Publicized Sobriety Checkpoint Programs

A Community Guide Systematic Review

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Context: Publicized sobriety checkpoint programs deter alcohol-impaired driving by stopping drivers systematically to assess their alcohol impairment. Sobriety checkpoints were recommended in 2001 by the Community Preventive Services Task Force for reducing alcohol-impaired driving, based on strong evidence of effectiveness. Since the 2001 review, attention to alcohol-impaired driving as a U.S. public health problem has decreased. This systematic review was conducted to determine if available evidence supports the effectiveness of publicized sobriety checkpoint programs in reducing alcohol-impaired driving, given the current context. The economic costs and benefits of the intervention were also assessed.

Evidence acquisition: This review focused on studies that evaluated the effects of publicized sobriety checkpoint programs on alcohol-involved crash fatalities. Using Community Guide methods, a systematic search was conducted for studies published between July 2000 and March 2012 that assessed the effectiveness of publicized sobriety checkpoint programs.

Evidence synthesis: Fourteen evaluations of selective breath testing and one of random breath testing checkpoints met the inclusion criteria for the systematic review, conducted in 2012. Ten evaluations assessed the effects of publicized sobriety checkpoint programs on alcohol-involved crash fatalities, finding a median reduction of 8.9% in this crash type (interquartile interval=−16.5%, −3.5%). Five economic evaluations showed benefit−cost ratios ranging from 2:1 to 57:1.

Conclusions: The number of studies, magnitude of effect, and consistency of findings indicate strong evidence of the effectiveness of publicized sobriety checkpoint programs in reducing alcohol-involved crash fatalities. Economic evidence shows that these programs also have the potential for substantial cost savings.

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Context

Alcohol-impaired driving is a major public health problem in the U.S., with adults reporting driving after having too much to drink an estimated 112 million times in 2010; impaired male drivers aged 21−34 years accounted for one third of these episodes.[1] Approximately one third of all motor vehicle crash fatalities involve an alcohol-impaired driver.[2] In 2012, impaired drivers were involved in 10,322 crash deaths.[2] Alcohol-impaired crashes cost an estimated $123 billion in the U.S. in 2012, including cost of quality-of-life losses, medical bills, loss of earnings, property damage, and other components. Each alcohol-impaired fatality costs $5.6 million.[3]

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Sobriety Checkpoints

Sobriety checkpoints, designed to decrease alcohol-impaired driving, are a form of high-visibility enforcement at which law enforcement officers select vehicles in a systematic manner to stop and assess the driver's degree of alcohol impairment. There are two types of sobriety checkpoints: selective breath testing (SBT), in which police must have suspicion of impairment, based on observation, to request a breath test, as done in the U.S.; and random breath testing (RBT), in which all stopped drivers are given breath tests for blood alcohol concentration (BAC) levels, as used in Australia and several European countries. A prior Community Guide systematic review (2001)[4] found strong evidence of the effectiveness of sobriety checkpoints, which reduced crashes likely involving alcohol by a median of 20% for SBT and a median of 18% for RBT. A more recent meta-analysis found that sobriety checkpoints resulted in a 17% reduction in crashes involving alcohol.[5]

The goal of sobriety checkpoints is to deter alcohol-impaired driving by increasing the perceived risk of arrest and arresting any identified alcohol-impaired drivers. On average in the U.S., impaired driving occurs 80 times for every arrest made[1,6]; therefore, increasing the perceived risk of arrest is important in discouraging alcohol-impaired driving. Media campaigns to increase public awareness of sobriety checkpoints are an important part of the intervention's overall success.[7] These media efforts are either paid or earned and are delivered through many channels, including radio, TV, newspapers, Internet, social media, billboards, and posters.

Law enforcement agencies started using sobriety checkpoints in the U.S. in the early 1980s.[8] After a legal challenge, the decision was appealed to the Supreme Court, which ruled that sobriety checkpoints are a minimal and acceptable intrusion given the benefit of preventing impaired driving and the small amount of time required of non-impaired drivers.[9] As of 2012, sobriety checkpoints were being conducted in 38 states, with about one third of these states implementing checkpoints at least once a week.[10] Twelve states prohibit use of sobriety checkpoints.[10]

Changes in alcohol-impaired driving. The original Community Guide review included evaluations, published through June 2000, of sobriety checkpoints conducted between 1973 and 1996.[4] During that period, the creation of citizen groups such as Mothers Against Drunk Driving (madd.org) led to increased media attention toward alcohol-impaired driving that, in turn, helped change social norms about the acceptability of this behavior.[11] Additionally, existing laws were strengthened and new laws were enacted.[11] From 1982, when the National Highway Traffic Safety Administration (NHTSA) first collected data on alcohol-impaired driving deaths, to 1996, the alcohol-impaired fatal crash rate declined from 9.1 to 5.0 deaths per 100,000 population, and the percentage of total motor vehicle crash deaths that involved an alcohol-impaired driver declined from 48% to 32%.[12,13] Since 1996, the percentage of all crash deaths that involve an alcohol-impaired driver has remained stable at 30%–32%. One possible reason for the stabilization is that media attention to and public focus on alcohol-impaired driving as a problem has decreased.[11]

Systematic Review Objective

The main objective of this systematic review is to determine the effectiveness of publicized sobriety checkpoint programs in reducing alcohol-involved crash fatalities. Since the time of the original review studies, appreciation for the importance of including a media campaign as part of a checkpoint program has increased, along with the importance of conducting multiple checkpoints over a period of time; hence, this review evaluates "publicized sobriety checkpoint programs." Additionally, the original review identified several evidence gaps in factors related to effectiveness, including the number of staff employed and the optimal level of media coverage. The present review also sought to examine the effect of these factors on effectiveness along with the economic costs and benefits of the intervention.

Evidence Acquisition

A review coordination team (*the team*) consisting of subject matter experts in the public health aspects of alcohol-impaired driving, traffic safety, and systematic reviews conducted this update under the oversight of the independent, nonfederal, unpaid Community Preventive Services Task Force, using established Community Guide systematic review methods.[4,14–17] The team refined the analytic framework from the original review to define the conceptual approach, searched for evidence, used the inclusion/exclusion criteria from the original review to screen evidence, and identified evaluations of publicized sobriety checkpoint programs. Two investigators independently abstracted and scored each study for quality of execution.[14,17] Studies with the outcomes of alcohol-involved fatal crashes and alcohol-involved fatalities were grouped and a median effect estimate and interquartile intervals (IQIs) calculated.

Update Review Method

Because the team anticipated that effect estimates from the updated review might differ from those of the original, results from the two effectiveness reviews were not combined. In contrast, the updated economic review combined the evidence from the prior review[4] and the updated literature search because some of the newly identified studies examined evidence from programs conducted during the period covered by the original review but published after it was completed.

Search for Evidence

For this review, the following databases were searched for studies published from July 2000 (the endpoint for the evidence search for the original review) to March 2012: Cochrane; MEDLINE; Embase; PsycINFO; TRIS; NTIS (Ebscohost); and EIComplex (Engineering Village). Key words included *motor vehicles*, *alcohol*, and *interventions*. Details of the search strategy are available at www.thecommunityguide.org/mvoi/AID/supportingmaterials/SSsobrietyckpts.html. The team also searched reference lists of studies and consulted experts for additional references. Published literature and published government reports were included. The economics team searched the economic evidence using the same search strategy, supplemented with economic-focused terms and databases such as EconLit and Health Economic Evaluations Database (HEED). The literature searches identified 13 effectiveness studies and 12 economic studies that met review inclusion criteria, with two additional effectiveness studies identified by subject matter experts and hand-searching of references.

Conceptual Approach and Analytic Framework

Publicized sobriety checkpoint programs. The analytic framework in Figure 1 defines the conceptual approach for evaluating publicized sobriety checkpoint programs. These programs are expected to increase driver awareness of enforcement activity, generating an increase in the perceived risk of detection of alcohol-impaired drivers and a subsequent reduction in drinking and driving. These programs might also lead to a change in social norms, resulting in a reduction in drinking and driving. Ultimately, these reductions in drinking and driving would lead to a decrease in alcohol-involved crashes and associated fatalities and injuries.

Inclusion Criteria

Included in this review were primary research studies conducted in high-income countries,[18] published in English, that evaluated the effectiveness of publicized sobriety checkpoint programs, had a comparison group or compared conditions before and after the checkpoint program, and reported outcomes of interest to this review. Studies that evaluated sobriety checkpoints implemented along with other methods of high-visibility enforcement, such as roving patrols, and did not produce independent estimates of the effects of sobriety checkpoints were excluded.

Summary Effect Measures

In selecting summary effect measures, the team looked for measures that controlled for factors other than publicized sobriety checkpoint programs and may have influenced outcomes.[4] Measures that used a concurrent comparison group were preferred.[4] The team also gave preference to direct over proxy measures, such as single-vehicle nighttime crashes.[4]

The primary outcome measures in this review were the number of fatal crashes and crash fatalities with at least one driver who had a BAC of $\geq$0.01 g/dL. These two measures were considered sufficiently similar to be combined into a single primary outcome measure reflecting alcohol-involved crash fatalities. Most studies with this measure obtained these data from the NHTSA Fatality Analysis Reporting System (FARS), which derives alcohol involvement using the measured BAC when available or using an imputed BAC when the measure is missing.[19] Nine of ten reviewed studies of alcohol-involved crash fatalities used a BAC of $\geq$0.01 g/dL to denote alcohol involvement, and the remaining study used a BAC of $\geq$0.10 g/dL, the illegal limit at the time of the study. Results based on the differing BAC levels were combined because 85% of drinking drivers in alcohol-involved fatal crashes typically have a BAC equal to or greater than the illegal level.[2]

Economic results of interest included data on intervention cost, cost-effectiveness, and benefit–cost ratios. All monetary values were expressed in 2011 U.S. dollars.

Evaluation of Media Campaigns

An intermediate outcome of "awareness of enforcement activity" was included as a measure of the effectiveness of media campaigns. This outcome was assessed by calculating the change from pre- to post-intervention in the percentage of survey respondents in the target population who answered *yes* to some variation of the question *In the past 30 days, have you seen or heard anything about a checkpoint?*

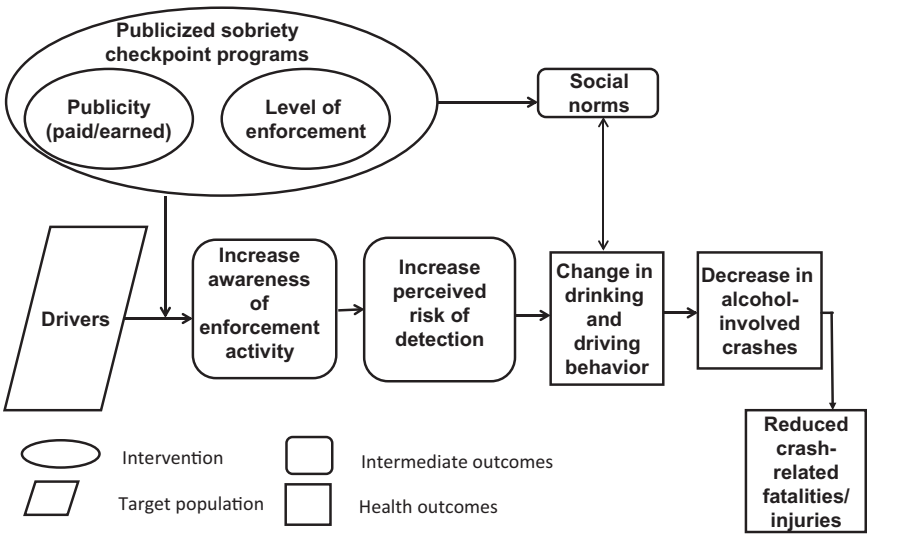

Figure 1. Analytic framework: publicized sobriety checkpoint programs

Evidence Synthesis

Characteristics of Included Studies

The literature search identified 15 studies from ten papers that met the inclusion criteria (Table 1).[20–29] Fourteen studies evaluated SBT checkpoint programs in the U.S. and one[25] evaluated an RBT program in New Zealand. Fourteen studies[21–29] evaluated the general population, two[20,29] evaluated

young adult populations, and one[29] reported outcomes by gender. Two studies[22,27] evaluated low-staffed checkpoints (≤11 officers) and five[24,28,29] evaluated the conducted media campaign.

Intervention Effectiveness: Alcohol-Involved Crash Fatalities

Ten studies (in five papers)[23,24,27–29] reported the number of alcohol-involved crash fatalities, and form the primary evidence for this review (Table 1), which was conducted in 2012. The median relative percentage decrease in alcohol-involved crash fatalities was 8.9% (IQI=−16.5%, −3.5%; Figure 2). Six of ten studies evaluated the Checkpoint Strikeforce Program conducted in the Mid-Atlantic region comprising the District of Columbia, Delaware, Maryland, Pennsylvania, Virginia, and West Virginia.[24] These studies were reported in one paper but were treated as individual studies because program implementation and evaluation decisions were unique to each state, although there was some common publicity. Evaluations of the checkpoint programs in the District of Columbia and Maryland showed relative increases in alcohol-involved crash fatalities of 1.8% and 10.7%. Results from the other four states showed relative percentage decreases in alcohol-involved crash fatalities ranging from 5.2% to 16.7%.

A program of statewide checkpoint blitzes in New Mexico resulted in a 15.7% reduction in alcohol-involved crash fatalities compared to neighboring states.[23] In Connecticut, checkpoints conducted over holiday periods resulted in a 16.4% reduction in alcohol-involved crash fatalities compared to contiguous counties.[29] In Georgia, a checkpoint program resulted in an 8.3% reduction in alcohol-involved crash fatalities.[28] Finally, highly mobile low-staffed checkpoints in Jefferson County, Colorado resulted in an 18% decrease in alcohol-involved crash fatalities.[27]

Other Crash-Related Outcomes

The remaining five studies in this review provided evidence on outcomes other than alcohol-involved crash fatalities (Table 1). A program of over 2,000 checkpoints conducted in Georgia resulted in a 14% reduction in the ratio of alcohol-involved drivers in fatal crashes to non-alcohol-involved drivers in fatal crashes.[21] A sobriety checkpoint program that used GIS techniques to locate sites for checkpoints in high-density alcohol-related crash areas of Indianapolis resulted in an 18.8% reduction in alcohol-involved fatal and nonfatal crashes.[26] Finally, an RBT checkpoint program conducted in New Zealand between 1993 and 1995 found a 22.1% reduction in serious and fatal nighttime crashes.[25]

Three studies reported on changes in drinking and driving behavior. An evaluation conducted on and around a college campus reported a 28% reduction in self-reported driving under the influence.[20] An evaluation of low-staffed checkpoints conducted in two counties in West Virginia reported a 64% reduction in the percentage of nighttime drivers with a measured BAC ≥0.08 g/dL.[22] The previously described evaluation in Connecticut reported a 7.2% decrease for men and <1% increase for women in the percentage of drivers with a measured BAC ≥0.01 g/dL.[29]

Evidence of Intervention Effectiveness Based on Checkpoint Staffing Level

Two studies provided evidence on low-staffed (≤11 officers) checkpoints. One study[22] found a 64% reduction in nighttime drivers with a BAC ≥0.08 g/dL and the second[27] found an 18% reduction in alcohol-involved crash fatalities.

Evidence of Intervention Effectiveness in High-Risk Groups

Two studies reported results in high-risk subpopulations of young adult drivers. The study conducted on and around a college campus[20] found that checkpoints resulted in a 28% reduction in the percentage of those reporting driving under the influence. The second study[29] estimated that 1.6 lives were saved per month in Connecticut among men aged 21−34 years when checkpoints were conducted.

Effect of Media on Intervention Effectiveness

Five studies in three papers[24,28,29] provided evaluations of the media campaign. These studies reported increases ranging from 3.4% to 31.9% of the target population who had seen or heard messages about drinking and driving or checkpoints, following implementation of the program (Table 2). The three studies[24,28] with the largest change in media awareness also found the biggest decreases in alcohol-involved crash fatalities.

Economic Efficiency

Characteristics of included studies. The search for the updated economic efficiency review found 12 studies in seven papers,[20,22,24,25,28–30] which were combined with four studies[31–34] from the original review. Of these studies, seven[22,25,30–34] reported cost and benefit findings on actual operation of the sobriety checkpoints alone, eight[24,28,29] reported cost or cost-effectiveness information on media advertising and publicity alone, and one[20] reported cost for both operations and media.

Table 1. Studies evaluating the effectiveness of publicized sobriety checkpoint programs

Author and year (*n* studies in paper); Time period of intervention	Study design	Location	Follow-up period	Intervention	Comparison group	Effect measures reported
Clapp 2005[20] (1); Spring 2002–Spring 2003	Controlled before and after	California, U.S.	1 year	Checkpoints, media coverage, student-designed social marketing campaign	Comparison to college in same area of state without sobriety checkpoints	**Self-reported driving under the influence decreased 28%** OR for driving under the influence when controlling for demographic/drinking characteristics=0.55 ($p<0.01$)
Fell 2005[21] (1); 07/2000–09/2001	Interrupted time series with comparison group	Georgia, U.S.	14 months	Conducted 2,837 checkpoints, and included earned and paid media	Comparison to neighboring states: Alabama, Florida, Mississippi, and South Carolina	**Ratio of alcohol-involved drivers in fatal crashes to non-alcohol-involved drivers in fatal crashes decreased 14% (p=0.05)** Alcohol-involved fatalities per vehicle mile traveled decreased 4.6% (p=0.177)
Lacey 2000[23] (1); 12/1993–12/1995	Interrupted time series with comparison group	New Mexico, U.S.	2 years	Periodic (bimonthly) statewide checkpoint blitzes accompanied by extensive public information and education	Comparison to Arizona, Nevada, Texas, Colorado, and Oklahoma	**Alcohol-impaired fatal motor vehicle crashes (BAC $\geq$0.10%) decreased 15.7% (near significance)**
Lacey 2008[24] (6); 06/27/2002–2004; Last 6 months of each year (July–December)	Interrupted time series with comparison group	Mid-Atlantic U.S. (District of Columbia, Delaware, Maryland, Pennsylvania, Virginia, and West Virginia)	2.5 years	Checkpoint Strikeforce: highly focused, border–to-border multistate sobriety checkpoint campaign, where each state agreed to conduct at least one checkpoint per week; aggressive paid and earned media included	Comparison to the rest of the U.S., excluding six states being evaluated	**Alcohol-involved fatal motor vehicle crashes:** **District of Columbia increased 1.8% (p=0.44);** **Delaware decreased 9.6% (p=0.18);** **Maryland increased 10.7% (p=0.13);** **Pennsylvania decreased 5.2% (p=0.23);** **Virginia decreased 6.1% (p=0.21);** **West Virginia decreased 16.7% (p=0.02)**

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Table 1. Studies evaluating the effectiveness of publicized sobriety checkpoint programs *(continued)*

Author and year (*n* studies in paper); Time period of intervention	Study design	Location	Follow-up period	Intervention	Comparison group	Effect measures reported
Lacey 2006[22] (1); 8/2003–8/2004	Interrupted time series with comparison group	Two counties in West Virginia, U.S. (Raleigh, Greenbriar)	8–10 months	Weekly low-staffed checkpoints, staffed with three to five officers, conducted in two counties over 1 year (Friday and Saturday nights between 10:00PM and 3:00AM); earned media included	Comparison to two other counties in West Virginia	**Proportion of nighttime driver BACs ≥0.08 g/dL decreased by 64% (*p*=0.18)**
Miller 2004[25] (1); 1993–1995	Interrupted time series	New Zealand	32 months	Random breath testing with target of 1.5 million tests annually; media campaign mentioned but not described	No comparison group	**Fatal and serious nighttime crashes decreased 22.1% (*p*<0.10)**
Nunn 2011[26] (1); 10/2008–09/2009	Interrupted time series with comparison group	Indianapolis, Indiana, U.S.	1 year	Checkpoints conducted in nine areas within the city with historically high density of alcohol-related collisions; public awareness mentioned but no description of media	Comparison to two locations within the city without checkpoints	**Alcohol-impaired collisions decreased 18.8% (*p*<0.001)**
Stuster 2006[27] (1); June 2003–June 2004	Before and after	Jefferson County, Colorado, U.S.	18 months	Highly mobile, low-staffed checkpoints. Paid and earned media used	No comparison group	**Alcohol-involved fatal motor vehicle crashes decreased 18% (significance not reported)**
Syner 2006[28] (1); 2003–2005	Before and after	Georgia, U.S.	3 years	Strategic Evaluation States Initiative: Georgia conducted at least monthly checkpoints that covered 65% of the state; paid and earned media used	Non-alcohol-involved crash fatalities in the state	**Alcohol-involved motor vehicle crash fatalities decreased 8.3% (significance not reported)** Alcohol-involved crash fatalities compared to non-alcohol-involved crash fatalities decreased 20%
Zwicker 2007[29] (1); 2003–2004	Interrupted time series with comparison group	Connecticut, U.S.	18 months	Checkpoints conducted during enhanced periods of enforcement over holidays (Independence Day, Thanksgiving, Christmas); paid and earned media used	Comparison to contiguous counties in New York, Rhode Island, and Massachusetts	**Alcohol-involved motor vehicle crash fatalities decreased 16.4% (*p*=0.04)** 2.6 lives saved per month for all age groups; 1.6 lives saved per month for men aged 21–34 years

Note: Boldface indicates the measure used for summary.
BAC, blood alcohol concentration

Costs of sobriety checkpoint programs included the costs of checkpoint operation and management, the driver's time while stopped at the checkpoint, and media advertising and publicity. Program benefits included potential averted crash costs (averted healthcare and ambulance costs, police and court expenditures, property damage, productivity loss); revenues generated by the program (police fines, towing fees); and the monetary value of averted deaths. Not all studies included these different components of costs and benefits.

Economic findings for sobriety checkpoint programs. Five cost–benefit studies[25,31–34] were identified. Two SBT studies reported benefit–cost ratio of 6:1[32] and 23:1[33] and three RBT studies reported ratios of 2:1,[34] 14:1,[32] and 57:1.[31] The RBT study with the highest ratio considered both fatal and serious injury crashes averted over a 3-year period as opposed to the other two RBT studies that used nonfatal crashes over 9 months[34] and nighttime fatal and nonfatal crashes over 2 years.[32] Furthermore, the intervention in the study with the highest ratio was more intensive, reaching one in three drivers, compared to another RBT study,[32] which reached one in nine drivers.[4] In summary, all studies found that benefits exceeded costs, indicating that publicized sobriety checkpoint programs have the potential for substantial cost savings (Table 3).

Three cost-effectiveness studies[20,22,30] were identified in the updated search. The first study[30] assessed the costs and outcomes of a 2-year regularly staffed program in Tennessee. It reported a cost of $1.25 million and a 20.4% reduction in alcohol-involved fatal crashes with an estimated cost per averted alcohol-involved fatal crash of $5,787. The other two studies[20,22] analyzed the comparative cost effectiveness of changes in drinking and driving behavior: one study[22] of weekly low-manpower checkpoints in two rural counties in West Virginia had a calculated cost of $35,146–$40,168 per percentage point reduction in nighttime drinking drivers with BAC $\geq$0.08 g/dL; the other study[20] of checkpoints in a large California university community had a calculated cost of $1,723 per percentage point reduction in self-reported driving after drinking. However, without additional information, it is not possible to translate these three reported measures into the more commonly used cost-effectiveness measures of cost per life-year saved or cost per quality-adjusted life-year.[15] These three studies (one low-staffed and two regularly staffed) found that operation costs of low-staffed sobriety checkpoint programs ($391–$446 per checkpoint) were less than those of regularly staffed programs ($1,470–$3,445 per checkpoint).

Economic findings for media campaigns. Nine studies from four papers[20,24,28,29] reported costs of media advertising that ranged from $1 to $82 per 100 persons in the targeted area. Five[24,28,29] studies provided information on change in media awareness, measured before and after advertising the intervention. The cost per additional 100 people aware of the sobriety checkpoints ranged from $29 to $257 (Table 2). The incremental cost of media varied based on the length, density, and duration of publicity, and the type of media used.

Additional Literature

After the current review was completed, three additional evaluations of RBT checkpoints that met the criteria for inclusion in the review were identified.[35–37] Two evaluations were conducted in Australia and one in New Zealand. All three were consistent with the findings of this review: Each study reported a net reduction in alcohol-involved fatal crashes associated with RBT sobriety checkpoints.

Applicability

Publicized sobriety checkpoint programs have been shown to be effective in various settings, jurisdictions, and populations. The programs studied in this review were implemented at the city,[20,26] county,[22,27] state,[21,23,24,28,29] and national levels,[25] and were conducted in rural,[22] urban,[20,26,27] and mixed rural and urban areas.[21,23–25,27–29] Most of these programs either were NHTSA-funded or followed NHTSA guidelines for conducting sobriety checkpoints.[23,24,26–29] All evaluated programs involved a series of checkpoints conducted over time, typically 1–3 years. Thus, results from this review may not be applicable to implementations that consist of a small number of checkpoints conducted over a brief time period.

Other Harms and Benefits

Sobriety checkpoints may help law enforcement officers detect law violations that would otherwise be missed, such as occupants not using seat belts,[22,24,28] driving without a valid license,[30] carrying weapons,[4,30] or major crimes.[22] One negative consequence of sobriety checkpoints is the inconvenience to and intrusion into the privacy of drivers who are required to stop. However, as stated previously, the U.S. Supreme Court ruled that checkpoints pose a minimal and acceptable intrusion.[9]

Considerations for Implementation

Securing the necessary staff to conduct sobriety checkpoints can be challenging because law enforcement agencies are often understaffed and their resources are divided among multiple priorities.[7,38] Additionally, sobriety checkpoints are typically conducted during times

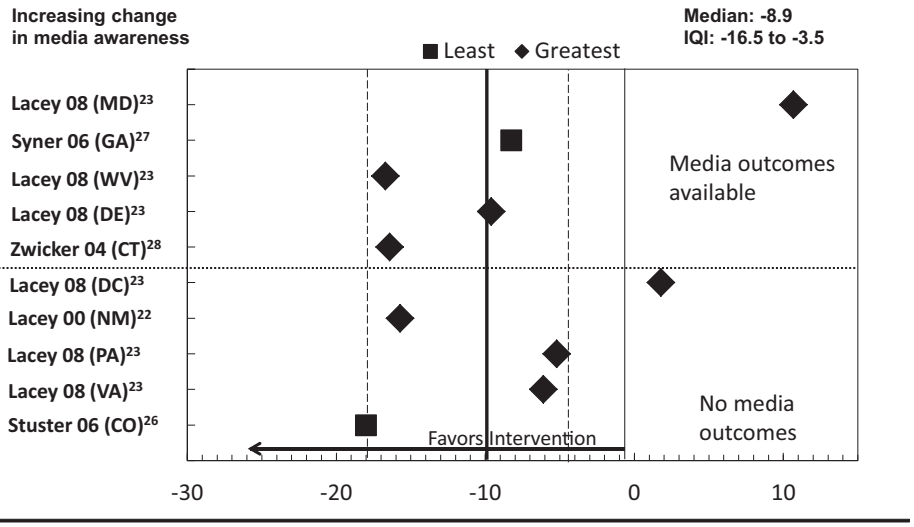

Figure 2. Effectiveness of publicized sobriety checkpoint programs in reducing alcohol-involved crash fatalities
IQI, interquartile interval

when alcohol-impaired drivers are most likely to be on the roads, such as weekend evenings, and staff overtime is often required, thereby increasing program costs.[20,22,39]

Compared with other forms of high-visibility enforcement such as roving patrols, sobriety checkpoints are harder and more dangerous to implement during adverse weather conditions, because they require law enforcement personnel to stand outside instead of patrolling in their vehicles.[7,27] In a profession where performance is sometimes measured by number of arrests made, law enforcement may be less supportive of checkpoint programs because these programs may result in fewer arrests of impaired drivers compared with other forms of enforcement.[4,38] Providing law enforcement personnel with information on the deterrent effects of checkpoints and feedback on the crash prevention outcomes may help to improve their support.[4,39]

The NHTSA how-to guide for planning and publicizing sobriety checkpoints[40] is an important resource for conducting checkpoints that are legal, safe, and effective. The guide recommends selecting a site for conducting checkpoints by identifying locations that (1) have a high incidence of impaired driving–related crashes and (2) are safe for both law enforcement and motor vehicle occupants. Systematically selecting vehicles for driver assessment and using standardized methods to determine who and how to test for alcohol can help avoid concerns about racial profiling by ensuring that the methods used to detect impaired drivers are not left to an individual officer's discretion.[38]

Conclusions

Summary of Findings

Eight of ten evaluations that measured alcohol-involved crash fatalities reported reductions in the outcome after implementing publicized sobriety checkpoint programs; the two exceptions occurred in Maryland and the District of Columbia. Maryland conducted fewer checkpoints per 100,000 people than other programs that reported this measure. Additionally, its media campaign funding was at the low end for states that reported the measure (see Table 2).[24]

Stratified analysis of the effect of various factors on intervention effectiveness showed evidence of effectiveness for high-risk populations and differing checkpoint configurations. Publicized sobriety checkpoint programs are effective among high-risk populations of men aged 21–34 years and college students. Low-staffed checkpoints are effective, but there was insufficient evidence to compare their effectiveness to that of regularly staffed

Table 2. Changes in media awareness owing to publicized sobriety checkpoint programs and associated costs

Author (year)	State	Change in media awareness (%)	Cost of paid media (annual, $)	Cost per additional 100 people aware of sobriety checkpoints ($)
Zwicker (2007)[29]	Connecticut	31.9	2,857,274	257
Lacey (2008)[24]	Delaware	15.8	74,871	87
Lacey (2008)[24]	West Virginia	7.1	128,309	150
Syner (2006)[28]	Georgia	4.7	121,544	29
Lacey (2008)[24]	Maryland	3.4	96,752	78

Table 3. Cost–benefit analysis of publicized sobriety checkpoint programs

Study	Type of sobriety checkpoint	Location	Study outcome reduction	Benefit–cost ratio
Wesemann (1989)[34]	RBT	Netherlands	25% in alcohol-involved injury or property damage on weekend nights	2:1
Miller (1998)[32]	SBT	Hypothetical[a]	15% in alcohol-involved crashes	6:1
Miller (2004)[25]	RBT	New Zealand	22.1% in fatal and serious nighttime crashes	14:1
Stuster (1995)[33]	SBT	California	17.5%–31.6% in alcohol-involved crash injuries and fatalities	23:1
Arthurson (1985)[31]	RBT	New South Wales, Australia	13% in fatal crashes, serious injuries, minor injuries, and tow-away crashes	57:1

[a]Author used a literature review to estimate effectiveness of sobriety checkpoints and based cost and benefits on this estimate.
RBT, random breath testing; SBT, selective breath testing

checkpoints. Finally, several studies reported on changes in media awareness, but too few reported this measure along with a standard outcome measure to be able to draw a conclusion about the relationship between change in awareness and effectiveness of publicized sobriety checkpoint programs.

The number, magnitude, and consistency of the systematic review findings indicate strong evidence of the effectiveness of publicized sobriety checkpoint programs in reducing alcohol-involved crash fatalities. Despite the smaller effect estimates shown by studies published since 2000 compared to the effect estimates from the original review, the number and consistency of findings still indicate strong evidence of effectiveness. A review of the economic evidence to assess the costs and benefits also showed that these programs have the potential for cost savings.

Evidence Gaps

The current review attempted to address several evidence gaps identified in the original review related to levels of enforcement and publicity.[4] However, too few studies included the details necessary to fully address these gaps, and several additional gaps were identified. Issues included the following:

- Too few studies examined differing configurations of checkpoints (e.g., low staffing versus regular staffing, intermittent blitzes versus continuous) to judge the impact on effectiveness.
- Evaluations did not always document useful process measures, such as the numbers of checkpoints conducted, vehicles stopped, or breath tests administered. With the technological advances in recent decades, electronic recording and reporting of this type of information is feasible. These types of process measures are needed to assess more thoroughly the effectiveness of sobriety checkpoints at varying levels of enforcement.
- Evaluations did not consistently include enough details about procedures and costs, such as the use of technology (e.g., instruments such as passive alcohol sensors), staff needed, costs of checkpoint operations, and cost and quantity of the different types of publicity used.

Future sobriety checkpoint programs will need to accommodate contextual changes such as potential shifts in alcohol-impaired driving patterns, new technologies to help identify alcohol-impaired drivers, and the rapid growth and diversification in media outlets. Working with law enforcement to understand and evaluate such changes, researchers could provide valuable information on the design of checkpoint programs to maintain and potentially increase their effectiveness.

Discussion

The smaller effect estimate reported in this updated systematic review compared to that reported in the original review can be attributed to several possible factors:

- The studies in the original review were conducted when use of sobriety checkpoints was a relatively new strategy, whereas those in this review were conducted when checkpoints were more commonly used. As a result, the more recently conducted sobriety checkpoint programs likely were not considered as newsworthy as those conducted during the original review period, and these programs likely received less earned media attention.
- Sobriety checkpoint programs and other methods of high-visibility enforcement, including roving and

saturation patrols, were in wider use during the period of the studies in the updated review. Also, since the original review, NHTSA has funded nationally broadcast paid media campaigns on alcohol-impaired driving. It is likely that increased levels of both high-visibility enforcement and publicity on alcohol-impaired driving were in use in the comparison areas during the more recent studies, compared to the original studies. Such changes in enforcement and publicity in the comparison areas likely contributed to smaller net decreases between study and comparison areas in alcohol-involved crash fatalities reported in this updated review.

- The number of alcohol-impaired driving fatalities and their rate per vehicle mile traveled declined significantly between the time of the original and updated review studies. Accordingly, declines in impaired-driving fatalities were likely more difficult to achieve in the more recently conducted studies compared with the earlier studies.

Although the median reduction in this review was lower than in the original review, the effect size (–8.9%) continues to be considered strong evidence of effectiveness. In addition, a review of costs and benefits shows evidence that these programs have the potential for significant cost savings.

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