

Effects of Ignition Interlock License Restrictions on Drivers With Multiple Alcohol Offenses: A Randomized Trial in Maryland

ABSTRACT

Objectives. This investigation sought to test the effectiveness of a statewide ignition interlock license restriction program for drivers with multiple alcohol-related traffic offenses.

Methods. A total of 1387 multiple offenders eligible for license reinstatement were randomly assigned to participate in an ignition interlock program (experimental group) or in the conventional postlicensing treatment program (control group). The arrest rates of these 2 groups for alcohol traffic offenses were compared for 1 year during the ignition interlock license restriction program and for 1 year after unrestricted driving privileges were returned.

Results. Participation in the interlock program reduced offenders' risk of committing an alcohol traffic violation within the first year by about 65%. The alcohol traffic violation rate during the first year was significantly less for participants in the interlock program (2.4%) than for those in the control group (6.7%). However, there was no statistically significant difference between these groups in the second year, after the interlock license restriction was lifted.

Conclusions. Ignition interlock license restriction programs are effective at reducing recidivism among drivers with multiple alcohol offenses, at least while the restriction is in effect. (*Am J Public Health*. 1999;89:1696-1700)

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Fatal crashes involving high blood alcohol concentrations have declined since the 1980s,¹ but there has been limited success in preventing alcohol-impaired driving among persistent drinking drivers. Programs that require mandatory incarceration, vehicle impoundment, and license revocation for these repeat offenders hold some promise. However, incarceration and impoundment programs are costly and are often difficult to impose because of underenforcement and judicial prerogative. For example, some judges may be lenient or may be unwilling to order incarceration or vehicle impoundment in a drunk driving offense. In addition, vehicle impoundment programs may affect people other than the offender (e.g., a spouse).

License revocation appears to hold the greatest potential for reducing recidivism. However, the effectiveness of such an approach may be limited with multiple alcohol offenders, many of whom continue to drive with a suspended or revoked license.^{2,3} In addition, license revocation programs do not address the needs of drivers who have gained control over their drinking and would like to reapply for a license.

Ignition interlock devices that are connected to breath analyzers represent a countermeasure that has only recently been investigated.⁴ In contrast to measures that focus on traditional deterrence-based strategies (e.g., sobriety checkpoints, fines, incarceration), ignition interlocks bypass disincentives that are presumed to motivate the alcohol-intoxicated driver. In theory, an interlock device prevents an intoxicated individual from starting a motor vehicle. It is an automated system designed to control intersecting risk behaviors (drinking and driving) rather than either behavior separately.

To date, ignition interlocks have not been adequately evaluated in scientific studies. Support for the devices has come largely in the form of exaggerated claims made by

interlock manufacturers and from the results of attitude surveys and reviews of methodologically limited studies.⁵ Previous evaluation studies⁶⁻¹² (also B. Jones, State of Oregon Motor Vehicle Division, unpublished manuscript, 1992) have reported positive effects. Some findings^{6,9} suggest that interlocks have a positive but nonsignificant effect on the risk of a subsequent alcohol traffic violation. Others^{7,8,10-12} indicate that ignition interlocks can significantly reduce the risk of alcohol traffic violations, by anywhere from 66% to 75%. However, the lack of random assignment in these investigations, coupled with methodological problems, makes the evidence from these studies inconclusive.

The purpose of this investigation was to test the effectiveness of an ignition interlock license restriction program in preventing recidivism in a group of individuals with multiple alcohol-related driving offenses. Five features of this investigation set it apart from previous studies:

1. The participants were limited to multiple alcohol offenders, defined as drivers who had committed 2 or more alcohol traffic violations in the previous 5 years or

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3 or more such violations in the previous 10 years.

2. Random assignment was used to determine entry of offenders into the experimental program (interlock license restriction) or the control program (customary treatment).

3. The interlock license restriction and customary treatment programs were administered by the state licensing agency (Motor Vehicle Administration) rather than the courts. This ensured greater consistency of case management and handling of license restrictions and allowed monitoring and enforcement of compliance with the license restrictions.

4. Each member of the experimental group had a restriction placed on his or her license indicating that the licensee could drive only a vehicle equipped with an ignition interlock.

5. Participants in the experimental group had 45 days in which to have interlock devices installed on their vehicles. After that time they faced suspension for failure to comply.

The Motor Vehicle Administration closely monitored compliance. The interlock assignment was for a period of 1 year from date of notification. Offenders were monitored for 2 years so that effects could be assessed while the interlock devices were in place (first year) and after they had been removed (second year). This investigation evaluated the effectiveness of an ignition interlock license restriction program and not the efficacy of interlock devices per se. Given the randomized nature of the design, all participants assigned to the interlock condition were analyzed as such whether or not they had the device installed, as appropriate under the intention-to-treat design.

Methods

Participants

The participants were drivers with multiple alcohol traffic offenses whose licenses had been revoked or suspended and who were later approved for relicensing by the state's Medical Advisory Board (MAB). The MAB is a group of physicians who evaluate certain medical disabilities in motorists requesting license reinstatement. The MAB makes recommendations; the final decision about reinstating suspended or revoked driving privileges rests with the Motor Vehicle Administration, which can also impose additional license restrictions.

Only those alcohol offenders who petitioned and were recommended for relicensing

by the MAB and whose relicensing was approved by the Motor Vehicle Administration were tracked for this study. To obtain the recommendation of the MAB, offenders had to demonstrate that they were complying with prescribed treatments and were sufficiently recovered to be allowed to drive again.

Procedure

Offenders who were recommended for relicensing were randomly assigned to the interlock program or to the control program. Participants assigned to the interlock program were notified by letter that they were approved for license reinstatement on the condition that they agree to a restriction prohibiting them from operating a vehicle without an interlock device for 12 months. This restriction was noted on the driver's license of each participant in the interlock program. Those who requested a license but did not own a car signed a waiver stipulating that they would not own or operate a car unless it was equipped with an interlock device.

Participants had 45 days to have the device installed. Initially, only one type of ignition interlock device—the Guardian model 2.2a—was certified in Maryland and available for installation. During the study period, a second type—the Lifesaver model SC 100—received certification. Participants were allowed to choose between the two and could change types after initial installation.

Participants in the interlock program were also informed about treatment or support programs (e.g., Alcoholics Anonymous) in which they were required to participate. Failure to comply with any of the terms of the program resulted in a suspension of driving privileges.

Offenders assigned to the control program were notified by letter that they must comply with the terms and restrictions customarily offered to multiple alcohol offenders, including a driver's license restriction stating that they may not drive after drinking any amount of alcohol. Most often, these restrictions required mandatory participation in Maryland's Drinking Driving Monitoring Program, in which drivers report regularly to a court-approved probation monitor who determines whether the person is complying with required treatment programs and whether the person is still drinking or taking drugs. Failure to report to the monitor or to comply with any of the terms of a treatment program results in suspension of driving privileges.

For participants in both the interlock and control programs, the duration of the treatment or support program requirements varied with the nature of the treatment dictated by the MAB or imposed by the courts.

After being notified of their assignment to the interlock or control program, offenders were required to sign and return a letter confirming their acceptance of the assigned restrictions. Those who did not comply with any assigned restriction were classified as failing to comply. Some offenders initially accepted the terms of their license reinstatement and continued to comply; some failed to comply initially but eventually did so; some never complied and remained classified as failing to comply; and some elected not to follow through with the procedures necessary to become relicensed.

Data Collection and Analysis

Each case was tracked by the Motor Vehicle Administration, which granted access to drivers' records after all personal identifying information had been deleted. A total of 698 offenders were assigned to the interlock program and 689 were assigned to the control program. Twenty-three people (13 in the interlock group and 10 in the control group) moved out of state during this investigation. Their out-of-state driving records were obtained and examined for subsequent alcohol violations.

The principal dependent measure was whether the offender committed an alcohol traffic violation during the first year after entering the study (defined as 365 days after notification), the period during which the interlock license restriction was in effect and an interlock device was required to be in his or her vehicle, or during the second year (defined as beginning 366 days after notification and ending 365 days later), the period during which the license restriction had been lifted and the device could be removed. The data were analyzed from a relative risk perspective.

Results

Demographic Characteristics

The driving records and case files were examined and relevant demographic and driving history information was abstracted. The sample was predominantly White, male, aged in the mid-30s, and single, separated, or divorced. Most had a high school education or less and earned less than \$25 000 per year. No statistically significant differences were found between the interlock and control groups on any of these measures (Table 1). The number of previous alcohol traffic violations did not differ between the interlock group (mean = 3.57, SD = 1.43) and the control group (mean = 3.61, SD = 1.33).

Program Acceptance

There was no significant difference between the 2 groups in the percentage of participants who became licensed within 1 year after notification (interlock group, 81%; control group, 87%) or in the percentage who returned a signed letter of compliance with the assigned restrictions (interlock group, 86%; control group, 89%). Within the interlock group, 396 (57%) had the device installed, 158 (23%) signed a waiver, and 46 (7%) signed a waiver for part of the restriction period but had an interlock installed for the remainder. The remaining 98 participants (14%) were in the failure-to-comply group and remained suspended.

Of those who had an interlock device installed at any time during the study period, 46% did so during the first month after enrollment. This percentage increased each month, reaching a peak of 82% by the sixth month. After the 12-month restriction period ended, most of the group had the devices removed. However, some retained the interlocks even 24 months after the initial restriction.

Subsequent Alcohol Traffic Violations

Within the 12 months after assignment, 17 (2.4%) of the 698 offenders in the interlock group and 46 (6.7%) of the 689 offenders in the control group committed an alcohol traffic violation. This difference was statistically significant, with a relative risk of 0.36 (95% confidence interval [CI] = 0.21, 0.63). Being in the interlock program reduced a driver's risk of committing a violation within the first year by approximately 64%.

Of the 17 recidivists in the interlock group, 10 had had an interlock installed, 2 had signed a waiver promising to drive only interlock-equipped vehicles, and 5 were in the failure-to-comply group. Of the 46 recidivists in the control group, 39 had accepted the conditions of the program (signed a compliance form) and 7 were in the failure-to-comply group. Eleven of the recidivists in the interlock group and 33 of those in the control group were licensed at the time of the subsequent violation. Five of the first-year recidivists were women (2 in the interlock group and 3 in the control group) and 58 were men (15 in the interlock group and 43 in the control group).

In the second year, 24 (3.5%) of the remaining 681 offenders in the interlock group and 17 (2.6%) of the remaining 643 offenders in the control group committed an alcohol traffic violation. This difference was not statistically significant. Of the 24 recidivists in the interlock group, 12 had removed the device, 2 still had the device in their cars, 9 had signed a waiver, and the status of 1 was unknown. Of

TABLE 1—Demographic Characteristics of Drivers With Multiple Alcohol Offenses Assigned to Ignition Interlock and Control Programs as a Condition of Relicensing

	Interlock (n = 698)	Control (n = 689)
Sex, %		
Male	88.7	91.0
Female	11.3	9.0
Education, %		
Elementary school	4.1	3.5
Junior high school	19.9	20.9
High school	56.2	56.7
Some college	14.6	16.1
College graduate	4.8	2.0
Graduate school	0.4	1.0
Marital status, %		
Divorced	20.2	19.2
Married	28.6	28.8
Separated	6.7	7.9
Single	44.5	44.1
Race/ethnicity, %		
White	85.5	82.7
Black	11.2	12.6
Hispanic	1.7	2.3
Native American	0.7	0.7
Asian	0.7	1.0
Other	0.7	0.7
Yearly income, %		
<\$7500	10.6	9.1
\$7500–\$15 000	24.1	24.8
\$15 001–\$25 000	39.4	40.6
>\$25 000	25.9	25.4
Age, y		
Median	33	33
Mode	30	29
Range	19–74	19–75

the 17 recidivists in the control group, 16 had accepted the conditions of the program and 1 was in the failure-to-comply group. One of the second-year recidivists was a woman (control group) and 40 were men (24 in the interlock group and 16 in the control group).

Over the combined 2 years of the study, 41 (5.9%) of the 698 participants in the interlock group and 63 (9.1%) of the 689 participants in the control group committed at least one alcohol traffic violation. This difference was statistically significant, with a relative risk of 0.64 (95% CI = 0.44, 0.94).

Multivariate statistical tests (proportional hazards model with demographic covariates) of the time until each alcohol traffic violation provided results similar to those of the univariate tests, as did the Kaplan-Meier survival curves.^{13,14} The survival functions (until recidivism) for the interlock and control groups are presented in Figures 1 (year 1) and 2 (year 2).

Discussion

The results show that an ignition interlock license restriction program can signifi-

cantly reduce recidivism among drivers with multiple alcohol traffic violations. Different effects may be expected when this program is applied to different populations in different settings. Further research is needed to evaluate the use of interlock devices with less serious offenders (e.g., first offenders). Several studies have estimated that a driver would have to drive drunk at least 200 times before being arrested once.^{15,16}

It is encouraging that such large reductions in recidivism were found in a population of persons with serious multiple alcohol offenses. The relatively high program acceptance rates for both the interlock and control groups (86% and 89%, respectively) indicate that administrative monitoring and enforcement were operational in both groups. Further, there was no evidence that a significantly lower proportion of drivers in the interlock group had their licenses reinstated; thus the reduction in recidivism in this group cannot be said to be due to a differential degree of relicensing or administrative monitoring.

The positive effects of the interlock program were limited to the first year, when the interlock license restriction was in

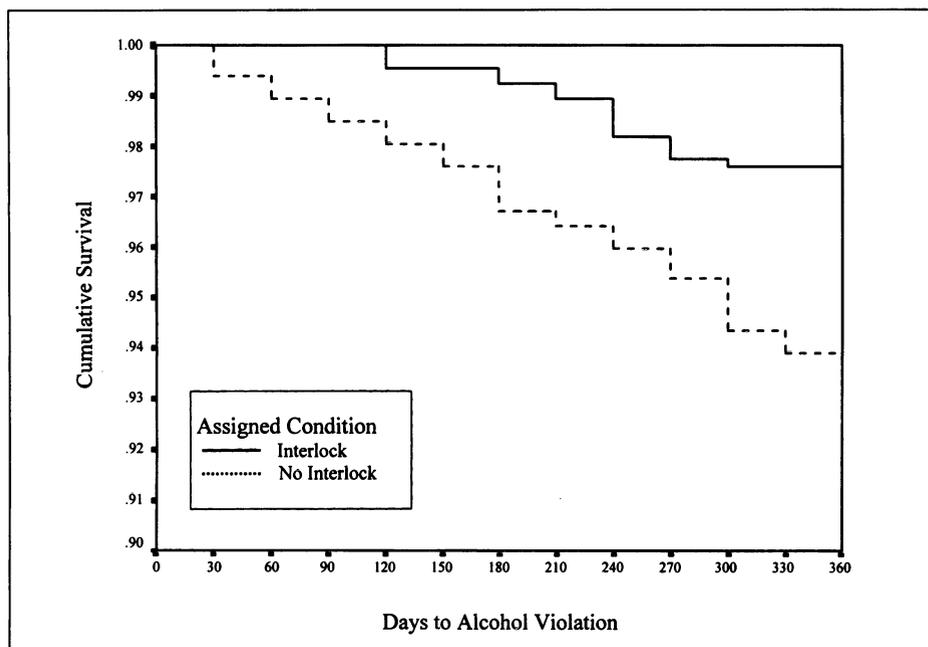


FIGURE 1—Survival function until recidivism among drivers with multiple alcohol offenses assigned to ignition interlock and control programs as a condition of relicensing: year 1.

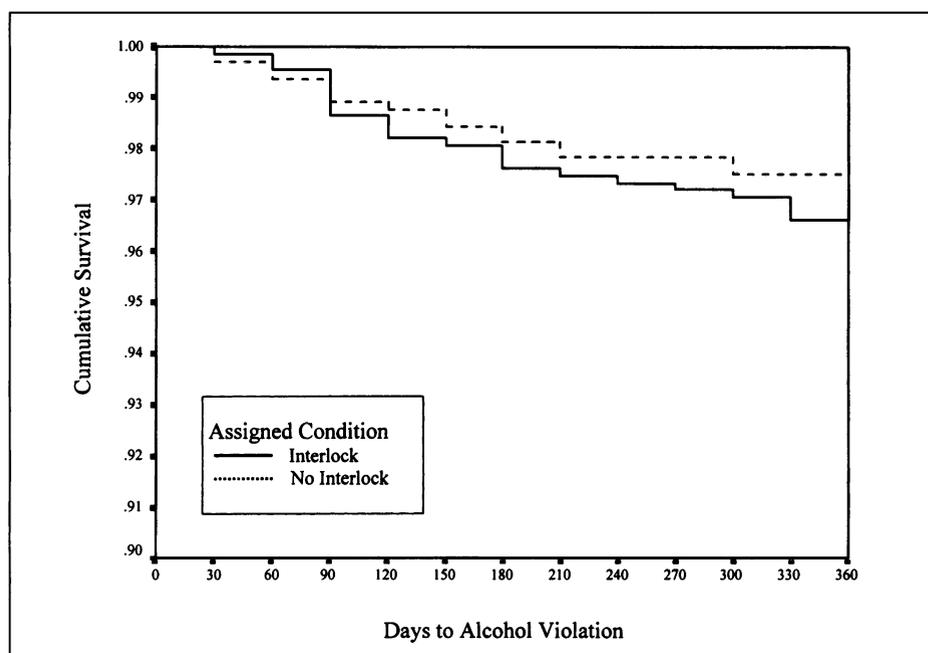


FIGURE 2—Survival function until recidivism among drivers with multiple alcohol offenses assigned to ignition interlock and control programs as a condition of relicensing: year 2.

effect. The first-year effects were strong enough that there was a positive effect over the 2-year period, but we found no evidence that the first-year benefits extended into the second year. Although the recidivism rate for the interlock group was greater in the second year (3.5%) than in the first (2.4%), the difference was not statistically significant. However, members of the control group were approximately 40% as likely to

commit a violation in the second year (when 2.6% of the group committed an offense) as in the first year (when 6.7% of the group committed an offense), a statistically significant difference.

It may be that chronic offenders who are going to commit another alcohol traffic violation are more likely to do so during the first year of a license restriction program than in the next 12 months. An interlock restriction

in the first year may serve to restrain chronic offenders during this high-risk period.

The results suggest that for certain chronic offenders, interlock restrictions may have to be maintained for longer than 12 months—perhaps indefinitely. Controlled investigations are needed to determine the optimum dose-response relationship for ignition interlock license restrictions. The type of offender who is best served by an interlock restriction also needs to be determined. This investigation dealt with multiple alcohol offenders who applied for reinstatement of their driving privileges, who were administratively considered to be in need of medical review before reinstatement, and who were medically judged to be in sufficient recovery to be eligible for reinstatement. Thus, they represent that proportion of chronic alcohol offenders who choose to apply for reinstatement of their driving privileges, and not those who choose not to apply or who do not qualify for reinstatement.

Additional carefully controlled studies are needed to determine whether an interlock program may work best when it is incorporated into an existing treatment process; such studies should incorporate careful case selection criteria and subsequent monitoring. There is no evidence from the present study to suggest that interlocks or interlock license restriction programs could or should operate as a stand-alone treatment approach for drivers with multiple alcohol traffic violations. Finally, further studies are needed to determine the optimum administrative arrangements for interlock restriction programs. Such programs may be more effective if they operate under one administrative agency (e.g., motor vehicle administration) rather than through the judicial system, where resources to screen drivers and monitor and enforce license restrictions may be lacking.

Ignition interlock restrictions, like license revocation, are not a foolproof system for preventing driving after drinking. They do not prevent a driver from operating a vehicle that is not equipped with an interlock device, although drivers may drive fewer miles and more conservatively as a result of the interlock license restriction. In addition, the older interlock models, in particular, can be circumvented in various ways. Newer models with technological improvements may reduce the possibility of circumvention. □

Contributors

All authors contributed significantly to the conception, analysis, and interpretation of the findings; the writing of the paper; and approval of the final version of the paper. K. H. Beck and E. A. Baker developed the idea, secured the cooperation of Maryland's Motor Vehicle Administration, and approached the

funding agency. W. J. Rauch and A. F. Williams provided support and input. W. J. Rauch developed the experimental design and specific measures. W. J. Rauch and K. H. Beck, with assistance from E. A. Baker, monitored the study for quality control. W. J. Rauch, with assistance from K. H. Beck, conducted the principal statistical analyses.

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The use of human subjects in this project was approved by the Institutional Review Board of the University of Maryland at College Park.

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