DOES AN IGNITION INTERLOCK LICENSE RESTRICTION ABSENT INTERLOCK REDUCE RECIDIVISM? A SUBGROUP ANALYSIS

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Alcohol-impaired driving continues to be a major public health problem in the United States. During 2005, alcohol was involved in 39% of traffic fatalities and 7% of all traffic crashes (National Highway Traffic Safety Administration, 2006). Based on research conducted in the State of Maryland, one of the most promising and particularly effective countermeasures to reduce alcohol impaired driving is the "ignition interlock license restriction program." However, few, if any states, have implemented an ignition interlock license restriction program similar to the one evaluated in Maryland. This research discusses three critical components of that successful program and reports on a subgroup analysis of data collected in the original Maryland study.

The Maryland study, a randomized trial conducted between 1993 and 1995, evaluated the "program effectiveness" of an ignition interlock license restriction program as a condition of relicensure (Beck et al., 1999). This program, administered by the Maryland Motor Vehicle Administration, is the only "program effectiveness" study conducted to date and is the only evaluation where the results can be inferred to the general population of alcohol-impaired drivers (e.g., multiple offenders). The program had a very high acceptance rate by offenders and thus warrants special consideration among all evaluations conducted to date. Conditional interlock relicensure programs administered by the courts have generally not been successful as judges often fail to order an offender to interlock, even when the statutes "mandate" that they do so. Moreover, most evaluations conducted to date limit their analysis to those offenders actually installing the interlock device and thus do not evaluate "program effectiveness."

In the original study, Beck et al. (1999) found that drivers randomized to the Maryland ignition interlock license restriction program had a 65% lower risk of alcohol-related traffic recidivism during the one-year program compared to drivers receiving the usual and customary treatment in Maryland. Though this initial estimate was based on manual data extraction methods, subsequent analyses based on electronic data abstraction found similar results, showing a 60% reduction in recidivism. Subsequent analyses examining recidivism post-interlock found no statistically significant differences between drivers assigned to the interlock or control group up to 10 years post-intervention. All analyses reported in this paper are based on electronic data abstraction and all testing was conducted at the 95% confidence level.

It is important to note that because it was a "program effectiveness" study, everyone who was assigned to the interlock group was analyzed as such, whether or not they actually had the device installed in what is referred to as an "intent-to-treat" analysis. Those offenders without vehicles in which to install the device were granted a waiver but still received an interlock conditional license restriction. This is a critical component because in the "real world," offenders requesting licensure may not own or have access to a vehicle in which to install the interlock device, but would otherwise legally qualify for a license. Like license revocation, a conditional interlock license restriction may not prevent drivers from operating a vehicle that is not equipped with an interlock device; however, they may drive fewer miles and more conservatively to avoid detection and thus benefit from the interlock program even absent ownership of or access to an interlock equipped vehicle.

In an article published in *Traffic Injury Prevention*, Raub et al. (2003) stated that the Maryland trial's "…randomness was compromised by the failure of one-half of the interlock group to install the devices. It is likely that only the most motivated drivers used the interlock." The authors further stated that the "…analysis should have been limited to those who installed the interlock..." If the purpose of the original Maryland study were to test program "efficacy" and not program effectiveness, Raub and colleagues would be correct. However, the program efficacy of interlocks is well established (i.e., among offenders actually installing interlock, the device itself prevents alcohol-impaired drivers from starting their vehicles) and the Maryland study's intent was to evaluate program effectiveness (i.e., asking does the interlock license restriction program, as a whole, not just the device itself, reduce alcohol-impaired traffic recidivism). Thus, an effectiveness evaluation is a more stringent test of the entire program and its three main components: the interlock device itself, the interlock restricted license, and close monitoring of offenders, all of which are thought to be effective in reducing recidivism. Limiting the analysis to those offenders installing an interlock device ignores 2 of the 3 key components thought to play a role in reducing alcohol-impaired driving and further introduces bias otherwise adjusted by the randomized trial and intent-to-treat analysis. Further, the randomized design and intent-to-treat analysis overcomes the biases associated with the most motivated drivers installing the interlock. The interlock group was composed of drivers who (1) installed the device, (2) waived (having no ownership or access to a vehicle in which to install the device, (3) initially waived but later installed the device on a vehicle they owned or had access to, and (4) those offenders who failed to comply and were emergency suspended. The 65% reduction in recidivism among offenders assigned interlock reported by Beck, et al. (1999) included all four subgroups, not just those installing the device.

To illustrate the concept, in a program effectiveness study, the impact of the program is determined by assessing those assigned to the intervention of interest. Program efficacy, on the other hand, only analyzes those who received the intervention. The volunteer or "self-selected" program is the most studied efficacy evaluation. However, results of these studies cannot be inferred to the general population of alcohol-impaired drivers because of potential "self-selection" bias. That is, offenders who volunteer for an interlock program and want to get their licenses back may differ from those offenders who do not volunteer. Thus, volunteers may be safer drivers for reasons unrelated to the interlock program itself, but the success of results are often attributed (incorrectly) to the interlock program. Another factor with most self-selected programs is that few offenders (less than 5-10%) opt to take the conditional license.

To further illustrate the difference between "efficacy" and "program effectiveness, "*program efficacy"* refers to the impact of a program among those who *received* the intervention while "*program effectiveness*" refers to the impact of the intervention among those *assigned or eligible* for the intervention and not just those who receive it. For example, suppose 1,000 offenders are eligible for or assigned to an interlock program and 50 offenders install interlock. Among the offenders installing an interlock, suppose 30 successfully complete the program. The efficacy of this program would be 60% (30/50 x 100) but the overall program effectiveness would be only 3% (30/1,000 x 100). Results of an efficacy study cannot be inferred to the general population. If an efficacy interlock study finds a 60% reduction in recidivism, we would not expect a 60% reduction in recidivism when the interlock program is applied to the general population of offenders. Ignition interlock program effectiveness studies, while rare, are especially important as results may be inferred to the general population of offenders and yield what could be expected if the exact same program were applied to the same general population of offenders.

As discussed below, conditional interlock relicensure through an administrative licensing agency may be the most effective method of offender compliance and the only successful "program" evaluated to date. This program will be reviewed for the three main factors thought to be essential to a successful ignition interlock license restriction program: (1) the interlock device itself, (2) a conditional license with

the interlock restriction clearly visible on the front of the license, and (3) close monitoring of participants for program compliance.

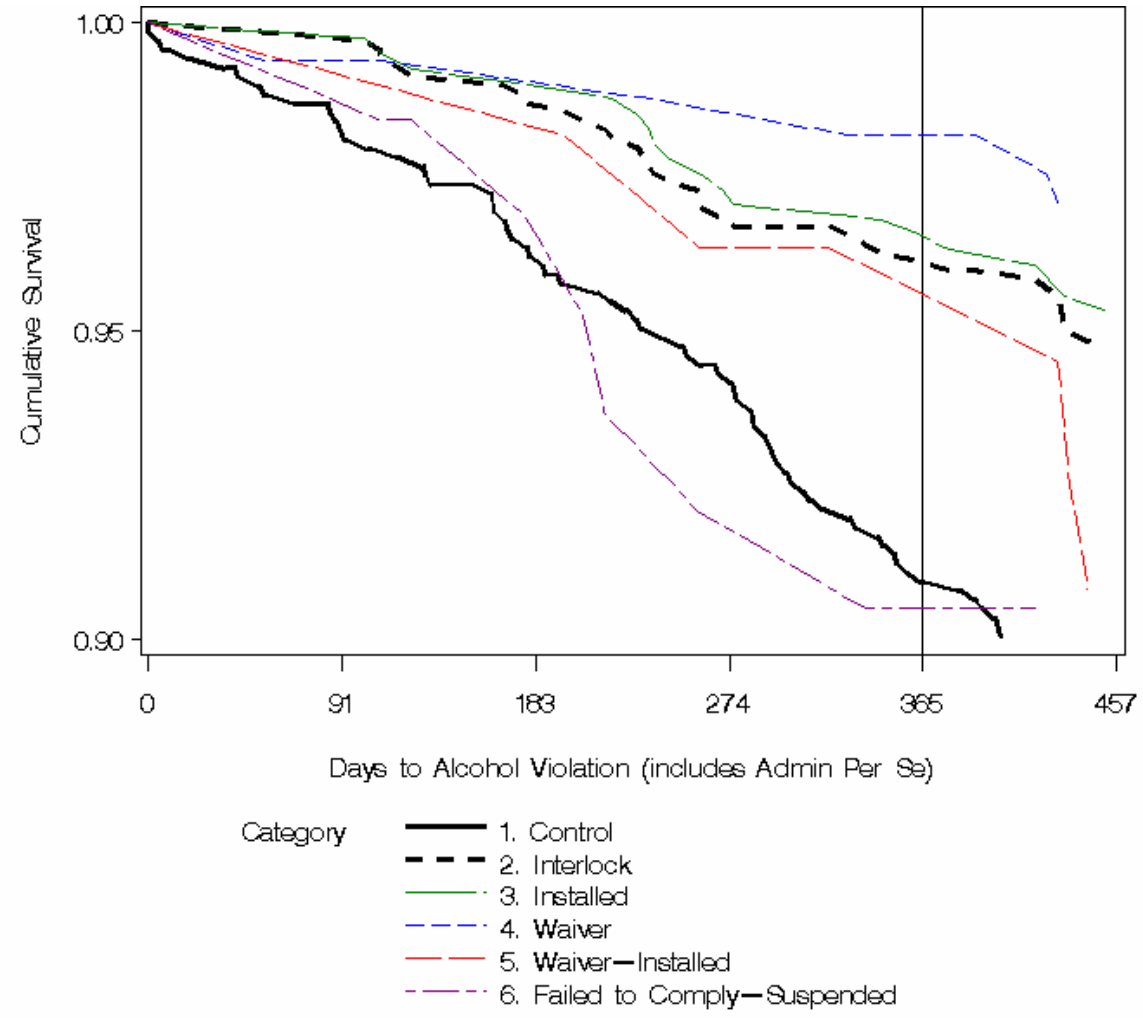
The first factor thought to be essential to an effective ignition interlock license restriction program is the interlock device itself. There is ample scientific evidence that the interlock device prevents alcohol-impaired drivers from starting their vehicles. Numerous efficacy studies have more than confirmed this finding. However, as discussed below, the effectiveness of an interlock license restriction program is not due solely to the device itself.

The second factor thought to be essential to an effective program is the "ignition interlock license restriction." The interlock license restriction means that an offender may only drive a vehicle on condition that it is equipped with an ignition interlock. The concept of an "ignition interlock license restriction" in Maryland means that the condition of licensure is spelled out in red letters on the front of the driver's license, ensuring that officers know immediately whether or not a driver is in violation of the interlock restricted license. Thus, similar to license suspension, offenders may choose to drive a vehicle not equipped with an interlock device but if they do so, it is likely that they drive more conservatively and fewer miles annually to avoid detection.

The third factor thought to be essential to an effective ignition interlock license restriction program is close monitoring of offenders for program compliance. Offenders failing to comply with program requirements (such as driving a non-interlock-equipped vehicle) or tampering with the interlock device in the original Maryland study were emergency suspended. Minor infractions resulted in telephone counseling by administrative staff and offenders could be referred to the medical advisory board for review, if warranted. Overall, drivers assigned to the interlock license restriction program had more ways to fail to comply than the controls because they were subject to more relicensure conditions and closer monitoring. By conducting a program effectiveness study using an intent-to-treat analysis, the biases associated with self-selected, motivated offenders is eliminated to the extent possible, and all three elements of an "interlock license restriction program" are evaluated.

Because the emphasis on many state interlock programs has been on the device itself and has not included other program components (the interlock license restriction itself and close monitoring), this paper reports on a subgroup analysis of the original Maryland ignition interlock study. We examined the four subgroups of drivers assigned to ignition interlock: interlock installed, waived, waived then installed and failure to comply. Drivers who actually installed an interlock had a 64% reduction in recidivism during the one-year trial ($p < .01$) compared to the control group. During the second year (post-interlock), there was no statistically significant difference in recidivism between those installing the device and the controls ($p = .27$). Drivers who received a waiver (i.e., did not own/co-own or have access to a vehicle on which to install an interlock) had an 80% reduction in recidivism ($p < .01$) compared to the control group. During the second year, there was no statistically significant difference in recidivism between those who waived and the controls ($p = .97$). Thus, the interlock license restriction, absent interlock, still reduced recidivism by about 80% among this group of offenders. Drivers who received an initial waiver and then later installed an interlock had a 58% reduction in recidivism compared to the controls although the differences were not statistically significant ($p = .22$). As expected, during the second year, there was no statistically significant difference in recidivism ($p = .84$) between the two groups. For drivers who failed to comply (i.e., did not install an interlock or receive a waiver) and were emergency suspended, there was a 5% increase in recidivism although the difference was not statistically significant ($p = .92$). During the second year, there was no statistically significant difference in recidivism ($p = .10$) between the two groups. We have plotted the four interlock subgroups on the survival curve along with the original survival function of the cases (with all four subgroups included) and the controls. Note that two of the interlock subgroups (installed and waived) appear above the "case" plot (improving the overall recidivism of the interlock group) and two of the interlock subgroups (waived-

installed and failed to comply) appear below the "case" plot (bringing down the overall recidivism of the interlock group).



The demographics of the 1,385 offenders participating in the original Maryland study were as follows: White (84%), Male (90%), Young (Median Age = 33), High School Education or Less (81%), Annual Income <$15,000/year (50%), Single/Separated/Divorced (71%), Prior Alcohol-Related Traffic Convictions (Mean = 3.57, Ranging from 2-11). There were no statistically significant differences between cases and controls on any of these variables at the 95% confidence level.

We next compare the demographics for each of the subgroups (waived, waived then installed and failure to comply) to drivers installing an interlock. Drivers who waived (but still had an interlock license restriction) were more likely than those who installed an interlock to be black or female, and have an annual income of less than $7,500. There were no statistically significant differences in age, education level, or marital status. This finding is plausible since it is not likely that an offender making less than $7,500 could afford to own and/or maintain a vehicle. [Note, however, that the effect may not be attributed solely to offenders not owning a vehicle (and thus not driving) since the interlock license restriction also acts as a deterrent should the offender choose to drive a vehicle not equipped with an interlock.] Drivers who waived and later installed an interlock were also more likely than drivers who installed an interlock to have an annual income of less than $7,500. There were no statistically significant

age, education level, marital status, gender, or racial differences between drivers who waived than installed and drivers who installed. For drivers who failed to comply and drivers who installed an interlock, there were no statistically significant differences with regard to age, education level, marital status, gender, race, or annual income. We also examined overall program compliance/acceptance between the interlock and control groups. Initial acceptance of the conditions of relicensure was 85% for interlocks and 88% for controls with no statistically significant differences. There were also no statistically significant differences for relicensure between the two groups as 81% of interlocks and 87% of controls received a license. Thus, the 60% reduction in recidivism among those offenders assigned interlock cannot be attributed to "motivated" drivers. Part of the reduction is due to the interlock device, part is due to the interlock license restriction and part is due to close monitoring of offenders. While this analysis teases out the reduction due to the interlock license restriction, the "interlock installed" effect is confounded with "closer monitoring" and thus cannot be attributed to either the device itself or closer monitoring but some combination of the two.

The one-year ignition interlock license restriction program showed reductions in alcohol-related traffic recidivism among drivers who installed an interlock, waived or waived then installed. These reductions were statistically significant for drivers who installed an interlock or received a waiver. Drivers who failed to comply with the conditions of relicensure had increased levels of recidivism. Because post-intervention recidivism rates returned to their previous pre-intervention levels, an interlock license restriction program longer than one year with criterion-based removal should be investigated because the limited time frame (one year) was not sufficient to alter drinking-driving behavior once the intervention ended. In summary, the essential elements of an effective ignition interlock license restriction program appear to be: (1) the interlock device itself; (2) a conditional interlock license restriction clearly visible on the front of the drivers' license; and (3) close monitoring of offenders for program compliance performed by an administrative rather than a judicial program. It is believed that the combination of these three components and not just the interlock device itself contributed to the overall reduction in recidivism seen in the Maryland study among interlock program participants. The device itself prohibits a driver from starting a vehicle with an elevated BAC level, the conditional interlock driver's license acts as a deterrent for drivers inclined to operate a non-interlock equipped vehicle and close monitoring provides feedback to the offender and assures program compliance. It is noted that few if any states have implemented an ignition interlock license restriction program similar to the successful one evaluated in Maryland. It is not clear if such modified interlock programs are effective in reducing alcohol-related traffic recidivism or have other secondary benefits. It is known that states have especially balked at the expense of monitoring program participants. At a minimum, interlock programs should include the device itself, a conditional interlock license restriction clearly visible on the front of the license whether or not the offender owns or has access to a vehicle and close monitoring of offenders for program compliance. It is not clear why states have chosen to implement interlock programs varying from the Maryland program which has been evaluated and found to be especially effective. In any event, all programs should have an annual evaluation that looks at both the efficacy and overall effectiveness of the program. This work was based on preliminary analyses and should not be reported or cited until final results have been published in a peer-reviewed journal.

References

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Memoriam

This research is dedicated to the memory of Dr. Robert Raleigh, who served on the Maryland Motor Vehicle Administration's Medical Advisory Board as both a member and Chief (1993-2005) without whose expertise, support, dedication and devotion this research would not have been possible.