THE FAILURE OF FEEDBACK ON ALCOHOL IMPAIRMENT TO REDUCE IMPAIRED DRIVING

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We examined the effects of rules to govern drinking, individual feedback on blood alcohol concentration (BAC), and public posting of group data on impaired driving on the incidence of impaired driving. Level of impairment was determined from breath samples taken from tavern patrons. Following baseline, an intervention package consisting of (a) cards to guide patrons in pacing their drinking to stay under the legal limit, (b) individual feedback on BAC, and (c) posted group feedback on the percentage of patrons driving while impaired the preceding week was introduced in two taverns. Results indicated that the intervention package did not reduce the percentage of impaired drivers departing either tavern. The addition of a brief intensive police enforcement program directed at impaired driving produced a short-term reduction in impaired driving.

DESCRIPTORS: public posting, feedback, impaired driving, alcohol impairment

Driving while under the influence of alcohol is one of the leading causes of death and serious injury in North America (National Highway Traffic Safety Administration [NHTSA], 1988). Feedback has been shown to be effective in reducing the incidence of speeding (Van Houten & Nau, 1983) and to increase yielding to pedestrians (Van Houten, Malenfant, & Rolider, 1985). Geller and his associates have suggested that providing feedback on alcohol impairment might be similarly effective in reducing the incidence of impaired driving (Geller, Altomari, & Russ, 1984; Geller & Lehman, 1988; Geller &

Russ, 1986). However, Calvert-Boyanowsky and Boyanowsky (1980) found that providing tavern patrons with simple feedback on blood alcohol concentration (BAC) had little effect on the likelihood of their driving while impaired.

The present study was designed to determine the effects of a more comprehensive intervention that included providing tavern patrons with cards to help them pace their drinks, individual feedback on BAC, and public posting of the percentage of patrons driving while impaired on the incidence of impaired driving.

METHOD

Subjects and Setting

Subjects were patrons of two Nova Scotian drinking establishments. The Sail Loft could accommodate 200 people and was located in Dartmouth; the Lion's Head had a capacity 250 people and was located in Halifax. Data were collected on Thursday and Friday nights, beginning at 11:00 p.m. and continuing until closing time (2:00 a.m.).

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The number of patrons averaged 98 at the Sail Loft and 104 at the Lion's Head.

Apparatus

Blood alcohol levels were measured using Alcohol Level Evaluation Road Testers (ALERTs), Model J3D, manufactured by Alcohol Countermeasure Systems, Inc. During baseline, the digital display of each ALERT was covered with gray duct tape. All devices were recalibrated after every second session, according to the manufacturer's specified procedure.

Upon leaving the tavern, patrons answered a two-page Canadian Drinking Pattern Questionnaire containing demographic questions and how much the patrons drank during the evening. The questions on drinking behavior were to supply information for Transport Canada. Patrons were also asked to indicate how they planned to return home.

Observation Procedures

Testing was conducted inside each drinking establishment by interviewers seated at a large table located near the exit. Departing patrons were asked to complete the questionnaire in exchange for a provincial lottery ticket. Each patron was asked to draw a token from a bag. Patrons who drew a blue token were asked to provide a breath sample and received an additional lottery ticket. One third of the tokens were blue, which meant that random breath samples were obtained for approximately one third of the patrons interviewed. This procedure was used because most patrons left around the same time, and it was not possible to obtain a breath sample for all patrons. Token selection and breath testing always took place after patrons completed the questionnaire but before they indicated how they planned to get home. Prior to breath testing, each patron rinsed his or her mouth with water. The number of patrons who refused to be interviewed or tested was tallied separately.

An additional observer randomly selected and observed 1 of every 5 patrons who provided a breath sample, in order to determine whether the patron drove home. This observer listened to the interview (or looked at the questionnaire) to de-

termine whether the subject planned to drive. Then the observer went outside to the parking lot and recorded whether the subject drove. Whenever the patron's reported intention to operate a vehicle corresponded with the observation made in the parking lot, an agreement was scored. A disagreement was scored whenever the patron's report did not correspond with the observation made in the parking lot. Correspondence was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100%.

Measured BAC at departure was the primary dependent variable. A mean of 36 and 40 persons were tested each night at the Sail Loft and Lion's Head, respectively. Of these, an average of 14 and 16 persons, respectively, were drivers. The number of drivers tested per night remained relatively constant across conditions, ranging between 10 and 21 at the Sail Loft and 11 and 28 at the Lion's Head. The percentage of impaired drivers was calculated by dividing the number of drivers whose BAC was above 80 mg% (blood alcohol level greater than 0.08) by the total number of drivers interviewed.

Experimental Design

A multiple baseline design across settings was used to evaluate the rules, feedback, and public posting intervention. Following 2 weeks of the intervention at the second setting (the Lion's Head), a 4-week intensive law enforcement campaign was added in Dartmouth.

Baseline. During baseline, interviewers did not provide patrons with information about their BAC.

Rules, feedback, and public posting. During intervention, a research assistant stood near the main entrance of the drinking establishment and gave a wallet-sized Safe Driver's Drinking Guide to each patron that entered. Each tab on the guide represented one drink, and the number printed on the tab represented the hour during which that drink could be consumed. By limiting each drink to its designated hour, the user could maintain a BAC below 80 mg%. Because BAC varies with body weight as well as amount ingested, separate cards were issued for six weight categories (88 to 112

lb, 113 to 137 lb, 138 to 163 lb, 163 to 187 lb, 188 to 212 lb, and 213 to 237 lb). Each patron was given a guide that was appropriate to his or her estimated weight and was informed that the guide could help pace drinking to avoid becoming impaired and avoid legal penalties. A guide was offered to every patron, beginning each night at 7:00 p.m. and continuing until 2 hr before closing. Drivers who participated in exit interviews were asked whether they had received a guide when they arrived. The percentage of drivers receiving guides at the Sail Loft and Lion's Head averaged 40% and 70%, respectively.

Patrons who were interviewed were also provided with feedback on their BAC and were told whether their BAC was over the legal limit. Patrons who were over the legal limit (80 mg%) and indicated that they planned to operate a vehicle were asked to switch drivers if they were accompanied by a nonimpaired licensed passenger. Impaired drivers who were leaving alone were advised to take a taxi, walk, wait, or find some other means of transportation home.

Finally, patrons were provided with posted feedback on the percentage of drinkers who had driven home while impaired during the preceding weekend via a sign (11.5 cm by 11.5 cm) prominently displayed at each interviewing table. The sign read "LAST WEEKEND ____% OF THE DRINKERS WHO DROVE HOME WERE OVER THE LEGAL LIMIT! THE LOWEST PERCENTAGE SO FAR WAS ____%." New percentages were displayed every weekend. Interviewers asked each patron to read the sign.

Enforcement operations. During this condition an enforcement operation was added to the rules, feedback, and public posting condition. However, data were not collected inside the taverns on nights that the police set up checkpoints. The enforcement operation was in effect for 4 weekends in November and December (during Sessions 16, 17, 19, and 20). A press release stating that Dartmouth police were cracking down on impaired drivers appeared in several local newspapers. Two newspaper stories announcing the crackdown appeared during the 1st week of the enforcement condition. In addition,

numerous news broadcasts and newspaper reports about the hazards of impaired driving and increased enforcement also occurred during this period because of the holiday season. During each night of enforcement, the police set up a two- or three-officer checkpoint at a predetermined location on a Dartmouth street. Six checkpoints were used, all situated on major routes traveled by patrons leaving drinking establishments. Checkpoints were set up only on Thursday and Friday nights, from 9:00 p.m. to 2:00 a.m. Police randomly stopped vehicles passing the checkpoint, asked drivers to produce valid driver's licenses, and determined if they could smell alcohol on the driver's breath or detect any other sign of drinking. If no sign of drinking was detected, a special flier warning of the hazards and penalties of drinking and driving was handed to the driver.

If signs of drinking were detected, the police officer demanded a breath sample. Drivers who passed the breath test received the flier and were allowed to leave. Drivers who triggered the "WARN" light on the ALERT were given a flier and a warning ticket and were encouraged to find another means of getting home. Drivers who failed the ALERT test were given a flier and were transported to the Dartmouth police station for further breath tests.

On all nights, a special observer monitored the parking lot of the drinking establishment nearest the checkpoint while maintaining constant radio contact with a second observer located at the checkpoint. These observers determined whether each vehicle passing the checkpoint had originated from the tavern parking lot.

On most nights the police stopped vehicles using a quasirandom selection procedure. However, during the last weekend of the enforcement condition, the observers at the checkpoint signaled the police whenever a driver from the drinking establishment was approaching, so that these drivers could be stopped on a preferential basis. These observers had no knowledge of driver BAC because measures at the tavern had not been obtained on these nights.

During nights that data were collected at the drinking establishments, interviewers reminded each

Figure 1. The measured BAC of drivers during each session of the experiment.

patron at the Sail Loft that an enforcement campaign was being carried out in Dartmouth. Interviews were not conducted on nights during which enforcement took place.

RESULTS

The measured BAC of drivers leaving the Sail Loft and Lion's Head during each weekend of the experiment is presented in Figure 1. Measured BAC remained stable at both drinking establishments during the baseline condition and did not decrease at either drinking establishment during the rules, feedback, and public posting condition.

Following the completion of the enforcement condition in Dartmouth, the mean BAC of drivers at the Sail Loft decreased, and little change occurred

at the Lion's Head. This decrease persisted for 4 weeks. However, by the 5th week, mean BAC of drivers had returned to baseline levels.

Figure 2 shows the percentage of drivers who were impaired (BAC at or over 80 mg%) when leaving the Sail Loft and Lion's Head during each weekend of the experiment. As in the case of mean BAC, the percentage of impaired drivers decreased only after the enforcement condition in Dartmouth.

The reductions in mean BAC of drivers and percentage of impaired drivers that occurred following the enforcement condition were not the result of sampling bias. For example, patrons refusing to be interviewed at the Sail Loft remained constant, averaging 20% during baseline, 20% during the rules, feedback and public posting condition, and 19% during the addition of the enforcement con-

Figure 2. The percentage of drivers who were impaired (peak BAC exceeding 80 mg%) during each session of the experiment. The horizontal dotted line represents the baseline mean.

dition. Refusals at the Lion's Head averaged 19% during baseline and 20% during the rules, feedback, and public posting condition.

The percentage of patrons driving a vehicle when they left also remained constant at both taverns, averaging 34% during baseline, 38% during rules, feedback, and public posting, and 37% during the addition of the enforcement phase at the Sail Loft, and 33% during baseline and 31% during rules, feedback, and public posting at the Lion's Head.

Finally, patrons' reports of their intention to drive remained consistent. Overall, an average of 20% of patrons were followed into the parking lots of the two drinking establishments. Correspondence between patrons' intention to drive and actual driving averaged 96.2% during baseline, 97.6% during rules, feedback, and public posting, and 100% during the enforcement condition at the Sail Loft. At the Lion's Head, correspondence averaged 85%

during baseline and 96% during rules, feedback, and public posting.

The efficiency of the enforcement procedures varied from night to night, depending on the exact procedure employed. Even though police checkpoints were situated in close proximity to drinking establishments, the police tended to detect few impaired drivers when vehicles were stopped on a random basis. Overall, 94% of the motorists who were stopped had not left the targeted drinking establishment, and of these, only 2.7% failed or were warned (BAC at or over 110 mg% or 50 mg%, respectively). Of the remaining 6% stopped (drivers who had left a drinking establishment), 55.3% either failed the test or were warned. Thus, when police stopped vehicles from the drinking establishment, they were far more likely to detect impaired drivers.

During the quasirandom procedure typically em-

ployed by police, only 12% of the drivers leaving the drinking establishment and passing the checkpoint were stopped, suggesting that there was considerable room for improvement in the police procedure. Not surprisingly, when police were cued to stop vehicles leaving drinking establishments, their efficiency showed a marked increase. Using this procedure, police stopped 65%, as opposed to 12%, of the drivers who had left the drinking establishment and passed the checkpoint. Of these, 62% either failed the test or were warned. Thus, during the cueing procedure, the police charged or warned 15.4% of all drivers stopped at the checkpoint. This represented a 260% increase in the percentage of drivers either charged or warned.

DISCUSSION

The intervention used in this experiment was quite comprehensive and included public posting of the percentage of impaired drivers, direct BAC feedback to drivers, and a card that could help each potential driver pace drinks to avoid becoming impaired. We found it surprising that such a comprehensive intervention had no effect on the occurrence of impaired driving. Feedback procedures may have been ineffective because feedback was provided to drivers after they had become impaired, with the only remaining options being driving home in an impaired state, switching with a friend, or leaving their cars and finding some other means of transport. Switching drivers was often not a realistic option because passengers tended to have a BAC that was as high or higher than those of drivers. Finding an alternative means of transport is a costly response and, given the extremely low likelihood that they will be caught, most people are probably unwilling to expend such effort.

An alternative feedback strategy without this drawback would be to provide feedback on the percentage of patrons drinking low-alcohol beverages. The promotion and selection of low-alcohol beverages throughout the night should lead to a reduction in the percentage of drivers becoming impaired. Information could also be provided on the percentage of drivers caught for impaired driv-

ing during the past week, or the cumulative costs resulting from impaired driving. Another strategy would involve combining feedback with other variables such as making available an alternative means of getting home.

The results of the experiment also showed that the addition of a brief enforcement campaign to the feedback intervention produced a 66% reduction in drivers' BAC that persisted for 1 month. This reduction was likely a result of the addition of the enforcement campaign, because no reductions were observed at the Lion's Head during the time the enforcement campaign was in effect in Dartmouth. There was no reduction in the car count in the two taverns during the enforcement condition. Thus, it is unlikely that the reduction in impaired driving was the result of patrons taking their business elsewhere during this condition. Although the results of this study show that the enforcement campaign was effective when combined with the rules, feedback, and public posting procedure, it is impossible to determine whether these procedures potentiated the effect of the enforcement campaigns, because the enforcement campaign was never introduced alone.

Publication of negative results obtained in studies of impaired driving may be important for several reasons. First, research in the area of impaired driving involves a substantial investment of societal resources because measurement procedures are relatively costly. Second, obtaining the cooperation of tavern owners and police involves a large investment in time. Publishing negative results allows other researchers to conserve limited research resources by not repeating interventions that did not yield positive results. Because the type of procedures used in the present study has proven effective in altering other target behaviors and has been advocated by prominent researchers working in the field, it is important to share these findings with others.

Finding ways of reducing drinking and driving is a high social imperative, and conducting research on this problem raises some ethical questions. In this study, the person doing the BAC testing always advised patrons who were over the legal limit not to drive. We also advised them that the results of

the testing were confidential. One could ask whether we had a legal obligation to report impaired patrons who chose to drive despite our warning. We chose instead to uphold the ethical principle of confidentiality. In future research, this dilemma could be avoided by ensuring that the person following the driver was not aware of the driver's BAC.

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