
Effectiveness of Designated Driver Programs for Reducing Alcohol-Impaired Driving

A Systematic Review

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Overview

A systematic review was conducted to assess the evidence of effectiveness of designated driver programs for reducing alcohol-impaired driving and alcohol-related crashes. Two types of programs were evaluated for this review: population-based campaigns that encourage designated driver use, and programs conducted in drinking establishments that provide incentives for people to act as designated drivers. Peer-reviewed papers or technical reports that met quality criteria and evaluated outcomes of interest were included in the review. A single study of a population-based designated driver promotion campaign was identified. Survey results indicated a 13 percentage point increase in respondents “always” selecting a designated driver, but no significant change in self-reported alcohol-impaired driving or riding with an alcohol-impaired driver. Eight studies of incentive programs at drinking establishments met inclusion criteria. Seven of these evaluated the number of patrons who identified themselves as designated drivers before and after programs were implemented, with a mean increase of 0.9 designated drivers per night (interquartile range: 0.3 to 3.2 designated drivers per night). The eighth study reported a 6 percentage point decrease ($p < 0.01$) in self-reported driving or riding in a car with an intoxicated driver among respondents exposed to an incentive program. The present evidence is insufficient to draw conclusions about the effectiveness of either type of designated driver promotion program evaluated. More carefully controlled studies are needed of the effects of population-based, designated driver promotion efforts. For incentive programs, the public health impact of the small observed increases in the number

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of self-identified designated drivers at each drinking venue is unknown. Furthermore, it is apparent that consistent, concerted promotional efforts are needed to obtain and maintain small increases in the number of self-reported designated drivers. Suggestions are provided regarding future research issues and needs raised by this review.

Introduction

Since the 1980s, designated driver programs aimed at reducing alcohol-impaired driving have been widely implemented and promoted in the United States.¹⁻³ Designated driver programs are appealing because they are viewed as simple, prosocial, voluntary, inexpensive, widely applicable, requiring a modest behavioral change, and as translating easily into mass media campaigns to change social norms.¹⁻³ The emphasis on this approach to the prevention of alcohol-impaired driving has been supported by drinking establishments,¹ the alcohol industry,² professional sports teams,⁴ the National Highway Traffic Safety Administration,⁵ media organizations,^{2,3} and advocacy groups.⁶ These efforts have resulted in widespread recognition and acceptance of the designated driver concept by the general public. In telephone surveys in California⁷ and nationwide,⁸ over 90% of respondents recognized the concept of the designated driver, and 92% viewed designated driver promotion as a good or excellent way to reduce alcohol-impaired driving.⁸ Despite this, there are few data on the effectiveness of these programs in increasing designated driver recruitment and reducing alcohol-impaired driving. In 1992, DeJong and Wallack,² noting a dearth of evidence-based data on designated driver programs, called for rigorous research in this area, but this situation remains relatively unchanged.

Definitions of “Designated Driver”

There is no universal definition of a “designated driver.” The most common definition, and the one used in studies performed in the United States, requires that the designated driver abstain from all alcohol, be assigned before alcohol consumption, and drive

other group members to their homes.^{3,9-11} Other definitions, which are more commonly used in other countries such as Australia, employ a risk- and harm-reduction strategy.¹² The primary goal in this context is not necessarily abstinence, but to keep the designated driver's blood alcohol content (BAC) at less than the legal limit,¹³⁻¹⁵ beyond which the crash risk increases dramatically.¹⁶ Although it is preferable that the designated driver be assigned prior to drinking, this is not a requirement under this "harm reduction" definition. The implementation of either the abstinence or harm-reduction approach to designated driver use could potentially reduce alcohol-related crashes.

In practice, it appears that only a minority of designated drivers in the United States remain completely abstinent, and many people may apply the designated driver concept in ways that are unsafe. In a California survey, only 56% of respondents said that the designated driver should be chosen before drinking begins, and only 64% expected the driver to abstain from alcohol for 4 hours before driving.⁷ Similar results have been reported by others.¹⁷ Also in some cases, the "designated driver" may be chosen based on who in the group is the least intoxicated.^{18,19} Given these attitudes and practices, it is not surprising that many college students consume some alcohol when acting as the designated driver.^{17,19-21} Indeed, Timmerman et al.²² found that the mean BAC for 66 designated drivers leaving campus bars was 0.06g/dL. These differences between the ideal of abstinence and the actual behavior of designated drivers may result in smaller public health benefits from designated driver use than would be expected under the assumption of abstinence.

Guide to Community Preventive Services

The systematic reviews in this report represent the work of the independent, nonfederal Task Force on Community Preventive Services (the Task Force). The Task Force is developing *The Guide to Community Preventive Services* (the *Community Guide*) with the support of the U.S. Department of Health and Human Services in collaboration with public and private partners. The Centers for Disease Control and Prevention provides staff support to the Task Force for development of the *Community Guide*. A special supplement to the *American Journal of Preventive Medicine*, "Introducing the Guide to Community Preventive Services: Methods, First Recommendations and Expert Commentary," published in January 2000,²³ presents the background and the methods used in developing the *Community Guide*.

Healthy People 2010 Goals and Objectives

The interventions reviewed here are relevant to the *Healthy People 2010*²⁴ objectives to reduce deaths caused by alcohol-related motor vehicle crashes from 6.1 per

100,000 persons to 4.0 per 100,000 (Objective 26-1a), and to reduce injuries caused by alcohol-related motor vehicle crashes from 122 per 100,000 persons to 65 per 100,000 (Objective 26-1b).

Methods

The goal of this systematic review was to assess the effectiveness of programs promoting the use of designated drivers in preventing alcohol-impaired driving and alcohol-related crashes in the United States and other developed countries. We conducted the review according to the methods developed for the *Guide to Community Preventive Services (Community Guide)*, which have been described in detail elsewhere.^{25,26}

Analytic Framework

According to the theory of planned behavior,²⁷ both the perceived risk of arrest, crashes, and crash-related injuries and fatalities, and the perceived social norms against drinking and driving can influence a group of drinkers to use a designated driver. Once the group members decide to use a designated driver, negotiations as to who should play this role must ensue. This negotiation process may further reinforce social norms against drinking and driving behavior and increase the perception of the relative risks of arrests and crashes.^{2,11} Once assigned, the designated driver would be expected to reduce his/her alcohol intake or abstain from alcohol completely. The use of a designated driver would be expected to lead to reduced alcohol-impaired driving, alcohol-related crashes, and crash-related fatalities and injuries.

Inclusion Criteria

To be included in the review, a study had to (1) be primary research published in a peer-reviewed journal, technical report, or government report; (2) be published in English before July 1, 2003; (3) meet minimum research quality criteria for study design and execution²⁵; and (4) evaluate the effects of a designated driver program using one or more of the outcomes specified below.

Search Strategy

The articles reviewed were obtained from systematic searches of multiple databases, reviews of reference lists, and consultations with experts in the field. The following databases were searched: Journals@Ovid, MEDLINE, PsycINFO, Sociological Abstracts, Sociofile, Educational Resources Information Center (ERIC), and Transportation Research Information Services (TRIS). The keywords used for the search were designated driver, alternative transportation, blood alcohol concentrations, motor vehicle accidents—prevention and control, alcoholic intoxication—prevention and control, drunken driving, driving while intoxicated, and passenger alcohol use. Other relevant sources were identified from the bibliographies of pertinent articles. Studies on the unintended effects of designated driver use, especially the effect on passenger alcohol consumption, were also included in the literature search. These studies were reviewed regardless of

whether they evaluated an intervention to promote designated driver use.

Evaluating and Summarizing the Studies

Each study that met the inclusion criteria was evaluated independently by two reviewers using the standardized *Community Guide* abstraction form, available at www.thecommunityguide.org/methods/abstractionform.pdf. The studies were assessed for the suitability of the study design and study execution. The suitability of each study design was rated as "greatest," "moderate," or "least," depending on the degree to which the design protects against potential threats to validity. The study execution was rated as good, fair, or limited, based on several factors that could potentially limit a study's utility for assessing effectiveness. Any differences of judgment between the abstractors were resolved by the consensus of a team of experts. Only those studies with ratings of good or fair execution were included in the review. Summary effect sizes were then calculated for the study outcomes.^{25,26}

Interventions and Outcomes Evaluated

Two approaches to promoting the use of designated drivers were separately evaluated in this review: population-based campaigns and incentive programs based in drinking establishments. The outcomes evaluated were (1) self-reports of frequency of designated driver selection before drinking begins, (2) observation of self-identified designated drivers in drinking establishments, and (3) self-reports of alcohol-impaired driving or riding with an alcohol-impaired driver. No studies that assessed the effects of designated driver programs on alcohol-related crashes were found.

Results Part I: Intervention Effectiveness

Review of Evidence: Population-based Campaigns

Population-based campaigns promote the concept and use of a designated driver primarily through mass media, including television, radio, newspapers, and other print media.^{3,14} In addition to using public service announcements or paid advertisements, these campaigns have also promoted designated driver use through other approaches such as incorporating designated driver themes into television story lines.^{2,3} Although this type of intervention has been used extensively and is popular with sponsoring groups, the effects of these campaigns on designated driver use and alcohol-impaired driving have rarely been evaluated.

Effectiveness. Although population-based designated driver promotion campaigns are common, we found only one evaluation study of this type of intervention.¹⁴ This study evaluated a 3-month mass media campaign, known as "Pick-a-Skipper," implemented in a small Western Australian city with a population of about 25,000. The campaign encouraged drinkers to choose a designated driver before consuming alcohol and the drivers to remain under the legal limit. A modest number of public service announcements (210) were

aired over a 3-month period during programs with viewers in the campaign's targeted age group of 18- to 35-year-olds. The campaign's media launch received newspaper coverage as well. Telephone surveys indicated a 13 percentage point increase in people always selecting a designated driver and these people were also more likely to report awareness of the "Skipper" concept. However, there was no significant change in self-reported drinking and driving or riding with an alcohol-impaired driver. Further information on this study is provided in the [Appendix](#).

Other positive or negative effects. No positive or negative effects specific to population-based campaigns promoting designated driver use were identified. Potential benefits and harms of designated driver use itself are addressed in the Discussion section.

Conclusion. The single available study provides insufficient evidence to determine the effectiveness of population-based campaigns promoting designated driver use.

Review of Evidence: Incentive Programs

Incentive programs offer free incentives to encourage people in drinking establishments to act as designated drivers. The most common incentive offered is free soft drinks, but other incentives, such as more exotic non-alcoholic drinks, nonalcoholic beer, food, or free admission may also be offered. The public can be informed of the availability of the incentives through various means. In addition to promotional displays in the bar, servers and door staff frequently assist in promotion efforts. Newspaper or television ads may also be used to publicize these programs.

Effectiveness. Eight incentive program interventions were evaluated.^{9,13,28,29} Five were reported in the same journal article,²⁸ and six were by the same two principal authors.^{9,28} Consistent with the designated driver definitions discussed above, the seven interventions that were conducted in the United States required abstinence to qualify for incentives, whereas the one in Australia did not. Detailed information regarding these studies is provided in the [Appendix](#).

The Australian study was conducted in three drinking establishments that were the only nightclubs serving two Melbourne suburbs.¹³ Designated driver use was encouraged by offering all drivers of two or more people free admission and soft drinks regardless of whether they abstained from alcohol use. Inexplicably, at post-test there was an increase in the proportions both of patrons reporting "always" and patrons reporting "never" selecting a designated driver prior to drinking. Nonetheless, there was a decrease of 6.5 percentage points ($p < 0.01$) in the number of patrons reporting traveling as driver or passenger in a car in which the driver was thought to have a BAC over 0.05 g/dL, the legal limit in Victoria.

A series of six American studies^{9,28} evaluated designated driver promotions using similar types of designated driver incentives and different promotional methods in various populations. In these studies, research assistants observed people who identified themselves as designated drivers and ensured that they abstained from alcohol use and drove their parties from the drinking establishment. The first study took place in a college bar with between 71 and 160 patrons per night. When premium non-alcoholic drinks for designated drivers were promoted by staff and in printed displays, the number of self-identified designated drivers increased by a mean of 4.3 per night. A replication of this first intervention in two campus bars, with additional publicity from newspaper ads, resulted in mean increases of 0.8 ($p=0.35$) and 3.2 ($p<0.001$) drivers per night. Replication of the same intervention and promotional efforts in two urban, noncollege bars with different clienteles resulted in mean increases of less than one designated driver per night (0.9 drivers/night, $p<0.01$ and 0.3 drivers/night, $p=0.68$). A final study found that using approximately 200 cable television ads to promote the program in one of these urban bars resulted in a mean increase of 3.8 designated drivers per night ($p<0.001$).

Another U.S. study²⁹ found that, despite the use of progressively more attractive incentives, increasing from free soft drinks to free food, and progressively stronger promotional efforts, the mean number of designated drivers in a Houston TX drinking establishment decreased by one per night ($p>0.05$) over a 6-week period.

The mean numbers of designated drivers at baseline and during the enhanced incentive phases for each of the American studies are presented in Figure 1. Interpretation of these results is complicated by the fact that only two of these studies^{9,29} reported the number of patrons or groups of patrons in the bar during each observation period. Given the lack of consistent denominator data, it is difficult to judge the magnitudes of intervention effects or the extent to which the numbers reported in each study are comparable. Across the seven studies, the median increase in the number of designated drivers per night is 0.9 and the interquartile range is 0.3 to 3.2 drivers per night. Four of the studies showed a mean change of one or fewer designated drivers per night. Notably, in two studies that used multiple baseline designs (Study 2 and Study 7), the number of self-identified designated drivers returned to baseline immediately after the enhanced incentives were withdrawn.

Each of the three outcomes evaluated in the studies reviewed has limitations for assessing the potential injury-prevention benefits of designated driver programs. Thus, although there were a substantial number of studies of incentive programs, which generally found small increases in the number of patrons identifying

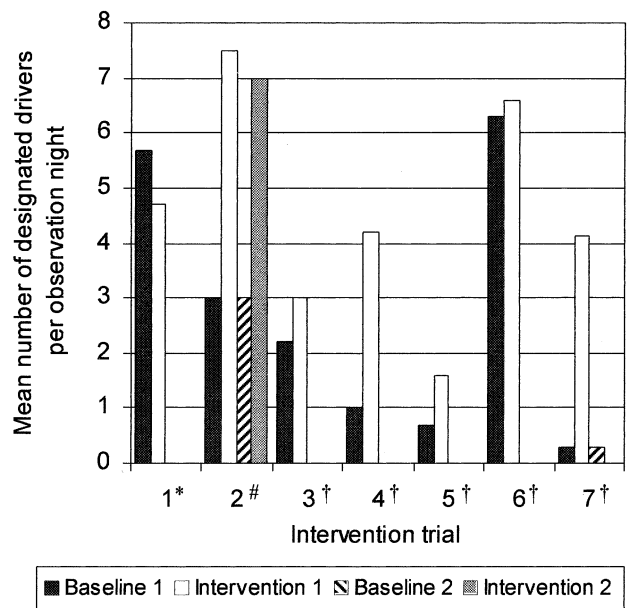


Figure 1. Number of designated drivers per night in the presence and absence of incentive programs. *Simons-Morton (1997)²⁹; #Brigham (1995)⁹; †Meier (1998).²⁸

themselves as designated drivers, the extent to which these changes relate to actual designated driver use is unclear.

Selection of a designated driver before drinking may not be accurately reported and the selected designated drivers may not fulfill their responsibilities in a safe manner. Self-reports of riding with an alcohol-impaired driver are also subject to the limitations of self-report data. Finally, it is impossible to estimate the public health effects of observed changes in the number of self-identified designated drivers without information on what their behavior would have been in the absence of a designated driver program. People who identify themselves as designated drivers to receive incentives may have otherwise acted as designated drivers without identifying themselves to staff or may have used alternative strategies to avoid driving while impaired.

It is apparent that consistent, concerted promotional efforts are needed to obtain and maintain small increases in the number of self-reported designated drivers. Promotional efforts of management, door staff, and servers may be particularly important for increasing participation by patrons.^{13,14,29} For example, in one study, 41.9% of patrons of the nightclub with the most enthusiastic promotion by door staff reported participating in the designated driver program, while the least enthusiastic nightclub had only 12.3% participation.¹³ In contrast, the strength of promotional media activities, which varied markedly in degree, duration, and type, did not have a clear effect on program outcomes.

Other positive or negative effects. No positive or negative effects specific to incentive programs to promote

designated driver use were identified. Potential benefits and harms of designated driver use itself are addressed in the Discussion section.

Conclusion. According to *Community Guide* rules of evidence, the studies reviewed here provide insufficient evidence to determine the effectiveness of incentive programs to promote designated driver use. Due to the small effect sizes observed and the limitations of the outcome measures, it is difficult to draw conclusions about the public health benefits of this intervention.

Discussion: Potential Benefits and Harms of Designated Driver Use

The studies included in this review evaluated the effects of specific designated driver programs and do not assess the potential benefits and harms of designated driver use itself. No study has evaluated whether the use of designated drivers actually decreases alcohol-related motor vehicle-related injuries. However, some studies of designated drivers have assessed their BACs, which are strongly associated with crash risk. Studies indicate that the BACs of designated drivers are generally lower than those of their passengers,^{11,17,19,30} and also lower than those of other drivers who are not acting as designated drivers.^{10,11,22} This generalization may not apply to all groups, however. For example, one study of drivers leaving bars in Virginia found that whereas women acting as designated drivers had significantly lower BACs than those who were not, there was no significant difference in mean BAC between men who were or were not acting as designated drivers.²² Furthermore, in both groups of male drivers, their mean BACs were above the state's legal limit of 0.08 g/dL. When an intended designated driver becomes intoxicated, this leaves group members with a difficult choice between having the least drunk person drive them home or arranging for alternative transportation.¹¹

There are several other potential benefits and harms of designated driver promotion and use beyond those related to alcohol-impaired driving. It has been suggested that the designated driver may prevent other types of alcohol-related injury and violence by preventing group members from engaging in other risky behaviors or placing themselves in risky situations.¹⁸ This role may place an unwanted burden on the designated driver, however, particularly if group members become verbally abusive or physically unruly.¹⁸

The potential impact of designated driver programs on alcohol consumption is another important consideration. Several studies indicate an increase in passenger alcohol consumption when a designated driver is available. One study estimated that the mean increase in the BACs of passengers of designated drivers was 0.017 g/dL, which is equivalent to approximately one drink over a 1-hour period.³¹ Young and high-risk

drinkers may be particularly likely to increase consumption. College undergraduates in surveys and focus groups commonly report increased alcohol consumption when using a designated driver.¹⁷⁻²⁰ In the broader population, one Australian study found that whereas the majority of the survey respondents tended not to increase consumption, 18- to 23-year-olds were most likely to do so, and some focus group participants recruited from a nightclub reported greatly increased consumption in the presence of a designated driver.¹⁴ Results are mixed, however. One study that measured the BACs of college students leaving bars found that the mean BACs of passengers using a designated driver (0.086 g/dL) did not differ significantly from those of passengers not using a designated driver (0.084 g/dL).²²

Designated driver promotion can also have a number of potential effects at the societal level. The widespread acceptance of the designated driver concept may serve to reinforce social norms against alcohol-impaired driving. The presence of abstinent designated drivers in drinking groups may also foster a social norm that accepts alcohol abstinence in the presence of drinking peers.¹⁸ On the other hand, several authors have expressed concern that messages promoting designated driver use may be interpreted as indicating that excessive drinking is acceptable as long as one avoids driving. Such normalization of excessive drinking could potentially contribute to binge drinking, underage drinking, alcohol abuse and dependence, and alcohol-related injuries.^{2,31} Some authors have also suggested that the focus of designated driver programs on the actions of individuals may divert the public's and policymakers' attention from addressing the environmental and social factors that contribute to both alcohol consumption and drinking and driving.^{1,2,20} Any such diversion of effort would clearly be misguided, as an environment in which alcohol-impaired driving is viewed as undesirable is a necessary precondition to motivate the use of designated drivers.

Results Part II: Research Needs

Population-based campaigns to promote designated driver use require more research and evaluation to determine their effectiveness. Although the studies reviewed indicate that incentive programs to promote designated driver use may result in small increases in the number of self-identified designated drivers, much remains to be learned regarding the influence of such programs on the decision to use a designated driver, alcohol-impaired driving, and alcohol-related crashes. Until we have stronger evidence regarding the effects of incentive programs on these variables, it will be difficult to determine their public health impact. Studies of the effects of incentive programs implemented in drinking establishments throughout a community would be ideal sources for such evidence. Well-

controlled studies of this nature would be difficult and costly to develop, but the evaluation of existing community-based, designated driving programs would be very helpful in providing preliminary estimates of the public health benefits of designated driver incentive programs. For example, a planned evaluation of the Townsville Thuringowa Safe Communities designated driver program in North Queensland, Australia may begin to address questions related to program effects on alcohol-related crashes and driver BACs.³²

Future studies of designated driver programs conducted in individual drinking establishments should consider consistently collecting information on the number of drinking groups in the establishment during the observation period. This information would allow for comparisons across studies. Second, it would also be helpful if such studies were supplemented with qualitative evaluations that examined the effect of incentive programs on people's choices about selecting a designated driver. For example, debriefing of people who identified themselves as designated drivers could help answer the fundamental question of how many of these people were new designated drivers recruited by the incentive program, as opposed to those who would have acted as such even without the program, or would have used other safe transportation alternatives.

Finally, if and when there are sufficient data on the effectiveness of designated driver programs, information on the cost-effectiveness of both the incentive and population-based campaigns would be helpful for program planning.

Points of view are those of the Task Force on Community Preventive Services, and do not necessarily reflect those of the Centers for Disease Control and Prevention.

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Appendix. Details and outcomes for reviewed designated driver promotion programs

Author (year) ^{ref} Study design: Quality Evaluation setting	Intervention details: Incentive/publicity used Evaluation method Time/duration of Intervention	Outcomes and results	Change in mean number of designated drivers/ night (<i>p</i> value)
Boots (1999)¹⁴ Before and after: Least Geraldton, West Australia (pop. ~25,000)	210 television ads promoting use of a designated driver over a 3-month period; 72 displayed primarily during evening hours and on youth-oriented shows; 140 aired at other times as PSAs. Television ads also promoted a local nightclub's designated driver program Random dialing telephone survey of 18- to 35-year-olds October 1 to December 31, 1994	Percentage of respondents reporting driving a car or riding with a driver with a BAC > 0.05 g/dL in the 4 weeks prior to the survey did not significantly change from pre-test to post-test Percentage of respondents reporting that they "always" select a driver before drinking commences increased from 46% to 59% following the campaign (<i>p</i> <0.05). Designated driver selection highest among subjects reporting not riding with 0.05 driver in last month (<i>p</i> =0.0025), and among females (<i>p</i> =0.0375) 93% of respondents recalled publicity about designated drivers at the post-test, vs 76% at the pre-test (<i>p</i> =0.0001) The youngest age group (18 to 23) was most likely to report that they increased their drinking as passengers of a designated driver followed by 24- to 29-year-olds and then 30- to 35-year-olds (<i>p</i> <0.05) On the pre-test, the frequency of selecting a designated driver was positively correlated with having heard of the concept (<i>p</i> =0.0047) and negatively correlated with having been in a car with a driver with a 0.05 g/dL BAC in the last month (<i>p</i> =0.0308)	NA
Simons-Morton (1997)²⁹ Before and after: Least Houston drinking establishment	Promotion and/or incentive levels increased over time: Weeks 1–2: servers wore buttons publicizing availability of free soft drinks for designated driver Weeks 3–4: servers also announced the promotion at each table Weeks 5–6: free appetizers added to the incentives and promotional napkins added Intervention lasted 6 weeks with three observations during the baseline and each of the three phases	Percentage of patrons drinking nonalcoholic beverages (presumed to be designated drivers) decreased from 10.8% (5.7 designated drivers per night) at baseline to an average of 8.4% (4.7 designated drivers per night) across the three intervention conditions (not significant) Results for specific intervention conditions were not provided	–1.0 driver (<i>p</i> > .05)
Brigham (1995)⁹ Interrupted time series with multiple baselines: Moderate College bar in unspecified location	Existing designated driver program was modified to improve the quality of nonalcoholic drinks provided free to designated drivers. Program promoted using posters and table placards Observation of self-identified designated drivers to ensure that they abstained from alcohol and drove their parties from the establishment Duration and time of intervention periods not specified. Intervention withdrawn for 6 weeks to establish a second baseline before renewing program	The median number of observed designated drivers was 3 for each baseline period; increased to 7.5 for first and 7.0 for second intervention periods Number and demographics of patrons did not change across intervention and baseline conditions All self-identified designated drivers remained abstinent from alcohol, and 173 of the 175 (98.9%) were observed to drive their parties from the establishment	4.3 drivers (not reported)

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Appendix. (continued)

Author (year) ^{ref} Study design: Quality Evaluation setting	Intervention details: Incentive/publicity used Evaluation method Time/duration of Intervention	Outcomes and results	Change in mean number of designated drivers/night (<i>p</i> value)
Meier (1998) ²⁸ (Study 1) Before and after: Least Bars in two university communities in western United States	Designated driver program offered improved free incentives—nonalcoholic drinks, food, and discount beer coupons—to self-identified designated drivers presenting a newspaper ad to their server. Program promoted with large ads in college newspapers Observation of self-identified designated drivers to ensure that they abstained from alcohol and drove their parties from the establishment Baseline and intervention sessions each conducted for 3 weeks over nine evenings on Wednesdays, Fridays, and Saturdays from 9 PM-12 AM	The mean number of observed designated drivers increased significantly for Bar 2: (baseline mean=1.0; intervention mean=4.22; <i>p</i> <0.001), but not for Bar 1: (baseline mean=2.22; intervention mean=3.0; <i>p</i> =0.35) All but five self-identified designated drivers (5.1%) were observed to drive their parties from the establishment	Bar 1: 0.8 drivers (<i>p</i> =0.35) Bar 2: 3.2 drivers (<i>p</i> <0.001)
Meier (1998) ²⁸ (Study 2) Before and after: Least Two drinking establishments in a western U.S. city (pop. ~400,000)	Established same program as Study 1. Promoted with large ads in the sports section of the city's major newspaper Observation of self-identified designated drivers to ensure that they abstained from alcohol and drove their parties from the establishment Baseline and intervention sessions each conducted for 12 sessions over 4 weeks	The mean number of observed designated drivers increased significantly for Bar 1: (baseline mean=0.667; intervention mean=1.583; <i>p</i> <0.01), but not for Bar 2: (baseline mean=6.33; intervention mean=6.583; <i>p</i> =0.68) A spot check of Bar 2 revealed that few individuals had seen the advertisement	Bar 1: 0.9 drivers (<i>p</i> <0.01) Bar 2: 0.3 drivers (<i>p</i> =0.68)
Meier (1998) ²⁸ (Study 3) Interrupted time series with multiple baselines: Moderate Bar 1 from Meier 1998 Study 2	Established same program as Study 1. Promoted with cable TV ads on youth-oriented channels Observation of self-identified designated drivers by wait staff. Reliability checks performed by research staff Baseline, intervention, and second baseline sessions each conducted for 3 weeks	The mean number of observed designated drivers was 0.333, <i>n</i> =3.0 for both baseline periods and 4.11, <i>n</i> =37 for the intervention period (<i>p</i> <0.001) During the intervention period the sales of nonalcoholic beers rose by 350%	3.8 drivers (<i>p</i> <0.001)
Boots (1994) ¹³ Before-and-after: Least Three large nightclubs in two Melbourne, Australia suburbs	Free entry and soft drinks provided to all drivers with two or more passengers (regardless of alcohol consumption). Program promoted in newspapers, posters, flyers, and by door staff Survey of entering patrons (20% refusal rate) Post-tests were conducted after 10 weeks of intervention at each club. Conducted from October 1992 to March 1993	Percentage of patrons reporting driving or riding with a driver with a BAC >0.05 g/dL in previous 4 weeks decreased from 23.7% to 17.2% (<i>p</i> <0.05) Percentage of drivers reporting an intent to drink "the same amount as usual" the night of the survey decreased from 10.5% to 5.2% (<i>p</i> <0.05), with a corresponding increase in those indicating they intended to "not drink at all" Percentage of patrons who report either "always" or "never" choosing their designated drivers increased during the intervention (<i>p</i> <0.05). These changes were seen only among patrons attending the club at least once a month (<i>p</i> <0.05) Patrons of the club with the strongest program promotion and participation (41.9% of patrons) exhibited larger pre- to post-intervention changes than those of the club with the weakest promotion and participation (12.3% of patrons)	NA

BAC, blood alcohol concentration; g/dL, grams per deciliter; NA, not available; PSAs, public service announcements.