b*) the proportion of fatal crashes that were alcohol related and in which alcohol was present in a driver or pedestrian at BACs of 0.10% or higher. They also examined fatal crash data from the U.S. Department of Transportation FARS.

The study compared the 0.08% law states of Kansas (0.08%) with Oklahoma, North Carolina (0.08%) with Tennessee, Florida (0.08%) with Georgia, New Mexico (0.08%) with Colorado, New Hampshire (0.08%) with Connecticut, and Virginia (0.08%) with Maryland. The maximum available equal numbers of pre- and postlaw years were compared in each state: 5 years pre- and postlaw for Kansas and North Carolina and their comparison states and 4 years pre- and postlaw by Florida, New Mexico, New Hampshire, and Virginia. Comparisons over those time periods were also made with all other 0.10% law states other than the direct comparison states.

The study found that as a group the 0.08% states experienced a pre- to postlaw decline of 26.1% in the proportion of drivers with elevated BACs, significantly more (6%) relative to a 20.2% decline in comparison states. Each 0.08% state experienced a greater decline than its comparison state, and there was no significant variation in 0.08% law effects across the six state pairs. The 0.08% law states also experienced a 21.4% pre- to postlaw reduction, significantly greater than the 16.8% postlaw reduction in the comparison states. Again each state experienced a greater decline than its comparison state.

In four of the 0.08% law states, ALR laws were in place long before adoption of 0.08%, precluding ALR laws as a confounder of 0.08% effects in those states. As a group those four states had significantly greater postlaw declines on outcome measures than their respective comparison states. In addition, all 0.08% law states had criminal per se laws and a minimum legal drinking age of 21 before the study period, and all but New Hampshire had safety belt laws in place throughout the study period, precluding passage of these laws in close time proximity to 0.08% laws as potential confounders.

Postlaw declines on outcome measures were greater in every 0.08% law states relative to its comparison state and in the four with ALR laws relative to their comparison states. In addition, the declines in 0.08% law states were significantly greater than in 0.10% states nationwide not selected as comparison states. Consequently, there is no reason to suspect any bias in selection of comparison states. The study concluded that if the states remaining without 0.08% laws passed 0.08% laws and experienced declines in alcohol-related fatal crashes similar to those 0.08% law states in this study, 400 to 500 fewer fatalities would occur annually nationwide.

In September 2000, Voas et al. examined the effectiveness of the Illinois 0.08% law enacted in July 1997. Arima time series analyses compared monthly -positive drivers involved in fatal crashes from 1988 through 1998, comparing Illinois with combined comparison states of Indiana, Iowa, Kentucky, Missouri, and Wisconsin. The trend for nondrinking drivers in fatal crashes was used as a covariate. Illinois experienced a 13.7% postlaw decline relative to a 2.5% increase in the comparison states. This article was cited by former President Bill Clinton when he signed the federal 0.08% legislation.

After the publication of the Voas et al. (2000) and Hingson et al. (2000) studies, a committee of scientists convened by the Centers for Disease Control and Prevention (CDC) completed an analysis of all studies published in governmental reports and scientific journals as well as analyses using different comparison states than used by Hingson et al. (1996) in the

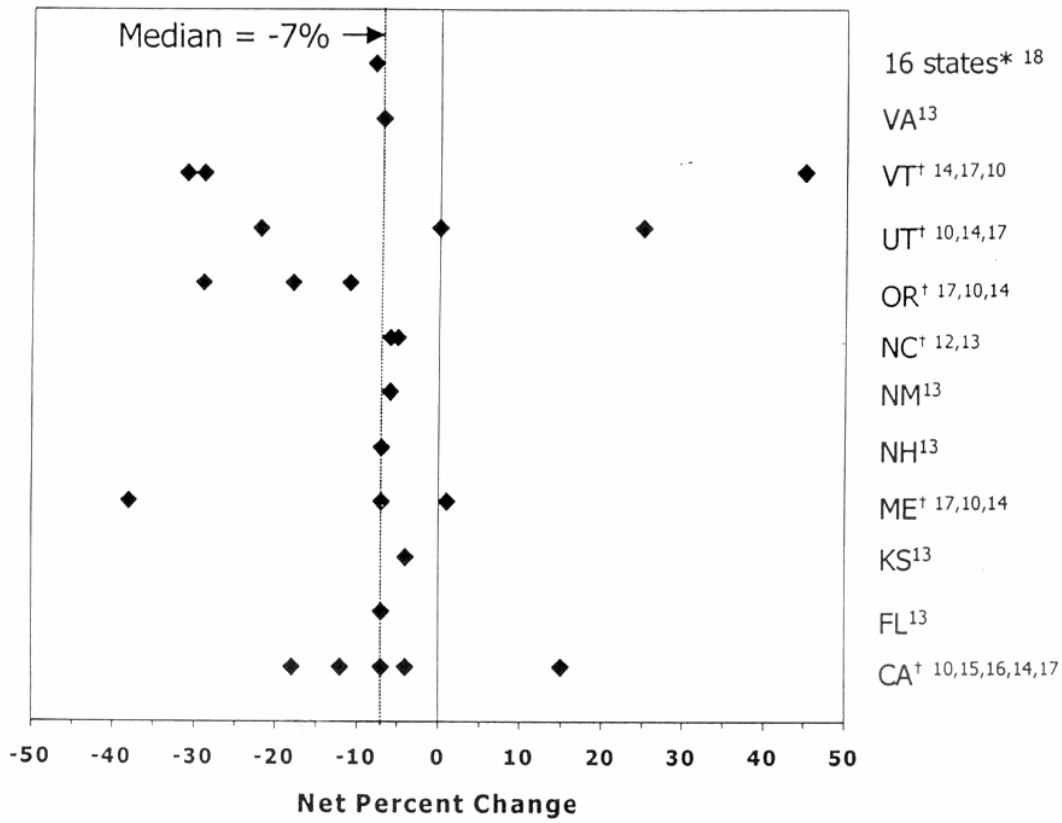

Figure 2. Percent change in measures of alcohol-related motor vehicle fatalities after .08 BAC laws were enacted, by state. *Numbers correspond to reference numbers of cited studies. †Median percent change calculated by using the median value for the state.

analysis of the first five 0.08% laws. They reviewed 25 comparisons from nine published studies (Shults et al. 2001). They found on average a 7% post-0.08% law decline in alcohol-related crash fatalities and reported that results were generally consistent in direction and size across studies (see **Figure 2**). Further, they noted that the Voas et al. (2000) and Hingson et al. studies found 0.08% law effects independent of ALR law effects. These findings prompted them to conclude that "available studies provide strong evidence that 0.08% BAC laws are effective in reducing alcohol-related crash fatalities." While this article had not been published before the October 2000 congressional vote, many congressional legislators had been apprised of its findings and conclusions.

Since passage of the congressional legislation to withhold highway construction funds from non-0.08% law states, one other multistate analysis has been published (Dee 2001). Examining data from all states from 1982 to 1998, they analytically controlled for whether states had ALR laws, whether jail time was mandated for first-time offenders, whether states had zero tolerance laws for drivers under 21, primary and secondary seat belt laws, vehicle miles traveled, state unemployment rates, and real state personal income. They found that 0.08% laws reduced traffic fatalities by 7%, with larger reductions in weekend than weekday crashes, 9% versus 6%. They projected that if all states adopted 0.08% laws, roughly 1,200 lives would be saved annually.

DISCUSSION OF EVIDENCE

A large body of evidence accumulated from studies of the effects of different BAC levels on driving performance found that impairment in tasks needed for driving occured for virtually all drivers at BACs of 0.08% or less and that single-vehicle fatal crash risk was much higher at that level. This evidence alone stimulated 11 states to adopt 0.08% per se laws by the end of 1994, and NHTSA and activist groups such as MADD to recommend that all states adopt these laws.

This evidence by itself, however, was not sufficient for most states. Many legislators in those states also wanted to know whether they could experience fatality declines relative to other states if they lowered the legal limit to 0.08%. The California study (Rogers 1995) and the first two analyses of the first five states to adopt 0.08% laws (Johnson and Fells 1995; Hingson et al. 1996) provided early indication that these laws reduce alcohol-related traffic deaths. However, because all of the first five 0.08% per se law states had ALR laws and three adopted them within 1 year of the 0.08% provision, it was difficult to isolate the specific benefits of 0.08% laws from ALR laws. Nonetheless, by 1998 five more states passed 0.08% per se laws, and President William Clinton called on all states to adopt the measure. In 1998, the U.S. Senate passed legislation introduced by Senator Frank Lautenberg of New Jersey to withhold funds if states did not pass 0.08% laws. That proposal, however, was defeated by a committee voice vote in the House of Representatives.

After 1998, additional information was published on the effects of BAC on driver performance. Moskowitz's review of 112 studies on BAC and impairment reported that virtually all drivers were impaired on some tasks needed for driving a motor vehicle by BACs of 0.08% or less. Further, Zador et al. found that in all age and gender groups of drivers in a national analysis, drivers at BACs of 0.08% to 0.99% had at least an 11-fold increased single-vehicle fatal crash risk.

In addition, two multistate studies using different designs and statistical analytic approaches were published in 1999 (Apsler et al. 1999; Voas et al. 2000) that showed 0.08% laws were associated with alcohol-related fatal crash declines independent of ALR laws. Despite

these and earlier studies, however, the GAO, as mentioned earlier in a report critical of existing reports up to that time on the effects of 0.08% laws, concluded that "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 …, sustained public education … and consistent enforcement can save lives." United in their opposition to 0.08% laws, U.S. beer manufacturers, beer distributors, and the ABI cited the GAO report as evidence that 0.08% laws had no effect.

Washington and Texas both implemented 0.08% laws in 1999; Washington passed its law before the GAO report and Texas, after its publication.

In 2000, the Hingson et al. (1996, 2000) papers joined the Voas et al. (2000) and Apsler et al. (1999) studies in showing that 0.08% BAC can reduce alcohol-related fatalities independent of ALR laws. The life-saving benefits if all states adopted 0.08% laws projected by the Hingson et al. (1996, 2000) studies, and Voas et al. (1999, 2000) study were similar, ranging from 400 to 600. The CDC reviewed this literature and concluded that there was "strong evidence" that 0.08% laws reduce alcohol-related deaths (Shults et al. 2001). CDC found the average decline associated with the laws to be 7%, close to the Hingson et al. (2000) reported 6% decline and the Voas et al. study (1999, 2000) reported 8% decline on similar outcome measures.

Thus, by October 2000, when Congress voted to withhold highway funds from non-0.08% per se law states, multiple studies on the effects of 0.08% laws produced a consistent pattern of results. Every multistate study (Johnson and Fell 1995; Hingson et al. 1996, 2000; Apsler et al. 1999; Voas et al. 2000) found a reduction in alcohol-related traffic deaths associated with the passage of 0.08% laws; Apsler et al. (1999), Voas et al. (2000), and Hingson et al. (2000) found beneficial effects of 0.08% laws independent of ALR. In 2001, Dee published another multistate analysis that indicated that 0.08% per se laws were associated with fatal crash declines and that these were independent of ALR law effects.

CONCLUSION

Many different types of studies offered evidence that contributed to passage of 0.08% per se laws. Studies regarding driving impairment at various BACs and epidemiologic studies of increased fatal crash risk stimulated 11 states to pass 0.08% per se legislation by the end of 1993. While these studies did not persuade all states to adopt 0.08% laws, they paved the way for analyses of the impact of lowering legal limits from 0.10% per se to 0.08% per se on alcohol-related fatal crashes. Further, those studies prompted NHTSA to encourage all states to adopt 0.08% laws.

Both single-state analyses of individual states (Rogers 1995; Foss et al. 1998; and Voas et al. 2000)—the later two using multiple comparison states—and analysis of several states using single-state pre- and postlaw designs (Johnson and Fell 1995; Apsler et al. 1999) were conducted and provided evidence that 0.08% laws reduce fatalities. The results generally found significant reductions, but not on every measure examined or in every 0.08% law state (Johnson and Fell 1995; Apsler et al. 1999). Also, one analysis of an individual state lacked adequate statistical power for meaningful declines in alcohol-related traffic deaths to be considered "statistically significant" (Foss et al. 1998). The California analysis (Rogers 1995) was compromised because 0.08% per se and ALR laws were passed within 6 months of each other. The Apsler et al. study

(1999) provided evidence that in some states 0.08% laws reduced alcohol-related fatalities in combination with ALR, notably in some states independent of ALR.

Strong evidence for 0.08% law effectiveness derived from multistate studies that analytically pooled the fatal crash outcome data from multiple states that adopted 0.08% laws and compared the data with pooled data from non-0.08% law states. Five of those multistate studies reported significant reductions in either alcohol-related or all fatal crashes (Hingson et al. 1996; Voas et al. 2000; Hingson et al. 2000; Schults et al. 2001; Dee 2001), and four of those studies provided evidence of declines that were independent of the effects of ALR laws and other DWI countermeasures (Voas et al. 2000; Hingson et al. 2000; Schults et al. 2001; Dee 2001).

Taken together, these studies have provided strong evidence for the benefits of lowering legal BACs to 0.08% per se. The diversity of study designs and data analytic approaches add strength to observed benefits of this legislation.

REFERENCES

Apsler, R., A. R. Char, W. Harding, and T. Klein. *The Effects of 0.08 BAC Laws*. National Highway Traffic Safety Administration, 1999.

Council on Scientific Affairs. Alcohol and the Driver. *Journal of the American Medical Association*, Vol. 255, No. 4, 1986, pp. 522–527.

Damkot, D. K., M. W. Perrine, D. G. Whitmore, S. R. Todissie, and H. A. Geller. *On the Road: Driving Behaviors and Breath Alcohol Concentrations, Vol. I and II*. Technical Report DOT HS 364 375 67. National Highway Traffic Safety Administration, 1975.

Dee, T. S. Does Setting Limits Save Lives? The Case of 0.08 BAC Laws. *Journal of Policy Analysis and Management*, Vol. 20, No. 1, 2001, pp. 113–130.

Finnegan, F., and R. Hammersley. The Effects of Alcohol on Performance. *Handbook of Human Performance: Volume 2. Health and Performance* (A. P. Smith and D. M. Jones, eds.). Academic Press, London, 1992, pp. 73–126.

Foss, D., R. Stewart, and D. Reinfurt. *Evaluation of the Effects of North Carolina's 0.08% BAC Laws*. Highway Safety Research Center, University of North Carolina, Chapel Hill, Nov. 1998.

General Accounting Office. *Highway Safety: Effectiveness of State .08 Blood Alcohol Laws*. GAO/RCED-99-179. GAO, 1999.

Hindmarch, I., J. Z. Bhatti, G. A. Starmer, D. J. Mascord, J. S. Kerr, and N. Sherwood. The Effects of Alcohol on the Cognitive Function of Males and Females and on Skills Relating to Car Driving. *Human Psychopharmacology: Clinical and Experimental*, Vol. 7, No. 2, 1992, pp. 105–114.

Hingson, R., T. Heeren, and M. Winter. Lowering State Legal Blood Alcohol Limits to 0.08 Percent: The Effect on Fatal Motor Vehicle Crashes. *American Journal of Public Health*, Vol. 86, No. 9, 1996, pp. 1297–1299.

Hingson, R., T. Heeren, and M. Winter. Effects of Recent 0.08% Legal Blood Alcohol Limits on Fatal Crash Involvement. *Injury Prevention*, Vol. 6, 2000, pp. 109–114.

Howat, P., D. Sleet, and I. Smith. Alcohol and Driving: Is the 0.05 Percent Blood Alcohol Concentration Limit Justified? *Drug and Alcohol Review*, Vol. 10, No. 2, 1991, pp. 151–166.

Johnson, D., and J. Fell. The Impact of Lowering the Illegal BAC Limit to .08 in Five States in the U.S. *39th Annual Proceedings of the Association for the Advancement of Automotive Medicine*, Chicago, Ill. National Highway Traffic Safety Administration, 1995.

Klein, T. *Changes in Alcohol-Involved Fatal Crashes Associated with Tougher State Alcohol Legislation*. DOT HS 807-511. National Highway Traffic Safety Administration, 1989.

Mortimer, R. G., and S. P. Sturgis. Effects of Low and Moderate Alcohol Levels on Steering Performance. *Alcohol, Drugs, and Traffic Safety* (S. Israelstam and S. Lambert, eds.). Addiction Research Foundation, Toronto, Ontario, Canada, 1975, pp. 329–345.

Moskowitz, H., M. M. Burns, and A. F. Williams. Skills Performance at Low Blood Alcohol Levels. *Journal of Studies on Alcohol*, Vol. 46, No. 6, 1985, pp. 482–485.

Moskowitz, H., and D. Fiorentino. *A Review of the Literature on the Effects of Low Doses of Alcohol on Driving-Related Skills*. DOT HS 809-028. National Highway Traffic Safety Administration, April 2000.

National Highway Traffic Safety Administration. *Presidential Initiative for Making 0.08 BAC the National Legal Limit: Recommendations from the Secretary of Transportation*. DOT HS 808-756. 1998.

Rogers, P. N. The General Deterrent Impact of California's 0.08% Blood Alcohol Concentration Limit and Administrative Per Se License Suspension Laws. *An Evaluation of California's 0.08% Blood Alcohol Concentration Limit and Administrative Per Se License Suspension Laws*, Vol. 1 (CAL-DMV-RSS-95-158). California Department of Motor Vehicles, Sacramento, Sept. 1995.

Scopatz, R. A. Methodological Study of Between-States Comparisons with Particular Application to .08 Percent BAC Law Evaluation. Presented at 77th Annual Meeting of the Transportation Research Board, Washington, D.C., 1998.

Shults, R. A., R. W. Elder, D. A. Sleet, J. L. Nichols, M. O. Alao, V. G. Carande-Kulis, S. Zaza, D. M. Sosin, R. S. Thompson, and the Task Force on Community Preventive Services. Reviews of Evidence Regarding Interventions to Reduce Alcohol-Impaired Driving. *American Journal of Preventive Medicine*, Vol. 21, No. 4 (supplement), 2001, pp. 66–88.

Starmer, G. A. Effects of Low to Moderate Doses of Ethanol on Human Driving-Related Performance. *Human Metabolism of Alcohol: Vol. 1 Pharmaco-Kinetics, Medicolegal Aspects, and General Interest* (K. E. Crow and R. D. Batt, eds.). CRC Press, Boca Raton, Fla., 1989, pp.101–130.

Voas, R., E. Taylor, T. K. Baker, and A. S. Tippetts. *Effectiveness of the Illinois .08 Law*. National Highway Traffic Safety Administration, 2000.

Voas, R. B., and P. S. Tippetts. *The Relationship of Alcohol Safety Laws to Drinking Drivers in Fatal Crashes*. National Highway Traffic Safety Administration, 1999.

Zador, P. L. Alcohol Related Relative Risk of Fatal Driver Injuries in Relation to Driver Age and Sex. *Journal of Studies on Alcohol*, Vol. 52, No. 4, 1991, pp. 302–310.

Zador, P. L., A. K. Lund, M. Fields, and K. Weinberg. Fatal Crash Involvement and Laws Against Alcohol Impaired Driving. *Journal of Public Health Policy*, Vol. 10, 1989, pp. 467–485, 1989.

CASE STUDIES: SUCCESS STORIES

The Fall and Rise of Graduated Licensing in North America

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Frustration arises when sound research indicates that a certain measure reduces motor vehicle crashes or injuries but the measure is not widely implemented. This is especially so when one can point to measures not supported by research that are mainstays of society's approach to the highway safety problem, for example, education and publicity campaigns alone or high school driver education (*1–5*). In a more perfect world, only science-based policies would be implemented and maintained. Researchers would conduct high-quality research, advocates would market the findings, and policy makers would enact appropriate legislation. Things do not work quite that way, so this paper discusses the ways in which policies do get implemented and how this process might be influenced.

What are the barriers to adopting science-based policies, and what are the elements that lead to their successful adoption? This paper covers a success story—the widespread adoption of graduated licensing—and what might be learned from it that could assist in future efforts to convert research into policy.

The adoption of graduated licensing in North America has been both a powerful and fast-moving social phenomenon, with jurisdictions rushing to adopt this popular licensing scheme that began in 1994 in Canada and 1996 in the United States. By 2003, 11 of the 12 Canadian provinces and territories plus 46 U.S. states and the District of Columbia had adopted at least one key element of a graduated system. In all, 41 North American jurisdictions have the recommended three stages—the extended learner phase of low-risk supervised driving, an intermediate phase with restrictions on high-risk unsupervised driving, and finally a full-privilege license. There is great variation in the comprehensiveness of these systems, and a welcome trend has developed to go back and strengthen initial legislation. All of this activity adds up to one of the strongest public health movements ever seen in North America.

THE FALL OF GRADUATED LICENSING

However, the modern graduated licensing movement is the second part of a two-part story. The concept of graduated licensing is not new. Waller is credited with introducing and elaborating the concept in the early 1970s (*6*), and graduated licensing was discussed and debated throughout the 1970s and 1980s. It was unpopular and largely rejected, even as it garnered support from safety organizations. NHTSA developed a model law in the 1970s and offered financial incentives to states to adopt it (*7*), but only two states, Maryland and California, introduced some elements of graduated licensing.

There has never been any question on whether night driving restrictions and other key elements of graduated licensing would be effective (*8*). The research basis for graduated licensing has long been established, and, in fact, even the weak versions of graduated licensing adopted in Maryland and California were found to have positive effects (*9*, *10*). And graduated

licensing has always made great sense as a way of introducing young beginners into the driving population. The phase-in system protects young beginners from potentially lethal consequences while they are learning, as opposed to the prevailing licensing systems that, as Waller noted, "violate almost everything we know about learning" (*11*). However, the mobility restrictions inherent in a graduated system were thought by many to be draconian and unfair. An editorial in the *Los Angeles Times*, published at the time California was debating a night driving restriction, illustrates the dominant attitude during this period. Objecting to the proposed midnight ban, the editorial recited all the traditional reasons for opposition—unfair because 18 to 19 year olds have driving records just as bad as the 16 to 17 year olds to whom the rules would apply, unenforceable, punishing to teenagers with good driving records, and "finally, it is contrary to the nature of teenagers to be home from a date by midnight. Curfew or no curfew, they are not going to leave a dance, a late movie, or a rock concert before it ends just to beat the clock" (*12*).

The night driving restriction proposed in California was going to start at midnight. Later it was amended to 1 a.m. and finally dropped altogether. Now night driving restrictions, found in 37 U.S. jurisdictions including California, are among the most popular features of graduated licensing. And contrast the California experience in 1983 with the North Carolina experience in the mid-1990s when, according to Rob Foss, supporters were hoping to get a restriction starting at 10 p.m. But when legislators looked at the hour-by-hour crash data on nighttime crashes supplied by researchers, they enacted a 9 p.m. restriction (*13*).

The frustration among researchers was clearly evident during the 1970s and 1980s. Why was it that the public seemed so unconcerned about the young driver problem and scorned graduated licensing? In a 1981 article, Dan Mayhew and others at the Traffic Injury Research Foundation reviewed the magnitude of the young driver problem in Canada, noting both the failure of existing efforts and the seeming lack of societal commitment to addressing the problem (*14*). Three questions were posed:

1. "Can we continue to justify as a society a continued commitment to a 'status quo' posture, wherein a disproportionate number of young people annually lose their lives or suffer disabling injuries as a result of motor vehicle traffic crashes?"
2. "Are we, as a society, and more specifically as a road safety community, adequately discharging our responsibility towards the young?"
3. "Are we prepared to undertake the level of commitment required to rectify this situation?"

In 1987, Williams responded to the last of these three questions, remarking that "to the extent that legislative restrictions on high-risk driving are necessary to rectify the situation, this question can presently be answered in the negative" (*15*).

THE RISE OF GRADUATED LICENSING

So what happened? How and why did graduated licensing make the transition from wildly unpopular to wildly popular? Are there lessons here? In addressing these questions, the author benefited from conversations with several colleagues who have been involved in young driver research during both periods, but what follows is a personal version of events, and others may have different views. There will always be some mystery as to why this transformation has taken

place. As Waller has admitted, “Why there was so much reluctance in the 1970s to consider seriously modifying how we taught young people to drive and why there is now so much support for modifying the system remains unclear to me” (*11*).

There is mystery because on the surface nothing significant seems to have changed to account for the rise of graduated licensing. There was no significant change in the size of the problem, no research breakthroughs, no discernable triggering event, no federal sticks or carrots such as those that prodded legislators into enacting other highway safety legislation. Nor has any Mothers Against Drunk Driving–type organization of parents coalesced because they lost sons or daughters to lax licensing laws (although this has always seemed like a possibility). In short, no champions came forward with the mission of promoting graduated licensing. To be sure, research and advocacy organizations did make contributions, discussed later, but there did not appear to be an unusual surge of attention to graduated licensing in the early 1990s. That came later, once the movement started and more and more organizations got into the graduated licensing game.

Change in the Social Climate

Clearly there was a much more receptive social climate for graduated licensing toward the end of the century. Parental support as measured in surveys had always been strong (*16*), so it was not that parents were just discovering the merits of this way of licensing. Compared with the 1970s and 1980s, there were, of course, different populations of parents, politicians, and other voting adults considering whether government should get more involved in licensing decisions that traditionally had been left largely to parents. The extent to which broad sociocultural changes in parent–child relationships or changes in the political climate contributed to the greater receptivity cannot easily be gauged. Indeed, it is difficult to specify the nature of these changes. Perhaps, as Waller speculates, baby boomers who are now parents of teenagers are more aware of and concerned about driving risks (*11*) Whatever the case, secular trends outside the realm of highway safety are likely to have played an important role in improving the social climate for graduated licensing.

The “Public Arenas” Model

Certainly there seemed to be little attention to young driver licensing issues in the 1970s and 1980s. But this changed in the 1990s. Sociologists talk about social problems as having “careers” because attention to them tends to wane after some success is achieved in addressing them. For example, alcohol-impaired driving was the dominant social problem in the 1980s, and the young driver problem was addressed through minimum alcohol purchase age legislation and subsequently by zero tolerance laws. Ross described the trajectory of attention to the alcohol problem in its “middle” and “late” stages (*17, 18*). In the “public arenas” model of the rise and fall of social problems, public attention is viewed as a scarce resource, and the model emphasizes competition and selection in the media and other public discourses as determinants of what gets defined as a social problem (*19*). Seat belt laws and the “seat belts versus airbags debate” also competed for and received attention in the 1980s and 1990s. Then interest began to taper off. The public cannot pay attention to everything, and the decline in attention to alcohol-impaired driving and occupant protection laws and strategies may have cleared the way for the young driver problem to take hold.

Role of Research and Advocacy

During this time several identifiable forces within the highway safety realm were directing attention to the young driver problem and graduated licensing. One significant event was the enactment in 1987 of New Zealand's full-fledged graduated licensing system, which included both nighttime and passenger restrictions. Ironically, New Zealand's decision to adopt the system was influenced greatly by North American research (*20*). Why the time was right in New Zealand and not in North America is unclear. Subsequent research indicated that New Zealand's system reduced crashes and was acceptable to the public, including teenagers affected by the new rules (*21–23*). This was a milestone, indicating graduated systems of this type were viable.

With a sustained push from various safety organizations, U.S. interest in graduated licensing was increasing. In 1995 Williams and Sweedler wrote

> The National Highway Traffic Safety Administration is promoting graduated licensing, as it has done in the past, and is providing funding to Alaska and North Carolina to implement and evaluate licensing systems….The model system described by NHTSA and the American Association of Motor Vehicle Administrators includes a permit stage of 6 months, a 12-month restricted licensing stage, a night driving curfew, and zero alcohol tolerance. The National Transportation Safety Board (NTSB) has recommended that states enact graduated licensing, especially with night driving curfews, and has been promoting such legislation in letters to governors and state legislative leaders. The National Administrative License Revocation Coalition, comprised of 35 public and private safety and health organizations, has endorsed the concept and recommended that its members support state action on graduated licensing. (*24*)

The research base was also growing. For example, the Traffic Injury Research Foundation (TIRF) and the Insurance Institute for Highway Safety had been conducting parallel research on young drivers in Canada and the United States in the 1980s and 1990s, and this continued. A 1995 article, "Characteristics of Fatal Crashes of 16-Year-Old Drivers: Implications for Licensure Policies," isolated the extreme crash rate and crash characteristics of this main target of graduated licensing (*25*).

In addition to its research program, TIRF since the mid-1970s had organized several symposia and workshops on young driver issues and graduated licensing, stirring public and governmental interest in these topics. Over a period of years, coroners in Ontario, Canada, had been conducting a series of inquests into the deaths of young people at which TIRF personnel testified in favor of graduated licensing, and the coroners' recommendations attracted considerable press attention. The Insurance Bureau of Canada also was targeting a substantial advertising budget to promote graduated licensing, and this added to the pressure. These developments, ably encouraged by the activities of TIRF, may help to explain why graduated licensing appeared first in Canada, specifically in Ontario in the spring of 1994 and in Nova Scotia later that year.

North Carolina and Michigan were actively debating graduated licensing in the mid-1990s, but in 1996 Florida was the first state to enact a three-stage graduated system. Florida had not been active, but the death of a teenager and the subsequent efforts of her family and an interested legislator resulted in a bill passed with little fanfare in the closing moments of the

legislative session. Then the movement took off in the United States. A bandwagon effect developed as legislators rushed to enact legislation that was being enacted in other states. Five laws were enacted in 1996, followed by 8 in 1997, 12 in 1998, 11 in 1999, 7 in 2000, 2 in 2001, and 2 in 2002. Not that it was an easy task. There were many tough and protracted legislative battles with the usual combination of politics, personalities, and events (e.g., a spectacular teenage crash in a key legislator's district) coming into play. But it did happen, and it happened fast, with just about every state passing one or more elements of graduated licensing and most of this action taking place in the 5-year period from 1996 through 2000. The rush to graduated licensing had elements of a social epidemic, as depicted by Gladwell in his book *The Tipping Point*, in which he describes the contagious behavior generated by an idea that has developed a critical mass (*26*).

Once the graduated licensing movement gained momentum, researchers and advocates were very active. There were opportunities for more research on effects, and positive opinions about graduated licensing fed the movement. For guidance, model laws were established as the research basis for elements of graduated licensing (*27*), and organizations such as the American Automobile Association and NTSB worked closely with state policy makers. The highway safety community took full advantage of opportunities to further the movement.

LESSONS LEARNED

What can be learned about converting research to policy from this two-part story of graduated licensing, a failure experience followed by a success experience? The first lesson is that good research indicating that a measure can reduce losses on the highway can be a starting point, but it can take much more to get such a measure adopted—and "much more" may involve things interested parties have no control over and may not even understand. Clearly the right kind of social climate needs to be in place, which was not the case in the 1970s and 1980s. It is difficult to determine the extent to which the more receptive climate for graduated licensing in the 1990s was due to secular forces, the effects of research and advocacy, or to the decline in attention to alcohol and occupant protection issues, which may have opened the way for the young driver problem to become more dominant.

It may be tempting to think that the popularity of graduated licensing in the last part of the century was due solely to the cumulative effects of the research and advocacy that had been ongoing and strengthening for more than two decades. But did the research and advocacy really create the more receptive social climate and public attention to the young driver problem? Recalling the lack of focus on the young driver problem in the 1970s and 1980s and the accompanying disdain for graduated licensing, it appears that other influencing social factors had to come into play. It is quite certain, however, that research and advocacy efforts played a role and that graduated licensing can be considered at least to some extent a long-term payoff for research. The lesson for researchers—in regard to both graduated licensing and other, heretofore underutilized, measures—would seem to be to conduct good research, try to make sure it is well publicized and communicated effectively to advocates and legislators, and then hope the social forces necessary for its implementation line up. Equally important is recognition that this might not happen immediately.

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REFERENCES

1. Vernick, J. S., G. Li, S. Ogaitis, E. J. MacKenzie, S. P. Baker, and A. C. Gielsen. Effects of High School Driver Education on Motor Vehicle Crashes, Violations, and Licensure. *American Journal of Preventive Medicine*, Vol. 16, 1998, pp. 40–46.
2. Royal Automobile Club of Victoria. *The Effectiveness of Driver Training as a Road Safety Measure: A Review of the Literature*. Report 01/03. Noble Park, Australia, 2001.
3. O'Neill, B. Role of Advocacy, Education, and Training in Reducing Motor Vehicle Crash Losses. *Proceedings of WHO Meeting to Develop a 5-Year Strategy for Road Traffic Injury Prevention*. World Health Organization, Geneva, Switzerland, 2001, pp. 32–40.
4. Mayhew, D. R., and H. M. Simpson. The Safety Value of Driver Education and Training. *Injury Prevention*, Vol. 8, No. 2 (supplement), 2002, pp. 2–7.
5. Mayhew, D. R., H. M. Simpson, A. F. Williams, and S. A. Ferguson. Effectiveness and Role of Driver Education and Training in a Graduated Licensing System. *Journal of Public Health Policy*, Vol. 19, 1998, pp. 51–67.
6. Waller, P. F., and D. W. Reinfurt. *The Who and When of Accident Risk: Can Driver License Programs Provide Countermeasures?* University of North Carolina Highway Safety Research Center, Chapel Hill, 1973.
7. Teknekron, Inc. *Model for Provisional (Graduated) Licensing of Young Novice Drivers*. Report DOT HS-802-313. U.S. Department of Transportation, 1977.
8. Hagge, R. A., and W. C. Marsh. *An Evaluation of the Traffic Safety Impact of Provisional Licensing*. California Department of Motor Vehicles, Sacramento, 1988.
9. McKnight, A. J., P. Hyde, and L. Albricht. *Youth License Control Demonstration Project, Maryland Department of Transportation and National Public Services Research Institute*. Report DOT HS-806-616. National Highway Traffic Safety Administration, 1983.
10. Preusser, D. F., A. F. Williams, P. L. Zador, and R. D. Bloomberg. The Effect of Curfew Laws on Motor Vehicle Crashes. *Law and Policy*, Vol. 6, 1984, pp. 115–128.
11. Waller, P. F. The Genesis of GDL. *Journal of Safety Research*, Vol. 34, 2003, pp. 17–23.
12. *Los Angeles Times*. Why curfew for teen drivers? (editorial). May 25, 1983, p. 6.
13. Foss, R. D. Personal communication, 2003.
14. Mayhew, D. R., R. A. Warren, H. M. Simpson, and G. C. Haas. *Young Driver Accidents: Magnitude and Characteristics of the Problem*. Traffic Injury Research Foundation, Ottawa, Ontario, Canada, 1981.
15. Williams, A. F. Effective and Ineffective Policies for Reducing Injuries Associated with Youthful Drivers. *Alcohol, Drugs and Driving*, Vol. 3, 1987, pp. 109–117.
16. Williams, A. F., and A. K. Lund. Adults' Views of Laws That Limit Teenagers' Driving and Access to Alcohol. *Journal of Public Health Policy*, Vol. 7, 1986, pp. 190–197.
17. Ross, H. L. The Rise and Fall of Drunk Driving as a Social Problem in the USA. *Proc., 14th International Conference on Alcohol, Drugs, and Traffic Safety Vol. 1* (C. Mercier-Guyon, ed.). Centre d'Etudes et de Recherches en Médecine du Trafic, Annecy, France, 1997, pp. 9–14.
18. Ross, H. L. Drunk Driving: The Middle Age of a Social Problem. *Transportation Research Circular 487: Combating Impaired Driving in an Era of Diminished Resources and Shifting Priorities*, TRB, National Research Council, Washington, D.C., 1999, pp. 37–39.

19. Hilgartner, S., and C. Bosk. The Rise and Fall of Social Problems: A Public Arenas Model. *American Journal of Sociology*, Vol. 94, 1988, pp. 53–78.
20. Begg, D., and S. Stephenson. Graduated Driver Licensing: The New Zealand Experience. *Journal of Safety Research*, Vol. 34, 2003, pp. 99–105.
21. Langley, J. D., A. C. Wagenaar, and D. J. Begg. An Evaluation of the New Zealand Graduated Driver Licensing System. *Accident Analysis and Prevention*, Vol. 28, 1996, pp. 139–146.
22. Begg, D. J., S. Stephenson, J. Alsop, and J. Langley. Impact of Graduated Driver Licensing Restrictions on Crashes Involving Young Drivers in New Zealand. *Injury Prevention*, Vol. 7, 2001, pp. 292–296.
23. Begg, D. J., J. D. Langley, A. I. Reeder, and D. J. Chalmers. The New Zealand Graduated Driver Licensing System: Teenagers' Attitudes Towards and Experiences with This Car Driver Licensing System. *Injury Prevention*, Vol. 1, 1995, pp. 177–181.
24. Williams, A. F., and B. M. Sweedler. The Case for and Strategies to Implement Graduated Licensing in the United States. *Proc., 13th International Conference on Alcohol, Drugs, and Traffic Safety*, Vol. 1, Adelaide, Australia. NHMRC Road Accident Research Unit, University of Adelaide, 1995, pp. 239–243.
25. Williams, A. F., D. F. Preusser, R. G. Ulmer, and H. B. Weinstein. Characteristics of Fatal Crashes of 16-Year-Old Drivers: Implications for Licensure Policies. *Journal of Public Health Policy*, Vol. 16, 1995, pp. 347–360.
26. Gladwell, M. *The Tipping Point: How Little Things Can Make a Big Difference*. Little Brown and Company, New York, 2000.
27. Insurance Institute for Highway Safety and Traffic Injury Research Foundation. *Graduated Licensing: A Blueprint for North America*. Insurance Institute for Highway Safety, Arlington, Va., 2001.

CASE STUDIES: SUCCESS STORIES

Commentary on "The Fall and Rise of Graduated Licensing in North America," "The Case for 0.08% Per Se Laws," and "Underage Drinking Enforcement Training Center"

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Those conducting research are often puzzled by the failure of jurisdictions to accept and adopt the programs and policies that clearly demonstrate success. "Why don't they implement the research because it works?" is a frequent remark by the researchers.

From the state highway safety offices, the difficulty to implement programs or policies is first and foremost the responsibility of the governor of the jurisdiction. Under the Highway Safety Act of 1966 adopted by Congress, the governor of each state and territory was granted the responsibility to direct and administer the Highway Safety Program. The governor appoints a designated representative that for all practical purposes is part of the governor's cabinet.

Highway safety professionals frequently prepare information and recommendations on impaired driving countermeasures that are directed to the governor for consideration and approval. However, the governor and immediate advisers must consider the political landscape and public acceptance of implementing these research-based policies and practices. Sometimes it may be a matter of timing for the implementation of such initiatives, and the governor will take a leadership role or allow his or her appointees to serve in that capacity. The most successful implementation occurs when the governors themselves take the lead.

The biggest success in utilizing research-based impaired driving and other traffic safety initiatives has occurred since the "performance-based strategic traffic safety planning" process was adopted under the Transportation Equity Act for the 21st Century guidelines. It allowed jurisdictions the flexibility and discretion to conduct problem identification and to implement countermeasures that would specifically target problems unique to their jurisdiction and produce measurable outcomes.

Under the prior planning system, officials from NHTSA applied management practices that were counterproductive to individual jurisdiction needs. This often resulted in an adversarial relationship with limited measurable performance outcomes and attempted to impose "one size fits all" strategies that alienated the policy leaders needed to adopt those effective research-based initiatives.

The performance-based strategic traffic safety planning process has been more successful in meeting goals and objectives than any other. This process allowed highway safety staff to be more creative, innovative, and productive than previously. Eliminating the federal micromanagement also created an environment for state highway safety professionals in which they could more effectively and efficiently manage the programs and projects for which they are responsible. They are attempting to measure up to a performance standard that they themselves have established.

THE FALL AND RISE OF GRADUATED LICENSING IN NORTH AMERICA

Graduated licensing research indicated potential benefits as early as the late 1980s and early 1990s, yet there was little action to adopt these policies. The recent interest and adoption of graduated licensing laws were more a product of timing. The research was needed, an essential part of getting these laws passed and adopted.

There are three elements that have contributed to the recent interest in adopting graduated licensing laws. First, many schools that had been offering drivers education were making cost-cutting decisions to eliminate these programs from school offerings. Second, the public health community became more interested in the traffic crash contribution to the "unintentional injury and fatality" totals. Finally, the jurisdictions were collecting better local crash data. The emphasis on the alcohol-related crashes and lack of occupant restraint use pointed out the overrepresentation of young inexperienced drivers and passengers in these events.

The better use of data to identify the problems associated with young drivers in the states allowed the highway safety community to partner with the public and others to propose the most effective solutions, which include graduated licensing as a public policy consideration. The effect of timing to gain legislative interest and support as well as convincing the state's citizens that such action is appropriate is essential for adoption.

One of the conclusions in the "Public Arenas Model" section makes an invalid assumption. The statement that "the decline in attention to alcohol-impaired driving and occupant protection laws and strategies may have cleared the way for young driver problems to take hold" does not accurately portray what was taking place. In fact, the overrepresentation of young drivers in the alcohol-related crashes and low occupant-restraint use in the crash data drew more attention to the issue and forced the public policy discussions to take place.

THE CASE FOR 0.08% PER SE LAWS

Jurisdictions, for the most part, had difficulty in gaining political support for 0.08% per se laws even though the research existed that concluded that adoption could reduce alcohol-related crashes. The influence and political contributions of alcohol industry representatives and trial defense attorneys played a significant role in raising questions concerning the validity of the research. The ability of these influential individuals and organizations to redirect the emphasis from those drivers with the lower 0.08% blood alcohol content (BAC) to those with higher BACs and their contribution to the alcohol-related crashes has been effective.

The issue became more about the lower BAC level and less about actual impairment. Because the relationship between the BAC level and being defined as "drunk" has become part of the society's culture, it becomes difficult to suggest that the 0.10% per se level was wrong. The failure to identify impairment adequately and when it begins for most individuals has helped the opposition to the 0.08% per se law, even though the research suggests that benefits will result from its adoption.

Much of the earlier data relied only on the testing of deceased drivers for alcohol. Medically, those drivers with serious injuries and higher amounts of alcohol were more likely to result in a fatality. As a result, the higher BAC driver is more represented in these crash data. These results supported the 0.08% per se opponents.

As the jurisdictions continue to collect alcohol test results on both deceased and surviving drivers in fatal collisions, the suggestion of a larger proportion of lower BAC drivers with accompanying impairment is emerging to support the consideration of a lower BAC. Better collected data and improved research continue to provide additional validity to the earlier research.

The continued threat of federal funding sanctions has created an environment of animosity and anger in the states' political process. While appearing to be a successful way of gaining needed public policy initiatives, it has resulted in energizing the opposition and allowing policy makers to dismiss the highway safety community supporters. The congressional action that prohibits those that receive federal highway safety funding from lobbying for safety initiatives has also effectively muted the best source for selling the research and its results.

In Nebraska, the legislative proponents were successful in getting the 0.08% per se law because of the significant amount of federal highway incentive funding available. While there had been a previous incentive funding option in Intermodal Surface Transportation Efficiency Act of 1991, the amount was insufficient to get the attention of the legislature. It would appear that incentive funding might be useful only if the amount is significant enough to warrant serious consideration.

UNDERAGE DRINKING ENFORCEMENT TRAINING

There is strong evidence to suggest that, to address the problem and frequency of underage drinking, community understanding and support is essential. Appropriate changes in policy and enforcement of existing laws will not take place unless there is significant, vocal, and visible community support.

As the research suggests, public information and education are not effective in reducing underage alcohol use unless there is a significant law enforcement component. To gain community support effectively, researchers must obtain data that specifically identify the prevalence of and the problems associated with underage alcohol use. This data-driven process and evaluation are also essential to determine the progress of implementing the variety of research-based practices.

Programs and practices that include reducing the physical availability of alcohol to young people, increasing alcohol taxes, establishing school policies, restricting alcohol promotions, and conducting enforcement compliance checks have all demonstrated success. These are especially successful when supported by a strong community coalition whose mission includes preventing underage alcohol use.

The most significant issue here is the problem of obtaining sufficient data to identify those crimes, accidents, and incidents in which underage alcohol use was a contributing factor. The cost in dollars, injuries, and lives associated with underage alcohol use is substantial. To gain additional public and political support to advance the agenda, the collection of the data is of continuing importance.

Appendices

APPENDIX A

Workshop Schedule

Putting Research Into Action: A Symposium on the Implementation of Research-Based Impaired Driving Countermeasures

Transportation Research Board
Committee on Alcohol, Other Drugs, and Transportation
National Academy of Sciences Beckman Center
Irvine, California
August 21–22, 2003

Thursday, August 21

9:00–9:15 a.m.	Introduction to Workshop Kathy Stewart, *Safety and Policy Analysis International*
9:15–9:45 a.m.	General Theory on Translating Research into Policy and Practice, Session Chair: Ruth Shults, *Centers for Disease Control and Prevention* General Theory on Translating Research into Policy and Practice, Everett M. Rogers, *University of New Mexico*
9:45–10:15 a.m.	Discussants: Bill Bronrott, *Delegate, Maryland House of Delegates*; Barry M. Sweedler, *Safety and Policy Analysis International*
10:15–10:45 a.m.	General Discussion
10:45–11:00 a.m.	Break
11:00–11:20 a.m.	Legislative Challenge: Primary Seatbelt Enforcement Laws Session Chair: Danielle Roeber, *National Transportation Safety Board* Minorities and Primary Versus Secondary Belt Use Enforcement, David F. Preusser, *Preusser Research Group*
11:20–11:50 a.m.	Discussants: Chuck Hurley, *National Safety Council*; John Cullerton, *Senator, Illinois Senate*; James L. Nichols, *National Highway Traffic Safety Administration (ret.)*
11:50–12:30 p.m.	General Discussion
12:30–1:30 p.m.	Lunch
1:30–2:15 p.m.	Enforcement Challenges Session Chair: Marcy Burns, *Southern California Research Institute* Putting Research into Action: Sobriety Checkpoints Save Lives, John H. Lacey, *Pacific Institute for Research and Evaluation* The Passpoint System—Passive Sensors at Mini-Checkpoints: Bringing Australia's Random Breath-Test System to the United States, Robert B. Voas, *Pacific Institute for Research and Evaluation*
2:15–2:45 p.m.	Discussants: Joe Klima, *Phoenix Police Department*; Thomas E. Page, *Los Angeles Police Department (ret.)*
2:45–3:15 p.m.	General Discussion
3:15–3:30 p.m.	Break

3:30–4:00 p.m.	Judicial and Administrative Challenges Session Chair: Cliff Helander, *California Department of Motor Vehicles* Vehicle Sanctions for Repeat DWI Offenders: Factors that Facilitate or Impede Their Adoption or Implementation, Steve Simon, *University of Minnesota* Challenges to Ignition Interlock Program Implementation, Douglas J. Bierness, *Traffic Injury Research Foundation*
4:00–4:30 p.m.	Discussants: Glenn Mahler, *Judge, Superior Court of California, Newport Beach*; Richard D. Blomberg, *Dunlop and Associates*
4:30–5:00 p.m.	General Discussion

Friday, August 22

9:00–9:20 a.m.	Alcohol Policy Challenges: Alcohol Taxes, Responsible Beverage Service, etc. Session Chair: Barry Logan, *Forensic Laboratory Service Bureau, Washington State Patrol* Preventing Alcohol-Related Problems: Alcohol Policy Challenges, Joel Grube, *Prevention Research Center*
9:20–9:50 a.m.	Discussants: Jim Lange, *San Diego State University*; Karen Sprattler, *Mothers Against Drunk Driving*
9:50–10:30 a.m.	General Discussion
10:30–10:45 a.m.	Break
10:45–11:05 a.m.	Case Studies: Success Stories Session Chair: Jim Hedlund, *Traffic Safety North* Success Stories: Measuring Successful Community Action in Alcohol Prevention, Johnnetta L. Davis-Joyce, *Pacific Institute for Research and Evaluation*
11:05 - 11:40 a.m.	The Case for 0.08% Per Se Laws, Ralph W. Hingson, *Boston University* The Fall and Rise of Graduated Licensing in North America, Allan F. Williams, *Insurance Institute for Highway Safety*
11:40–12:10 p.m.	Discussants: Richard Compton, *National Highway Traffic Safety Administration*; Fred Zwonechek, *Nebraska Governor's Highway Safety Representative*
12:10–12:30 p.m.	General Discussion
12:30–1:30 p.m.	Lunch
1:30–2:30 p.m.	Final Discussion: Where Have We Been? What Lessons Have We Learned? Where Do We Go From Here? Kathy Stewart, *Safety and Policy Analysis International*; The Perspective of Legislators, Bill Bronrott, *Delegate, Maryland House of Delegates*; John Cullerton, *Senator, Illinois Senate*

APPENDIX B

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