Evaluation of the New Mexico Ignition Interlock Program

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16. Abstract

This Evaluation of the New Mexico Ignition Interlock Program begins by summarizing the development of alcohol ignition interlock devices, laws, and programs during the past 22 years. It then reviews the laws that were written in New Mexico from 1999 to 2005. It goes on to characterize current penetration of interlocks relative to alcohol-related risk indicators, followed by detailed methodological reports on eight studies undertaken to understand the effects of several aspects of the New Mexico laws. The eight studies include (1) an evaluation of recidivism among court-mandated offenders who were required to install interlocks but were not allowed to drive those cars; (2) an evaluation of recidivism differences of first-time offenders who installed interlocks relative to matched offenders who did not; (3) an evaluation of the effect of an interlock licensing law that allows revoked DWI offenders to install an interlock on an insured vehicle and drive that way during the remainder of their revocation period; (4) an evaluation of a strong mandate in Santa Fe County during a 2-year period in which electronically monitored house arrest was required for offenders who did not want to have an interlock or claimed no plan to drive; (5) an evaluation of the patterns of elevated BAC tests by hour of the day and day of the week from among the more than 10 million New Mexico breath tests collected by interlock devices; (6) a comparative evaluation of predictors of recidivism including prior DWI, measures of drinking from the interlock event record, age, and other predictors; (7) a report on an interview process that included key informants, such as judges, prosecutors, defense attorneys, and probation officers, who manage or administer the interlock program; and (8) a report on focus group findings with interlock-using DWI offenders. Each of the eight studies is reported with Methods, Results, and Comments sections. The conclusion summarizes key findings and places the New Mexico results in the larger context of the national effort to reduce impaired-driving-related injuries and deaths. This report begins with an executive summary that touches on all these topics, including key findings, lessons learned, and potential areas for improvement of the New Mexico program.

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Introduction

Alcohol ignition interlocks are devices installed on vehicles that, by requiring a breath test before the engine can be started, prevent drivers with more than minimal amounts of alcohol in their breath from operating vehicles. The first pilot evaluation of the ability of interlock devices to limit alcohol-impaired driving by convicted alcohol offenders was the 1986 Farr Davis Driver Safety Act of California. Between 1986 and 1999, many States passed interlock laws, but few States or counties attained more than minimal use of these devices within their alcohol offender populations. In 1999, the New Mexico legislature began passage of a series of changes to its laws leading to a comprehensive interlock program with both mandatory judicial and voluntary administrative components. In 2007, half of all convicted DWI (driving while impaired) offenders in New Mexico were using interlock devices.

This report has several sections. The first two sections provide background information: one on alcohol ignition interlocks, and the other on New Mexico's laws. The first background, a comprehensive review of interlock history and development, was judged warranted because this type of information provides a useful context for the reasons why the New Mexico interlock program evolved the way it has. The second background section summarizes the evolution of the New Mexico interlock laws. There have been six laws passed since 1999.

Following the two background sections, an introduction provides a brief summary of the rationale that supports the logic for pursuing each of eight specific research studies. The introduction is followed by current descriptive data in the form of a status report on interlock penetration in New Mexico through 2007.[1] The purpose of the Current Interlock Penetration in New Mexico section is to characterize the factors associated with growth and status at the time this report was written. The Interlock Penetration section is followed by the eight research studies. The following lists the studies addressed in each section.

1. Early Mandatory Interlocks: The impact of the 1999-2003 mandatory interlock laws when an interlock order conflicted with laws requiring 1 year of full license revocation for repeat offenders.

2. First Offender Interlocks: An evaluation of interlock effectiveness with first-time DWI offenders.

3. Ignition Interlock Licensing Act – 10-Year Revocation: A study of the effect of the Ignition Interlock Licensing Act (IILA) that allowed revoked offenders to drive during their revocation period after installing an interlock.

4. Santa Fe's Strong Interlock Mandate: An evaluation of a Santa Fe County program that raised installation rates by making the required alternative to interlock more restrictive and less appealing than the interlock.

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[1] This report covers studies of the New Mexico ignition interlock laws through 2007.

5. <u>BAC Test Patterns in Interlock Record</u>: An evaluation of daily and hourly patterns of blood alcohol concentration (BAC) tests captured in the interlock record with comparison to other jurisdictions.

6. <u>Comparative Predictors of Recidivism</u>: A comparative analysis of predictors of recidivism derived from driver records and from the BAC test patterns in the interlock records.

7. <u>Key Informant Interviews</u>: A summary of discussion and interviews with key informants, including judges, probation officers, prosecutors, and defense attorneys who manage and debate the interlock programs, along with some geographical correlates of interlock penetration.

8. <u>Offender Focus Groups</u>: A summary of focus group findings during discussions with interlock-using offenders.

Following the eight studies, a conclusions section reviews the evidence from New Mexico and draws inferences to the way in which these findings help inform our larger understanding of interlock programs and how they might help achieve national safety goals.

This executive summary of this report presents three issues: (1) What did we know about interlocks before New Mexico's program? (2) What did we learn from the New Mexico experience? (3) What remains to be resolved or improved about the effectiveness of interlock programs in New Mexico?

What did we know about interlocks before New Mexico's program?

Alcohol ignition interlocks, which require a breath test before an engine start, were devised to prevent alcohol-impaired drivers from operating vehicles. In 1986, California was the first State to implement a pilot program to evaluate their effectiveness. As early as 1990, despite the interlocks' limited contribution to reducing jurisdiction-wide impaired driving at that time, research studies teased out considerable information on how interlocks function, their problems, and how to estimate their unrealized potential for monitoring impaired-driving attempts of DWI offenders. By 1992, there had been enough experience with them for NHTSA to publish a set of recommended guidelines, *Model Specifications for Breath Alcohol Ignition Interlock Devices* (NHTSA, 1992). These were written for the States to help them write their own standards to ensure that the equipment was dependable, that it would perform well under a variety of environmental conditions, and that it would be somewhat difficult to circumvent. Through the 1990s, the annual number of installed interlocks nationwide grew in a slow linear fashion from a few thousand to about 50,000 as more States wrote interlock laws during that decade. Two major evaluations (Voas, Marques, Tippetts, & Beirness, 1999; Beck, Rauch, Baker, & Williams, 1999) provided the first systematic evidence of a substantial reduction in recidivism while the interlock was installed.

One of the features of the 1992 NHTSA Model Specifications was the requirement for a system that would record every engine start and every breath test. Subsequent studies determined that an unexpected benefit of that feature was that the offender's pattern of elevated BAC tests (positive BAC tests, fails, or lockouts) associated with driving proved to be predictive of later recidivism. When combined with the offender's State driving record, these two measures provided an important means of predicting recidivism and potentially a basis for establishing objective criteria to determine when the individual should be permitted to have the interlock

removed. Another feature emerging from the analyses of the interlock breath-test record was the surprising consistency across locations in different States and countries of the typical day and hour patterns of positive BAC tests. Although most tests (engine starts) occurred in the late afternoon, most high-BAC lockouts occurred between 7 and 9 a.m. on weekdays, suggestive of heavy drinking the prior evening, and people with morning lockouts, in particular, were more likely to recidivate after the interlock was removed (Marques, Voas, Tippetts, & Beirness, 1999; Marques, Tippetts, Voas, & Beirness, 2001b; Marques, Tippetts, & Voas, 2003a; Marques, Voas, & Tippetts, 2003b). This suggested that information in the BAC test log could help target high-risk people and that the interlock record could become an important adjunct to a DWI treatment program. Initial efforts to demonstrate such a program in Alberta (Marques et al., 1999) and Texas (Marques et al., 2007a) were promising.

New Mexico passed and the governor signed its first interlock law in 1999. Before 2003, the New Mexico interlock laws were typical of judicial laws in many States at that time. The problem with all of the laws up until then was that they resulted in low penetration of interlocks among those who might otherwise be eligible for the interlock program. Even when laws mandated interlocks, the uptake rate was slow in States with such laws. One reason for this was a conflict in statutory requirements for "hard" suspension in which no driving was permitted, and laws mandating interlock installation, which carried an implicit message that driving was permitted.

After 2000, research on interlock effectiveness from both the United States and Canada had progressed to a point that it was clear interlocks were effective in reducing DWI recidivism while installed. Data combining studies, including meta-analysis, by several research groups found that recidivism was reduced by almost two-thirds (Willis, Lybrand, & Bellamy, 2004) while interlocks were on the offenders' vehicles. In most programs studied, however, there was little evidence of a residual effect once the devices were removed from the vehicle. Although this demonstrated that the interlock was producing recidivism reduction, most early interlock programs, New Mexico included, called for relatively short periods in the interlock programs. This short duration of installation limited their overall benefit. The short installation period combined with low penetration of interlocks into about 10% of the offender population began to dim any real hope that interlocks could contribute substantially to reducing the DWI problem at the State or national level. The voluntary programs and the conflicting laws of mandatory programs were a problem nearly everywhere. There were many court-mandated programs before those of New Mexico, but they all failed to enlist large numbers of offenders in interlock programs because of problems with the laws, limited probation staff, and conflicting DWI sanction requirements.

What did we learn from the New Mexico experience?

The legislative achievements in New Mexico changed the outlook for interlocks' potential for making a contribution to road safety. This final report describes the series of interlock laws passed in New Mexico between 1999 and 2005. The early 1999 law allowed revoked offenders to receive vocational licenses allowing them to drive to and from work provided they installed interlocks, and it allowed judges to mandate interlocks for license-revoked multiple offenders. Initially, relatively few judges took advantage of this opportunity. A change in the law passed in 2002, effective January 2003, mandated interlocks for first offenders convicted of aggravated

offenses that included those with BACs .16 g/dL[2] or higher, as well as for all repeat offenders. The law also made a year of interlock an optional sanction for first nonaggravated offenders. Legislation also established an indigent fund for offenders who could not afford the interlock fee. In June of 2003, New Mexico implemented the first of some unique laws. One, the Ignition Interlock Licensing Act (IILA), allowed nearly all license-suspended DWI offenders to obtain a special permit to drive an interlock-equipped vehicle by demonstrating that they had installed an interlock device in their vehicles. While the license revocation officially remained in place, preventing offenders from legally driving a non-interlock-equipped vehicle, the offender could drive an interlock-equipped vehicle legally for the duration of the revocation period. In June of 2005, after this research project began, a further strengthening of the New Mexico interlock laws mandated 1 year on the interlock for first offenders, 2 years for second offenders, 3 years for third offenders, and a permanent interlock requirement with 5-year reviews for offenders with four or more DWI offenses.

The growth in interlock legislation in New Mexico between 1999 and 2005, particularly after 2003, resulted in a substantial increase in the penetration of the interlock as a means of controlling DWI offenders in the State. Penetration rose from about 150 in 2002 to more than 6,000 in 2007, at which time interlocks were being installed in 49% of all DWI convictions. During that period, alcohol-related fatal crashes declined along with all alcohol-related crashes (fatal and non-fatal); however, because there were other statewide and local DWI programs in place during that period, including the NHTSA/NM Comprehensive Impaired Driving Program intended to increase DWI enforcement, it is not possible to estimate the extent of the contribution made solely by the interlock laws. It should be noted that alcohol-involved crashes are defined in this report as those crashes in which at least one driver or motorcycle rider had a BAC ≥.01 g/dL.

The following paragraphs describe the eight studies contained in this report and what was learned from each.

Study 1: Early Mandatory Interlocks

Results coming out of New Mexico provided a way to test an issue that remained unresolved up to the time that research began (2004). That is, would recidivism be reduced among offenders who were required to install interlocks on their vehicles even though they were already prohibited from driving because their license had been suspended? Because evidence in the published literature has documented high rates of driving while licenses are suspended for DWI, up to 88% when enforcement is lax, 36% where sanctions are strong (McCartt, Geary, & Nissen, 2002) and 75% by self-report in an earlier study (Ross & Gonzales, 1987), it is understandable that DWI offenders might be required by the court to install interlocks on their vehicles even though they are not allowed to drive at all while their licenses are suspended/revoked.[3] California, among other States, passed such laws, but the courts generally

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[2] Grams per deciliter of alcohol (g/dL) is used here instead of the inaccurate but commonly "percent" weight by volume (%w/v) alcohol, a misleading piece of toxicologist's shorthand. G/dL is readily converted to other metrics, such as grams per 100 milliliters. Over the past several decades 46 out of 50 States have abandoned the "percent" language in whole or in part.

[3] Use of "revocation" or "suspension" varies by State. A suspension does not require reapplication for a driver's license; a revocation does. In New Mexico, upon a DWI arrest, police officers take the driver's license and send it to the motor vehicle department. The offender is issued a permit to drive for 20 days during which he or she may appeal the revocation. If an offender appeals, he or she may drive legally until the appeal is heard and a decision given. The revocation begins on the 21st day after the arrest if there is no appeal or if on the date of the hearing

refused to implement them as such laws present a conflicting message implying that the court expected the offender to disobey the law. Until New Mexico created the opportunity, there had been no adequate test of the effectiveness of devices required in the vehicles of offenders who were prohibited from driving. New Mexico enacted its first interlock law in 1999, and between that date and 2003, the courts required a small group of offenders to install interlocks even though they could not drive legally because their licenses remained fully revoked.

This research determined, through analysis of the records, that imposing the additional requirement to install interlocks on suspended offenders did reduce their recidivism (by 65%) while the device was on the vehicle. Nonetheless, there is considerable resistance to requiring offenders with revoked/suspended licenses to install and pay for interlocks when they are not permitted to drive at all. This finding has some significance for the Nation as a whole when laws requiring hard suspension/revocation are in conflict with interlock laws. New Mexico devised a solution to this problem with its IILA.

Study 2: First-Offender Interlocks

In this study, using multivariate Cox regression survival analysis methods, we describe a significant finding from the early New Mexico data on the efficacy of interlocks for first-time DWI offenders. Prior studies in Alberta, Canada; West Virginia; and California have reported somewhat conflicting results on the effectiveness of interlock programs for first offenders. Whether interlocks reduce the recidivism of first offenders is a particularly significant issue because there are twice as many first as repeat offenders arrested for DWI each year (NHTSA, 1995).

The study described in this section clearly demonstrates that when first offender interlock users are compared with a carefully constructed control group of non-interlock first offenders, the interlock group has significantly lower conviction recidivism (61% lower than comparison offenders) while the interlock is on the vehicle. This has national significance since Mothers Against Drunk Driving (MADD) has been promoting the passage of laws requiring interlocks for first offenders as a major objective of their prevention program. The California study that suggested first offenders might be different and less affected by the interlock-controlled period did not distinguish between those who were required to install interlocks and those who actually did so. The California study was therefore a policy implementation evaluation; the New Mexico study evaluated the effect of interlocks on recidivism of first offenders that are using ignition interlocks.

Study 3: Ignition Interlock Licensing Act—10-Year Revocation

In this section, also using survival analysis methods, we describe the response of third-time DWI offenders who were serving 10-year license revocation periods (under pre-2003 legislation) and now have the opportunity to drive legally with interlocks. Study of this group allowed for an evaluation of New Mexico's IILA implemented in 2003, which is an ultimate example of a voluntary interlock program. The law provides for a permit to drive a vehicle with an interlock to be issued to any DWI offender with a revoked license who demonstrates that he or she has

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decision the revocation is upheld in the hearing. The administrative revocation is for one year unless it was a first offender who blew less than .16 g/dL. If the offender is convicted, the revocation is extended to 1 year for a first offender, 2 years for a second offender, 3 years for a third offender, and lifetime with a 5-year review for offenders with four or more DWI convictions. All DWI license actions are revocations in New Mexico. The revocation stands until the offender successfully reapplies.

installed an interlock, has insurance, and has not previously caused a vehicular homicide. The issuance of the special permit does not change their suspended or revoked status, so if they drive any other vehicle, they will be subject to arrest for driving while suspended.

In our analysis, we selected the 10-year revocation group so there was less difficulty distinguishing court-mandated and voluntary interlock users. In addition, experience has shown that few DWI offenders serving a relatively short 6-month to 2-year license suspension apply for a voluntary interlock program, and we assume on those bases that the IILA would have more appeal to third-time DWI offenders serving 10-year license revocation periods. This provided the opportunity to determine whether offenders faced with such long periods of suspension would be more likely to apply for an interlock program, and having elected it, whether they have lower recidivism rates than those who do not.

Our study demonstrated that at the time of this evaluation, the IILA had not attracted a much higher rate of voluntary interlock use than other voluntary programs that have been evaluated in the United States or Canada. Like programs in other jurisdictions involving short suspension periods, only 10% (1,545 of 15,693) of these long-term revoked offenders took advantage of the opportunity to drive legally in interlock-equipped vehicles. While those who did install interlocks had lower recidivism rates, the group differences suggest it may reflect self-selection bias, with those at a lower likelihood of rearrest choosing the interlock, rather than the interlock lowering recidivism. The small proportion applying for the IILA suggests that the law might not be very effective in reducing recidivism among all long-term revoked drivers. The rate of interlock uptake by these voluntary interlock users may improve over time and with more effort to communicate to offenders by State government, but the impression that emerges from the data is that the studies of the New Mexico interlock laws confirmed the larger problem around the United States that DWI offenders are not eager to install interlocks as a means of legally operating a vehicle to avoid rearrest if driving while suspended, or remaining suspended. This suggests that a stronger alternative sanction for driving while suspended, such as vehicle forfeiture or other sanctions, may be required to motivate DWI offenders to install an interlock.

Study 4: Santa Fe's Strong Interlock Mandate

This section covers what may be the most important study of the New Mexico Interlock Program, an evaluation of whether a mandatory law to make installation of an interlock a firm requirement for all DWI offenders can result in most DWI offenders enrolling in interlock programs. As described earlier, the full mandatory interlock law was only enacted in 2005 and, in that year, was still in the process of being fully accommodated in all the courts in the State, so the full impact of the basic laws remains to be determined. However, it is clear that, although it has increased the proportion of offenders in interlock programs in some areas, there is considerable variation in its application. As of the date of this report, the statewide installation rate was 49% of those convicted, an excellent achievement relative to other States, but one that still leaves half of the DWI offenders without an interlock. However, the Santa Fe courts achieved a 71% installation rate during a 2-year period under a special program. In other counties, lower installation rates likely reflect judicial discretion and/or loopholes in the law that allows offenders without vehicles, and those who state that they will not drive, to avoid installing interlocks.

The 71% rate of installation during the Santa Fe court trial period reflects the use of electronically monitored home confinement as the alternative to the installation of an interlock

for those who claimed "no vehicle" or "not driving." The finding appears to confirm and extend results of an earlier study in Indiana in which the threat of home confinement as the alternative to the interlock achieved a 62% installation rate (Voas, Blackman, Tippetts, & Marques, 2002). In addition, the Santa Fe study had substantially more interlock offenders in the study pool than did the Indiana report. Attaining this new higher installation rate provides an answer to the question of whether applying pressure on offenders to install interlocks by threatening a less desirable sanction, such as home confinement, might result in interlock installation by users who would be less willing to live with them and therefore more likely to try to circumvent them. The question is answered by the finding that 1-year recidivism rates on the strongly mandated group in Santa Fe was 62% less than noninterlocked offenders for 1 year, a recidivism reduction that is in accord with most other interlock evaluations and with the meta-analysis of interlock program effectiveness by Willis et al. (2004).

Study 5: BAC Test Patterns in Interlock Record

Our analysis of the New Mexico interlock breath-test data confirmed several important features of the interlock data patterns that we had observed in earlier studies in other jurisdictions. As described in this section, we found that the patterns of positive BAC tests and ignition lockouts as a function of the day of the week and the time of day were similar in New Mexico to that of Texas and the two Canadian provinces, Alberta and Quebec, which we had previously studied.

Most positive breath tests on working weekdays occur between 7 a.m. and 9 a.m. in the morning, whereas most total tests occur in the late afternoon and early evening. This early morning peak in positive tests appears to reflect heavy drinking the night before. Fewer total tests occur on weekends than on weekdays (less total vehicle use), but as might be expected, more positive tests as a proportion of all tests occur on weekends. With New Mexico data added to the findings from the other States and provinces, the conclusion, now based on data from approximately 20,000 DWI offenders who provided 50 million breath tests in four jurisdictions (Alberta, Texas, Quebec, and New Mexico), is stronger yet. In all jurisdictions studied, Tuesday was always the day of fewest elevated BAC tests, and Saturday, always the most (midnight to midnight). The rate of positive BAC tests and the early morning positive tests have previously been reported as uniquely predictive of later DWI recidivism, the topic of study in the next section.

Study 6: Comparative Predictors of Recidivism

Having determined that the patterns of BAC tests in New Mexico match those found previously, the important question was to evaluate whether BAC variables are also strong predictors of recidivism there. In this study, we evaluated classes of recidivism predictors while the interlocks were still on the vehicles, and after interlocks were removed.

To address this question, we drew upon data from the driving records of 5,885 DWI offenders and from the approximately 10 million breath tests recorded on the interlock event recorders to identify the measures most useful for predicting recidivism. We separately report on unadjusted (simple) relationships between a predictor and recidivism, as well as multivariate Cox regression in which all variables compete in the models, to explain recidivism.

In studying the performance of youth with interlocks relative to other age groups, we found that those in the 20-and-younger group had higher recidivism rates while on the interlock and during the 2 years following its removal than any older age group. Although we know that youth with interlocks have lower overall recidivism than youth without interlocks, the fact that

those with interlocks have substantially more recidivism than other age groups, both during and after interlocks, serves to underscore the exceptionally high risk in this age group and suggests the importance of initiating supplemental methods of control and monitoring. In addition to younger age, offenders with more prior DWIs, especially those with six or more previous arrests are (as always) highly likely to recidivate with or without an interlock. The interlock suppresses recidivism of most offenders, but these special subgroups of very young and high multiple repeat offenders may need special monitoring, control, and treatment interventions.

In New Mexico as well, we find that the positive BAC tests have high-predictive validity as a measure of impaired driving, both during and after interlock removal. In this section, we demonstrate that the frequency of tests higher than .025 and .05 g/dL BAC and early morning tests of .025 g/dL or higher, all predicted recidivism as simple univariate indicators, and one or more of those variables entered into the Cox regression models as key components of final predictive recidivism models either during or after interlock removal. The Cox regression analysis determined that a combination of two driving record variables, age and prior DWIs, along with two interlock breath-test recorder measures, were strong significant predictors of recidivism. These interlock predictors are validated on the basis of actual attempts to drive with elevated BAC, and accordingly serve as high-sensitivity indicators of impaired driving likelihood.

Study 7: Key Informants Interviews

In this study, we report on interviews with judges, prosecutors, defense attorneys, and probation officers in eight New Mexico counties. Interviews were conducted in 2005 and again 18 months later in 2007. These interview data are not a comprehensive snapshot of average views, but the interview process did impose randomness on the way in which the officials were selected for interview. Among officials involved in the court system, the mean enthusiasm for the use of interlocks with DWI offenders was mostly just average (approximately 4 on a scale of 7), and the appraisal did not change very much during the 18-month interval. Judges were more bullish than probation officers or prosecutors, but judges expressed concern over the cost of the interlock program and suggested that the cost was a major reason for offenders not installing them. Some offered views that they want the interlock to identify the person who is blowing into the interlock, a view that suggests somewhat of a philosophical difference from the initial design of the interlock, which was simply to exclude drinking drivers from the roads rather than to enforce court-ordered abstinence. Preventing drinking and driving, which interlocks do, is not the same as preventing drinking. Judges who decry the inability of interlocks to positively identify the exact driver believe it opens a way for sober people to assist impaired drivers to start the vehicle, despite the breath-test anti-circumvention protocols designed into interlocks to minimize it. Judges also reported concern that the limits placed on the length of the probation period permitted by law that, in some cases, was shorter than the length of the period mandated for the interlock. The responses from the other officials interviewed were somewhat similar. The issue of cost and the ability of the offender to avoid the interlock because of the loophole in the law that allowed offenders to claim not to have a vehicle or to plan not to drive arose repeatedly. It appeared that rumors and anecdotes relating to the failure of the devices often influenced decisions. In addition, key officials were not fully aware of the existence of the indigent fund. This suggests that there is a need for additional judicial education efforts covering interlock programs. It seems the administrative authority would provide a good

service if complaints and various urban legends about interlock failures could be tracked down and evaluated to separate legitimate from bogus information.

At the end of this section, we provide some information on the clustering of interlocks and arrests by county. The geographical dispersion patterns of interlock uptake relative to crashes and DWI convictions suggest some regional spillover of arrests and interlock use among counties that share boundaries.

Study 8: Offender Focus Groups

Finally, in this section, we describe a series of focus group meetings with interlock-using offenders in an effort to understand end-users perceptions of how well or how poorly the interlock program fits into the lives of those who use interlocks regularly. Here again, there is no expectation that the views expressed are representative of the average interlock offender, but the focus group format did provide a way to flesh out common interlock topics with different groups of users. As more States expand their interlock programs, it is important to understand how the devices are being perceived and what kind of accommodations offenders and their families must make. The views of those who participated in discussions suggested there was a grudging acceptance of the interlock as generally useful, very embarrassing, but on balance better than not having the ability to drive. Of course, those who are in the interlock offender group necessarily made the decision to comply with the court order to install, so this may not be a very surprising finding. Family members seemed generally happy that alcohol risk was reduced. Interlock cost is frequently mentioned as an issue by offenders.

What remains to be resolved or improved to raise the effectiveness of New Mexico's Interlock Program?

To date, the New Mexico Interlock Program has confirmed much of the earlier research demonstrating interlock programs reduce recidivism while the devices are installed on the offenders' vehicles, that they are effective with first and multiple offenders, that the devices provide a breath-test record that is useful for predicting recidivism, and that a majority of the DWI offenders can be induced to install an interlock if the alternative (such as house arrest/electronic monitoring) is less attractive. The New Mexico program has also demonstrated that a State legislature can be convinced to enact a comprehensive and relatively strong set of interlock laws that require up to lifetime installation of interlock devices. The State judicial and administration practices are still adjusting to and absorbing this program, so the final effectiveness of the policies cannot yet be judged. What is exceptionally clear, however, is that New Mexico has accomplished a vastly higher rate of installations than any other State or province in the United States or Canada, the two countries with the most mature and most active interlock programs. There is good correlational evidence that New Mexico's alcohol highway safety risk indicators (crashes, fatalities) are coming down while interlocks are going up. Interlocks are not the only safety intervention underway, however, and identifying interlocks as the major cause of the safety achievements cannot be made confidently. We know that at the level of program participants, when interlocks are installed, recidivism goes down, and when interlocks are removed, recidivism goes back up. Nonetheless, there are features of New Mexico's program that are still missing and questions that still require resolution. Among them are the following:

1. The law mandates interlocks for all DWI offenders, statewide, and about 49% of convicted offenders in 2007 (5,204 interlocks of 10,722 convictions) were installing them. Attaining a higher rate than that may be difficult to achieve unless motivated by the threat of a less desirable penalty, such as house arrest or full-time alcohol monitoring. However, those high-cost supplements may be less practical in poorer and rural areas. Although the mandatory law in New Mexico improves on installation rates found in other jurisdictions, it has not yet been shown that mandating interlocks can overcome the major loophole: the offender can avoid the interlock by claiming not to have a vehicle or simply declaring he or she will not drive. Safety advocates in New Mexico have proposed new legislation in an attempt to close these loopholes.

2. The IILA (which allows, with minor exceptions, any revoked DWI offender to apply for and receive a limited license to operate an interlock-equipped vehicle) may have attracted only about 10% of the DWI offenders who are facing up to 10 years of license revocation. This suggests that in New Mexico revoked offenders at least initially resist interlocks even if they face long periods of revocation; they seem to prefer the risk of arrest for unlicensed driving to the burden of an interlock. It may be that the two most significant achievements of the IILA are to remove the conflict that judges face when ordering interlocks onto the vehicles of revoked offenders and to get many interlocks installed on vehicles before adjudication, allowing revoked offenders to drive insured vehicles and reducing the likelihood that they learn unlawful driving habits.

3. The New Mexico interlock laws now provide for long periods on the interlock (3 years for third offenders; lifetime for fourth offenders). It is too soon to evaluate the capability of judges to monitor offenders over such a long period. Furthermore, with one minor exception, there is currently no authority within New Mexico that evaluates performance reports for those offenders who have *elected* an interlock under the IILA. This is a problem because, if no one is watching, there is no way to determine if there is misuse of the interlock by those installing it under the IILA, such as those who use it to drive during a revocation period. This flaw in the information flow needs to be addressed. It is not clear how much additional reduction in recidivism can be achieved with monitoring other than what the interlock itself provides, but monitoring does help the marginally honest to be more honest.

4. New Mexico law provides for an indigent fund. Despite this, a major reason reported by judges for not requiring the installation of an interlock is the offender's inability to pay. It is not clear whether this is just a matter of improving information flow to the courts or whether the fund needs to pay a higher portion of offenders' costs. Apparently, the administration of the interlock indigent fund is not clear to some judges. Part of the reason for this may be that objective standards for indigence status are not being used. The indigent fund increases the affordability of interlock programs and is widely applauded, but its implementation would benefit from explicit guidelines that define indigency for the courts.

5. The interlock record produced by DWI offenders in New Mexico has been shown to be a valuable tool for predicting recidivism once the interlock is removed. This opens the possibility of developing objective criteria based on the rate of lockouts for the removal of the devices. Several other States have now written such provisions into their interlock laws. Although this has been proposed in New Mexico legislation, the State legislature has not enacted it. Another feature that warrants some study is whether early removal of the

interlock for offenders should be considered for those who have proven full compliance with the program while using the interlock-equipped vehicle.

6. Evaluation of the interlock record clearly identifies subgroups of offenders who are resistant to interventions. Although New Mexico, like most States, requires treatment for high-risk offenders, there is no comprehensive program that links the treatment resources of the State to the interlock program so that early prediction from the interlock record can be used as evidence to divert certain high-risk offenders toward a next higher level of intervention. Treatment is potentially very costly, but with objective risk indicators of the type available in the interlock record, the State could effectively channel more intensive services toward those whose rehabilitation might most improve public safety. Although New Mexico, like most States, does require treatment for DWI offenders, the provision of treatment services could be more cost effectively targeted toward those whose BAC evidence shows that they are most in need of it. The objective performance-based information in the interlock record of BAC tests is more dependable than the self-reported assessment information typical of most treatment programs.

BACKGROUND 1: INTERLOCK PROGRAM HISTORY AND DEVELOPMENT

We begin this report by providing some context for the road safety circumstances that led to the need for a device such as the alcohol ignition interlock. In this section, we summarize the history of interlocks to provide context for understanding the New Mexico program, the evaluation of which is the subject of this report. This background review of the research and policy evidence will broadly address the potential of interlock programs to lower the road toll due to impaired driving, while identifying some of the legislative and practical barriers to the attainment of that goal.

Many States within the United States began their first forays into the use of the interlock long before New Mexico passed its first law in 1999. By the time New Mexico passed the first in a series of interlock laws (1999-2005), the devices that were initially developed had matured into more reliable second-generation products built around alcohol-specific fuel cells. At the same time, the efficacy/effectiveness evidence in favor of interlock programs had begun to strengthen. When New Mexico considered its first interlock legislation, the proportion of all roadway deaths due to alcohol, which had declined for a decade, had gone flat for several years in a row. Some believed that ignition interlock programs might help resume the downward trend in alcohol crashes. Others were skeptical.

Nonetheless, the New Mexico legislative climate in the late 1990s was primed for a new initiative. New Mexico's DWI problem was among the worst in the United States at that time. From this context, there emerged bipartisan political will within the statehouse to do something. Goaded on by citizen action groups who were advocating for interlock programs, the first law in 1999 was passed unanimously in both houses of the legislature. Subsequent legislative changes strengthened the interlock provisions and led to installation rates in 2008 that are the highest in the United States.

Brief History of Interlock Programs in the United States

Driving While Suspended and the Enforcement of Unlicensed Driving

Drivers convicted of DWI present a high risk to other highway users. Hedlund and Fell (1995) found that offenders convicted of DWI are 4.1 times more likely to be involved in a fatal crash while intoxicated than are the average licensed drivers. Further, 35 to 40% of all fatally injured drinking drivers are estimated to have had at least one prior DWI offense (Simpson, 1995; Vingilis, Stoduto, Macartney-Filgate, Liban, & McLellan, 1994). For the first two-thirds of the 20th century, the traditional penalties assessed for a DWI conviction were jail, fines, and license suspension. Of these, only license suspension provided evidence of effectiveness in reducing recidivism (Peck, Sadler, & Perrine, 1985; Voas, 1986). Over time, however, the effectiveness of license suspension may have degraded. Evidence for the limited effectiveness of license suspension comes from various sources. These include interviews with DWI offenders, 75% of whom admit to illicit driving (Ross & Gonzales, 1987); surveillance of the driving of suspended offenders, which showed at least 88% in a low-enforcement State drove while suspended, and at least 36% drove while suspended in a high-enforcement State (McCartt et al., 2002); and from evidence that DWI offenders are not highly motivated to get their licenses back, with up to 83%

delaying reinstatement for more than a year beyond their eligibility date for license renewal (Tashima & Helander, 1999).

Use of Vehicle Sanctions to Reduce Illicit Driving

Understanding that suspension alone was not keeping DWI offenders from driving illicitly, State legislatures began enacting measures to keep impaired-driving offenders from accessing their vehicles. Among these sanctions have been vehicle impoundment and immobilization laws (DeYoung, 1999; Voas & DeYoung, 2002; Voas, Tippetts, & Taylor, 1997) and vehicle forfeiture laws (Peck & Voas, 2002). Although there is evidence that impoundment reduces recidivism, storage and other administrative costs can be expensive for the community, and loss of access to the vehicle can adversely affect innocent family members. A more targeted approach to incapacitating DWI offenders was needed, and from this there arose an opening for some form of hardwired device to lockout the ignition. The idea of the interlock was to prevent driving by someone impaired by alcohol while allowing a sober operator to drive.

Attempts to Develop Performance-based Devices to Exclude Impairment

Efforts to develop such a device grew out of human performance research initiated during World War II to assess pilot readiness for flight. Following the war, research in driving simulators and instrumented vehicles was directed at detecting driver errors related to crash involvement, fatigue, and intoxication. From this work, some prototype devices, such as a "Quick Key" unit that tested the driver's reaction time, were developed for mounting in a vehicle (Voas, 1970). A limitation on all such skill-measuring systems was the large variation in human performance that resulted in a substantial number of false-positive signals when the individual was not impaired. Such systems, while possibly having the advantage of detecting impairment due to other substance use and fatigue, could not compete with the relative stability of BAC measurement for detecting alcohol impairment. As a result, interlock devices built around alcohol-sensing semiconductors and fuel cells were the only instruments to come into widespread use. This was particularly the case once per se illegal BAC laws were enacted in the United States in the 1960s and 1970s.

Early History of Alcohol Interlock Development

The Borg Warner Company produced the first ignition interlock device in 1970. That unit, built upon a nonspecific semiconductor sensor, could prevent ignition of the vehicle's engine based on a specified BAC setting. However, it did not exhibit the features ultimately required to ensure reliable operation under all environmental conditions nor did these early interlocks have any features to prevent circumvention. Developing such early devices was slow because of the continued interest in developing a performance-based interlock (e.g., reaction time, perception) that might also prevent a drugged or drowsy driver from starting the vehicle. Federal funding was initially devoted to these more general performance interlocks, and during that period, support for BAC-sensing interlocks was marginalized somewhat. Initially, no State legislation providing for the use of interlocks by the courts was available. Early interlock programs were implemented through the initiative of individual judges as a novel element in their DWI sentencing program. In 1986, California passed the Farr-Davis Driver Safety Act that provided for a pilot study of interlocks in a few counties. Over the next several years, a few other States similarly supported pilot studies of interlocks.

Model Interlock Guidelines

In 1989, with interest in interlocks growing, NHTSA awarded a contract to the National Public Services Research Institute in Landover, Maryland, to draft certification guidelines or model specifications for interlock devices. States were encouraged to use these Federal recommendations as guidelines for development of their own State interlock standards. The final NHTSA Model Specifications, published in the *Federal Register* (NHTSA, 1992), provided recommendations for environmental factors, such as air temperature, electromagnetic interference, and vibration, in which the devices need to operate. The model specifications recommended that the interlocks be set to lockout the vehicle's ignition system at .025 g/dL BAC 90% of the time when BAC was as high as .035 g/dL and operating in normal/moderate environmental conditions; in more extreme cold or hot temperature conditions, the guidelines were even more lenient. These lax accuracy and precision standards reflected the quality of the early equipment. These early devices, based on the Tagucci semiconductor sensor, drifted, were affected by altitude, and were not alcohol-specific.

Since issuance of the model specifications, States have often adopted set points in their legislation at or near the NHTSA recommended level of .025 g/dL. (Florida's current law is an exception, with a lockout point at .051 g/dL, twice the recommended level, a point at which impairment is likely.) The 1992 Model Specifications included the rolling retest requirement—a requirement that the driver be retested while the vehicle's engine is running—because the technology at that time could not ensure that the individual providing the breath sample was the driver. Currently, NHTSA is revising the 1992 Model Specifications to reflect technical improvements that have occurred over the last 15 years. Although not expected to be part of the new NHTSA guidelines, several manufacturers are developing systems to improve the identification of the individual providing the breath sample. None of these has yet been evaluated to determine if they are sufficiently accurate (or easily screened by the authority). Currently, the interlock is still regarded as a type of vehicle sanction inasmuch as the vehicle is the intervention point and the driver is not identified.

Second Generation Devices

Beginning in the 1990s, a "second generation" of interlocks (Collier, 1994) was introduced that added several features to the devices designed to prevent circumvention. These include alcohol-specific fuel cells; the requirement that learned skills such as hum tone recognition, which requires the operator to hum while blowing into the interlock unit, be included to prevent an untrained individual from substituting for a DWI offender; filtered air detection (prevents blowing through a device that filters out the alcohol); blow abort (detection of too small an air sample); and significantly, the requirement for random rolling (aka running) retests once the vehicle is underway or started to discourage having a person, such as a parking lot attendant, start the vehicle for the offender, or allowing a vehicle to sit idling while the owner drinks. In addition to these controls, a breath test and engine operation monitor was added to the unit that would detect any starts not preceded by a breath test and that provided evidence the vehicle was in use and not simply stored in the driveway while a substitute vehicle was used. These and similar measures led to devices that were more difficult to circumvent without disabling the system or, if circumvented, would result in registration of the act on the record that would be later detected when the vehicle was brought in for routine service one or two months later (Collier, Comeau, & Marples, 1995).

Recent Evidence and Features of Interlock Programs

Effectiveness of Interlocks

There is strong evidence now that interlocks reduce DWI recidivism while installed in an offender's vehicle (Coben & Larkin, 1999; DeYoung, Tashima, & Masten, 2004 ; Voas et al., 1999). Figure 1 summarizes 10 studies representing a mix of programs that had used both first and second generation interlocks. In the figure, the recidivism of the interlock group is adjusted to percent of recidivism relative to its own control group. All the control groups are represented as 100% recidivism and shown as a black horizontal line. Recidivism rates while the interlock is installed are 40 to 90% lower (dark bars) than the recidivism rates of the control noninterlock groups (black horizontal line). Once the incapacitating effect of the interlocks is removed (light bars), recidivism returns to rates comparable to (and not different from) the control group rates set at 100% (Marques et al., 2001a). The bar pairs within a State/province are the same people during and after interlock. This suggests that the reduction in recidivism found in interlock groups relative to control offenders is not a simple matter of initial differences in risk. One of these studies (Beck et al., 1999) in Maryland was a random assignment of offenders to the interlock and noninterlock groups; those results accord with those in other States and provinces.
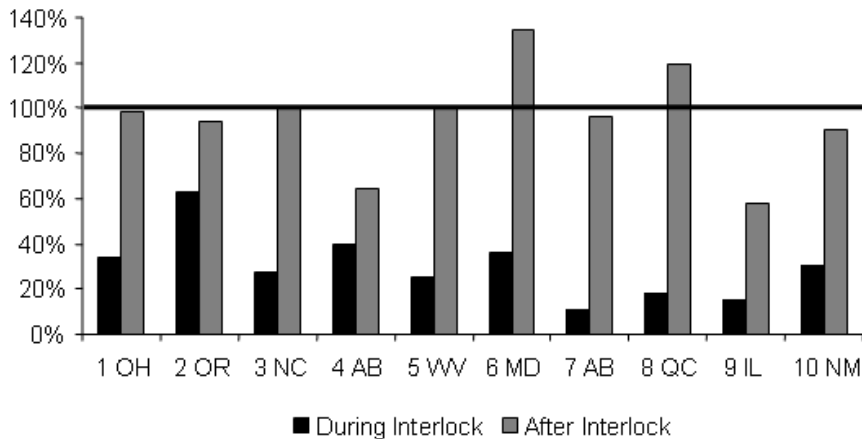
Figure 1. Recidivism in 10 studies: While the interlocks are on the vehicle (dark bars) and after removal (light bars). Rates are expressed relative to noninterlock license-suspended DWI offenders in each study (adapted from Marques et al., 2001a).

A different look at the data is found in a meta-analysis by Willis, Lybrand, and Bellamy (2004). They selected 13 studies under the rules of the Cochrane Collaboration and similarly found that, while installed, the interlock reduces the relative risk of DWI recidivism to .36 (64% reduction) with a 95% confidence interval from 0.21 to 0.63 relative to suspended noninterlock DWI offenders. Figure 2a from Willis, Lybrand, and Bellamy (2004) illustrates the consistent reduction across studies with 6 of the 8 studies finding statistically significant differences for multiple offenders and 3 of 5 studies showing significant results for DWI first DWI offenders (e.g., the confidence interval line does not cross one). Figure 2b is several of the same studies after interlock removal and demonstrates the loss of the interlock effect. The size of the square box reflects statistical power. In both Tables 2a and 2b, the labels for column 2 and 3 (n/N) reflect recidivists/total sample size respectively for the interlock and control offenders.

Review: Alcohol ignition interlock programmes for reducing drink driving recidivism
Comparison: 02 Controlled Trials
Outcome: 01 Recidivism while the interlock device is installed in offender's vehicle

Study	Interlock installed n/N	Control n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 First time offenders (or not described)					
Alberta	2/1982	393/17587		8.7	0.05 [0.01, 0.18]
California	16/283	19/270		2.1	0.80 [0.42, 1.53]
Hamilton County	8/273	24/273		2.6	0.33 [0.15, 0.73]
Quebec	34/8846	485/25559		27.4	0.20 [0.14, 0.29]
West Virginia	0/137	157/10198		0.5	0.23 [0.01, 3.75]
02 Repeat offenders					
Alberta	7/781	878/10840		13.0	0.11 [0.05, 0.23]
California	6/293	9/235		1.1	0.53 [0.19, 1.48]
Colorado	8/501	35/584		3.5	0.27 [0.12, 0.57]
Illinois	20/1560	94/1384		10.9	0.19 [0.12, 0.30]
North Carolina	11/407	65/916		4.4	0.38 [0.20, 0.71]
Oregon	16/648	63/1541		4.1	0.60 [0.35, 1.04]
Quebec	20/1050	398/7108		11.3	0.34 [0.22, 0.53]
West Virginia	12/761	1290/20062		10.4	0.25 [0.14, 0.43]

0.1   0.2   0.5   1   2   5   10
Favours interlock   Favours control

Review: Alcohol ignition interlock programmes for reducing drink driving recidivism
Comparison: 02 Controlled Trials
Outcome: 02 Recidivism after the interlock device has been removed from the offender's vehicle

Study	Interlock installed n/N	Control n/N	Relative Risk (Random) 95% CI	Weight (%)	Relative Risk (Random) 95% CI
01 First time offenders (or not described)					
Alberta	25/1479	127/6805		5.6	0.91 [0.59, 1.39]
Quebec	332/8846	098/25559		44.0	1.37 [1.21, 1.56]
West Virginia	6/137	629/10041		2.1	0.70 [0.32, 1.53]
02 Repeat offenders					
Alberta	41/586	224/3061		8.8	0.96 [0.69, 1.32]
Colorado	0/1	0/1		0.0	Not estimable
Illinois	48/1540	107/1290		14.3	0.38 [0.27, 0.52]
North Carolina	10/160	25/428		1.7	1.07 [0.53, 2.18]
Oregon	78/648	198/1541		14.4	0.94 [0.73, 1.20]
Quebec	12/1050	42/7108		1.3	1.93 [1.02, 3.66]
West Virginia	70/749	851/18772		8.0	2.06 [1.63, 2.60]

0.1   0.2   0.5   1   2   5   10
Favours interlock   Favours control

Figures 2a (top) and 2b (bottom). Recreated based on Willis et al., 2004. Results from a meta-analysis of 13 interlock studies of recidivism reduction while on the vehicle (Figure 2a) and after removal (Figure 2b)

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Support Programs for Interlock Participants

Based on our preliminary evidence from New Mexico, it is quite possible that we will eventually be able to report that there is a post-interlock statistically significant recidivism reduction. To date, however, across the jurisdictions that have studied the interlock, the more usual return to control rates of recidivism after the interlock is removed has been disappointing to safety advocates, raising the question as to whether a remediation intervention might help preserve or extend some of the interlock benefits. An interlock program seems a near ideal time for an intervention because, once enrolled, offenders are also required to come in for periodic monitoring and device servicing. These occasions provide an intervention opportunity. A project was initiated in Alberta, Canada, to test the utility of providing a counselor to help offenders understand the relationship between their drinking, as recorded in the interlock breath-test log file, and the need to rethink their own choices regarding drinking, in general, and drinking-driving, in particular. The intervention in that study was built loosely around motivational enhancement theory (Miller, Tonigan, & Longabaugh, 1995). Evidence suggested a modest short-term benefit may have accrued for first offenders (Marques, Tippetts, Voas, Danseco, & Beirness, 2000). The modest success of that program led to the initiation of a much more intensive *Support Interlock Planning* (SIP) program for interlock program offenders in Texas. The results suggested that participation in a manual-based, structured, 12-hour motivational program, consisting of group and individual sessions for DWI first offenders on interlocks, substantially improved the response of the offenders to standard screening measures, such as the AUDIT (Alcohol Use Disorders Inventory) (Babor, de la Fuente, Saunders, & Grant, 1992) and DRINC (Drinkers Inventory of Consequences) (Miller et al., 1995), between the baseline program entry and 6 months later at program completion. Due to sample size constraints, offenders who attended the SIP program could not be properly matched to non-SIP participants, but relative to generic interlock DWI offenders without the benefit of the SIP intervention, the SIP interlock participants showed lower rates of elevated BAC tests on the interlock record. Because the number of high-BAC tests on the interlock is a predictor of recidivism (evidence discussed later), these results suggested that the SIP program may have achieved its objectives during the interlock. As a scientific problem, however, it remains an open question as to whether treatment-like interventions during the interlock can reduce post-interlock recidivism. Such a study will not be possible until a court will allow a random clinical trial of this type of interlock supplemental intervention.

In a Swedish program of medical monitoring linked to the interlock requirement, Bjerre, Marques, Selen, and Thorsson (2007) reported that a strict program that routinely monitors alcohol-use indicators can reduce offender hospital utilization and the use of sick leave, an effect later shown to result in a 25% reduction in hospitalization costs (Bjerre, Kostela, & Selén, 2007). Data from these programs suggest there is evidence that the period of interlock-controlled driving is an effective intervention point to alter drinking-driving choices.

Patterns of Breath Tests Recorded on Interlock Records

Unpublished transportation resources surveys of 2,000 offenders in Canada and the United States that were conducted by the authors from 1995 to 2005 found that 98% of interlock-stipulated offenders are the main users of interlock-equipped vehicles. Accordingly, the pattern of breath-test results logged on the interlock event recorder provides a unique window into drinking-driving proclivity among those who use interlock-equipped vehicles.

The evidence in the interlock record shows a consistent pattern of elevated BAC tests both for the day of the week and for the hour of the day. The weekends have the highest *proportion* of all start attempts with BAC tests that are positive above .02 g/dL; by contrast, Tuesday is the day with the lowest proportion of positive tests (Marques et al., 1999). These results were from a 1994-1999 Alberta study that included approximately 2,000 interlock-using DWI offenders. Additional data from Quebec's 1997-2001 program with 7,300 DWI offenders using interlock devices was similarly examined (Marques et al., 2003b). The day and hour patterns were largely the same as in Alberta.

We further reported that both the Quebec and Alberta data showed a clear working weekday morning spike in the *number* of elevated BAC tests during the hours of 7 to 9 a.m., while the largest *number* of breath tests of any kind occurred from 4 to 6 p.m. Assuming that the schedule-bound life of working people accounts for this pattern of breath tests, driving to work led to more lock-out events than returning home after work. The Saturday and Sunday patterns were shifted such that both the number of all tests and number of elevated tests had a peak that centered at about noon. We interpreted the morning workday elevation in positive BAC tests as evidence of a prior night of drinking.

Although Alberta and Quebec are both Canadian provinces, they are culturally and linguistically distinctive. Nonetheless, the interlock BAC patterns were very consistent. Both provinces use the same interlock devices manufactured by Alcohol Countermeasures Systems (ACS), and the interlock program is managed by its own subsidiary Guardian Interlock Systems (this is not the same company named Guardian that operates in the United States with headquarters in Georgia).

In 2002, the interlock manufacturer, Smart Start, Inc., of Irving, Texas, provided data that was subsequently evaluated. The Texas data set was larger than both of the two prior data sets, approximately 11,000 DWI offenders, about a third of whom were Latino (in contrast to the Anglo Alberta population and the French Quebec population). The Texas Smart Start data pattern was consistent with the pattern in Canada and the ACS (Guardian Interlock) data. In an effort to portray this information and the similarity of patterns on a common chart, Figure 3 was included in the International Council of Alcohol, Drugs and Traffic Safety Volume 2 Working Group report (Marques & Voas, 2005). The figure shows two curves for each jurisdiction. A solid line plots the proportion (0 to 1) of all tests in each of the three jurisdictions relative to the time of day when the highest count of tests occurred there. Each line is distinguished by different point markers for Alberta, Quebec, and Texas. In addition, a separate set of three dashed lines for each jurisdiction is shown that plots the proportion of all tests ≥ .02 g/dL relative to the time of day when the highest count of tests occurred. All three jurisdictions had a peak count of positive BAC tests at 8 a.m., while Quebec and Alberta had a peak of all tests at 4 p.m. and Texas at 5 p.m. These curves represent the data from approximately 20,000 DWI offenders who took 38 million breath tests. The comparable patterns from New Mexico patterns are reported in the Results section.
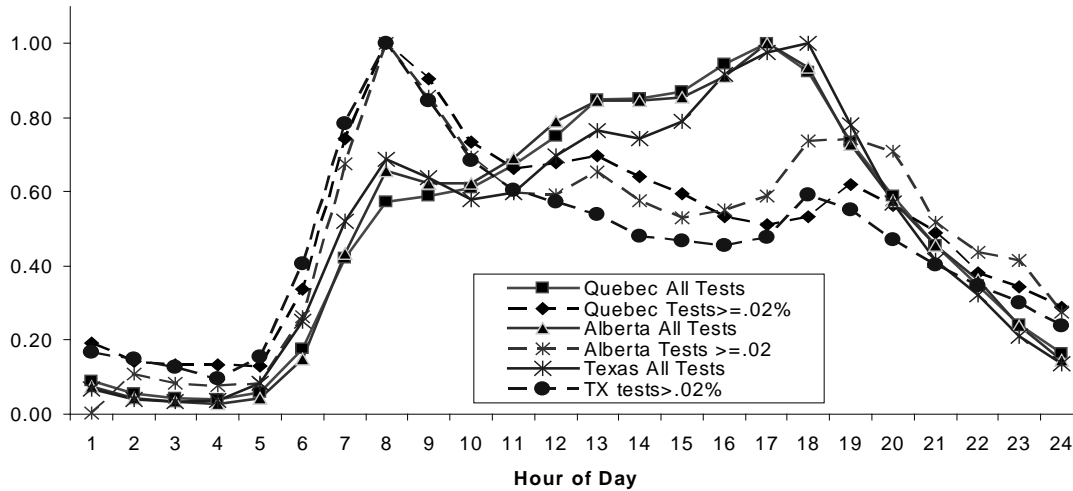
Figure 3. Relative rates of interlock BAC tests >.02 g/dL (dashed lines) and all tests taken (solid lines) over 24-hour periods, Monday to Friday, in Quebec, Alberta, and Texas. Sampling base = 38 million breath tests.

Use of Interlock Breath Test Records to Predict Recidivism

The discovery that elevated interlock BAC tests occur most frequently in the morning hours when people start their vehicles on their way to work led to the conjecture that those DWI offenders who have positive morning BAC tests are also more likely to be alcohol dependent. It was shown in Alberta and in Quebec that both the overall rate of elevated interlock BAC tests and the particular occurrence of elevated morning BAC tests were uniquely predictive of post-interlock recidivism (Marques et al., 2001b; Marques et al., 2003a). Figure 4 shows the relationship between the rate of blowing positive BAC tests during the interlock-installed period (arranged in deciles of greater rates of positive BAC tests while on the interlock on the X axis) and on the Y axis the recidivism rate during the 2 years following the removal of the interlock. That is, the X or category axis in Figure 4 reflects those offenders with increasingly higher rates of failed BAC tests (e.g., each decile has about 720 offenders, and decile 1, represents those with no recorded no failed BAC tests while using an interlock while decile 10 represents those with the highest rates). The Y axis is the rate of reconvictions for DWI 24 months after interlock removal with licenses fully reinstated. Figure 4 is based on 18.8 million breath tests provided by 7,200 offenders in Quebec during an average of 9 months interlock use. The relationship suggests that jurisdictions have been re-issuing unrestricted driver licenses to people completing an interlock program on whom there would have been ample evidence from the interlock record of BAC tests (if it had been examined) to know in advance that the offenders are still attempting to drink and drive. It further suggests the possibility of creating criterion-based programs in which offenders would be required to continue to drive with an interlock until they had demonstrated an ability to control their drinking and avoid lockouts. Based on this research evidence, a few States currently have such programs. New Mexico does not, but as we show in the Results section, its interlock program provided an opportunity to determine if this same kind of predictive relationship found in the administrative programs of Canada can be found in a U.S. judicial program.
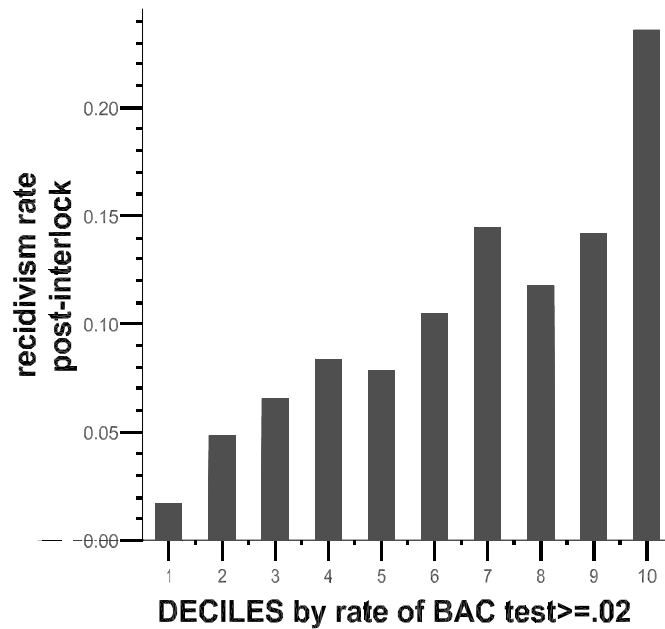
Figure 4. Interlock BAC test rates (during) by 2-year DWI recidivism (after) interlock removal. Rates for each bar represent ~720 offenders.

Growth in the Use of Interlocks in the United States

Although interlock programs around the United States are not yet taking full advantage of the breath-test record to help DWI offenders resolve drinking problems or further protect the public by extending the interlock requirement, there are nonetheless a growing number of interlocks in service annually.

Figure 5 plots the growth in total number of interlocks in the United States in the past 20 years. The data points represent unpublished telephone surveys of manufacturers conducted in 1997 by Richard Freund (Lifesafer Interlock), 2002 by William Rauch (Westat), 2005, and 2007 by Richard Roth (Impact DWI); 1986 is set at zero, and the 1990 and 1994 points are interpolated. Although the growth is strong in recent years, the number is still low compared to the FBI's estimate of around 1.4 million annual DWI arrests in the United States (Federal Bureau of Investigation, 2007). On that basis, even with the 134,000 interlocks in use by 2007, not quite 1 in 10 individuals arrested for DWI enters an interlock program. [4]

Interlock penetration as a way to control the DWI problem grew slowly during the first generation of devices, partly because they were distrusted, partly because they were unfamiliar, and partly because there was not yet much evidence to warrant interest. As the anticircumvention features of second generation interlocks became more widely known, belief in their potential grew slowly. Soon more States were enacting more comprehensive interlock laws, efficacy evidence began to accumulate, and the number of interlocks in service grew. The

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[4] Many DWI arrests do not result in convictions. The rate of interlocks in use per convictions is much higher, but national conviction rates were not available. In 2007, interlocks were in use for 49% of DWI convictions in New Mexico.

growth reflected both homegrown legislative initiatives and advocacy by the MADD national office. In 2005 MADD made interlocks a central part of its Campaign to Eliminate Drunk Driving. The estimated 134,000 units in use by 2007 was up 34% from the 100,000 estimate just 18 months earlier. The surge in growth between 2006 and 2007 is most closely emulated by a third-order polynomial fit line superimposed on the estimates.
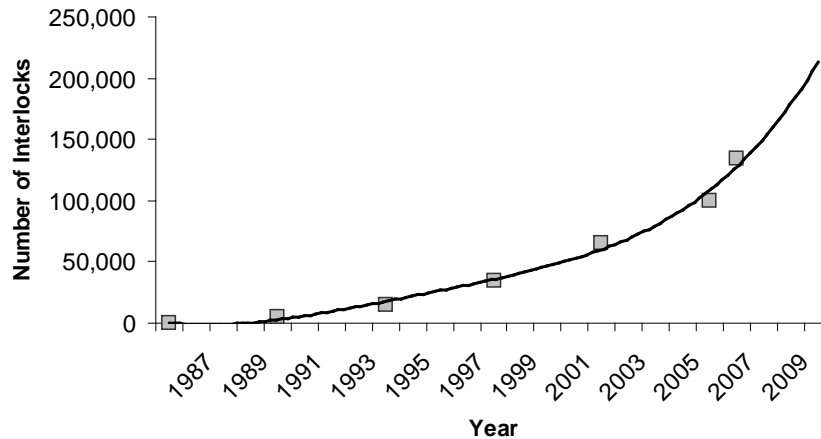
Figure 5. Interlock growth in the United States through mid-2007, data with polynomial fit

Effectiveness of Interlock Programs With DWI Offenders With Fully Suspended Licenses

Some interlock laws are in conflict with Federal requirements establishing a minimum period of hard suspension for DWI second and subsequent offenders. This means that a law can (and sometimes does) mandate that an interlock be installed on a vehicle that the offender is not allowed to drive. This seems contradictory, but there is some support for the legitimacy of this requirement. Evidence that up to three quarters of license-suspended DWI offenders report driving illicitly (Ross & Gonzales, 1987) suggests this requirement is not without merit. However, a common counterargument heard from judges is that assigning an interlock to an offender who is prohibited from driving sends a mixed message, suggesting that the judge expects the person to violate the sanctions applied by the court. The current research program in New Mexico provided an opportunity to study the effect of assigning interlocks to DWI offenders who were fully suspended. From July 1, 1999, to January 1, 2003, New Mexico had a law making ignition interlocks an optional judicial sanction for DWI second and third offenders, while a separate New Mexico law required a 1-year hard suspension for DWI second offenders. A judicial requirement to install an interlock did not remove the suspension of the offender.

This situation is not unique to New Mexico. The question is very straightforward. Does requiring an offender to install an interlock further reduce recidivism among those drivers who are by law not permitted to drive the interlock-equipped vehicle? That is, does the interlock help reduce driving-while-suspended violations?

Effectiveness of Interlock Programs With DWI First Offenders

Since their initial use as a countermeasure, alcohol interlocks have been most widely used for multiple DWI offenders (those with more than one prior DWI conviction) based on the general belief that interlocks are most needed by, and most effective with, individuals who cannot control their drinking. Interlocks have been less widely used with first offenders, in part because they are subject to less severe sentences and, presumably in part, because courts consider first offenders better able to control their drinking and driving. As a result, the evidence for the effectiveness of interlocks for first offenders is less widely available. Although several early studies (Morse & Elliott, 1992; Vezina, 2002; Voas et al., 1999) found a positive influence of interlock programs on DWI first offenders, the effectiveness of interlocks with first offenders was called into question by a California study of first offenders by DeYoung, Tashima, and Maston (2005). The DeYoung study, however, did not distinguish first offenders ordered onto the interlock from those who actually complied with the order. That is, the California study became an evaluation of the law more so than use of the device. As a part of the current evaluation of the interlock programs in New Mexico, we evaluated recidivism for first offenders known to have installed a device.

Circumvention While Under an Interlock Restriction

As the number of interlocks in service grows, offenders that are more recalcitrant will inevitably be eventually swept up and into interlock programs. With less compliant offenders using the interlock, we can expect that some of them will resist the external control, especially those who find it more difficult (or less desirable) to control their drinking.

Engineering features have made the newer devices more sophisticated, but they are still unable to prevent all circumvention. A key reason is that the easiest way to circumvent is to use a non-interlock-equipped vehicle. However, driving without an interlock makes the offender subject to arrest and sanctioning for a driving-while-suspended offense. Some are willing to take that risk, just as many have been shown willing to drive while suspended/revoked. During the New Mexico evaluation, we had an opportunity to study the extent to which offenders use other vehicles to avoid the interlock. We compared the vehicle registration information of the rearrest vehicle based on police reports and the interlock-equipped vehicle registration to determine the proportion of all rearrests that occurred while driving the interlock-equipped vehicle. No such estimate has been reported previously, but access to multiple sources of information in New Mexico allowed us to make this estimate. Those findings are reviewed in the eight study sections.

Perspectives of Interlock Participants and Their Families

Much of interlock evaluation is properly directed toward impact evaluation of the interlock programs and devising ways to improve program efficacy and effectiveness. Less attention is directed toward the offenders who participate in these programs and how they and their families regard life with an interlock device. Survey questions related to user acceptability and overall experience were fielded during an evaluation of the Alberta interlock program during the mid-1990s, and it was interesting to learn that most offenders adopt a type of grudging acceptance of the interlock even though many find it embarrassing and do not like having to use it.

In an effort to sample some of the free-form, self-generated appraisals of life with an interlock, this New Mexico evaluation study formed focus groups (both English-speaking and Spanish-

speaking) in the major population centers of Albuquerque and Santa Fe in order to speak directly with interlock offenders. This report summarizes some interlock user comments. Focus groups are not designed to represent the average views of a population, and the ones conducted in New Mexico are no different. Nonetheless, there were some consistent themes that emerged during the sessions, and the similarity to commentary heard in other evaluation studies in administrative and court programs was notable. The results of these focus group conversations are summarized in the Results section.

Legal Basis of Interlock Programs in the United States

After the early 1990s, interlock design had advanced sufficiently that the devices were being used in a wide variety of criminal justice programs. Nonetheless, program implementation procedures varied substantially, and little data were being collected on the effectiveness of various implementation procedures. One of the earliest suggestions of how such interlock support programs might be structured (Voas & Marques, 1992) was a product of the same contract that led to the publication of the 1992 NHTSA Model Specifications. Since then, interlock programs in the United States have been implemented under three types of legal authority:

1. The judicial authority to impose sanctions under the common law.;

2. State laws specifically provided for the use of interlocks as a sanction for DWI or for DWS; and

3. Under the administrative authority of the State motor vehicle department to regulate driver licensing.

Among the innovations in New Mexico have been legislative changes that have created a mandatory judicial interlock requirement for all offenders (differing in duration depending on the number of prior DWI convictions), a voluntary administrative interlock option for all revoked offenders, and a law that adds provisions for cost assistance for indigent offenders. Built from serial legislation, the program has closed loopholes and made it possible to get more DWI offenders onto interlock-controlled driving. The 1997-2005 laws in New Mexico are summarized following this background section.

Early Judicial Interlock Programs Based on Common Law

The legislative achievements in New Mexico are best understood in the context of other types of interlock programs. The following sections will help to provide some context for New Mexico's laws.

In the earliest interlock years, programs were implemented because individual judges wanted to use the interlock as one of their sanctioning options. Such scattered programs made it difficult for interlock service providers to obtain enough participants to warrant the establishment of convenient service locations. Beyond the convenience factor, there was poor information flow across divisions of government and often the court order for the interlock was not processed by the department of motor vehicles (DMV). Consequently, the interlock requirement may not have appeared on the driver's license record where it could alert a police officer that an impaired driver who had been stopped was operating under an interlock requirement. At the same time, many judges were skeptical of the effectiveness of interlocks, or were concerned whether some of their offenders could afford to pay the approximately $65 per

month for the device. Also, supervision of offenders on the interlock program added yet another burden on probation officers (DeYoung et al., 2004). So while these early programs were initiated under the common law authority of the court (Table 1, item 1), they succeeded in enlisting only a minority of the offenders to install interlocks. There was, nonetheless, early evidence reported that those who did install the interlocks experienced reduced recidivism (Baker & Beck, 1991).

Table 1. Seven types of interlock programs

	Individual Case Law	Criminal Justice State Laws	Administrative State Laws
Laws providing for pre-adjudication installation		(2) Interlock requirements as a condition of bail	(5) Interlock licensing law
Laws providing for discretionary installation	(1) Early interlock programs	(3) Judicial discretionary laws	(6) Offender voluntary laws
Mandatory laws		(4) Interlocks mandated as a condition of probation (4a) Interlock mandated as a condition of probation with strong incentive to comply.	(7) Mandatory requirement for reinstatement laws

Mandatory Pre-adjudication Interlock Programs

The passage in the 1980s and 1990s of administrative license revocation (ALR) laws, which provided for immediate loss of the driver's license, increased the proportion of offenders whose licenses were suspended and increased both the speed with which the sanction followed the offense and the certainty of receiving a sanction. States enacting such laws experienced a reduction in alcohol-related crashes (Voas, Tippetts, & Fell, 2000). Based on that experience, an administrative system for imposing the interlock on arrested, but not yet adjudicated, DWI offenders should increase the penetration and effect of interlock programs. One procedure for requiring pre-adjudication installation of an interlock is to make it a condition for posting bail at the time of arrest (Table 1, item 2). Texas has such a law for DWI second offenders, but it has not been evaluated. Although Texas has many interlocks in service, on a rate basis (per capita or per alcohol fatalities), its installation rate is much lower than New Mexico's.

State Laws Providing for Judicial Interlock Programs

The modest success of the early judicially initiated programs (Table 1, item 1) encouraged a few early-adopter States to pass legislation authorizing the use of interlocks by the courts (Table 1, item 3). These State laws provided judges with the authority to impose the interlock at their discretion. This discretionary use of interlocks produced only a modest increase in the number of offenders on interlocks because judges, despite the laws, still had reservations (already noted) relating to inconvenience, cost, and perceived ineffectiveness (DeYoung et al., 2004). An evaluation of such a law in California found that many judges did not require interlocks, and when they were required, the probation departments failed to follow through to confirm that the offenders installed the devices. In part, the low penetration of interlock programs following the discretionary laws led to the passage of mandatory laws that required judges to place multiple DWI offenders in interlock programs (Table 1, item 4). However, the effectiveness of such laws was reduced because they conflicted with other State or Federal legislation mandating hard (no driving) suspensions for second offenders. For example, a provision of the

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Federal Transportation Equity Act for the 21st Century (TEA-21) Restoration Act required States to suspend the licenses of multiple offenders for at least 1 year or risk being subject to a transfer of a portion of their highway construction funds (Voas & Marques, 2003). The provision of that law [5] remained in effect through 2007, but was amended in 2008. Until that time, the law had created a situation in which the court, because of the mandatory interlock law, was forced to require an interlock on a vehicle that the offender could not lawfully drive; consequently, few courts at that time mandated interlocks (DeYoung, 2002b).

Judicial Interlock Programs that Attain High Rates of Installation

Court interlock programs, which make the installation of the device an element of the probation requirements, would seem to ensure that offenders would comply with the interlock requirement because a failure to do so would put them in noncompliance with the court, making them subject to additional sanctions, including jail time. However, most mandatory laws have loopholes. The New Mexico mandatory laws' loopholes, like most mandatory judicial laws, allow offenders to avoid installing interlocks if they claim to not have vehicles or, in some cases, by simply providing statements that they will not drive. In addition, mandatory judicial program offenders may plead that they cannot afford the interlock program. The offender's resistance to an interlock may also play a role in plea negotiation. Richard Culver, a judge in Hancock County, Indiana, closed that loophole by adopting the policy that the alternative to installing an interlock would be electronically monitored home confinement (e.g., house arrest). A study of that court found that this more severely restrictive and less appealing alternative sanction resulted in 62% of the Hancock County DWI offenders installing interlocks. This rate of installation, in turn, led to a 40% reduction in DWI recidivism for Hancock County compared to six other suburban/rural county courts, that like Hancock, surround Marion County where Indianapolis is located (Voas et al., 2002). This is represented as a special condition in Table 1 (Table 1, Item 4a).

New Mexico provided an opportunity to replicate the Indiana study when, from 2003 to 2005, the magistrate court in Santa Fe adopted the policy of making electronically monitored house arrest the alternative to installing the interlock to motivate all DWI offenders to accept interlocks on their vehicles. This development provided an opportunity to study three key questions: (1) Would use of the less desirable home confinement sanction produce an increase in the rate of installed interlocks similar to that found in Hancock County, Indiana? (2) Would the increase in pressure on offenders to install interlocks result in a group of users who are less willing to comply with the interlock program and more likely to circumvent? (3) Would the higher rate of interlock installation in Santa Fe County be detectable as a reduction in countywide recidivism (not just among the interlock offenders); would Santa Fe County as a whole have lower DWI arrest (and alcohol crash) rates than it had previously and lower than the rest of New Mexico?

State Law that Provides a Path to Reinstatement for Revoked Offenders

New Mexico enacted an administrative law that provided the opportunity for a revoked DWI offender to apply for a limited license to drive an interlock-equipped vehicle at any time (Table 1, item 5). This unique 2003 law allows a driver revoked for an alcohol offense to receive a

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[5] In June 2008 an amendment was enacted to allow States, without penalty, to substitute limited interlock-controlled driving for all but the first 45 days of the 1-year hard suspension requirement for multiple offenders, provided the offender is permitted to drive for only limited purposes.

license to operate an interlock-equipped vehicle by appearing at the motor vehicle department with a vehicle in which such a device is installed. This voluntary administrative program, which permits unrestricted driving in an interlock-equipped vehicle, is open to any revoked DWI offender (assuming there were no past vehicular homicides and the vehicle is insured).

"Voluntary" Administrative Interlock Programs

An early approach to the implementation of interlock programs through State legislation was to enact administrative laws that empowered the motor vehicle departments to allow license-suspended DWI offenders to drive a vehicle with an interlock during a portion of the period they would otherwise be fully suspended (Table 1, item 6). It was assumed that such voluntary programs would provide an attractive opportunity for the offender to drive legally; however, only a small percentage of the eligible offenders opted to install an interlock under these types of programs (DeYoung et al., 2004; DeYoung et al., 2005; Tippetts & Voas, 1998). This suggested that the opportunity to drive legally with an interlock was not as attractive to DWI offenders as expected. They may have preferred suspension, or they may have never learned about or understood the program. The actual reasons for the failure of discretionary programs to attract more volunteers are not known for certain, but some factors are clear. One of the issues often cited by offenders is the cost and embarrassment of having the devices on their vehicles. These comments, captured on the Transportation Resources Survey, were first heard from administrative interlock participants in Canada and were also mentioned by the New Mexico offender focus groups and by offenders studied in Texas. An unstated, but probably significant, factor in reducing the appeal of the interlock is the perceived low risk of arrest for unlicensed driving and the possibility that the interlock would interfere with drinking. The optional type of interlock program means the offender must accept many types of cost, including vehicle insurance costs, the costs of the program itself, psychological costs of making lifestyle changes, and possible embarrassment when using the vehicle. Choosing to remain suspended brings few of these costs.

"Mandatory" Administrative Interlock Programs

The possible loss of some Federal highway funding if States failed to comply with the requirements of the TEA-21 Federal legislation led some States to implement laws that require installation of an interlock as a prerequisite for reinstatement (Table 1, item 7). Two types of such legislation have been implemented. Some States require offenders to have a period on the interlock as a condition for reinstating their licenses, but do not enforce it. In other States, the interlock is a prerequisite for reinstatement.

In the former, offenders can choose to delay reinstatement during the period the interlock would be required and thereby avoid the necessity of installing the device. Essentially, such laws allow those not interested in an interlock to extend voluntarily the period of hard suspension; evidence suggests most choose that option. In the latter, States such as Florida, Arizona, and Colorado require a period on the interlock no matter how long the offender delays in seeking reinstatement, rendering it impossible to avoid the requirement if the offender is ever to be relicensed. That is, the path to license reinstatement runs through the interlock program.

In the type of voluntary administrative programs that allow an offender to wait out the suspension period, the installation rates range from about 10% (Alberta) to approximately 25% (Quebec). There is no evidence that programs of this type in the United States achieve anything higher.

In Florida, DWI offenders cannot wait out reinstatement because the law requires 6 or more months on the interlock as a condition of reinstatement for all multiple offenders. A preliminary look at the Florida program showed that, as of September 2006, 51,043 DWI offenders had been notified that they would be required to install an interlock to reinstate their licenses. Of those, 37,931 had not yet served the full period of their suspension or had not fully satisfied all of their probation requirements, so that they were not qualified to apply for reinstatement. Of the 15,181 DWI offenders who had met the requirements for reinstatement, 86%, or 13,112, had installed interlocks (Voas, Tippetts, & Grosz, 2007b). If those who are not yet qualified make an effort to become qualified, it could mean that policies requiring the interlock as a prerequisite for reinstatement can increase the proportion of offenders installing interlocks, but that is yet to be proven. In 2007, just 25.6% of arrested offenders had installed an interlock, and about 43% of those who had completed all suspension requirements had installed an interlock. It is not yet known how many of Florida's DWI offenders will choose to drive while suspended and never become relicensed. The program is being carefully monitored, and another few years of data will make it possible to answer this question.

Will DWI Offenders Delay Reinstatement to Avoid the Interlock?

A potential problem for post-reinstatement administrative programs is that many DWI offenders delay reinstating their licenses (McKnight & Voas, 1991; Tashima & Helander, 1999). Requiring the interlock may further discourage reinstatement. In a study of more than 2 million DWI offenders in six large States (Florida, Indiana, Iowa, Michigan, Minnesota, and North Carolina), Voas, Tippetts, and Grosz (2007b) found that only 58% of the first offenders and 45% of the multiple offenders reinstated within 1 year of becoming eligible (Table 2). Further, by the end of the 5th year from the eligibility date, a quarter of the first offenders and a third of the multiple offenders had not yet reinstated. These differences between first and multiple offenders varied across States and were statistically significant in some States but not in others.

Table 2. Cumulative percentage of first and multiple DWI offenders reinstating each year following their date of eligibility in six States

Years following eligibility	Offense #		TOTAL combined
	First	**Repeat**	
At 1 year	57.6%	44.7%	51.1%
At 2 years	65.1%	52.9%	59.0%
At 3 years	70.0%	58.4%	64.2%
At 4 years	73.0%	62.0%	67.5%
at 5 years	75.1%	64.6%	69.9%
Cases with known eligibility date	*1,515,503*	*846,312*	*2,361,815*

BACKGROUND 2: INTERLOCK LEGISLATION IN NEW MEXICO 1999-2005

Overview

The interlock laws of New Mexico have introduced several new concepts for other State programs to consider. No State, New Mexico included, has yet produced a program that has achieved full or near full implementation of interlocks for all eligible offenders. Nonetheless, New Mexico has been the most active in passing legislation designed to increase the penetration of interlocks. The State has achieved the highest rate of installations on a per capita basis by a considerable margin.[6] As of 2007, New Mexico was estimated to have 36 interlocks installed per 10,000 population compared to 15 per 10,000 in the next two highest States. Relative to 12,930 DWI convictions in 2007, 6,161 interlocks were installed in New Mexico that year. This is a penetration rate of 48% on a simple interlock to conviction basis. About 65% of New Mexico arrests led to convictions in 2007. A later section provides more information about the growth in installed interlocks.

The first interlock law in New Mexico, passed in 1999, authorized (but did not mandate) the courts to require interlocks on the vehicles of second and DWI third offenders. That law was expanded in 2003 to mandate interlocks on all aggravated DWI first offenders and all multiple offenders. Later that year, a unique administrative interlock law allowed any license-suspended offender to apply for an interlock license at any time by installing a unit in his/her vehicle (Voas, Roth, & Marques, 2005). Finally, in 2005, a law mandating interlocks for all DWI offenders was implemented. This full mandatory law specified a 1-year suspension for first offenders, 2 years for second offenders, 3 years for third offenders and lifetime with a 5-year review for fourth or subsequent offenders. With each new legislative change, the rates of interlock installation have increased.

By early 2008, the comprehensive 2005 law had been in place for more than 2 years. The statewide penetration of the interlock, although better than in other States, is still limited even though the interlock is mandatory for all convictions. This illustrates barriers to its potential effectiveness here and elsewhere. Some offenders abscond; in some cases, prosecutors do not bring the cases forward; and in some cases, offenders are judged not guilty. In New Mexico, roughly a third of those arrested for DWI are not convicted of that offense. Further, loopholes in the legislation allow some offenders to claim no vehicle access and/or no plans to drive to avoid installing an interlock. Leniency in these cases would be the appropriate decision if the pleas were valid; however, evidence from many jurisdictions suggests this is rarely the case. The "no-vehicle problem" (Voas, Marques, & Roth, 2007a) may be the major barrier to fuller penetration. A full test of an interlock benefit cannot come until penetration improves across all jurisdictions. Policies such as those implemented in the Santa Fe court showed promise. For a 2-year period there, judges used an alternative (home confinement) to the interlock that was less acceptable to the offenders, and it resulted in installation rates of more than 70%.

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[6] Because annual FBI DWI arrest information is based on voluntary reporting by agencies around the United States, it is not equally valid for all States and is ordinarily used only as a national estimate.

The Unfolding

Expecting that interlocks may help to reduce DWI recidivism, the New Mexico legislature and two governors passed laws designed to increase the use of interlocks. It is interesting to consider that, although New Mexico has the most ambitious ignition interlock program in the United States with the highest rates of installation relative to other States, the New Mexico laws did not conform to the hard suspension requirements in the original Federal TEA-21 Restoration Act legislation. Consequently, the State was nominally penalized with up to 3% of the funds normally provided by the Federal Government to New Mexico for highway construction transferred to safety programs. Despite this, the political support for the initial laws was strongly bipartisan, passing unanimously in both houses. Support for interlock laws continued to be strong, but somewhat less so after 2005. A few recent legislative initiatives to close more loopholes have been defeated. Overall, however, New Mexico's interlock program has moved ahead of other States due to enactment of mutually reinforcing laws.

As is so often the case with legislation that intends to lower the public risk of exposure to alcohol-involved drivers, there were personal experience factors operating for legislators on both sides of the political spectrum. Passage of the bills was enhanced by the support of two senators: one, a Democrat, said that an interlock program had made a significant contribution to his recovery from alcoholism, and the other, a Republican, had had a sister-in-law and nieces killed by an alcohol-impaired driver. These bills were eventually supported, or at least not opposed, by the New Mexico Transportation Department, the Traffic Safety Bureau, the Motor Vehicle Division, the Administrative Office of the Courts, the Trial Lawyers Association, the District Attorneys Association, and MADD.

The Laws

The Optional Interlock Laws (Table 1, Item 3)

In 1999, two ignition interlock laws were passed in New Mexico. One made the ignition interlock a requirement for any limited license that was to be issued that allowed DWI offenders to drive to work or to school. The second law gave judges the option of mandating ignition interlocks as a condition of probation for second and third offenders. Under this law, only about 150 of the 12,000 convicted DWI offenders installed interlocks. These laws did not achieve the levels of installation needed to determine if interlocks could improve road safety. Reasons for this were summarized previously. Judges were reluctant to mandate the installation of an ignition interlock for a DWI offender whose license was revoked, and in addition, judges usually applied only the minimum mandatory sentences to DWI offenders (this issue is revisited in Study 1 of this report).

Ignition Interlock Licensing Act (Table 1, Item 5)

In 2002, the New Mexico legislature passed a law that mandated ignition interlocks as a condition of probation for everyone convicted of a subsequent DWI, or a first aggravated DWI, which in New Mexico is defined as someone who (a) drove with a BAC of .16 g/dL or higher, or (b) caused a person bodily injury while driving intoxicated, or (c) refused a BAC test when arrested. For first nonaggravated offenders, interlocks were an optional sanction. This 2002 law was signed by Governor Gary Johnson and went into effect in January of 2003, and it included a provision for an indigent fund. The ignition interlock indigent fund received $300,000 per year from the State and a 10% surcharge on interlock fees for all nonindigent offenders. The fund

paid for a portion of the interlock costs for indigent offenders. By 2005, the surcharge on nonindigent offenders was changed to $100 per year and the payout to indigent offenders was changed to 50% of interlock fees. The sentencing judge currently determines indigent status, and so far, attempts to legislate a more objective standard and more uniform disbursement of these funds have not succeeded.

Nonetheless, following implementation of the 2002 law, the interlock installation rate climbed to 1,000 per year (see Figure 6). This made interlocks a much more visible intervention, and more offenders became aware of the consequences of DWI. Still, the laws had a problem to overcome: people who were mandated to install an interlock by the courts could not legally drive a vehicle while their license status was still officially "revoked for DWI." That problem was corrected by the IILA, and the bill was signed by Governor Bill Richardson and became effective in June 2003. A second purpose of this law was to make it possible for revoked DWI offenders to drive legally when sober in order to work and more fully participate in family support. A third purpose was to reduce the natural reluctance of judges to mandate the interlock sanction on offenders who had previously been prohibited from legal driving. With this law, the courts received the legislative authorization to allow an offender to drive an interlock-equipped vehicle even while general driving privileges were still revoked. The IILA made a license available to anyone revoked for DWI who installed an interlock and had insurance on the interlocked vehicle. This was not a restricted license, but a license to drive anywhere, anytime in the interlocked vehicle. Nonetheless, the official license status was still "revoked for DWI"; accordingly, the offender was prohibited from driving any vehicle other than the one that had the interlock installed. After this law, the interlock installation rate (Figure 6) grew to more than 3,000 per year once the motor vehicle department started issuing ignition interlock licenses.
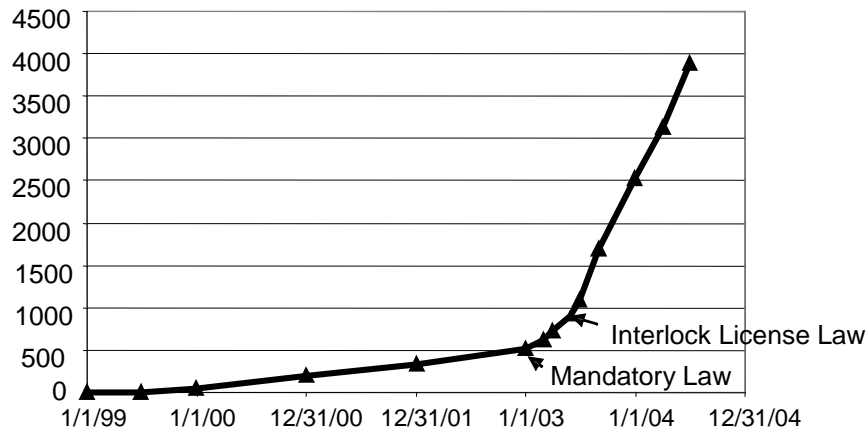
Figure 6. Interlock installation before and after the 2003 implementation of the mandatory interlock and licensing acts.

Mandatory Interlocks for All Offenders (Table 1, Item 4)

The next enhancement to the interlock laws in New Mexico was passed in spring 2005 and went into effect on June 17, 2005. This law mandated an interlock license as a condition of probation for all DWI offenders. Because having proof of an installed interlock was a requirement for an interlock license, this law was intended to tighten the interlock requirement that previously had only required interlocks in all vehicles "driven by the offender." Under this law, interlock installations increased to about 6,000 per year, which reflected a statewide level of about half of the 12,000 DWI convictions per year. The main loophole is that judges are reluctant to mandate

an interlock license for offenders who genuinely do not have access to any vehicle. In 2007, an attempt to put an alternative form of electronic monitoring into the law for DWI offenders who claimed that they were not going to be driving did not pass.

The 2005 mandatory law also had provisions for extended sentences such that first time offenders were now required to have 1 full year on the interlock; second offenders, 2 full years; third offenders, 3 full years; and fourth or greater offenders are sentenced to a lifetime interlock with a 5-year review. Bills designed to extend the required duration of interlock use based on interlock BAC test records have not passed into law.

Santa Fe County Mandatory Interlocks or Electronic Monitoring (Table 1, Item 4a)

In Santa Fe County between June 2003 and May 2005, all three magistrate judges decided that they would try to improve adherence to their interlock installation orders. Operating under the authority of the earlier laws that gave judges the option of requiring an interlock, these courts, as part of an intentional strategy, routinely mandated interlocks for all convicted DWI offenders and made the alternative to interlock installation house arrest to enhance the appeal of the interlock. That is, if an offender pled to have no vehicle access or no plans to drive, he or she would be required to wear an electronic-monitoring bracelet. Alcohol testing was not part of the house arrest. The results of that decision can be found in a later section of this report.

Their decision overcame one of the most common loopholes in interlock legislation that had allowed revoked offenders to avoid installing an interlock. That is, when offenders pled to the judge that they neither owned a vehicle nor had any intention of driving a vehicle while suspended, the judge often allowed them to sign a statement attesting to that and then did not order the interlock. In Santa Fe County, however, during the 2-year period in which the judges required electronic monitoring, the installation rate rose to 71% among the 1,145 people convicted in that interval. This remedy was short lived because, in 2005, a district judge ruled that judges could not substitute the *general sanction* of house arrest for the ignition interlock sanction that was *specified in the law.* This ruling was not appealed to a higher court and offenders throughout New Mexico can currently still invoke the "no vehicle" plea to avoid an interlock. Subsequent to this ruling, the Santa Fe County installation rate declined.

What Is Happening Now?

New Mexico Governor Bill Richardson convened a DWI Task Force in 2004 to formulate recommendations, and he later appointed a "DWI Czar." Presently, a group of about 30 stakeholders, called the "DWI Leadership Team," meets monthly for 3 hours. The citizens of New Mexico appear to be generally supportive of cost-effective efforts to reduce the deaths and injuries that result from DWI, including use of ignition interlock strategies. There are ongoing efforts to close the remaining loopholes in the Ignition Interlock Program. All of this will require careful research to find the most effective DWI solutions.

Summary of New Mexico Interlock Laws

- · 1999 Optional Interlock for second and DWI third offenses
- · 2002 Mandatory Interlock for all Aggravated and Subsequent DWIs
- · 2002 Interlock Indigent Fund
- · 2002 Ignition Interlock Licensing Act

· 2005 Mandatory Interlocks for all DWI Offenders

   o 1 year for first offenders
   o 2 years for second offenders
   o 3 years for third offenders
   o Lifetime interlock with 5-year review for offenders with four or more DWI

New Mexico Legislative Initiatives Put Forward by Interlock Advocates

Loopholes that allow offenders to avoid interlocks are not unique to New Mexico. Interlock advocates there have been introducing legislation or legislative ideas, so far without success, to limit the ways that interlocks can be avoided. The positions advocated include the following:

· Require immobilization of vehicles driven by anyone arrested for DWI.

· Remove immobilization device only if an interlock is installed or if there is a successful administrative appeal of the DWI arrest.

· Provide a multilingual certified notification to household members of the penalties for allowing even a sober interlocked offender to drive a non-interlock-equipped vehicle.

· Forbid registration of any non-interlock-equipped vehicle owned by a DWI offender.

· Institute a compliance-based interlock removal program; that is, judicial certification attesting to having had no recorded BAC > .05 g/dL for some portion of a year before an interlock can be removed.

None of these has been proven to be beneficial, but then neither is there evidence that they would be problematic or ineffective. Most policy initiatives, including the introduction of the interlock, precede evaluation evidence that proves their efficacy. Ordinarily, evidence has to be retrospectively evaluated to determine if new initiatives have any benefit.

INTRODUCTION TO THE STUDIES IN THIS REPORT

This section introduces the evaluation topics that follow in subsequent sections of this report. The evaluations summarize a wide variety of data. Each study has some bearing on, or draws reference to, the two background sections.

Interlock Penetration by 2007

This section reviews the growth of the interlock program in New Mexico over time, relative to other States. It also presents some time-correlated changes in measures that have relevance to alcohol-related road safety. The purpose of this section is to characterize the interlock environment in New Mexico between 2003 and 2007 before presenting the analyses in the sections that follow.

Study 1: The Initial New Mexico Mandatory Interlock Laws of 1999 to 2003

This section reviews the effectiveness of the first judicial mandatory laws during the time that mandatory installation laws were in conflict with the Federal TEA-21 Restoration Act.

As noted in Background 1, the meta-analysis by Willis, Lybrand, and Bellamy (2004) found that, while installed, the interlocks reduced DWI recidivism to 0.36 (64% reduction) of that of noninterlocked offenders. A limit to the program effectiveness of interlocks (jurisdiction-level effect) has been the low-installation rate, often found to reflect judges' reluctance to impose interlocks due to cost and a conflict in the laws. As a result, often less than 20% of the offenders eligible for interlock programs install the devices (Voas et al., 2002; Voas et al., 1999, p. 48). DeYoung (2002a) conducted a survey of judges in California and found that, although some judges questioned the effectiveness of interlock devices, most who chose not to order installation of an interlock made the decision because the offender claimed to not own a vehicle, and because of poor monitoring resources for program compliance. The offenders' motivations for not installing interlocks are likely due to cost of the device, cost of insurance, embarrassment, and the relative ease of driving illicitly without a high risk of arrest.

New Mexico's initial mandatory interlock law created an opportunity to study the efficacy of interlocks in a context similar to California's, where judges mandate interlocks for offenders who were ineligible for any license to drive legally. From July 1, 1999, to January 1, 2003, New Mexico law made ignition interlocks an optional judicial sanction for second and DWI third offenders. Conflicting with that law was another New Mexico law that required a 1-year hard suspension for DWI second offenders. A judicial requirement to install an interlock did not affect the suspension status of the offender. Our study of the New Mexico Mandatory Law allowed for a replication of the evidence found in DeYoung's 2004 paper because 95% of the subjects of our Study 1 were revoked when they installed interlocks.

Study 2: Effectiveness of Interlocks for First-Time Offenders

This section reviews the recidivism reduction of first offender interlocks in New Mexico.

In the United States, vehicle alcohol interlocks have been most widely used for multiple DWI offenders. That practice reflects a widespread belief that the external control provided by the interlock is most needed by individuals who, by virtue of their repeat DWI offenses, are seen as

incapable of exerting internal control of their drinking-driving decisions. In addition, it is easier to apply sanctions on multiple offenders. The evidence for an interlock benefit with multiple offenders is well demonstrated, but the evidence for interlock effectiveness with first offenders has been slightly less clear. Arguably, first offenders have better control over their drinking and should be more likely to respond appropriately to license suspensions and other sanctions. This, of course, assumes that self-control rather than a careless attitude is the primary cause of impaired driving.

Although it is popularly believed that first-time offenders carry a much lower risk than repeat offenders, the truth is somewhat different. Rauch et al. (2002) evaluated 5 million licensees in Maryland and counted the number of alcohol "mentions" in their driving records and broke out these alcohol mentions with the actual number of DWI convictions on their records. The number of alcohol mentions is much larger than the number of alcohol convictions because of plea-downs, dropped charges, probation before judgment, and other court interventions. The alcohol mentions of first offenders at 30 per 1,000 drivers was 10 times the rate for nonoffenders at 3 per 1,000 drivers, but first offenders had only 25% fewer than second offenders, who were about 33% less than third offenders. This somewhat dispels the idea that first-time offenders are unlucky normal social drinkers who pose little risk.

New Mexico provided an opportunity to study first offender recidivism in response to a court-order to install interlocks. The interlock providers in New Mexico were required to forward information on the installation and removal of all interlocks, and 97.6% of the cases were matched with the New Mexico Motor Vehicle Department's DWI Citation Tracking System (CTS). By accomplishing the match, it allows the measurement of recidivism rates in two periods: (1) while the interlock is installed on the vehicle and (2) after the interlock has been removed. The DeYoung et al. (2004) California study did not match citations with interlocks to determine installation rates or to separate interlock on and off periods.

Study 3: Impact of the Ignition Interlock Licensing Act

As noted in Background 1, suspending the license has historically been an effective method for reducing the crash involvement of drivers convicted of the DWI offense (Peck et al., 1985; Voas, 1986). However, license suspension does not eliminate the driving risk posed by those who choose to drive without a license. As noted earlier, there is evidence that between 36% and 88% (depending on enforcement and consequences) have been found to drive without a license, at least to some extent (McCartt et al., 2002; Ross & Gonzales, 1987). If license-suspended offenders who drink and drive can be motivated to install interlocks rather than remain suspended, it is expected to serve the interests of public road safety.

As discussed previously, "voluntary" programs that provide DWI offenders with the option of driving legally with an interlock attract disappointingly few offenders into the program. Installation rates as high as 26% in Quebec's voluntary administrative program have been reported (Vézina & Dussault, 2001), but more commonly, around 10% of the eligible offenders install interlocks (Voas & Marques, 2003).

Although the cost of the interlock program (approximately $65 per month) is modest, offenders seem to prefer the risk of an arrest for driving with a suspended license, more than the costs and inconvenience associated with the interlock. The probability of detecting a suspended driver is likely even lower than the detection rate of impaired driving because, with impaired driving,

higher levels of impairment alters driving skills, which enhances detection. Estimates from Miller et al. (1995) suggest as few as 1 in 1,700 crash-free episodes of impaired driving result in an arrest. In the United States, police are not permitted to stop a vehicle to check the license unless the driver commits a traffic offense. DWS sanctions vary by State, but usually involve fines and additional suspension time; if a judge chooses it, jail time can be added. Some States are less concerned about DWS than other States.

It is not known whether facing many years of suspension is a sufficient threat to encourage offenders to install interlocks. Nor did we know if those who were revoked before the New Mexico mandatory interlock laws were enacted would welcome the opportunity to drive legally after having lost that privilege. Is the legal interlock license a sufficient motivator to make the interlock an attractive choice? If yes, for whom? New Mexico provided an opportunity to partially answer this question. The IILA permits nearly all drivers who had a license revoked for DWI to receive a special permit to drive with an interlock upon demonstrating that the vehicle is insured and the interlock has been installed

Study 4: Mandatory Interlocks for All DWI Offenders Bolstered with a House Arrest Alternative

Nearly all the interlock studies in the literature have compared a small group of interlock users against a covariate matched larger group of noninterlock offenders whose licenses are suspended or revoked. Because of the usually small number of matching variables available in a driver's record (e.g., age, gender, arrest BAC, prior DWI) that can help to statistically equate the groups, questions are often raised about the possibility of selection bias in the interlock groups (rendering them at lower risk). For example, with few matching variables to control for, it is not unreasonable to conjecture that the overall risk profile of those electing interlocks might be lower because the choice to install the device may reflect a more generally responsible outlook or social conscience. These concerns are somewhat allayed, however, since interlock user recidivism rates return to levels equivalent to noninterlock offenders once the interlock devices are removed. Although most studies have been quasi-experimental, the Beck et al. (1999) study was a randomly assigned interlock intervention that produced a recidivism outcome similar to other studies without random assignment.

With the basic efficacy question answered, a practical effectiveness problem has remained—the resistance of DWI offenders to installing interlocks. This has been illustrated in programs that provide license-suspended DWI offenders with an opportunity to install interlocks for some portion of the suspension period during which they would otherwise be unable to drive at all. Depending on the external motivation provided when the choice is left to the DWI offenders (to install or wait out the suspension period), most programs attract, on average, only about 10% of the eligible offenders (DeYoung, 2002a; Voas & Marques, 2003), with a few attracting about 25%. The estimated 2007 U.S. penetration rate of 134,000, discussed in Background 1, suggests about 10% of arrested DWI offenders get interlocks. Until the majority of DWI offenders in a jurisdiction install interlocks, the definitive test of jurisdiction-level effectiveness will remain unanswered.

Given the efficacy of the interlock, there has been considerable interest in raising the penetration of the devices with DWI offenders as a means of reducing impaired driving. A legislative approach to this goal has been to write laws that make the interlock a mandatory sanction for the DWI offense. It might seem that if the court imposes the interlock requirement as a sanction,

it would ensure that offenders comply because failure to do so makes the offender subject to additional court sanctions, possibly including jail time. However, most mandatory laws have loopholes. Even in New Mexico where the interlock laws are very strong, an offender can avoid installing an interlock by claiming not to have a vehicle or even by providing a simple statement claiming no intention to drive during the probationary period if an offender owns or has access to a vehicle. In addition, in some States, an offender may plead that he cannot afford the interlock program. The offender's resistance to an interlock may also play a role in plea and sentence negotiation (Carroll, 2003). As a result, the proportion of interlock offenders who actually drive under an interlock restriction is often well below the number convicted of DWI. Most judicial mandatory laws can manage a rate that is higher than 10%, but maybe not high enough to have an appreciable jurisdiction-level effect on the risk posed by impaired drivers.

Through the late 1990s and early 2000s, Judge Richard Culver, of Hancock County, Indiana, closed an interlock loophole by adopting the policy that the alternative to installation would be electronically monitored home confinement (e.g., house arrest). A study of that court found that this more restrictive and much less appealing alternative sanction resulted in 62% of the Hancock County DWI offenders installing interlocks (Voas et al., 2002). This installation rate, in turn, led to a 40% reduction in first-offender DWI recidivism for Hancock County, and a 22% reduction in multiple-offender DWI recidivism for Hancock County, compared to six other suburban/rural counties, which like Hancock, surround Marion County, where Indianapolis is located. This study was the first to document a jurisdictional--level reduction in repeat DWI because of a judicial practice that made interlocks the more appealing of two alternatives.

The interlock program that ran in Santa Fe County, New Mexico, for a 2-year period provided an opportunity to replicate the Indiana study. All three judges of the magistrate court in Santa Fe adopted the policy of making electronically monitored house arrest the alternative to installing the interlock between 2003 and 2005.

Study 5: Breath-Test Patterns in the Ignition Interlock Record

Beginning with the first analysis of ignition interlock data from the event recorder reported in 1999, an interesting pattern of elevated BAC tests emerged for both the day of the week and the hour of the day. Not surprisingly, the weekends have the highest *proportion* of all start attempts with BAC tests that are positive above .02 g/dL, and Tuesday was found to be the day with the lowest proportion of positive tests (Marques et al., 1999; Marques et al., 2001b, Marques et al., 2003a). The evidence came from Alberta based on approximately 2,000 interlock-using DWI offenders. Subsequently, similar findings emerged when Quebec's program, with 7,300 DWI offenders using interlock devices, was similarly examined (Marques et al., 2003b). The day and hour patterns were largely the same as in Alberta.

Both Quebec and Alberta data showed a clear working weekday morning spike in the *number* of elevated BAC tests between 7 a.m. and 9 a.m., despite the fact that the largest *number* of breath tests of any kind have been found to occur between 4 p.m. and 6 p.m. While not all people work Monday to Friday, and not all people work from 8 a.m. to 5 p.m., the majority of us do. Accordingly, the behavior of the majority dominates the aggregate pattern. This means that more positive BAC events occurred driving to work than returning home after work. Perhaps as confirmation of that conjecture, the Saturday and Sunday patterns were shifted such that both the number of all tests and the number of elevated tests peaked near noon rather than late afternoon and early morning. We interpreted the morning elevation of positive BAC tests as

evidence of a prior night of drinking that is reflected in higher rates of failed tests during what is likely the first start attempt of the day.

Subsequent interlock records from more than 11,000 interlock users in Texas confirmed that this same pattern prevailed there as well. This New Mexico research project opened the opportunity to study this further to determine if it is as characteristic of interlock DWI offenders as we had come to expect.

Study 6: Comparative Analysis of Predictors of Recidivism

The period of interlock-controlled driving provides an opportunity to evaluate several predictors of DWI recidivism to determine their relative importance as advance indicators of offender risk. In addition to variables known to be predictive of future DWI recidivism, such as younger driver age and more prior DWI convictions, the data from the New Mexico Citation Tracking System (CTS) file also has information about arrest BAC level, whether the person had an aggravated DWI (defined as at least a BAC ≥.16), and whether there was a crash associated with the citation.

In addition, there are several variables from the interlock record that can be evaluated; some have previously been found predictive of future recidivism in data sets from other jurisdictions. One consideration in selecting predictors from the interlock record is to minimize problems of collinearity without excluding variables that have unique information. The interlock record provides information concerning BAC results on all tests, and initial start tests can be distinguished from running retests. Available predictors include the time of the day when an elevated test occurs and procedural violations, such as refusal to take requested retests, failed running retests, and circumvention attempts. Other useful information associated with the interlock event record includes time on the interlock, the interlock service provider, and rates of tests per week (e.g., vehicle use).

As was demonstrated with the Quebec data (Marques et al., 2003b), the total rate of elevated BAC startup tests and the rate of elevated BAC starts in the morning, are both uniquely predictive of future recidivism. As to BAC tests, prior studies have ordinarily found the startup test is a slightly better predictor of recidivism (as opposed to all tests, which include both startup tests and running retests). Any startup test that is locked out will not be followed by a retest. As a result, running retests can be expected to have a lower density/rate of positive BAC or lockout tests. The running retests that do result in retest failures (e.g., above the set point) are likely due to three main sources: drinking while in the vehicle, an initial startup blow from someone other than the driver whose BAC is already elevated, or a driver's rising BAC curve that continued climbing after a successful startup. Following a drinking episode, BAC will continue to rise for about an hour, especially if there is food in the stomach that slows absorption.

Accordingly, this report compares different predictors of future recidivism at two time points during the interlock and four time points after the interlock. It compares each important predictor as an unadjusted variable associated with recidivism, as well as one of several variables in multivariate Cox Regression models, before and after interlock, in which the contribution of all important variables are adjusted for other variables in the final model.

Study 7: Key Informant Interviews

An important question is the extent to which public servants, such as judges and prosecutors, abide by the laws and can exert discretion in implementing them. This section of the report reviews some of the opinions of the judges, prosecutors, and probation officers from both Santa Fe County and other counties who exercise authority over interlock programs. It is important to understand the problems encountered in the field when attempting to administer or carryout the provisions of the interlock laws. Some of the opinions will inevitably be based on hearsay or urban legend, but it is important to sample those opinions so that valid views can be discovered that can lead to program improvements.

Key informant opinion interviews were conducted in 2005, and 18 months later, in 2007, both in person and by telephone. This section also includes some information about geographical/county-level distribution of interlocks, crashes, and DWI arrests.

Study 8: Offender Focus Groups

This section summarizes conversations with interlock-using offenders at four focus groups held in New Mexico during late 2005. Two were held in Albuquerque, two in Santa Fe, and one was composed only of Spanish-speaking participants. Participants were selected from questionnaires distributed at Victim Impact Panels in 2005. Almost all of the attendees had been on the interlock for at least 4 months; most had been on the interlock at least 5 months. The information acquired is not completely representative of DWI offenders with interlocks but does identify some topics of concern.

Conclusion

The Conclusion section highlights topics from each separate study, discusses findings with relevance to the larger road safety problem consequent to impaired driving, and integrates the findings into a set of conclusions and recommendations.

CURRENT INTERLOCK PENETRATION IN NEW MEXICO

As noted in the Background 1 section, there have been four estimates of interlock penetration in the United States since the early years. The data in Figure 5, presented earlier, graphically summarized this evidence. The September 2007 estimate is 134,000 interlocks in the United States. New Mexico only began contributing to that growth curve in 1999, and the estimate at the time of this report suggests that approximately 7,500 interlocks are now in service there. On a population base of not quite 2 million residents, this represents approximately 36.4 interlocks per 10,000 people. At 7,500, the New Mexico contribution to the overall national count of interlocks is a little over 5%. The ability to make State-by-State comparisons of these numbers is hampered because 1 of the 10 interlock providers would disclose only the company's national numbers, not State-level numbers. Nonetheless, noting that limitation in the State-level estimates, New Mexico's per capita interlock rate, at 36.4, is more than twice that of the approximately 15 interlocks per 10,000 in both Washington and Iowa, which have the next highest rates. New Mexico has approximately 38 interlocks in service per alcohol fatality whereas Washington (33.3) and Iowa (31.6) are somewhat lower (Roth, Marques, & Voas, 2007, August 26-30).

The penetration of interlocks is highest in the most urbanized counties, such as Bernalillo County (Albuquerque) and Santa Fe County (Santa Fe City). Nonetheless, a few rural counties have high rates of interlocks relative to DWI arrests. In 2007, there were 32 interlocks installed per 100 arrests statewide. Relative to convictions, the rates are much higher. In New Mexico, there were 5,204 interlocks for the 10,722 convictions in 2007, a 49% rate. The percentage estimate of interlocks per conviction is slightly inflated as a few offenders install interlocks on more than one vehicle. However, at about 70 people with more than one confirmed interlock, the ratio of interlocks to convicted offenders is reduced by one half of one percent

The rate of interlock installation in rural areas has been increasing in the past years and the chart in Figure 7 shows the installation rate by county in 2007. Of the 33 counties in New Mexico, Figure 7 clusters nine of the small population counties that have few convictions to allow for a more compact presentation of the rates. Seventy-three percent of all installed interlocks are found in the five counties with a population of 100,000 or more (Bernalillo, Santa Fe, Dona Ana, San Juan, and Sandoval) representing over 60% of the statewide population. Two of those are above the State average and three are below it. So, rural interlocks are being installed, but the rate is somewhat lower than in the larger population centers. Of all the seven counties above the State average shown in Figure 7, only one—Eddy County—is not adjacent to the others in the north central part of the State. This suggests that there is some regional information spillover that affects adoption of the interlock programs by the local courts. A map of New Mexico counties can be found in Study 7 in the section that covers key informants' interviews.
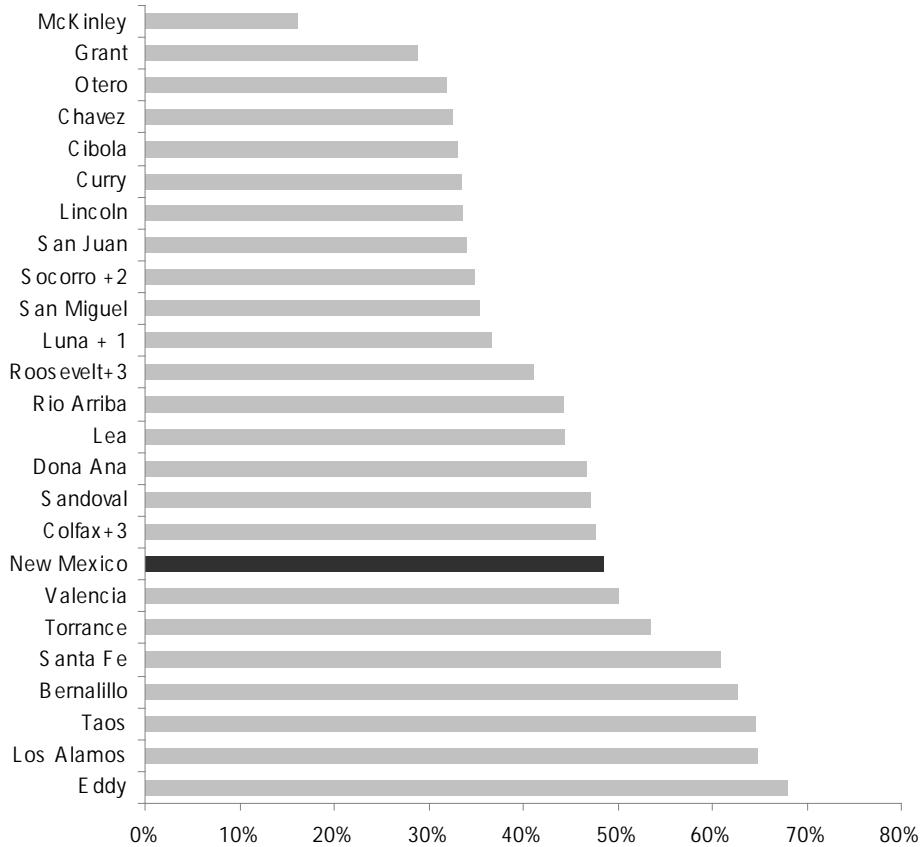
**Figure 7. Interlocks by convictions by New Mexico County in 2007.
Nine small counties are clustered with four others.**

Indicators of Alcohol-Related Risk

It is not possible to directly attribute the growth of interlock laws and interlock penetration as the sole cause of improving traffic safety conditions in New Mexico as New Mexico's Comprehensive Impaired Driving Program was also underway concurrently. Nonetheless, there is a compelling temporal relationship between the growth of interlocks and the several indicators of alcohol-related highway risk. To portray these changes on the same chart, the rates of 7 variables are converted to z scores (mean=0, standard deviation=1) to represent the 4 years after installation rates inflected upward (as shown in Figure 6). The standardized scores allow portrayal of these events in a relational way across years. In addition to the declining DWI arrests over time and the growth in interlocks, the data elements shown in Figure 8 include reductions in alcohol-involved (A-I) crashes, injury crashes, injuries, fatal crashes, and number of fatalities. The definition of injury crashes and fatal crashes are at the vehicle level, whereas fatalities and injuries are at the individual level. Alcohol-involved crashes are defined in this report as those crashes in which at least one driver or motorcycle rider had a BAC $\geq$.01 g/dL.
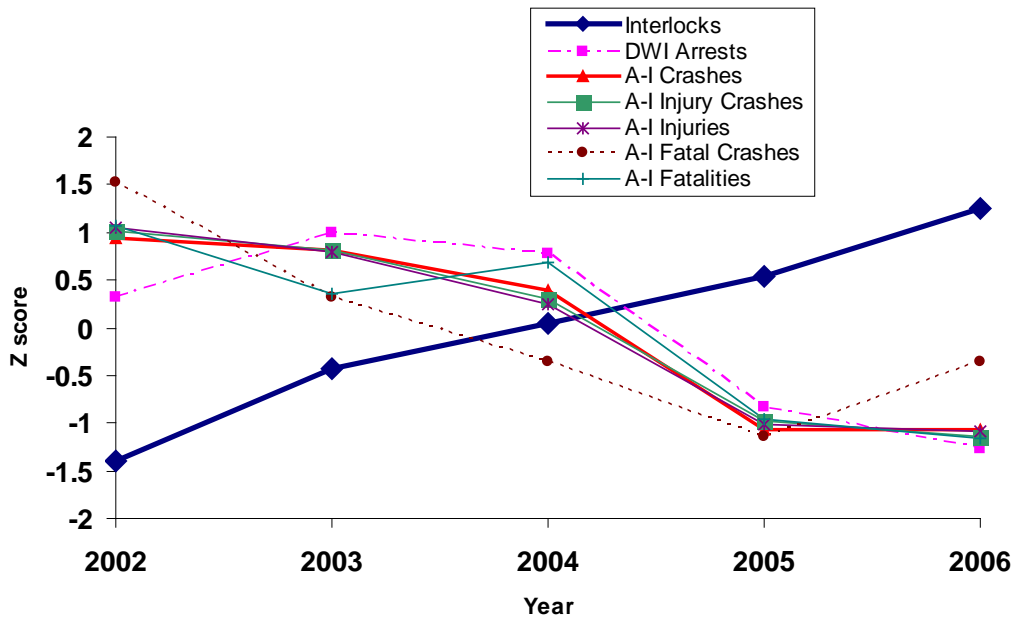
Figure 8. Standardized rates (Z Scores) of alcohol-involved (A-I) risk in New Mexico plotted with standardized rates of interlock installations and DWI arrests

Factors That May Preclude Higher Rates of Installation

No one yet knows what degree of penetration of interlocks into the DWI population is either possible or desirable. Despite New Mexico's successes with its interlock programs, there may be aspects of the current laws or practices that preclude additional interlock use. Among the reasons are the following:

- 35% of those arrested for DWI are not convicted for a variety of reasons This represents a mix of absconders and cases dismissed due to technicalities.

- 50% of convicted offenders claim to "not own a vehicle" or have decided "not to drive." The New Mexico laws require interlocks for all vehicles driven by the offender, so in cases where those claims of no car and no intention to drive are valid, the law does not require an interlock.

- Existing stiff penalties for driving a vehicle without an interlock are sometimes not enforced.

STUDY 1: THE INITIAL NEW MEXICO MANDATORY INTERLOCK LAWS OF 1999-2003[7]

The primary purpose of this evaluation topic was to determine if a judicial order to install an interlock, when that order results in an installation despite continuing license revocation status, will reduce recidivism more so than license revocation alone and no interlock order. Further background can be found in the Introduction section of this report.

DeYoung (2002a) reported that, in California, judges ordered the interlock on only 83 (10%) of 887 convicted drivers who were by law mandated to use interlocks but could not drive legally. Only 18 of them (2% of the convicted drivers) actually installed the devices. DeYoung (2004), however, found that offenders who installed the devices under court order had an 18% lower recidivism rate than those who did not. This is a smaller reduction than the average 64% reduction reported in the meta-analysis of 13 studies of offenders who are permitted to legally drive when they install the interlock (Willis et al., 2004), but it does add to the evidence that interlocks can reduce illicit driving by fully license-suspended drivers. This situation was somewhat brought about by TEA-21, which created incentives for States to mandate a full-year's license suspension for second offenders, even though it potentially interfered with existing State court interlock programs. For that reason, information on the efficacy of the interlock on fully license-suspended offenders is useful because it allows for an evaluation of a combined legal restriction (license revocation) and a physical restriction (the interlock).

New Mexico's initial optional mandatory interlock law created a situation similar to California's, where judges were to require interlocks for offenders who were ineligible for any license to drive legally. From July 1, 1999, to January 1, 2003, New Mexico had a law making ignition interlocks an optional judicial sanction for second and DWI third offenders. Conflicting with that law was another New Mexico law that required a 1-year hard suspension for DWI second offenders. A judicial requirement to install an interlock did not affect the suspension status of the offender. This section on the New Mexico Mandatory Law allowed for a replication of the evidence found in DeYoung's 2004 paper because 95% of the subjects of this study were suspended at the time they installed interlocks.

Methods

Defining Interlock and Comparison Groups

In New Mexico, interlock service providers are required to forward records of all installations and removals to the State Traffic Safety Bureau. Offenders who installed interlocks from July 1, 1999 to December 31, 2002, were matched for DWI arrest and conviction records in New Mexico's Citation Tracking System (CTS), a statewide offender tracking system that contains the records of every driver arrested for a DWI offense in New Mexico. Our objectives were to determine the recidivism rate of those who installed interlocks compared to similar offenders who did not install units during three periods: (1) while the interlock was on the vehicle, (2) following removal of the interlock, and (3) over a 4-year interval that combined periods 1 and 2.

Based on installation records received from interlock providers (98% of which could be matched with the New Mexico's DWI CTS records), 437 multiple offenders installed interlocks between

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July 1, 1999 and December 31, 2002. During that same period, 20,949 other multiple offenders were convicted who did not install interlocks, indicating that less than 5% of the offenders installed interlocks during that period. Of the 437 interlock cases, 415 removed the units before the end of the study period. Based on the CTS record, the licenses of 94.9% of the interlock offenders were revoked when they installed the device, 2.3% had reinstated before installing the interlock, and 2.8% could not be matched with a revocation record.

A histogram of the time between conviction and interlock installation for the 378 offenders who installed interlocks within 1 year of conviction is shown in Figure 9. The mean time between conviction and installation was .19 years or 70 days. A histogram of the times between installation and removal for the 415 offenders who removed their interlocks before the end of the study period is shown in Figure 10. The mean installation period was .77 years (281 days). The long tail of the graph, consisting of 41 people with installation durations longer than 400 days, was apparently composed of offenders for whom the probation department may have extended the requirement or who voluntarily kept the interlocks installed.
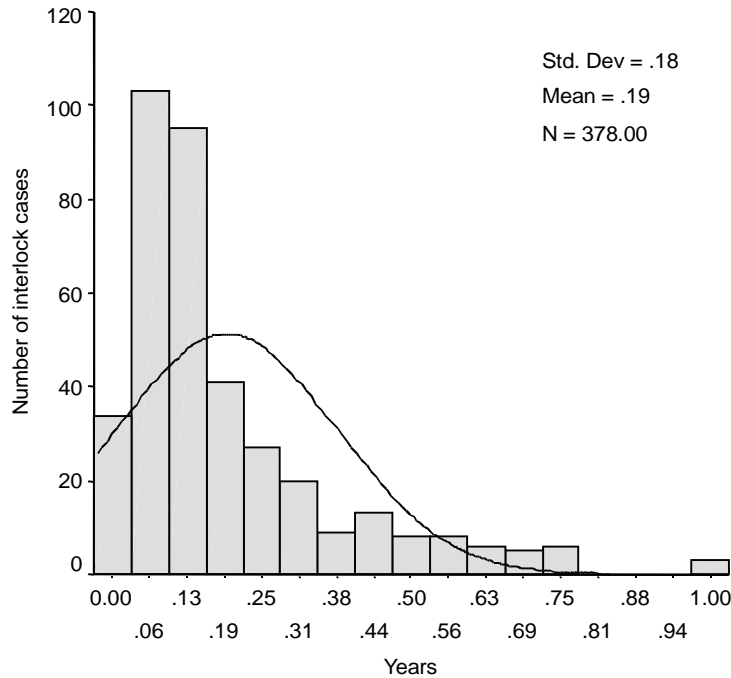
Figure 9. Histogram of the time between conviction and interlock installation for 378 New Mexico DWI offenders who installed interlocks between 1999 and 2002

Std. Dev = .36

Mean = .77

N = 415.00
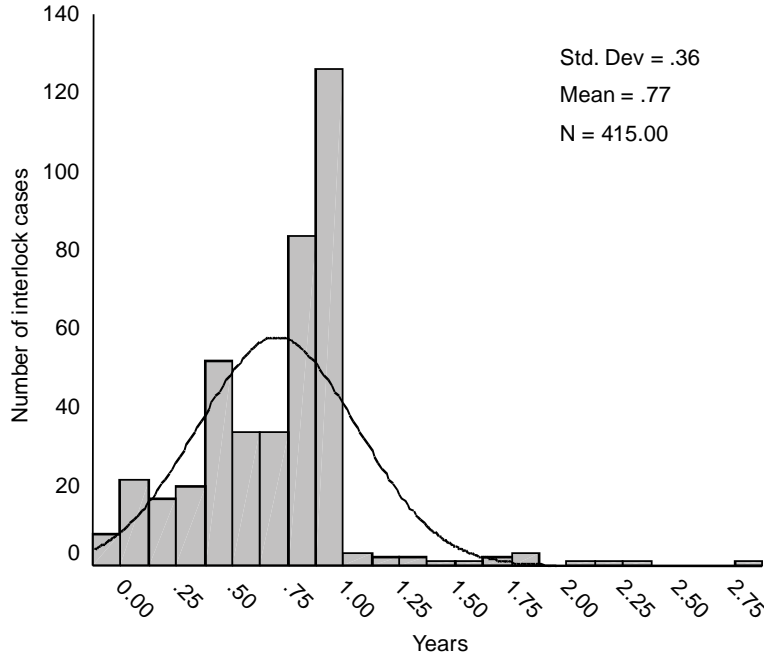
Figure 10. Histogram of the time difference (in years) between installation and removal dates of interlocks by 415 New Mexico DWI offenders between 1999 and 2002

Stratified Random Sampling of Noninterlock Offenders

A concern in any study comparing a relatively small group of interlock users with a much larger group of nonusers is the possibility that those who installed the interlocks may be a select set of offenders with a lower risk of recidivism. These risks can be partially allayed with statistical adjustments. In an effort to produce groups with equivalent recidivism risk, DeYoung (2004) used the propensity score procedure described by Rosenbaum and Rubin (1985). We used an equivalent procedure designed to ensure the inclusion of the largest possible number of the cases from the 20,949 noninterlock multiple offenders convicted between July 1, 1999, and December 31, 2002. To do so, each of the four available variables (age, arrest BAC, gender, prior DWIs) was dichotomized—age into ≤30 and >30, BAC into <.16 and ≥.16 g/dL together with those who refused to provide a breath test,[8] gender into males and females, and priors[9] into 2 and ≥ 3—and these variable splits were used to construct a 2X2X2X2, 16-element matrix into which both the interlock and the comparison cases were distributed. Comparison cases were randomly selected from each of the 16 cells in the matrix.

Our procedure for selecting the stratified random sample follows. First, the "maximum size" of a matched sample was determined by finding the stratum for which the ratio of available comparison group members to interlock group members was smallest. The stratum with the smallest ratio (relative to that of the interlock group) was males with BAC<.16, aged 31 and older, and having just two priors. For this stratum, there were 1,264 members in the available

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[8] Those who refused were lumped with the high-BAC group because recidivism curves for the two were indistinguishable.

[9] The 1999-2002 New Mexico interlock law specified interlocks as an optional sentence for DWI second and third offenders. Therefore, first offenders were excluded from our interlock group. Those with four or more DWI convictions were included in the "priors ≥ 3" subgroup because many offenders with four or more DWIs are pled-down third-misdemeanor offenses.

comparison group and 44 members in the interlock group, a ratio of 28.7. All of these 1,264 were included in the comparison group, and for each additional cell, 28.7 times as many members were chosen randomly from each of the other strata of the available noninterlock offenders as were in each corresponding stratum of the interlock group. For example, in the stratum of females aged 31 and older with three or more priors and either a BAC>=.16 or a refusal to take a breath test, there were 21 members in the interlock group; 28.7 times that many (28.7X21 = 603) were randomly chosen from the 772 available noninterlock offenders in the same stratum.

This procedure maximized the inclusion of available offenders who did not install interlocks and yielded a 12,554-member comparison group having the exact same proportion in each of 16 matching categories as in the interlock group. Consequently, the comparison group and the interlock group were each composed of 84% males, 73% of whom were aged 31 or older. Each group had 51.6% second offenders and 49.4% third or more frequent offenders, and 66.8% of the members of each group had arrest BACs of .16 or higher or had refused the breath test (refusers had recidivism rates similar to those with BACs of .16 or higher).

Survival rates for the comparison and interlock groups were then compared using Cox regression with covariates with the same bivariate structure for arrest BAC, age, gender, and priors as used in the matrix procedure previously described to further reduce the influence of those factors in the analysis. Recidivism events included a subsequent arrest for DWI. Three analyses were conducted. The first analysis compared the recidivism rate for interlock users with the comparison group *while* the interlock device was installed on the vehicle. The second analysis covered the period following interlock removal for approximately 3 years to the end of the study period. The third analysis covered the total 4-year period from the same starting point as the first analysis. It was designed to evaluate the overall impact of the interlock, combining both the period while the unit was installed and the period after it was removed for the interlock group.

Because the average time between conviction and installation for the interlock group was 70 days (Figure 9), the index time for the comparison group was shifted to 70 days (.19 years) after conviction for the first and third analyses. The purpose of this shift was to make the beginning of the exposure period the same for both groups. Without this shift the interlock group would have the clear advantage over the non-interlock group. This mandatory interlock group was defined as those convicted offenders who installed an interlock after a conviction rather than after an arrest. This means there were no re-arrests between conviction and interlock installation. If we had chosen the conviction date as the index for both groups, the interlock group would have had the advantage of an average period of 70 days during which there were no re-arrests. If we had chosen the installation date as index for the interlock group and the conviction date as index for the comparison group, then the interlock group would have still had an unfair advantage because the period right after conviction has the highest rate of re-arrest. What we did, excluding all re-arrests within 70 days of conviction, is an attempt to make the groups equivalent at the index time.

 For the second analysis covering the post-interlock period, an additional 281-day (total 70 + 281 = 351) shift of the index time for the control group was included to match the average interlock removal time of those in the interlock group (Figure 10). The 351 day shift from the conviction date for the comparison group makes its index time for the post interlock period the same as the average of the interlock group. If the re-arrest rate as a function of time after conviction were constant none of these shifts would have been necessary.

For each analysis, those who reoffended before the index time were excluded. For the first and third analyses, the control group was reduced to 12,340 by the exclusion of 214 people who recidivated within 70 days of conviction. For the post-interlock analysis, the comparison group was further reduced to 11,438 by the exclusion of an additional 902 people who recidivated during the 351 days before the removal index time. The interlock group was reduced to 409 for the post-interlock analysis by the exclusion of the 11 people who recidivated during the interlock period and the 17 people whose interlocks were still installed at the end of the study period.

Results

Based on the procedures described, it was possible to examine the recidivism rates of interlock users, relative to nonusers, during three periods: (1) while the interlock was on offenders' vehicles, (2) after the interlock was removed, and (3) for the sum of both periods, which provided the best comparison with the earlier work of DeYoung (2004).

On the Interlock

Table 3 provides the results of the multivariate Cox regression analysis with dichotomous covariates for age, BAC, gender, and priors for the period that the interlock was on the vehicles of those offenders who installed the device. Column header abbreviations of Table 3 reflect the regression coefficient (B), the Standard Error (S.E.), the Wald test statistic, the degrees of freedom (Df), the probability that the subgroup difference is just chance (Sig), the correlation (R), and the Exponent of B (Exp B) which reflects the proportional difference in recidivism rates.

Except for male and female, the variable strata in the model differ significantly. For each variable, the regression estimates the recidivism ratio for the two subgroups of that variable. For the age variable, the regression indicates that the recidivism rate of those aged 31 and older is only 65% (Exp(B) =0.6481) of that for those aged 30 or younger. The recidivism rate (Exp(B)) for those who refused or had BACs $\geq$ .16 g/dL is 1.36 times that of those with BACs < .16 g/dL. The recidivism rate of males was not significantly higher than that of females, ratio = 1.04, p = .59. Those with three or more DWI convictions were 1.26 times more likely to recidivate than second offenders. The "Sig" is the p value for each estimate. It indicates, as might be expected, that prior arrests, arrest BAC, and age have a significant relationship to recidivism. The multivariate analysis adjusts for any potential biases due to differences in covariates and estimates the recidivism rate of the interlock group to be .34 of the comparison group's. The small p value, 0.0004, indicates that the recidivism ratio is unlikely to have occurred by chance, but the relatively small size of the interlock group results in a relatively large 95% confidence interval, .19 to .62. Figure 11 presents a graphical comparison of the recidivism versus time for the interlock and the comparison groups while the device was on the vehicle of the interlock group. One year after installation, only 3% of the interlock group had reoffended, compared to more than 9% of the comparison group. Both the regression and the recidivism curves indicate that members of the comparison group were three times more likely to be rearrested than the interlocked group.

Table 3. Cox regression recidivism analysis of multiple offenders with interlock devices (IID) installed relative to noninterlock offenders. New Mexico 1999-2002.

Variable	B	S.E.	Wald	Df	Sig	R	Exp(B)
Age	-.4337	.0630	47.4598	1	.0000	-.0452	.6481
BAC	.3079	.0659	21.8399	1	.0000	.0298	1.3606
Gender	.0432	.0803	.2901	1	.5902	.0000	1.0442
Prior DWI	.2284	.0601	14.4365	1	.0001	.0236	1.2566
IID vs. Control	-1.0753	.3030	12.5936	1	.0004	-.0218	.3412
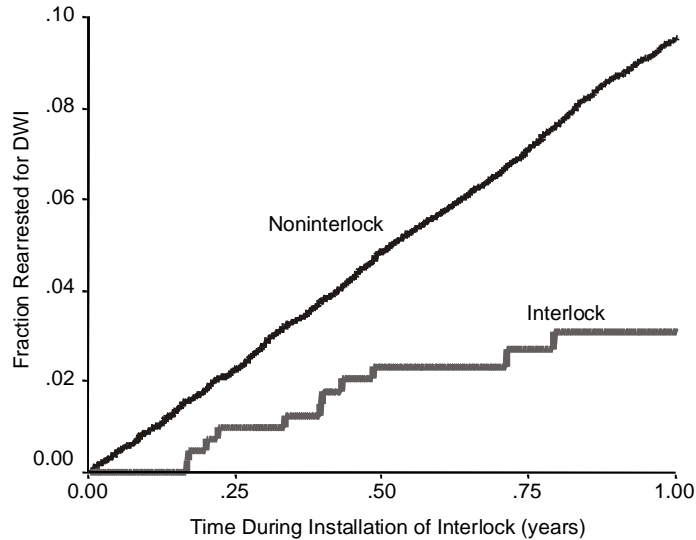
Figure 11. Recidivism of multiple offenders with or without interlocks during the period of interlock installation, New Mexico 1999-2002

After Removal of the Interlock

The Cox regression analysis of recidivism during the post-interlock period, with covariates as before for prior arrests, BAC, gender, and age is shown in Table 4. All of the covariates were significant, and when their influence is removed, the recidivism rate of the interlock group after interlock removal is indistinguishable from that of the comparison group. The recidivism ratio is .96 with a 95% confidence interval from .76 to 1.21. The recidivism curves are shown in Figure 12.

Table 4. Results of Cox regression analysis of offender recidivism during the post-interlock period, New Mexico 1999-2002.

Variable	B	S.E.	Wald	Df	Sig	R	Exp(B)
Age	-.3921	.0467	70.5208	1	.0000	-.0412	.6756
BAC	.1898	.0469	16.3699	1	.0001	.0189	1.2090
Gender	.1655	.0610	7.3630	1	.0067	.0115	1.1800
Prior DWI	.2331	.0439	28.1327	1	.0000	.0254	1.2625
IID vs. Control	-.0390	.1190	.1073	1	.7432	.0000	.9618
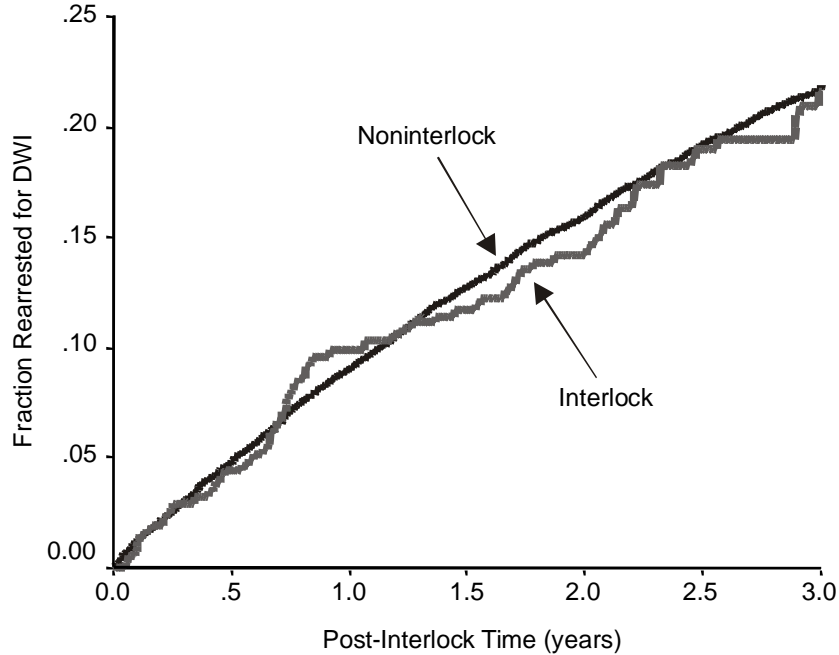
Figure 12. Recidivism of multiple offenders with or without interlocks during the 3-year period after interlock removal, New Mexico 1999-2002

Overall Period

Table 5 provides the results of the third analysis covering a 4-year period beginning 70 days after conviction (the average point at which offenders installed interlocks) that encompasses both installation and post-installation conditions for the interlock group compared to the noninterlock group. As before, covariates for prior arrests, arrest BAC, gender, and age were included in the Cox regression analysis and the rearrest rate ratios for all covariates significant. With the contribution of those demographic variables controlled by the multivariate Cox regression, the rearrest rate for the interlock group was .78, (22% lower) than the control group with $p =.02$. A graphic presentation of the recidivism curves is presented in Figure 13.

Table 5. Cox regression for the total period of 4 years after installation (combines installed and after removal periods), New Mexico 1999-2002

Variable	B	S.E.	Wald	Df	Sig	R	Exp(B)
Age	-.3987	.0387	105.9813	1	.0000	-.0421	.6712
BAC	.2296	.0394	33.9635	1	.0000	.0233	1.2581
Gender	.1474	.0505	8.5254	1	.0035	.0105	1.1588
Prior DWI	.2096	.0366	32.8579	1	.0000	.0229	1.2332
IID vs. Control	-.2485	.1075	5.3405	1	.0208	-.0075	.7800
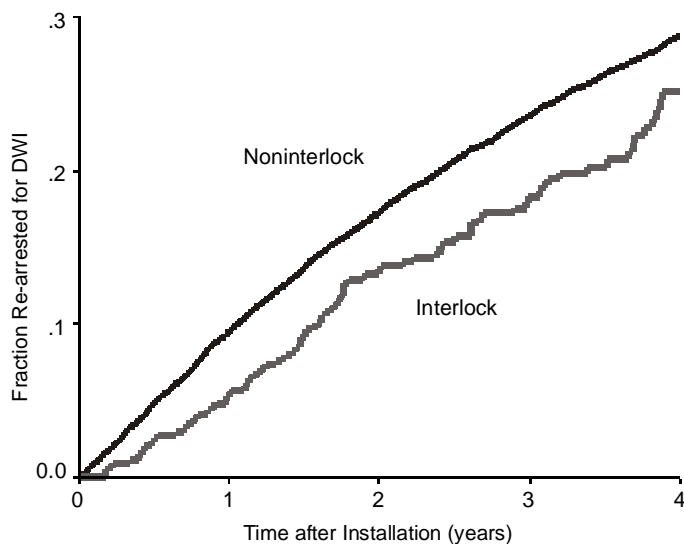
Figure 13. Overall 4-year recidivism for interlock and noninterlock multiple offenders, New Mexico, 1999-2002

Comments

Under some circumstances and in some States, a limitation to mandating interlocks effectively is the courts' reluctance to order their use, and the offenders' resistance to installing them, when the offenders are still not permitted to drive (DeYoung, 2002a; Voas, 2001). DeYoung found that, under these conditions in California, offenders who nonetheless installed interlocks had an 18% lower recidivism rate over the following 4 years (1,300 days). Our New Mexico study replicates DeYoung et al.'s (2005) and found that over a similar 4-year period, offenders with interlocks had a 22% reduction in recidivism. Unlike De Young et al. (2005), we separated the recidivism occurring during the period when the interlock was on the vehicle from the period following its removal. While on the vehicle, recidivism was reduced two-thirds (66%), but after the interlock was removed, there was no significant difference in the recidivism rates. The post-interlock resumption of recidivism is a finding common to most interlock studies. Overall, however, in New Mexico there was a 22% lower rate for interlock offenders.

The overall recidivism rate (inclusivie of both during and after periods) similarity of our results in New Mexico with those of DeYoung et al.'s in California (22% compared to 18%) is striking. It also is interesting to note that the rearrest probability ratio of .34 while the interlock was on the vehicle in the current study is almost identical to the .36 reported by Willis, Lybrand, and Bellamy (2004) in their meta-analysis of 13 interlock studies.

This study has several limitations. Despite efforts to equate interlock and noninterlock groups through stratified random structuring of the comparison and the use of covariates in the Cox regression, the contrasting groups may not be equivalent as would have occurred through a random trial. The interlock group is a small, possibly select, sample of all offenders; demographic and prior record factors may not fully compensate for group differences. Those who installed interlocks may have lower recidivism because they were compliant, or alternatively, those whom the judges insist install interlocks may have been those judged to be the most likely to continue to drink and drive. Nonetheless, the almost identical recidivism rate of the interlock users and the control group in the period following removal of the device from

the vehicle suggests that the two groups are not significantly different in their degree of recidivism risk.

The number of offenders in this study who installed interlocks was too small to determine the effect on crash involvement. This is an important limitation because DeYoung et al. (2004) found that non-alcohol-related crashes increased among offenders who installed interlocks. He attributed that finding to increased exposure due to increased driving by interlock users. Most crashes do not involve alcohol, and the interlock would not be expected to reduce non-alcohol-related crashes. So if the presence of the interlock results in driving more than when fully suspended, then the increase in non-alcohol-related crash involvement would not be unexpected.

Like most of the previous interlock studies, we did not have access to court or treatment records, so we could not consider those interventions in our analysis. There is no evidence, however, that indicates any difference between interlock and comparison offenders in the other sanctions they received. We also had no way to measure the amount of illicit driving by either group. State records are imperfect for tracking offenders who move to another State. Those who move out of State will not accumulate offenses in New Mexico. This record problem is more likely to affect comparison suspended drivers than interlock participants who must report each month to have their units checked.

A feature of these results not in the DeYoung et al. (2004) study was the separate evaluation of the on-interlock and post-interlock periods. Consistent with prior studies (Voas et al., 1999; Willis et al., 2004), we found that the reduction in recidivism rate achieved during installation does not continue after the device is removed from the vehicle. The group difference in recidivism accumulated during the interlock period is sustained after removal, that is, for the period studied, the interlock group does not catch up to the noninterlock group, even though their rates of new recidivist events do not differ. As a matter of public policy, the total recidivism reduction matters if there is eventually to be a jurisdiction-wide reduction in alcohol-impaired driving, especially if all convicted DWI offenders must install interlocks for some period. Because the curves stay separated after interlock removal, it implies that, within the time horizon studied, the benefit achieved during interlock installation does not become lost, as might have been the case if the interlock offenders "caught up" with the noninterlock group once the interlocks were removed.

A procedural limitation in all these studies of carryover effects is the difficulty of equating the interlock periods based on matching interlock and noninterlock groups. The most precise method might be to match interlock and comparison offenders on a case-by-case basis, but this involves a very intricate process when an effort also is made to match on a set of covariates. For this study, fixed periods were used based on the overall distribution of the interlock installation times and the interlock-on periods. This approximation of the relevant periods following conviction compensates, although somewhat imperfectly, for problems, such as prospective interlock users who recidivate before installing the device and therefore do not appear in the interlock group. So it is appropriate to eliminate from the comparison group those who recidivate during the period between conviction and interlock installation (the average time is 70 days for this study).

Finally, this study illustrated that a law giving judges the option to mandate interlocks for second and DWI third offenders who could not legally drive even if they installed interlocks resulted in very few (less than 5%) interlocks being installed. Nonetheless, the law still

demonstrated that interlocks reduced recidivism, even among fully suspended offenders who could not drive legally and would have been subject to arrest even when operating the interlocked vehicle. New Mexico has passed additional changes to its interlock laws in 2002, 2003, and 2005, and research currently is underway on the effectiveness of those laws at getting more interlocks installed and reducing recidivism.

STUDY 2: EFFECTIVENESS OF INTERLOCKS FOR FIRST OFFENDERS[10]

Background information for this section was described in the Introduction section of this report. In that brief overview, while introducing the first-offender analyses that follow in this section, data were presented from the Rauch et al. (2002) Maryland study of licensees showing that first offenders posed alcohol-related risks that are tenfold greater than non-offenders (e.g., 3 alcohol mentions per 1,000 nonoffender drivers versus 30 alcohol mentions per 1,000 first-offender drivers). Similarly, and more germane to the situation in New Mexico, is evidence in Figure 14, which addresses the same issue in a different manner by showing the arrest, or rearrest, of people in a subsequent 3-year period based on the number of prior convictions as of 2003. It includes the arrest rates for those with no prior convictions, as well as those with two, three, four, or five and more. Figure 14 shows that those with no prior DWI arrests in 2003 have a new DWI arrest rate of 3% 3 years hence, whereas the first offenders had a rearrest rate 3 years later of 15%, a fivefold difference. This matches well with the tenfold difference in alcohol mentions (a lower threshold criterion) reported in Maryland data.

This information supports the decision by the New Mexico government to impose mandatory interlocks on first offenders and to regard and sentence first offenders as only quantitatively (not qualitatively) different from those with more prior offenses. Many States continue to be reluctant to impose the interlock on first offenders.
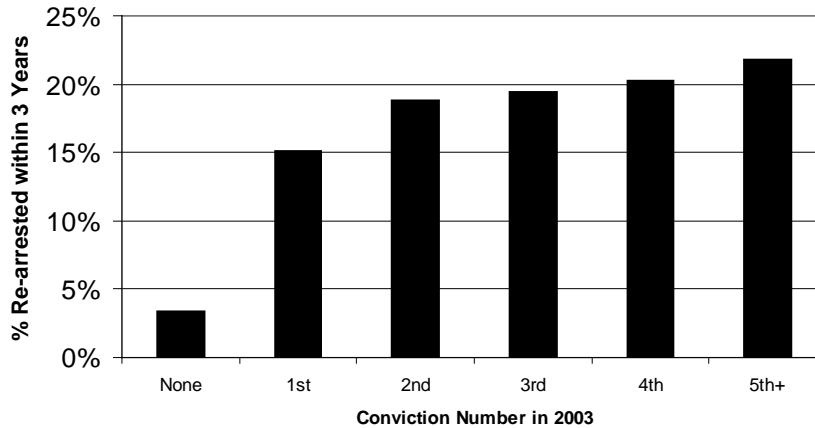
Figure 14. Percentage of DWI arrests in New Mexico from 2003 to 2006 by number of DWI convictions in 2003

There have been a few studies of DWI first offenders interlock programs. Several studies have mixed first and multiple offenders together, failing to report the findings separately. For example, in Ohio, one of the earliest interlock evaluations (Morse & Elliott, 1992), 25% of the participants were first offenders. These were selected cases, however, with arrest BACs of .20 or higher or arrests for refusal to take the breath test. Weinrath (1997) similarly studied a mixed group of first and multiple offenders. The 1992 Oregon study by Jones and the 2002 Illinois study by Frank et al. primarily included second offenders, and the 1999 study by Beck et al. was limited to multiple offenders. In a West Virginia study, Tippetts and Voas (1998) compared 137

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[10] Substantial portions of this section appeared in *Traffic Injury Prevention* (2007), Roth, Voas & Marques, *8*(4), 346–352.

DWI first offenders on the interlock with 10,198 license-suspended DWI first offenders not on the interlock and found a small, but not significant, recidivism reduction among the interlock users. Over a 12-month period, Voas et al. (1999) compared the recidivism of 1,982 first offenders on the interlock with 17,587 fully suspended offenders not on the interlock in the Canadian Province of Alberta and found that the reoffense rate for the interlock group was 0.10% compared to 2.23% for the nonusers, which was strongly significant ($p<.0001$). Vezina (2002) studied 8,846 first offenders, representing 26% of the first offenders in the Province of Quebec over 12 months. The interlock users maintained a 0.201 reoffense rate ratio ($p=.0001$) relative to the fully suspended comparison first offenders who did not install interlocks.

By contrast, DeYoung et al. (2005) reported that first offenders ordered by the court to install interlocks had recidivism rates that were not statistically different from similar offenders who did not receive such orders. Their study differed from the two Canadian studies, however, because interlock records were not available for their first-offender group. Consequently, they had to conduct their study based on court orders to install an interlock without assurance that a unit had actually been installed. As the authors pointed out, substantial proportions (up to 80%) of these offenders do not install the court-ordered interlocks on their vehicles. Thus, the DeYoung et al. (2005) study can be classified as a "program" evaluation of court orders to install interlocks rather than as a study of the effectiveness of the interlock when installed on the vehicle, as most of the earlier interlock studies have been.

Methods

Construction of the First Offender Interlock Group

As of December 1, 2005, 3,069 DWI first offenders in New Mexico had installed interlocks following their convictions. Of these, 223 nonresidents who had never obtained a New Mexico driver's license were eliminated from the study as there was no driver record file for them. In addition, 744 who were first convicted before the mandatory first-offender law[11] became effective on January 1, 2003, were dropped from the study because their motivations for installing the unit may have differed from those who installed it after the new law was implemented. One of New Mexico's interlock laws is unique in that it permits any revoked offender to drive an interlock-equipped vehicle legally. Accordingly, offenders who take advantage of that law are not court-mandated but still choose to install interlocks on their vehicles. To confine the study only to those offenders mandated by the court to install interlocks, 457 cases whose convictions were more than 90 days before installation also were dropped from the first-offender group. Finally, 84 cases whose installation date was after December 1, 2005 (the end of the study period) were also dropped. This left an interlock group of 1,461 court-ordered first offenders. These deletions from the interlock group are summarized in Table 6. An analysis of recidivism in the year following interlock installation for those excluded from the interlock group demonstrated that they had lower rates during that period

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[11] Many first offenders did not install interlocks under the 2003 law because it only required interlocks on all vehicles driven by first *aggravated* offenders. *Aggravated* offenders include those who refuse to provide a breath sample, or those with a BAC $\geq.16$ g/dL, or those who are involved in an injury crash. The interlock mandate was optional (up to the judge) for first offenders with a BAC $<.16$ g/dL. The wording also allowed offenders to escape the mandate by claiming "no vehicle" or "not driving." Finally, many *aggravated* DWI offenders are pled down to a *nonaggravated offense*. These loopholes were partially closed in June 2005 when interlock *licenses* became mandatory for all convicted impaired drivers because, to get an interlock license, an offender had to have evidence of having installed an interlock.

than those retained in the interlock group (see Table 6). This confirmed that the cases eliminated did not bias the interlock group toward a lower recidivism rate.

Construction of the Comparison Group

The comparison group was selected from the CTS, which contains data of 432,967 DWI arrests and 300,834 DWI convictions in New Mexico in the last 20 years. From records of 259,008 people arrested for DWI, 22,348 noninterlock offenders who were convicted for the first time between January 1, 2003, and December 1, 2005, were selected for the study. To mirror the construction of the interlock group, 4,786 offenders who had never had a New Mexico driver's license were deleted, leaving 17,562 first offenders for the comparison group.

Table 6. Selection of interlock groups for first conviction study

	First offender interlock subgroups	N	Number arrested during	Percent arrested during	Percent at 1 year
Interlocked first offenders	Total interlocked 1999-2005	3,039	30	1.0%	1.8%
Excluded groups:					
Out of State	No NM driver's license	223	2	0.9%	1.4%
No mandatory law	Convicted before 1/1/2003	870	4	0.5%	0.5%
	Installed more than 90 days				
Not mandated	after conviction	1,292	7	0.5%	1.0%
No time for rearrest	Installed after 12/1/2005	321	0	0.0%	
Included in study	Interlock study group	1,461	21	1.4%	2.9%

Establishing Index Dates for Interlock Group/Comparison Group

The objective of the study was to compare the recidivism rate of the interlock group with the comparison group over three periods: (1) while the interlock was on the vehicles of the interlock group, (2) after the interlock was removed to the end of the study period on December 1, 2005, and (3) for the two periods combined. To accomplish this, the three periods for the comparison were defined based on the conviction, installation, and removal dates of the interlock group. Figure 15 is a histogram of the times between conviction and installation for the interlock group. The average delay was .077 years or 28 days. Figure 16 is a histogram of the lengths of time that interlocks were installed. The mean period while the interlock was on the vehicle was .54 years or 197 days.

Based on these data, the index date for the comparison group in the "interlock-on" period was defined as beginning 28 days after conviction. For the post-removal period, the index date for the comparison group was defined as 28 +197 = 225 days after conviction. Finally, for the combined period, the index date for the comparison group was defined as 28 days following conviction.

Std. Dev = .06
Mean = .077
N = 1461.00

Number of Interlock Cases

Time between Conviction and Installation (Years)
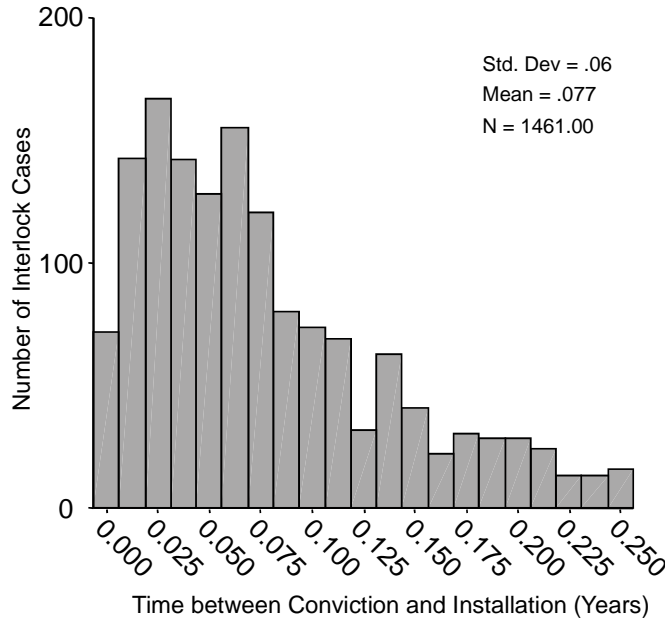
Figure 15. Histogram of number of first offenders in New Mexico who installed interlocks as a function of time between conviction and installation

Std. Dev = .49
Mean = .54
N = 1461.00

Number of Interlock Cases
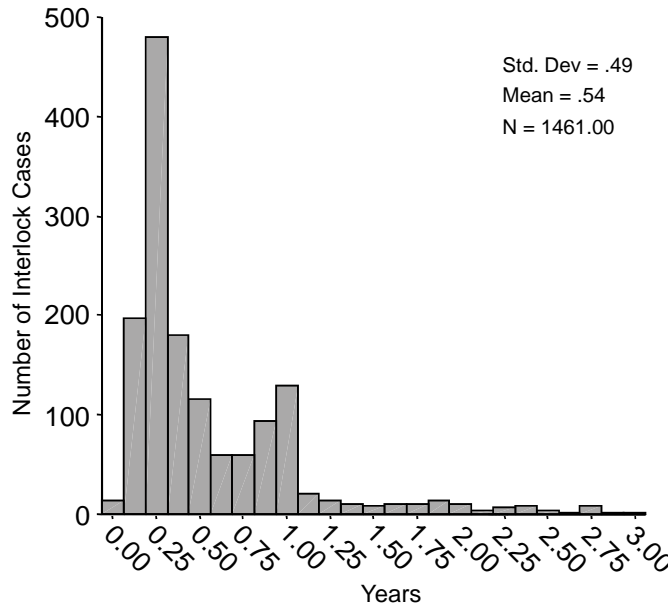
Years

Figure 16. Histogram of the number of first offenders in New Mexico with interlock durations of various lengths (in years)

Equating Groups

In a recent study of New Mexico multiple-offender interlock users (Roth, Voas, & Marques, 2007a), summarized here as Study 1, we selected the comparison group as a stratified random sample of all available noninterlocked offenders. The stratification was into 16 cells of age, gender, BAC, and priors. The proportion of comparison group members chosen from each cell was determined from the proportion of interlock group members in the same cell. We found that creation of the stratified random sample did not change the reoffense rate ratio obtained by

simply using multivariate Cox regression on the entire available group of noninterlocked offenders. Consequently, for this study, we did not attempt to equate groups on covariates before applying Cox regression.

The characteristics of the interlock and comparison groups are shown in Tables 7, 8, and 9. The mean age of the comparison group members is 4 years less than that of the interlock group members. This would tend to give the comparison group a greater recidivism rate. Conversely, the proportion of high-BAC arrestees and test refusers is greater in the interlock group. That would tend to make the interlock group have a higher recidivism rate. Finally, the proportion of males was slightly higher in the interlock group. That would tend to increase the recidivism rate of the interlock group. Inclusion of these covariates in the multivariate Cox regressions minimizes their influence on the ratio of the reoffense rate of the interlock group to that of the comparison group.

Table 7. Age distributions of the first-offender comparison and interlock groups, New Mexico

Group	N	Mean	Standard deviation
Comparison	17,562	31.7	11.5
Interlock	1,461	35.7	12.7

Table 8. Arrest BAC and test refusal distributions of the first-offender comparison and interlock groups, New Mexico

			GROUP		Total
			Comparison	Interlock	
BAC group g/dL	< .16	Count	7,549	519	8,068
		% within GROUP	43.0%	35.5%	42.4%
	≥.16	Count	6,719	652	7,371
		% within GROUP	38.3%	44.6%	38.7%
	Refused or no BAC	Count	3,294	290	3,584
		% within GROUP	18.8%	19.8%	18.8%
Total		Count	17,562	1,461	19,023
		% within GROUP	100.0%	100.0%	100.0%

Table 9. Gender distribution of the first-offender comparison and interlock groups, New Mexico

| | | | GROUP | | Total |
			Comparison	Interlock	
Gender	Male	Count	13,025	1,101	14,126
		% within GROUP	74.2%	75.4%	74.3%
	Female	Count	4,537	360	4,897
		% within GROUP	25.8%	24.6%	25.7%
Total		Count	17,562	1,461	19,023
		% within GROUP	100.0%	100.0%	100.0%

Analysis

Survival analysis was our method of choice for comparing recidivism rates because it uses all available data and accounts for the varying lengths of time available for following the offenders' driving histories. Cox regression has the particular advantage of allowing the inclusion of covariates to reduce the effect of potentially confounding factors. Three analyses were conducted using age, gender, BACs, and test refusals as variables (see Tables 10, 11, and 12): one for the interlock-on period (28 to 225 days after conviction), one for the post-interlock period (225 days to 3 years after conviction), and one for the combined period (28 days to 3 years after conviction).

Results

Interlock-on Period

Table 10 presents the results of the Cox regression analysis comparing the interlock and comparison groups while the interlock was installed. Gender, age, and BAC ≥ .16 g/dL were all significant recidivism predictors. Refusal of the test or a missing BAC was not a significant predictor of recidivism. The interlock group demonstrated a substantially lower recidivism rate (hazard ratio = .39) than the comparison group. The survival curves for the interlock and comparison groups are shown in Figure 17.

Table 10. Cox regression analysis for the first-offender interlock-on period, New Mexico

	B	S.E.	Wald	df	Sig	R	exp(B)
BAC g/dL:				2	0.0000	0.0429	
≥.16 / <.16	0.4333	0.0689	39.5195	1	0.0000	0.0433	1.5423
Refused breath test / <.16	0.1559	0.0919	2.8784	1	0.0898	0.0066	1.1687
Female/male	-0.2208	0.0752	8.6071	1	0.0033	-0.0182	0.8019
Age (per year)	-0.0188	0.0030	38.2250	1	0.0000	-0.0425	0.9814
Interlock group/ comparison group	-0.9477	0.2323	16.6388	1	0.0000	-0.0270	**0.3876**
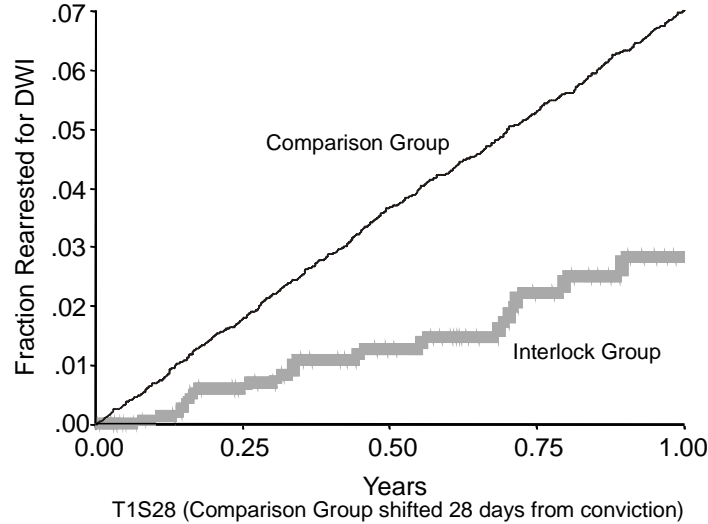
**Figure 17. Survival curves for the first-offender interlock-on period
for the interlock and comparison groups, New Mexico**

Post-Interlock Period

Table 11 presents the results of the Cox regression analysis comparing the interlock and comparison groups during the period after the interlock was removed. Once again, gender, age, and BAC ≥ .16 g/dL were all significant predictors of recidivism, whereas test refusal was not a significant predictor. The interlock group had a lower, but not significantly lower, recidivism rate (hazard ratio = .82) than the comparison offenders. The survival curves for the interlock and comparison groups are shown in Figure 18.

Table 11. Cox regression analysis for the first-offender post-interlock period, New Mexico

	B	S.E.	Wald	Df	Sig	R	exp(B)
BAC g/dL:			37.4233	2	0.0000	0.0414	
≥.16 / <.16	0.4019	0.0674	35.5888	1	0.0000	0.0415	1.4947
Refused breath test / <.16	0.1142	0.0923	1.5317	1	0.2159	0.0000	1.1210
Female/male	-0.2193	0.0743	8.7160	1	0.0032	-0.0186	0.8031
Age (per year)	-0.0265	0.0031	72.6256	1	0.0000	-0.0602	0.9739
Interlock group/ comparison group	-0.2041	0.1440	2.0091	1	0.1564	-0.0007	**0.8153**

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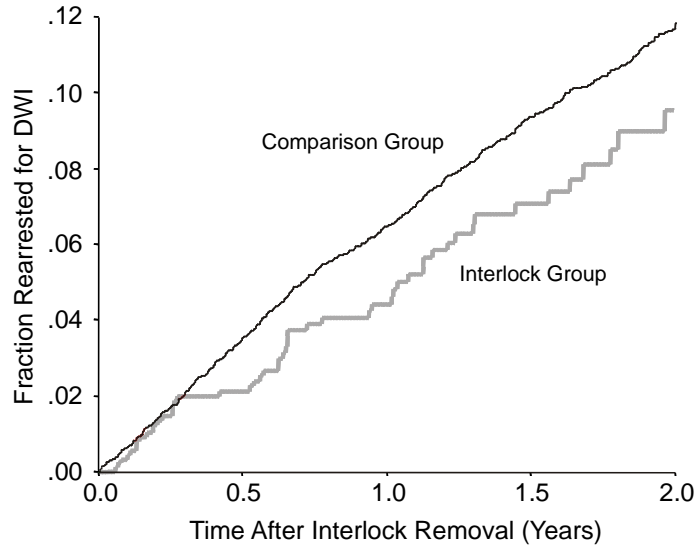
**Figure 18. Survival curves for the first-offender post-interlock period
for the interlock and comparison groups, New Mexico**

Recidivism for the Combined Period

Table 12 presents the results of the Cox regression analysis comparing the interlock and comparison groups for the total period from the index times to the end of the study period on December 1, 2005. All variables except test refusals were significantly related to recidivism. The reoffense rate of the interlock group was .61 of the comparison group's rate, a ratio significant beyond the p=.0001 level. The survival curves for the interlock and comparison groups are shown in Figure 19.

**Table 12. Cox regression analysis of first offenders for the combined period
from index to the end of the study period on December 1, 2005, New Mexico**

	B	S.E.	Wald	df	Sig	R	exp(B)
BAC g/dL:			51.8011	2	0.0000	0.0389	
≥.16 / <.16	0.3855	0.0540	50.9849	1	0.0000	0.0394	1.4703
Refused breath test / <.16	0.1606	0.0718	5.0055	1	0.0253	0.0098	1.1742
Female/male	-0.1900	0.0585	10.5410	1	0.0012	-0.0164	0.8269
Age (per year)	-0.0218	0.0024	81.7090	1	0.0000	-0.0503	0.9784
Interlock group/ comparison group	-0.4972	0.1208	16.9320	1	0.0000	-0.0217	**0.6082**
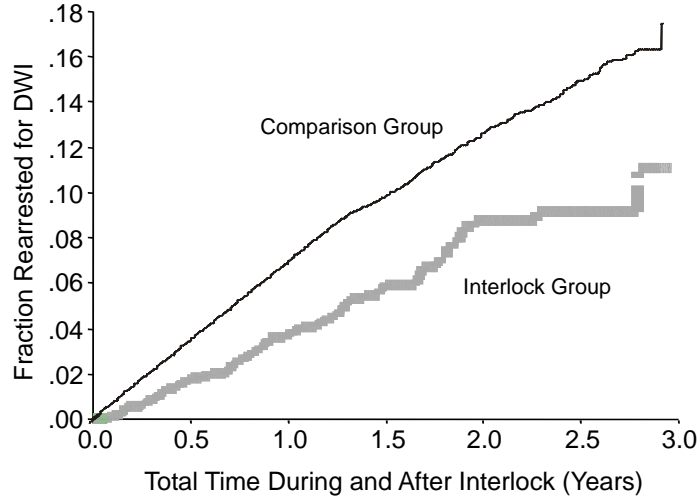
Figure 19. Survival curves for the first offender combined period from 28 days after conviction to the end of the study period on December 1, 2005, New Mexico

Rearrest Rates per Year of Exposure

Figure 20 summarizes the rearrest rates per year of exposure for the interlock group and the comparison group in each of the three periods. These rates are calculated directly from the raw data without using survival graphs or Cox regressions. For example, 1,461 offenders had interlocks installed for an average of .545 years, and 21 of them were rearrested during that time. So the rearrest rate per year for the interlocked group during the interlock-on period was 21/1461/.545= 2.6%. The annualized rearrest rate for the comparison group during the .545 years after the index time was 7%.
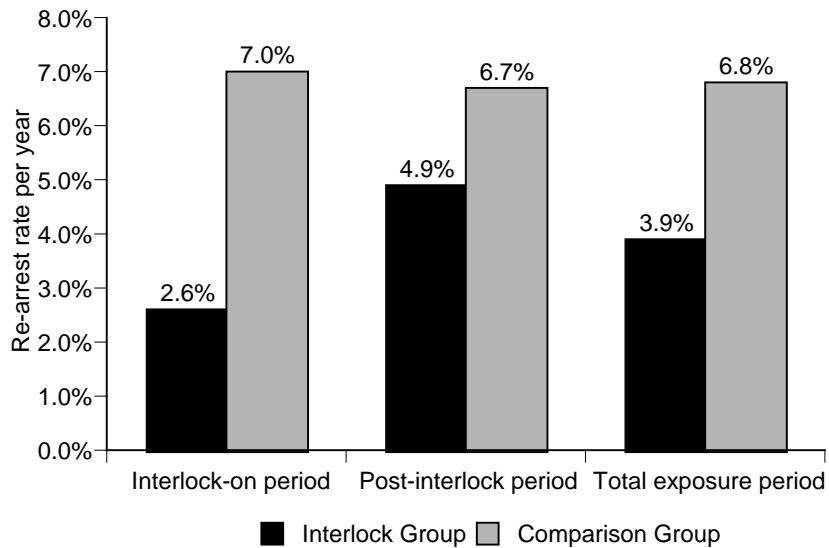
Figure 20. Comparison of rearrest rates per year of exposure for interlocked and noninterlocked first offenders in three periods, New Mexico

Benefit-Cost Analysis

In this study, the DWI rearrest rate of first offenders while the interlock was on their vehicles was 60% lower than that of the comparison group. After interlock removal, the recidivism rate increased and fell within the rate range of the comparison group. Over the entire period, up to 3 years from installation to the end of the study, the recidivism of the interlock group was 31% lower than that of the comparison group. The 31% overall reduction in recidivism suggests that requiring first offenders to install interlocks is cost-effective. The argument follows.

The New Mexico Department of Transportation (NMDOT) in its yearly publication, DWI New Mexico,[12] uses a Federal Highway Association formula (FHWA, 1994) based on the work of T.R. Miller et al. (1988) to estimate the cost of alcohol-involved (A-I) crashes. The formula estimates the cost from the yearly numbers of A-I fatalities, injuries, and property-damage-only crashes. The formula includes not only direct costs, such as lost wages and medical expenses, but also indirect "willingness to pay" estimates of lost quality of life. Over the last 12 years, the average cost was $991 million per year and the average number of DWI arrests was 19,787/year. If we assume that the number of DWI arrests, A-I injuries, A-I crashes, and A-I fatalities are all roughly proportional to the number of impaired-driving trips, then we can estimate the benefit of any DWI treatment or sanction from reduction in the number of DWI arrests due to the treatment or sanction.

The benefit, B, of a treating N offenders would be (N*U-N*T)*b, where U is the fraction of untreated offenders rearrested in the same follow-up time as the treated group, T is the fraction of treated offenders who are rearrested, and b is the benefit per DWI arrest prevented. N*U is the number of treated offenders who would have been rearrested if they had not been treated and N*T is the number of treated offenders who were rearrested. The total cost, C, of the treating N offenders would be N*c, where c is the average cost of the treatment. The benefit to-cost ratio, B/C is:

$$B/C = (N*U-N*T)*b \ / \ (N*c)$$

Dividing numerator and denominator by N gives:

$$B/C = (U-T)*b/c$$

The follow-up time does not matter as long as c is the average cost of treatment during that follow-up time.

The NMDOT estimate of the economic impact of impaired driving in 2003 was $1,005,000,000 and the number of DWI arrests was 20,313. So the economic benefit, b, is approximately $50,000 per DWI arrest prevented.

From Figure 19, the difference in the probabilities of rearrest, U-T, is 0.032 at 1 year, and .038 at 2 years, after interlock installation. Interlocks cost offenders about $1,000/year, and this first-offender interlock group had them installed for an average of 0.54 years. So the average cost of treatment, c = $540.

Using these values, the B/C at 1 year is B/C = 0.032 * $50,000 / $540 = 3.0, and at 2 years, B/C = 0.038 * $50,000 / $540 = 3.5. So there is an economic benefit of more than $3 per $1 of cost to these interlocked first offenders. The fact that U-T, and consequently B/C, is increasing in this

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[12]DWI New Mexico Reports from 1995-2006 are available at http://www.unm.edu/~dgrint/dgr.html.

study reflects the persistent difference, not only in the total recidivism of the two groups, but also in the recidivism rates after interlock removal.

Unfortunately, in this research study, we have no estimate of the cost of the interlock program to the New Mexico government directly. Any such estimate, at a minimum, would have to build in components for State expenditures, Federal contributions to the New Mexico Impaired-Driver Countermeasures initiative, and costs incurred by local court systems. Such estimates are outside the scope of this effort.

Comments

The strong reduction in recidivism while the interlock is installed, followed by a return to the level of recidivism comparable to noninterlock offenders, is often cited as evidence that the interlock produces no "learning effect" or enduring behavior change. This is likely because the interlock mainly has an incapacitating effect, like being in jail, but once the barrier is removed, the interlock offenders return to their previous behavior. For the sanction of incarceration, this has been shown to be the case as there is no evidence of reduced recidivism once offenders are released from jail (Voas, 1986; Wagenaar et al., 2007).

This study provides the clearest evidence for the effectiveness of interlocks with first offenders in the United States. The reduction in recidivism is consistent with that shown in the two Canadian studies (Vezina, 2002; Voas et al., 1999), but shows a stronger reduction in first-offender recidivism than the early Tippetts and Voas (1998) study in West Virginia. It is not surprising that the current results differ from those of DeYoung et al. (2005) because most of the first offenders in that study were under a court order to install an interlock but failed to do so. Thus, the first-offender "interlock group" in the DeYoung study included people who were told to install interlocks, but most did not, rendering the DeYoung et al. (2005) study more of an evaluation of the earnestness with which the courts administered the law than of interlock efficacy as we report here for New Mexico. Without information on interlock installation, DeYoung et al. did not have a measure of recidivism that differentiated recidivism while the device was on the vehicle and after it was removed. Thus, the closest comparison with their study is our combined (on and off) 3-year period of this study as summarized in Figure 19 and Table 12. Information on the degree of compliance with court orders to install interlocks during the study period was not available, so we do not know how many offenders were mandated to install interlocks but did not follow through. If this occurred, such offenders would have been in our comparison group as noninterlock offenders. Without information on court interlock orders, that aspect of the DeYoung et al. (2005) study could not be replicated.

The weakness in this, and all nonrandom assignment studies, is the uncertain equivalence of intervention (interlock) and comparison groups. Only four variables—age, gender, arrest BAC, and test refusal—were available to equate the groups. Cox regression with those variables may not account for all group differences. It is not clear whether the reduction in DWI recidivism is associated with a reduction in alcohol-related crashes, though logically, fewer impaired drivers on the road means fewer impaired-driving trips and that should result in fewer alcohol crashes.

Finally, as interlock research matures, investigators must be prepared to confront issues about the meaning of hazard ratios in an interlock sample relative to the larger population of noninterlock drivers. A reasonable person could ask whether the sample estimates, particularly

the ratio of the interlock to noninterlock sample rates, are unbiased estimates of the population rates or ratios. At the individual level, they may not be.

However, the damage done by impaired drivers (i.e., crashes, injuries, and deaths) is proportional to the number of impaired-driving trips, not to the number of impaired drivers. It does not matter what the ratio of rearrests to impaired-driving trips is for the two groups; it just matters that the ratio is the same for both interlocked and noninterlocked offenders. As long as the two groups have the same probability of arrest when driving impaired, then the hazard ratios of rearrest rates are unbiased estimates of the ratio of the number of impaired-driving trips per person in the two groups. An impaired-driving trip is both (a) the unit that produces risk to the public, and (b) the unit of exposure from which a terminal event (rearrest) can be "sampled." If we assume that the probability of being arrested is proportional to the number of vehicle miles of impaired driving, then the hazard ratios are unbiased estimators of the ratio of vehicle miles of impaired driving per person in the two groups. Impaired-driving trips and impaired-driving vehicle miles are the target for reduction. Stated differently, 52 drivers who drive after drinking once per year represent the same traffic hazard as 1 driver who drives after drinking each week.

STUDY 3: IMPACT OF THE IGNITION INTERLOCK LICENSING ACT BASED ON STUDY OF 10-YEAR REVOCATION

Background information on this section was detailed in the Introduction of this report. The objective of this study was to determine whether the opportunity to avoid a long period of license revocation would motivate a higher proportion of multiple DWI offenders to install interlocks. That is, what proportion of those who are eligible for the interlock license will actually follow through in order to regain revoked driving privileges? Further, will the revoked offenders who decide to install interlocks demonstrate a reduction in recidivism comparable to revoked offenders on interlocks in other North American published studies?

As noted previously in the section on the New Mexico laws, the interlock-restricted permit does not alter the revocation status of the regular license; the required period of interlock driving must be for the full duration of the revocation period imposed by the court. If a non-interlock-equipped vehicle is driven during that period, the charge would be driving while revoked. For a repeat offender with 10 years of revocation, the interlock would seem to be an attractive alternative to a decade of no legal driving. Is it? And does the interlock license option enhance public safety?

Methods

Evaluation Sample

In New Mexico, three DWI convictions within 10 years previously resulted in a 10-year revocation of the license. Between June 1, 1993, and June 1, 2006, in New Mexico, 15,693 people had 23,170 sets of three DWI convictions within 10 years. These offenders were not only revoked, they were denied the possibility of applying for an unrestricted license for 10 years from the last conviction. Even after serving the 10-year revocations, they were still required to have a hearing before a district judge to determine their eligibility for reinstatement.

Of this 10-year "denial" group, comprised of 15,693 offenders, a self-selected subset of 1,545 people (9.85%) took advantage of the IILA after its passage in 2003 and voluntarily installed interlocks. Unfortunately, the installation of an interlock is not separately coded in driver records files as to whether the installation was responsive to a court order or a whether it was a choice made by the offender. Accordingly, we had to make some inferences in order to isolate this group.

Based on surveys of offenders at the time of installation, we do know that within 90 days of a conviction, 91% of all interlock installations are court-ordered. Accordingly, voluntary installations were identified as installations by DWI offenders whose interlock installation date was more than 90 days after their last court conviction. Use of the date restriction undoubtedly introduces some mixing of group members between mandatory and voluntary, but the actual average difference in dates between conviction and installation for the group defined as voluntary exceeds 3 years of time (see following paragraphs). This provides some assurance that the motivation for installation of this group differs substantially from the court-mandate group ≤90 days. It is worth noting that based on the first 3 years of the IILA law, the participation rate of offenders with three or more DWI offenses has been similar to that of previous volunteer interlock studies (Voas et al., 1999; Willis et al., 2004).

Formation of a Starting Comparison Group

To identify the conviction related to the interlock installation, the time between conviction and interlock installation of each member of the interlock group had to contain no further DWI arrests. The period between conviction and interlock installation varied from 92 days (based on the date difference restriction) to 12.7 years with an average of 3.88 years. This reduces the probability of recidivism for the interlock group in the early years after conviction. Because only 10% of the 15,693 eligible offenders with 10-year revocations elected to install interlocks, self-selection as well as the interlock played a role in the recidivism of the interlock group. Accordingly, the available noninterlock cases have to be restricted to find an appropriate comparison.

Constructing an Unbiased Comparison Group

To offset the effect of arrest-free periods between conviction and interlock installation, a one-to one comparison group was chosen with the requirement of the same arrest-free periods as the interlock group. The unbiased comparison group was chosen using a variant of propensity scores. The variables used in the process of equating groups are shown in Table 13.

Table 13. Variables for constructing a matched noninterlock group of offenders

Covariate
Sex
# of prior convictions
Age
Revocation date
Age at time of conviction
DT: time between 1st & 3rd conviction
AD: difference in age from interlock group
DC: difference in conviction date from interlock group

For each interlock group member, the closest match was chosen from the 14,048 "denied" people who did not install an interlock. Due to the date restrictions, there are "denied" offenders that have to be excluded from both interlock and unbiased comparison groups. Also excluded are those with a second denial that preceded the interlock. This reduced the pool of possible comparison group members by 1,788.

The index date for the initiation of survival analyses comparing interlock and unbiased comparison groups was established as the date of interlock installation for each of the members of the interlock group so that date also became the index date for the noninterlock group comparison case paired with the interlock group member.

In the first step of the matching process, for each interlock group member, the closest match was determined using an iterative process in which each unmatched interlock group member was first matched with all noninterlock group members having the same sex and same number of prior convictions, and to the extent possible, the same age, revocation date, and time between the first and third conviction within 10 years. This latter value, referred to as T10, was twice the average time between successive convictions in the 10-year period. The most stringent requirement in this iterative process was that the noninterlock group member had not had a DWI arrest for a time interval equal to the time between conviction and interlock installation of the interlock group member being matched.

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In the second step of the process, a closeness criterion was chosen to balance the differences in ages (DA), the differences in conviction dates (DC), and the differences in times (DT) spanned by the three convictions, which is the basis for the 10-year suspension. The criterion *"e", (e = sqrt(DA^2 +DT^2 + DC^2))* was defined as the square root of the sum of the squares DA, DC, and DT between each interlock group member and every available noninterlock group member. For each interlock group member, the noninterlock group member with the smallest value of the criterion was the initial choice for a match. Because some noninterlock group members were the best match for more than one interlock group member, it was necessary to identify the corresponding interlock group member with the smallest value of the criterion as the match for that noninterlock group member. After this step, the whole process was repeated for the unmatched interlock group and noninterlock group members until all interlock group members were matched.

Results

Unadjusted Recidivism Rates of Revoked Third Offenders Installing Interlocks

Before matching interlock and noninterlock offenders, an initial analysis covering the 3 years following the last DWI conviction found that 30% of all the noninterlocked revoked offenders, but only 5% of the interlocked offenders, had been rearrested for DWI from 2003 to 2006 (Figure 21). This figure, before selection of the unbiased comparison group, vastly overstates the effect of the interlock. It is also probable that a greater fraction of the starting comparison group members have died or moved out of State than have the interlock group members who are all being monitored by in-State interlock providers. This loss of cases over time probably accounts for the decrease in the slope of the starting comparison group curve with time.
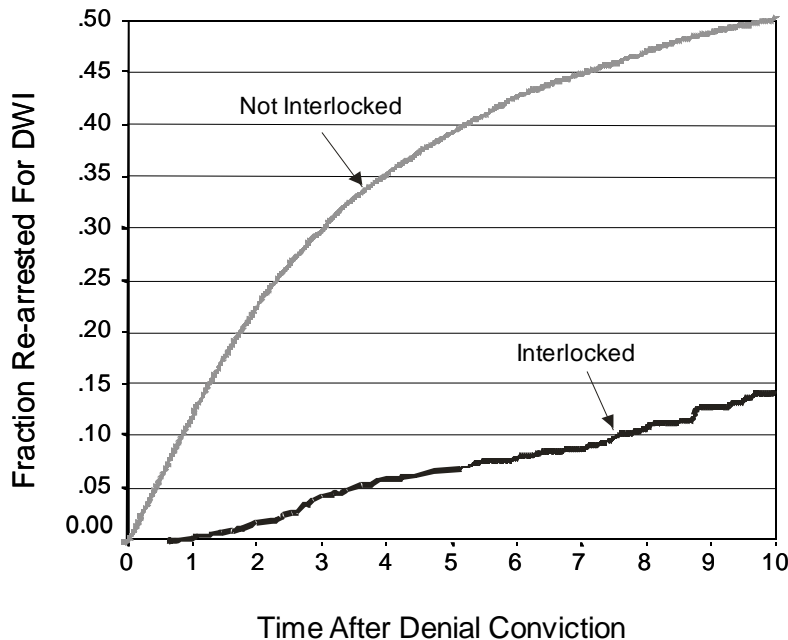
Figure 21. Recidivism after denial conviction for DWI offenders with three convictions in 10 years, New Mexico

Recidivism of Third Offenders Relative to an Unbiased Comparison Group

Having applied the restrictions for comparison group selection based on the selection criteria, $e=sqrt(DA^2 +DT^2 + DC^2)$ accounting for differences in age, intervals between convictions, and differences in conviction dates, Figure 22 shows the distribution resulting from the iterative procedure for assigning noninterlock comparison cases to interlock group members. The median overall difference *"e"* between interlock group and unbiased comparison group members was 0.49 years, mean difference 0.9 years, and the standard deviation 1.53 years. Further evidence of the effectiveness of the modified propensity score procedure in constructing a matching comparison group is provided in Table 14.

Criteria: sqrt(DA^2 + DC^2 + DT^2)
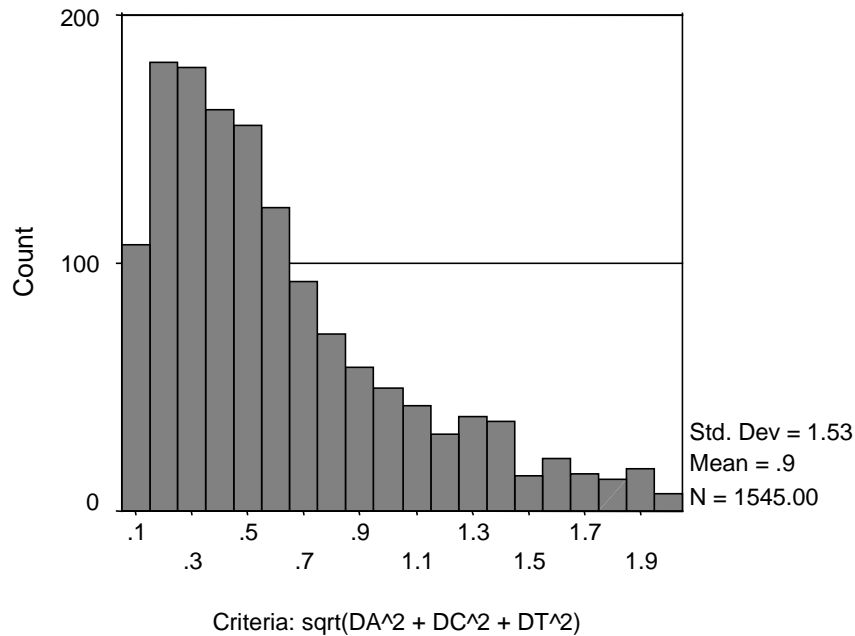
**Figure 22. Difference in "*e*" a function of age, conviction date and time
to accumulate three DWIs in 3 years, New Mexico**

**Table 14. Matching of the unbiased comparison group
with the interlock group, New Mexico**

Covariate	Comparison group	Interlock group
N	1,545	1,545
Female (number, percent)	163, 10.6%	163, 10.6%
Index–conv.(mean, STD)	3.88 yrs, 2.72 yrs	3.88 yrs, 2.72 yrs
Prior convs (N: 3, 4, 5+)	867, 404, 274	867, 404, 274
Age at conv. (mean,STD)	35.80, 9.37	35.78, 9.41
Revoc.date (mean, STD)	May 4, 2000, 2.82 yrs	Oct 1, 2000, 2.82 yrs
Prior arrests (mean, STD)	4.26, 1.72	4.26, 1.70
Prior conv. (mean, STD)	3.78, 1.24	3.75, 1.14

Overall, it appears that the two groups are closely matched in their propensity to be apprehended for DWI. Univariate and multivariate Cox proportional hazard regression analyses were used to determine the hazard ratio and to eliminate any remaining biases due to the measured covariates. The multivariate analysis compensates for biases based on covariates

included in the model. Because we also tried to eliminate biases due to covariates by carefully matching each member of the interlock group to a noninterlocked member with very close values of all covariates, we expected that a univariate Cox regression would give a similar value for the interlock group to unbiased comparison group hazard ratio. We found that the multivariate hazard ratio, 0.68 (95% CI = 0.51-0.90), was statistically indistinguishable from the univariate value, 0.71 (95% CI = 0.54-0.95). This is further evidence that this matching procedure eliminated biases due to differences between the comparison group and the interlock group in the measured covariates that we could control. Of course, the variables we do not have (e.g., income, health, family status, socioeconomic status) might be important determinants of an effect.

Results of the Unbiased Comparison

Figure 23 is a one minus survival graph (i.e., a recidivism plot) for interlock and unbiased comparison groups. It is a conservative comparison because an unknown number of the unbiased comparison groups members will have died or moved out of State without their exit recorded on the State driver record, such that rearrests of this group may be underestimated (due to a surplus of inactive offenders in the denominator). The cumulative recidivism curves seem to diverge up to 2.5 years after the index date of interlock installation. Because the study period extended a maximum of 3 years from the first interlock installation, Figure 23 has few remaining members of either group in the year beyond 2.5 years after installation. During that time, each rearrest makes a substantial step in the curve. It will require additional follow-up time or evidence that the noninterlock offenders are still in New Mexico for this last part of the curve to be statistically significant.
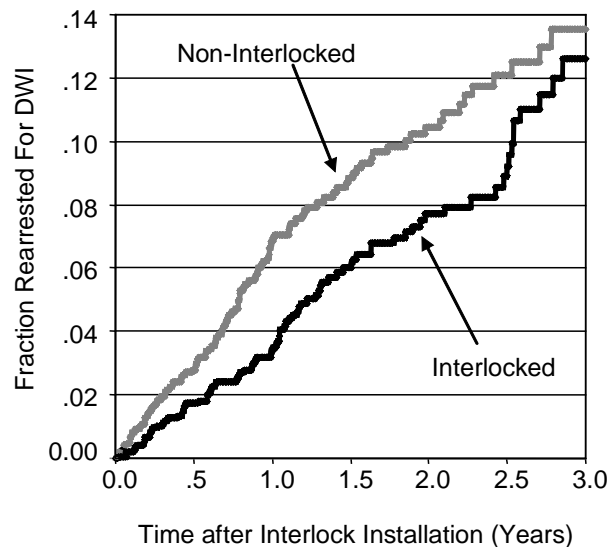
Figure 23. Rearrests for interlock and noninterlock offenders in New Mexico under 10-year denial

The multivariate Cox proportional hazard regression analysis, shown in Table 15, confirms that multiple DWI offenders who installed interlocks had a recidivism rate about one-third lower than those who did not choose to apply for interlock permits (e.g., hazard ratio H.R.=.6771).

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Table 15. Multivariate Cox regression of rearrests during installation

Variable	B	S.E.	Sig	R	H.R.	95% CI
Interlock/comparison group	-.3899	.1432	.0065	-.0425	.6771**	0.51-0.90
Female/male	-.0547	.2494	.8264	.0000	.9468	0.58-1.54
T10 per year	-.0589	.0294	.0453	-.0259	.9428*	0.89-1.00
Age per year	-.0190	.0085	.0254	-.0316	.9811*	0.96-1.00
REV_DATE/yr	.1016	.0280	.0003	.0611	1.1069***	1.05-1.17
4conv/3convs	.3453	.1729	.0458	.0258	1.4125*	1.01-1.98
5+conv/3convs	.7984	.1831	.0000	.0754	2.2219***	1.55-3.18

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

Comments

The study attempted to answer two questions. First, would legal driving with an interlock-equipped vehicle, while still in revoked status, motivate offenders with three or more DWIs to voluntarily install interlocks at a rate more than the typical 10% rate reported in many previous interlock studies (Voas et al., 1999); and second, would election of the interlock improve alcohol-related road safety by reducing recidivism in groups who chose to install?

This preliminary analysis of the IILA considered all eligible multiple offenders revoked for 10 years and found that, at the time of this study, only 9.8% installed interlocks, a rate approximately equal to that in other voluntary interlock studies (Willis et al., 2004; Voas et al., 1999). A detailed and conservative study of the carefully matched groups has demonstrated that those revoked multiple offenders who did install interlocks had significantly lower recidivism rates than the offenders who elected not to install interlocks. The 32% difference in recidivism is less than the 64% reduction reported in the multijurisdictional meta-analysis (Willis et al., 2004), and less than the statewide reduction (discussed in Study 4) when the interlock is mandated. It is likely that this study group is not typical of interlock offenders; the long length of the interlock period and other factors make them a little different from other studies reported. The 3-year recidivism rate of approximately 12% for these third offenders is better than usual and likely reflects the degree of selection required to compare the groups. This level of case selectivity (excluding 90% of the comparisons to ensure a good match) likely rendered the groups very different from any routine offender population previously studied.

The low 10% installation rate in this group may partly reflect the relatively short period following the passage of the 2003 IILA during which the message may not have spread about the opportunity presented by the law. As interlock programs in New Mexico get more attention, the number of offenders taking advantage of the IILA alternative to revocation may grow. Although a major effort was made to create a closely matched comparison group, it is probable that unmeasured factors may have influenced the result. The revoked comparison group may include individuals who have left the State with no departure recorded in the State driver record file. With this long-term revoked group, it is also possible that some members are no longer living. Such factors reduce the apparent recidivism rate of the noninterlock DWI offender group, making the comparison very conservative. We know the interlock group is alive and living in New Mexico; we cannot know the same about the comparisons.

The implication of these results is that the IILA law provided an opportunity for about 1 in 10 otherwise fully license-suspended DWI offenders to drive legally without increasing their recidivism. Thus, as the cost of the interlock program is born by the offender, the IILA law provides the State with a method for modestly reducing recidivism and assisting a selected group of offenders to drive legally without cost to the State or increasing the risk to other road users. The safety benefit of the IILA is still an open question that is awaiting more evidence. Nonetheless, it should also be considered that less salutary outcomes are also possible. Although there is no evidence for it, it is possible that the IILA availability may have unintended effects on general deterrence, for example, by sending a message to the public that maybe impaired driving is not such a big deal if multiple offenders can return to driving without little personal inconvenience. This would be unfortunate because there is a good counterargument that the public will have to learn: specifically, the interlock is not a gift to offenders, but rather a shield to protect the public from illicit, license-revoked, drinking drivers. One of the most significant communication challenges for government public information efforts is to help manage that shift in perception.

STUDY 4: MANDATORY INTERLOCK FOR ALL DWI OFFENDERS BOLSTERED WITH A HOUSE ARREST ALTERNATIVE

An opportunity to evaluate several important questions about interlock effectiveness came about when all three Santa Fe County magistrate judges decided not only to mandate interlocks for all convicted multiple offenders and aggravated first offenders, as required by the 2003 New Mexico Mandatory Interlock Law, but also required the interlock for nonaggravated first offenders (an option in the law at that time). Further, they required house arrest (electronic home confinement for purposes other than work or health services, but no alcohol testing) as an alternative for those who claimed to have given up driving or otherwise could not install an interlock. In addition to the three magistrate court judges, the Santa Fe municipal court judge agreed to participate for part of the 2-year study period after the protocol was established. Compliance monitors answered client questions about the interlock mandate immediately after sentencing and oversaw the installation of the devices in the offenders' vehicles.

The three key questions follow: (1) Would use of the less desirable home confinement sanction produce an increase in the rate of installed interlocks similar to the 62% rate reported earlier in Hancock County, Indiana? (2) Would the increase in pressure on offenders to install interlocks yield a group of users who are less willing to comply with the interlock program and therefore more likely to circumvent? (This would be indicated by a smaller reduction in recidivism compared to past studies in which house arrest was not a factor.) (3) Would the effect of a higher rate of interlock installation in Santa Fe County be detectable as a reduction in countywide recidivism, not just among the interlock offenders, but such that Santa Fe County as a whole has a lower DWI arrest rate than the rest of New Mexico?

Methods

Interlock Installation Rates

Interlock penetration rates were calculated to compare Santa Fe magistrate court with all other adjudications and convictions in New Mexico during the same time interval of June 2003 to May 2005. The Santa Fe municipal court is included for comparison.

Table 16 shows the number of adjudications and convictions for each of the two Santa Fe courts and for all other courts in New Mexico. The ratio of convictions to adjudications was 81.7% for the magistrate court (1,145/1,401), 76.4% for the municipal court (543/711), and 74.5% for other New Mexico courts (20,685/27,767).

Table 16. Adjudications and convictions, June 2003 to May 2005, Santa Fe County, New Mexico

	Santa Fe magistrate	Santa Fe municipal	Other New Mexico
DWI adjudications	1,401	711	27,767
DWI convictions	1,145	543	20,685

Equating Groups for Recidivism Analysis

In a study of New Mexico multiple-offender interlock users (Roth et al., 2007a) shown in Study 1, we created a comparison group based on stratified random sampling of all available offenders who did not install interlocks. The stratification was into 16 cells based on age groups,

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gender, arrest BAC groups, and priors groups. The proportion of comparison group members chosen from each cell was determined from the proportion of interlock group members in the same cell. Having made those selections and inclusions, we found that this stratified random sample did not change the repeat offense rate ratio obtained by simply using multivariate Cox regression on the entire available group of offenders without interlocks. Consequently, for this study, we did not attempt to constrain subgroups into dichotomous pairs or to equate groups on covariates before applying Cox regression.

Survival analysis is the best choice for comparison of recidivism rates because it uses all available data and accounts for the varying lengths of time available (not everyone has the same interlock duration) for following the offenders' driving histories. Multivariate Cox regression reduces the effect of known covariates that may introduce confounding factors. Multivariate analyses were conducted using age, gender, BACs or test refusals, and prior DWIs as variables, and the hazard ratios from the multivariate regressions were compared to the univariate Cox regression. Different periods of during and after interlock were evaluated for comparison across groups.

Results

It should be noted that all New Mexico courts were operating under the same mandatory interlock laws and the same discretionary law for nonaggravated first-time offenders. The Santa Fe decision to require the interlock for nonaggravated first offenders and house arrest as an alternative were the only differences.

Santa Fe County Installation Rates

To establish a consistent basis for comparing the installation rates of offenders in different samples, it was necessary to trim down the sample to a subset likely to have installed the interlock as a result of the court order, meaning they were ordered to install the interlock because of the strong policy, not just voluntary re-entrants (under the IILA of 2002, revoked offenders who want to retain a driving privilege in New Mexico can install an interlock and drive during their remaining revocation period). To exclude volunteer interlock users, we calculated the number of installations of interlocks for those who were convicted in each of the courts. Choosing the date range most likely to be associated with an installation in anticipation of a conviction or because of a conviction, the time between arrest, and 1 year after a conviction appeared to be an appropriate definition of an installation motivated by the court sentence. Those installation rates, as shown in Table 17, are 814 of 1,145, 154 of 543, and 2,718 of 20,685 installations respectively for the Santa Fe magistrate, Santa Fe municipal, and all other courts in New Mexico outside Santa Fe County.

**Table 17. Interlocks installed by New Mexico drivers convicted
between June 2003 and May 2005**

Interlock Installation Date	Santa Fe magistrate	Santa Fe municipal	Other New Mexico
Within 1 year after conviction	767	125	2,121
Between arrest and 1 year after conviction	814	154	2,718
Any time after conviction	846	147	3,031
Installed anytime before or after conviction	933	184	3,747

Figure 24 is a histogram of the percentage of convicted offenders who installed interlocks in each of the courts. The 71% rate achieved in the Santa Fe magistrate court far exceeds the 13% achieved in other New Mexico courts outside Santa Fe (at that time; the statewide rate is much higher now) and also higher than the 16% total statewide installation rate of all NM courts. The highest previously reported installation rate (Voas et al., 2002) was 62% in Hancock County, Indiana, and that was with a relatively small sample of offenders.
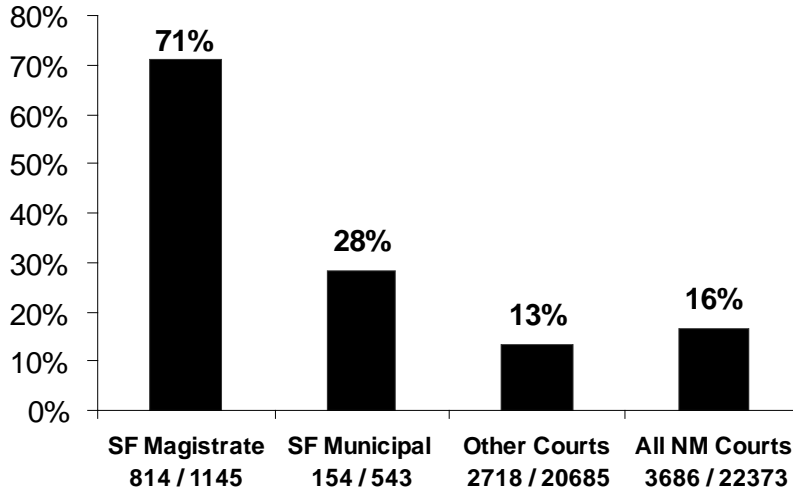
Figure 24. Percentage of convicted DWI offenders installing interlocks in Santa Fe (SF) and other New Mexico (NM) courts and total NM courts (from June 2003 to May 2005)

The lower installation rate for Santa Fe municipal court relative to the magistrate courts reflected the decision of the Santa Fe municipal judge to not mandate interlocks for nonaggravated first offenders. Also, that judge only participated in the program for half of the 2-year study period.

Figure 25 shows the installation rates for each of the participating judges. As can be seen, the installation rates for the three magistrate judges were very similar.
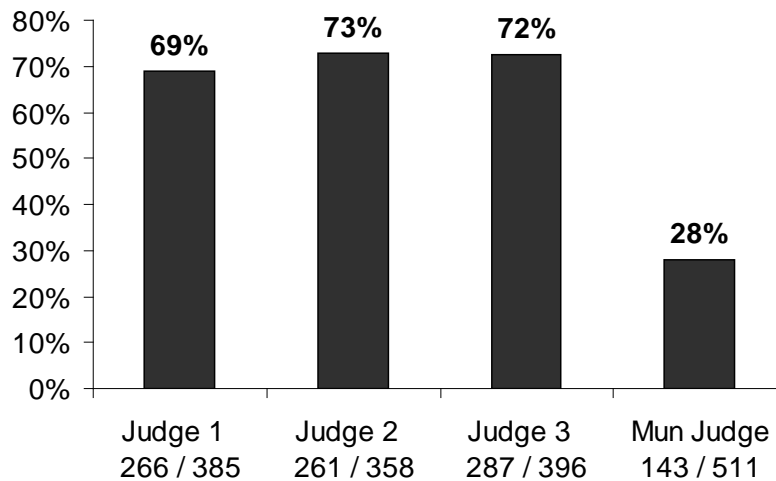
Figure 25. Installation rate by judge for convicted offenders in Santa Fe County, New Mexico

Comparison of the Recidivism of Interlock and Noninterlock Offenders in All New Mexico

The second key question in this study is whether pressuring a high proportion of offenders onto the interlock would result in rates of recidivism higher (poorer) than the 60 to 65% reduction typically found in interlock groups. If so, it may reflect less compliance with the interlock program (e.g., more circumvention) than is ordinarily found. However, to establish a suitable benchmark for understanding the Santa Fe recidivism rate following the judicial mandate requires an examination of statewide New Mexico recidivism of interlock and noninterlock groups.

The appropriate statewide benchmark is a study of the rearrest rates for offenders who installed interlocks only as a result of a judicial order during the same period as the program was operative in Santa Fe County. Accordingly, the interlock group was limited to 1,987 offenders who installed an interlock, within 90 days after a DWI conviction, in the State between June 2003 and May 2005. The logic for making these restrictions has been explained previously (Roth et al., 2007a, 2007b), and these reasons are summarized in Studies 1 and 2 of this report. These selections serve to reduce the likelihood of including offenders who have installed for reasons other than a court order. The comparison group consisted of the 18,978 revoked convicted offenders throughout New Mexico who did not install interlocks during the study interval when it was mandatory for all repeat offenders and high-BAC first offenders to install. Covariate comparisons included age (as a continuous variable), arrest BAC group (contrasting $\geq .16$ vs. $<.16$, and refusal vs. $<.16$) gender, and prior convictions (contrasting first offenders with second, third, and 4 or more DWI).

Figure 26 shows the recidivism of 20,965 DWI offenders in New Mexico who were convicted in the 2-year period from June 2003 to May 2005. As noted, these include 1,987 offenders with an interlock and 18,978 offenders who did not have an interlock. The index date for both groups was the date of conviction and the terminal events were a rearrest, an interlock removal, or 1 year after conviction, whichever came first. At 1 year after conviction, the figure shows that 2.8% of the interlocked group and 7.0% of the noninterlocked group were rearrested, a ratio of 0.40. This ratio is similar to the 0.36 ratio reported in the multijurisdictional meta-analysis of Willis et al. (2004).
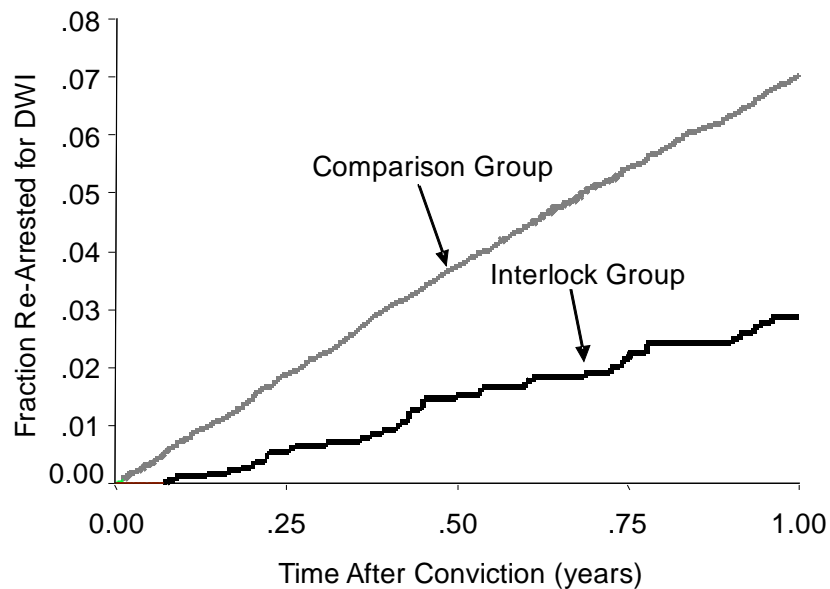
Figure 26. Recidivism in New Mexico during use of a court-ordered interlock relative to noninterlock revoked offenders

Univariate Regression Analysis of One-Year Interlock

Unlike the simple ratio cited above that is calculated at the end of the study period, Cox univariate analysis provides an estimate of this ratio during the entire period. Cox univariate analysis yields a hazard ratio of 0.384 with a 95% confidence interval of 0.28-0.52. The 0.384 univariate hazard ratio is the average ratio of the rearrest rates over the 1-year period and is similar, but not identical, to the ratio, 0.40, at the end of the period. Neither of these ratios (0.40 or 0.38) takes into account differences in the makeup of the interlock group and the comparison group.

Multivariate Regression Analysis of One Year Interlock

A Cox Proportional Hazard Multivariate Regression Analysis (CPHMR) was used to compare the interlock group to the comparison group for up to 1 year after the conviction date while controlling for available covariates (arrest BAC, BAC test refusal, prior DWI offenses, age, and gender). For both groups, the index time was the date of conviction. The terminal events were either 1 year after conviction or the interlock removal date if that event occurred at less than 1 year after conviction. The CPHMR hazard ratios for each variable are average ratios of rearrest rates over the period. The results are shown in Table 18. With the covariates controlled, the interlock group still has only 38% of the recidivism of the comparison group (HR=0.378, CI=0.28-0.52). This ratio is very close to that of the univariate analysis and could only result if the distributions of covariates are the same for the interlock and the comparison groups or if there are differences that cancel out.

Table 18. Hazard ratios for one year during interlock in New Mexico

Variable	Hazard ratio	95% Confidence Interval
Group: interlock/comparison	0.38	0.28-0.52
BAC g/dL ≥.16 / <.16	1.45	1.29-1.63
BAC refused / <.16	1.28	1.09-1.50
Conviction 2nds / 1sts	1.37	1.20-1.56
Conviction 3rds / 1sts	1.39	1.16-1.66
Conviction 4+ / 1sts	1.25	1.02-1.54
Gender female / males	0.89	0.77-1.02
Age (per year)	0.976	0.970-0.981

Covariates: BAC

Offenders with a high BAC upon arrest (BAC ≥ .16) were 45% more likely to be rearrested (HR = 1.45, CI = 1.29-1.63) than low BAC offenders (BAC < .16). Those who refused to submit to a breath-alcohol test were 28% more likely to be rearrested (HR = 1.28, CI = 1.29-1.63).

Covariates: Prior DWI

The rearrest rates of those who were convicted more than once were compared to the rearrest rate of first offenders. Second offenders were 37% more likely to be rearrested than first offenders (HR =1.37, CI = 1.20-1.56). Third offenders were 39% more likely to be rearrested than first offenders (HR = 1.39, CI = 1.16-1.66). Those convicted for four or more times were 25% more likely to be rearrested than first offenders (HR = 1.25, CI = 1.02-1.54). The rearrest rates of those arrested three or more times were suppressed somewhat because of the greater time that they spent in jail in the first year after conviction.

Covariates: Gender

Females were less likely to be rearrested than males, HR = 0.89, but the difference was not statistically significant, $p = 0.08$, CI = 0.77-1.02. Fewer of the comparison group (78.0%) were males relative to the interlock group (79.2%).

Covariates: Age

As usual, age is very significantly correlated with the probability of rearrest, HR = 0.976, CI = 0.970-0.981. This means that for every additional year older, a convicted offender has a lower probability of rearrest by 2.4%, (CI = 1.9%-3%, $p<.001$). The average age of the interlock group was 37.0, 3.5 years older than the 33.5 age of the comparison group; the potential bias due to this factor in the univariate analysis favored the interlock group, and was just large enough to cancel out the biases due to the three previous covariates. The three estimates of the ratio of probabilities of rearrest within 1 year after conviction are summarized in Table 19.

Table 19. New Mexico interlock and comparison groups hazard ratio for one year during interlock

Type of Analysis	Hazard ratio	95 percent Confidence Interval
Calculated from Figure 26:	0.40	
Univariate Cox regression	0.384	0.28 – 0.52
Multivariate Cox regression	0.378	0.28 – 0.52

Recidivism Three Years after a DWI Conviction for Interlock and Noninterlock Groups

Recidivism during the 1-year period most proximal to the interlock installation in New Mexico is summarized in Figure 26 and Tables 18 and 19. Depending on the method used to calculate differences, the figure shows a 60 to 62% reduction in the recidivism rate while the interlock is on the vehicle, a rate comparable to those in other States and provinces. To include time after interlock removal, all 20,965 statewide offenders were followed for 3 years from the time of a DWI conviction. The survival graph of that group broken out by interlock and noninterlock is shown in Figure 27. The gap between the interlock and the comparison groups may widen somewhat over the entire 3-year period but much less rapidly after the first year during which the interlocks were installed. At 3 years after the conviction dates, the absolute difference between the 12.8% recidivism for the interlock group and the 17.7% recidivism for the comparison group was 4.9 percentage points 3 years after the dates of conviction.
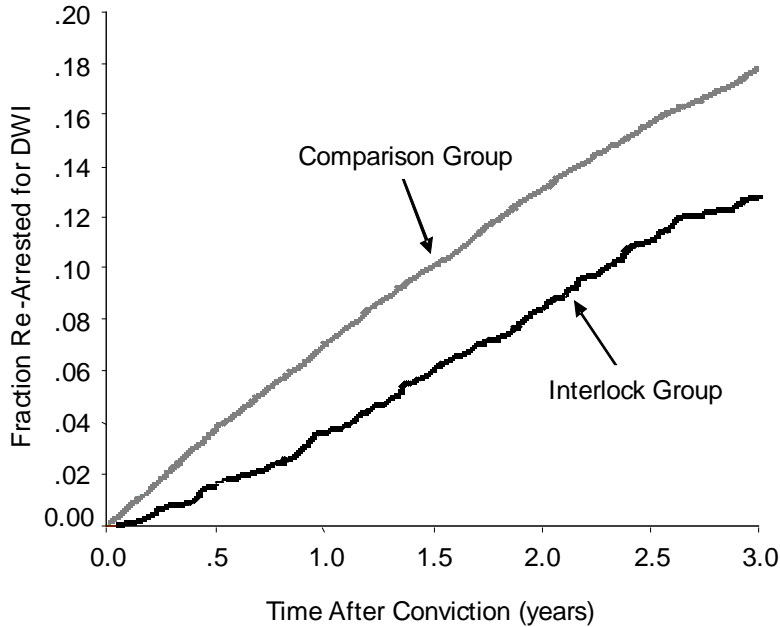
Figure 27. Interlock and noninterlock recidivism for 3 years from conviction date, New Mexico

Cox Regressions for Three Years of Data

Regressions were run for the 20,965 convicted offenders from their conviction date until the end of the available arrest data, March 31, 2007. The results are shown in Table 20. As with the 1-year data, the ratio calculated from the 3-year survival graph is very close to the hazard ratio from the univariate Cox regression and the ratio calculated from the multivariate Cox regression. Again, this is likely due to cancellation of the biases within the covariates of age, gender, priors, and BAC between the interlock and the comparison groups. Although the separation of the curves is steepest during the first year, there is nonetheless a significant difference for the entire period including both the interlock and post-interlock periods.

Table 20. New Mexico interlock and comparison groups hazard ratio for 3 years after conviction

Type of analysis	Hazard ratio	95% CI
Calculated from Figure 27: 12.8 % / 17.7 %	0.72	
Univariate Cox regression	0.70	0.61 – 0.79
Multivariate Cox regression	0.71	0.63 – 0.81

Recidivism of Interlock and Non-interlock Offenders in Santa Fe County

One Year after Conviction

Knowing the recidivism rate statewide, the question about reductions in expected recidivism can now be examined by comparing the high-installation rate of Santa Fe County, during the special 2 year period, to the rest of the State. In Santa Fe County, between June 2003 and May 2005, 729 DWI offenders installed interlocks within 90 days after their conviction, and 788 did not. Again, the number of interlocked offenders who installed within 90 days after a conviction was chosen because this time interval likely excludes voluntary installations. This 90 day number is smaller than the values in Table 17 which are for wider intervals. That is, in order to

isolate the mandatory installations, we operationally defined installations within 90 days after conviction as true mandatory installations. Figure 28 shows the recidivism of both analysis groups between the conviction date of each and terminal events as before: a rearrest date, an interlock removal date, or 1 year, whichever comes first. The survival graph adjusts for the fact that some in the interlocked group were followed for less than a year because they removed their interlocks before 1 year after conviction. Nonetheless it allows us to estimate the absolute difference in recidivism, 8.4% - 4.2% = 4.2% and the ratio of recidivisms, 4.2% / 8.4% = 50% at the end of the 1-year period. The ratio represents the recidivism of convicted offenders who installed interlocks within 90 days after conviction to the recidivism of convicted offenders who did not install interlocks.
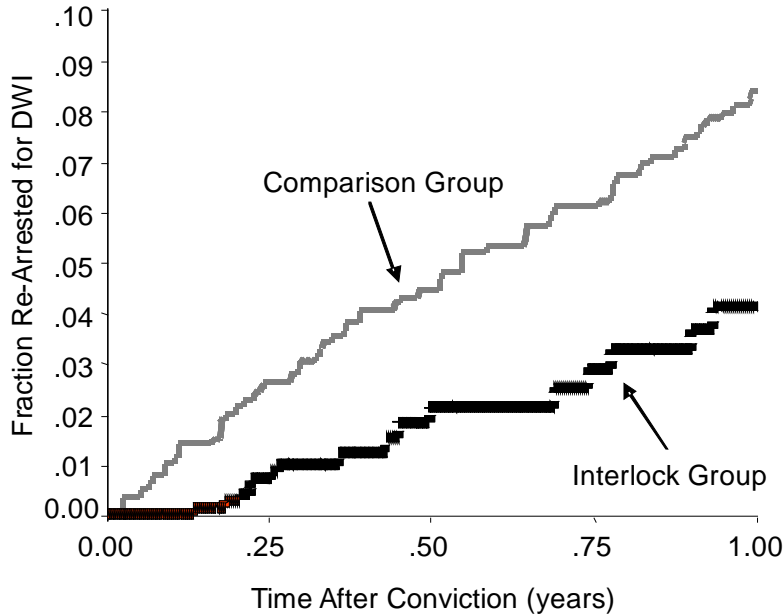
Figure 28. Recidivism of Santa Fe County, New Mexico, offenders 1 year after conviction

Santa Fe County Cox Univariate and Multivariate Regressions One Year
As before, Cox univariate and multivariate regressions were also run on the data for Santa Fe magistrate and municipal courts during this active period. The results are summarized in Table 21. The univariate analysis gave a hazard ratio of 0.43 and a 95% confidence interval of 0.25 – 0.75. The multivariate analysis gave a hazard ratio of 0.39 with a 95% confidence interval of 0.22 – 0.68. The multivariate Cox regression hazard ratio of .39 during the 1-year interlock installed period compares favorably with the multivariate hazard ratio of .38 shown in Table 19 for the State as a whole.

Table 21. Santa Fe interlock and comparison groups hazard ratio for 1 year during interlock

Type of analysis	Hazard ratio	95% CI
Calculated from Figure 28: 4.2 % / 8.4 %	0.50	
Univariate Cox regression	0.43	0.25 – 0.75
Multivariate Cox regression	0.39	0.22 – 0.68

Three Years After Conviction Santa Fe County Cox Univariate and Multivariate Regressions
Figure 29 shows the recidivism of interlock and noninterlock offenders from Santa Fe courts during a 3-year period following conviction. For the interlock group, it covers the period both

during and after interlock (and a brief period before interlock to equate the exposure period post-conviction of the two groups). The interlock group has a cumulative rearrest rate of 14.2% and the noninterlock group has a rearrest rate of 17.4%. The absolute difference is 3.2% and the ratio is 0.82.
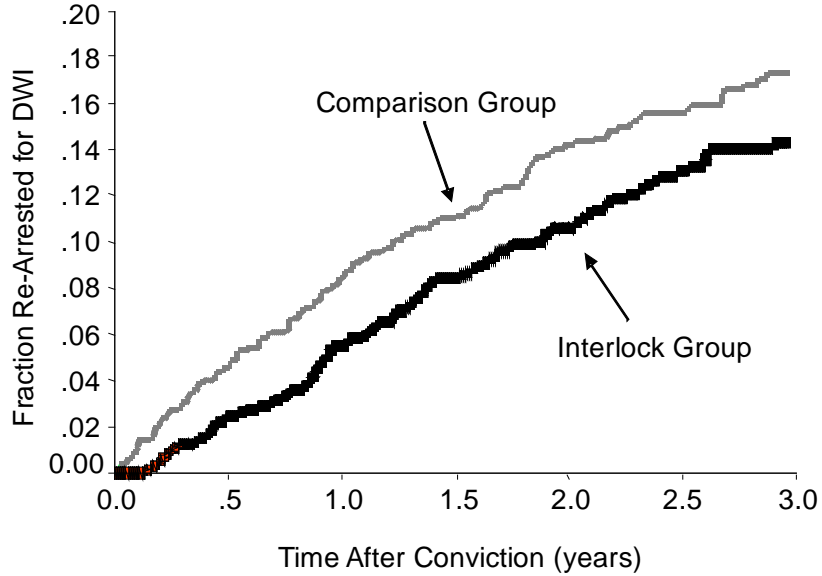
Figure 29. Recidivism of Santa Fe offenders 3 years after conviction

Once again, Cox univariate and multivariate regressions were run on the data for Santa Fe magistrate and municipal courts. The results are summarized in Table 22. The univariate analysis yielded a hazard ratio of 0.80 with a 95% confidence interval of 0.62 – 1.03. The multivariate analysis yielded a hazard ratio of 0.85 with a 95% confidence interval of 0.65 – 1.10. These ratios, though substantial, were not statistically significant at the 95% confidence level. It is evident from Figure 29 that the growing initial separation of the curves begins to close toward the end of one year after which the curves run almost parallel. An important difference in Santa Fe County is the much higher proportion of all offenders with interlocks. The strong mandate in Santa Fe likely drew more resistant offenders into the interlock sample, and as a result, some of this group may have had a higher proclivity to reoffend once the device was removed. If the sample size was greater, the confidence intervals around the hazard ratio likely would have been tighter and statistical significance attained, but that would not alter the evidence that the interlock has its safety benefit largely while installed. This information from Santa Fe shows it appears the interlock program is capable of having a benefit even when such a large proportion of all offenders are included in the sample. A useful contrast is the similarity of the State and county multivariate hazard ratios during the interlock-installed period of 1 year and the 3-year (during plus after) hazard ratios of .71 for the State (Table 20) and .85 (Table 22) for Santa Fe County.

Table 22. Santa Fe interlock and comparison groups hazard ratios for 3 years after conviction

Type of analysis	Hazard ratio	95% CI
Calculated from Figure 29: 14.2% /17.4%	0.82	
Univariate Cox regression	0.80	0.62 – 1.03
Multivariate Cox regression	0.85	0.65 – 1.10

Comparison of Overall Reductions in Recidivism in Santa Fe and in New Mexico

The only study reporting a reduction at the county level (among all offenders) was the Voas et al. (2002) study in Hancock County, Indiana, which found 40% (first offender) and 22% (multiple offender) reductions consequent to the 62% installation rate attained.

In Santa Fe County with a 71% installation rate during this period, the third question posed in the introduction about jurisdiction-level reduction in arrests can now be addressed. First, however, we need to determine what the statewide benchmark recidivism rates are before and after the first mandatory law.

It is clear that interlock DWI offenders have a lower rearrest rate than noninterlock offenders while the device is installed, but a more important question is "What is the association between the introduction of the mandatory ignition interlock law in New Mexico and the statewide DWI rearrest rate?" Figure 30 bears on that question. In New Mexico, there were 58,779 convicted offenders in the 2 years before and the 2 years after the first mandatory interlock law went into effect on January 1, 2003. Figure 30 compares the rearrest rates before and after January 1, 2003. It shows that there was a 16% reduction in 1-year recidivism, from 8.0% before to 6.7% after the new law. The absolute difference in recidivism was 1.3% at 1 year and 2.3% at 2 years. For this difference to be interpreted as a consequence of the interlock laws requires the assumption that any other safety initiatives underway had little or no effect. Because there was concurrent activity to improve enforcement under the auspices of a Comprehensive DWI Enforcement Program in New Mexico supported by NHTSA, the possible interlock effect shown here is perhaps best considered to be an upper bound of an impact estimate. At some future time, when NHTSA can quantify the impact of its DWI Enforcement Program it may be possible to distinguish the relative contributions of these different initiatives to improve road safety in New Mexico.
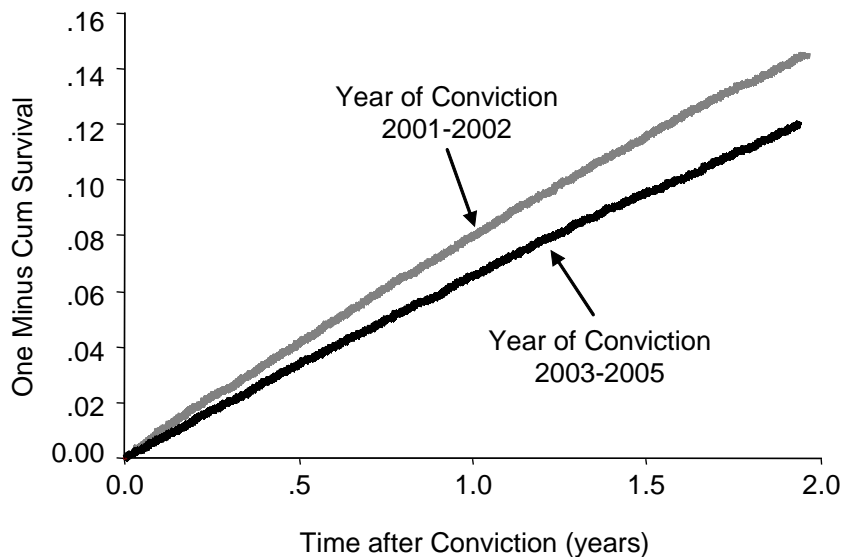
Figure 30. Changes in DWI arrest rates among 58,779 DWI offenders 2 years before and 2 years after the initial mandatory interlock law in New Mexico

Because a much greater fraction of offenders installed interlocks in Santa Fe County than statewide, there should be an even greater jurisdictional reduction in recidivism there. Figure 31 shows the data for Santa Fe County. There was a 29% reduction from 8.7% before the new law to 6.2% after the new law. The absolute difference in recidivism was 2.5% at 1 year and 3.8% at 2

years. Before 2003, Santa Fe recidivism rates were higher than the statewide rate; after 2003, Santa Fe rates were lower.
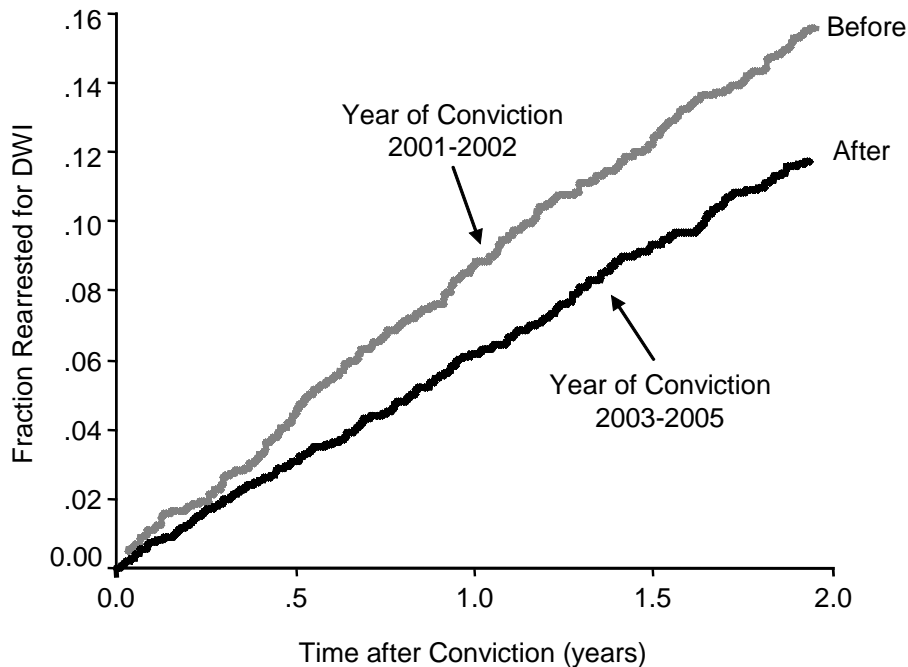
Figure 31. Changes in DWI arrest rates among 4,855 DWI offenders in Santa Fe County 2 years before and 2 years after the initial mandatory interlock law in New Mexico

Comments

Over a 2-year period from June 2003 to May 2005, 71% of the 1,145 people convicted in Santa Fe magistrate court installed interlocks between their arrest and 1 year after their conviction. During this same period, the comparable installation rate in the Santa Fe municipal court was 28% while other courts in the State averaged 13% (the State rate is much higher now). Seventy-one percent is the highest rate of installation yet reported, eclipsing the 62% rate reported in Hancock County, Indiana, program (Voas & DeYoung, 2002). The Hancock County rate was attained as a result of a similar judicial policy that encouraged installation of interlocks by making the alternative house arrest (electronic monitoring). We know from the Santa Fe County compliance officer, Joann DeBaca, that 25 to 30% of offenders initially given the choice of interlock or house arrest elected house arrest, but after some thought many later came back with a vehicle for interlock installation. The actual estimate of offenders who had house arrest during the probation period was 10-15%, and that rate reflects county financial support since house arrest is akin to jail. More importantly, the Indiana study was a small sample in a small rural county whereas the Santa Fe program had big numbers in a midsize county; this high-installation rate is one of the two most important features of the Santa Fe County interlock mandate. Furthermore, even when drawing into the program the more recalcitrant DWI offenders, the interlock program still significantly reduced DWI offenses during that time.

Having more DWI offenders on the interlock helps reduce jurisdiction-level recidivism. The comparison of before and after the initial mandatory ignition interlock law in New Mexico

showed that the 1-year rearrest rate decreased 16%, whereas in Santa Fe County the decrease was 29%. The rearrest rate of offenders without interlocks was two and a half times that of those who had interlocks while interlocks were installed, despite the revoked status of the noninterlocked offenders who should not have been driving at all. These differences must be appreciated with the caveat that differences in arrest rates are not the same as differences in alcohol crashes or other more meaningful measures of road safety. However, the standardized score comparison of interlock penetration with some of the other safety-related changes in alcohol-related risk, shown in Figure 8 in the Interlock Penetration section, provides some support for attributing the safety effect to the interlock rather than some undocumented concurrent initiative.

Legislative efforts to strengthen the ignition interlock continued in New Mexico after the study period described here. The study period reported here preceded the June 17, 2005, law that requires all convicted DWI offenders to get an ignition interlock license and install interlocks in all vehicles that they drive.

The Santa Fe program study period ended in 2005 because a district judge determined that the magistrate judges did not have the right to impose a general sanction (house arrest) for those who did not comply with the specific sanction of interlock. The effect of that prohibition is evident when looking at the 2007 county-level penetration by conviction data (Figure 7) in which Santa Fe County is now fifth from the top rate in New Mexico, below Bernalillo County (Albuquerque), whereas the same charts reflecting 2005 data had Santa Fe County at the top by a considerable margin. So, today offenders in Santa Fe, New Mexico, who claim to have no vehicle or claim to have no intention to drive can usually still avoid the interlock. Evidence presented earlier (McCartt et al., 2002; Ross & Gonzales, 1987) shows that most offenders, especially those in States with lax enforcement and laws, continue to drive, at least occasionally. In addition, a wealth of evidence presented in the background sections has shown those without interlocks are rearrested for DWI two to three times more frequently than offenders with interlocks. Those who abscond or who are not convicted are not subject to the State mandatory installation sanction.

One argument that judges have made is that they do not have the necessary probation staff to enforce and monitor interlock mandates. In New Mexico, when funds were made available to support three probation officers to serve the Albuquerque Courts, there was a large increase in the interlock installation rate, suggesting that their argument is valid, and this may partially account for the sharp increase in Bernalillo County interlock penetration between 2005 and 2008.

The results of this Santa Fe study demonstrate that motivating interlock installation by providing a less desirable alternative to the interlock (house arrest/electronic monitoring) can substantially increase the number of DWI offenders choosing to install interlocks, and that increase in pressure to install does not decrease the effectiveness of the interlock in limiting recidivism.

STUDY 5: BREATH-TEST PATTERNS IN THE INTERLOCK RECORD

New Mexico Interlock BAC Test Patterns

In earlier work, we have reported on the BAC data from the interlock records based on one or two interlock providers working within a single State or province. We reported on results from more than 2,000 DWI offenders in Alberta (Marques et al., 1999; Marques et al., 2001b, Marques et al., 2003a) from ACS data, more than 7,200 offenders in Quebec from ACS data (Marques et al., 2003b), and more than 11,000 offenders in Texas from Smart Start and Lifesafer data (Marques & Voas, 2005). Because New Mexico allowed many interlock companies to operate within the State, in New Mexico the interlock data (10.1 million tests) of approximately 7,500 DWI offenders represent five interlock companies. Table 23 shows the breath-test event frequency across the five different providers. These range from a high of 49.9% from Lifesafer to a low of 5.3% from ACS. Aggregating the data into a common file format is more time consuming, and there are minor differences in the coding of events; nonetheless, the general patterns have a familiar look. Approximately half of interlock tests in New Mexico are running retests rather than startup tests; in other jurisdictions studied, about 60% of tests are startup tests.

Table 23. Interlock breath-test frequency by provider in New Mexico

	Frequency	Percent
ACS	53,7003	5.3
Draeger	1,519,055	15.0
Guardian	1,589,970	15.7
LifeSafer	5,047,586	49.9
SmartStart	1,422,403	14.1
Total	10,116,017	100.0

In New Mexico, there were 10.1 million BAC tests in the log file. Here, as in the other jurisdictions that have been studied, most tests are passed. New Mexico interlock BAC test patterns by day of the week are shown in Figure 32. The total bar heights on this figure show that Friday is the day with the most tests and that the rate of tests drops off during Saturday and Sunday. In many figures that follow, there are BAC intervals represented in stacked bar graphs. Until the final interval, all are equal in size (e.g., .00 - .009 g/dL, .01 - .019 g/dL … .07 - .079), but the final interval represents all results at .08+ higher values.

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Patterns by Day of the Week
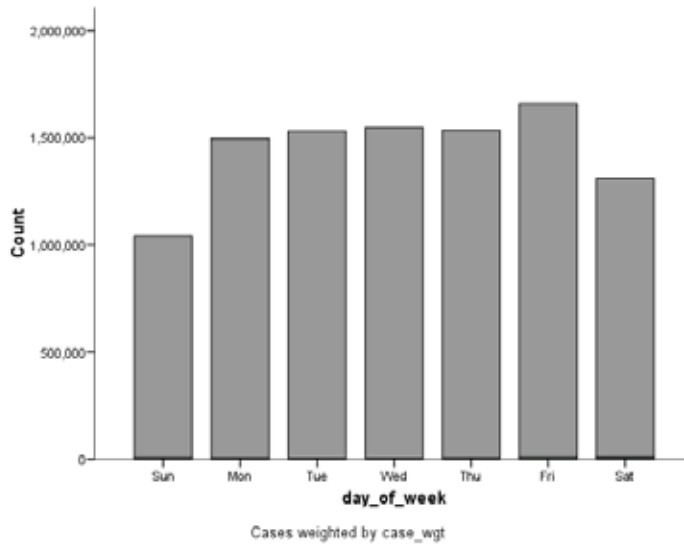
Figure 32. Count of interlock BAC tests by day of the week, New Mexico

To see the day-by-day pattern of elevated BAC tests, BAC values < .02 g/dL, representing about 99% of tests, are excluded from the bars. The pattern shown in Figure 33 without the two most frequent bins of passed tests emulates the same pattern found in other jurisdictions. That is, Tuesday has the fewest elevated tests and the positive tests increase each day through Saturday , after which they begin to decline. As each day breaks at midnight, the Saturday bar has late elevated tests after Friday ends and again in the hours up to Saturday midnight.
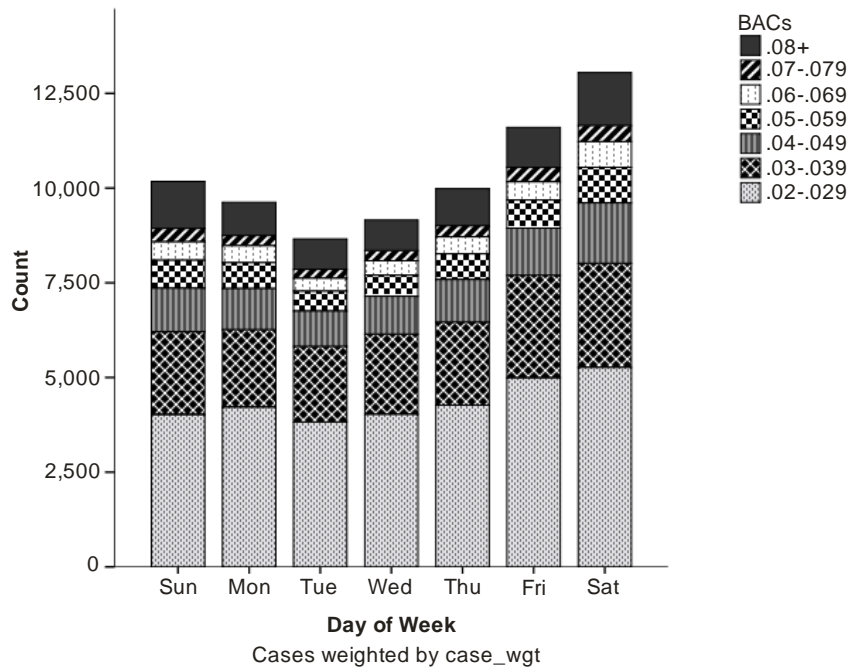
**Figure 33. Stacked bars with count of BAC tests by day of the week,
BAC < .02 g/dL excluded, New Mexico**

Patterns by Hour of the Day

The hour of the day when tests are most likely to be taken is also of interest, particularly because, as our prior research has determined, the early morning elevated tests are predictive of future recidivism (Marques et al., 2001b, 2003b). The distribution of all tests taken by hour of the day is shown in Figure 34. In Figure 34, as in Figure 32, all BAC ranges are shown, but higher BAC stacked bar segments are obscured by the more dominant passed BAC test results in the range of 0-.019 g/dL. The peak hour for maximum number of all tests is 16:00 hours (4 p.m.). Figure 34 includes all 7 days of the week.

All seven days of week together

Cases weighted by case_wgt
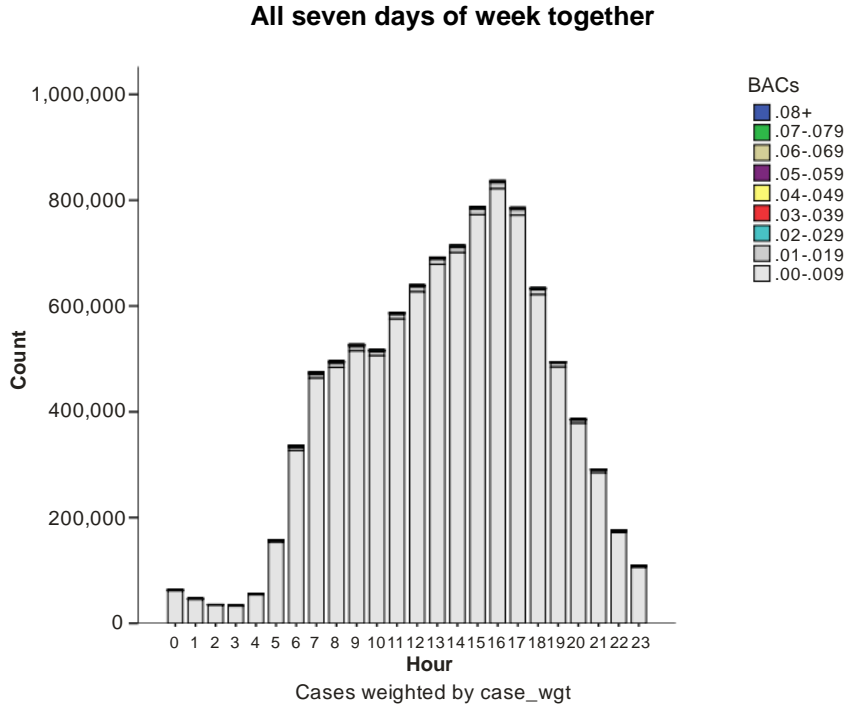
Figure 34. All interlock BAC tests by the hour the test was taken, New Mexico

As was shown earlier for day of the week, removing the BAC test results <.02 g/dL reveals the pattern of elevated BAC tests. The chart in Figure 35 shows this result for all days of the week, including Saturday and Sunday. Even with Saturday and Sunday in the chart, it is already apparent that the morning hours from 7 to 9 have the time of greatest number of elevated tests.
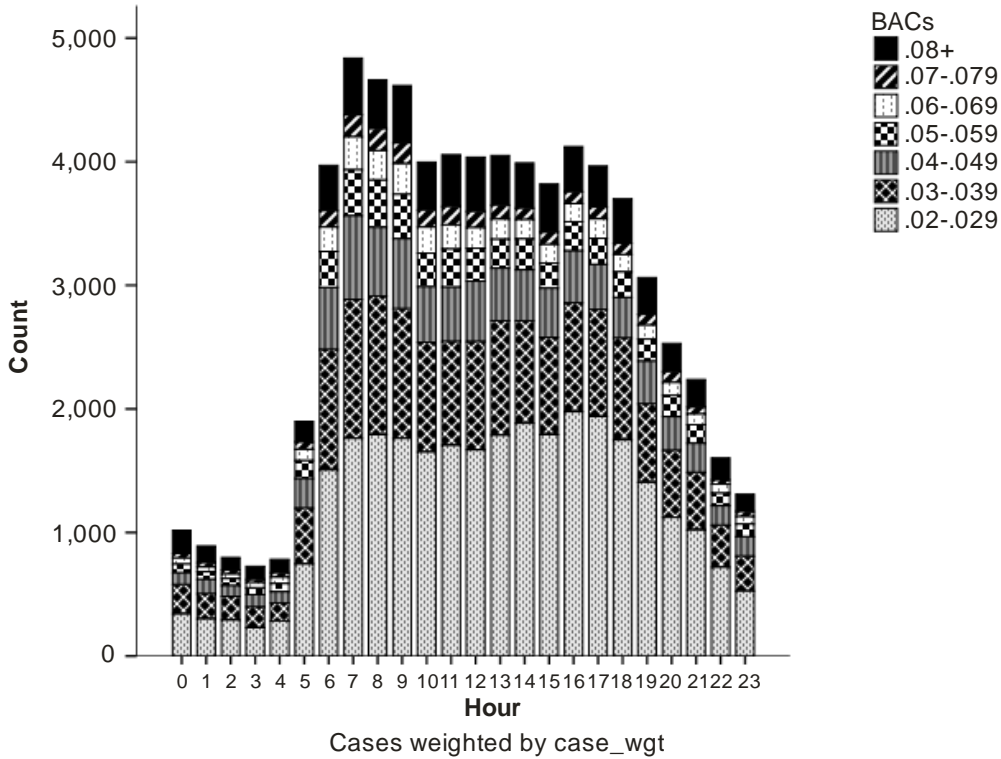
**Figure 35. All days of the week, stacked bars of elevated BAC tests
by hour, BAC < .02 g/dL removed, New Mexico**

Monday to Friday Only

The weekend (Saturday and Sunday) generally has different vehicle startup patterns. Figure 36 shows the hour-of-the-day data with Saturday and Sunday removed from the data set. This emphasizes the strong spike up in positive BAC tests during the early morning workday hours, showing that the high rate of positive tests spans the hours from 6 a.m. to 9 a.m. This is very much the same pattern as is shown in Figure 3 in the Background 1 section from Alberta, Quebec, and Texas when Saturday and Sunday are excluded. It also shows a secondary late afternoon peak, much as was found in those jurisdictions.

There has been no external confirmation of the interpretation we impose on these patterns. We assume the early morning peaks reflect unmetabolized alcohol from the prior night of drinking and the late afternoon peak could reflect either end of the work day "Happy Hour" drinking or the swing shift workers getting their day started.

Monday to Friday Only

Cases weighted by case_wgt
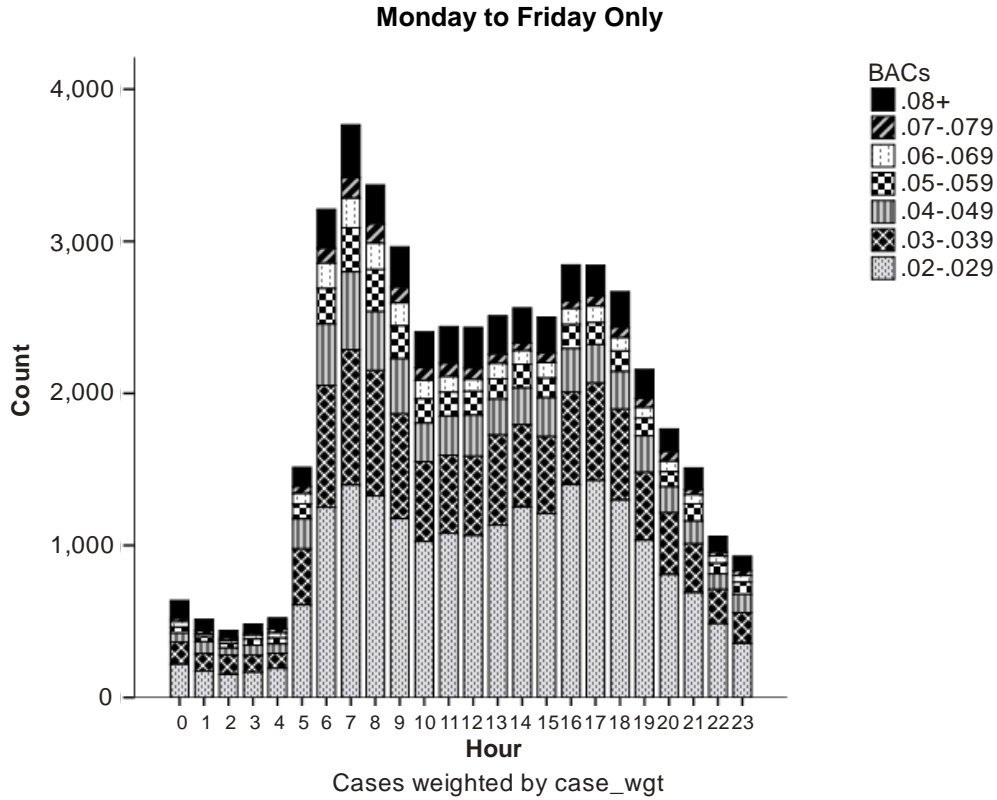
Figure 36. Stacked bars of elevated BAC tests by hour, BAC < .02 g/dL removed, Monday to Friday only, New Mexico

Saturday and Sunday Patterns

To emphasize the difference in pattern between the weekdays and the weekend, Figure 37 shows the distribution of elevated tests for Saturday and Sunday only. In this case, the time of peak elevated tests is similar to the time of all tests (not shown), reflecting the typically different schedule of waking and vehicle use during the weekend.
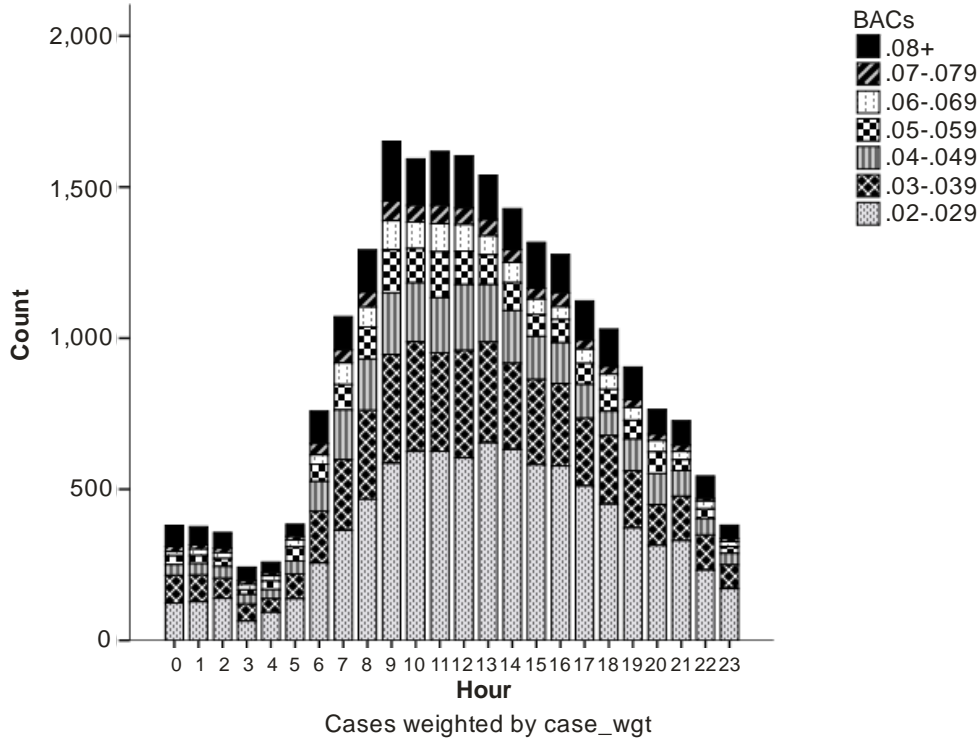
Figure 37. Stacked bars of elevated BAC tests by hour, BAC < .02 g/dL removed, Saturday and Sunday only, New Mexico

Weighted Summary Patterns of Lockout BAC Tests

A way to emphasize the lockout results (not just the elevated test patterns) is to portray these BAC data by assigning the value of zero to all results that are less than the New Mexico lock point of .025 g/dL, a value of 1 to all values at or above the lock point up to .0499, and a value of 2 to all values at .05 g/dL or greater. The line chart shown in Figure 38 portrays the weighted result of this for hour of the day (all days of the week), and Figure 39 portrays this weighted result for days of the week. The summed score by hour is shown on the ordinate. Assigning zero to the passed BAC tests effectively removes them and gives greater emphasis to the lockouts. Assigning a value of 2 to tests ≥ .05 g/dL emphasizes the impairing levels of alcohol among those lockouts. Tuesday is the day with the fewest attempts to drink and drive. By hour of the day, the 7 a.m. to 9 a.m. peak is definitively emphasized.
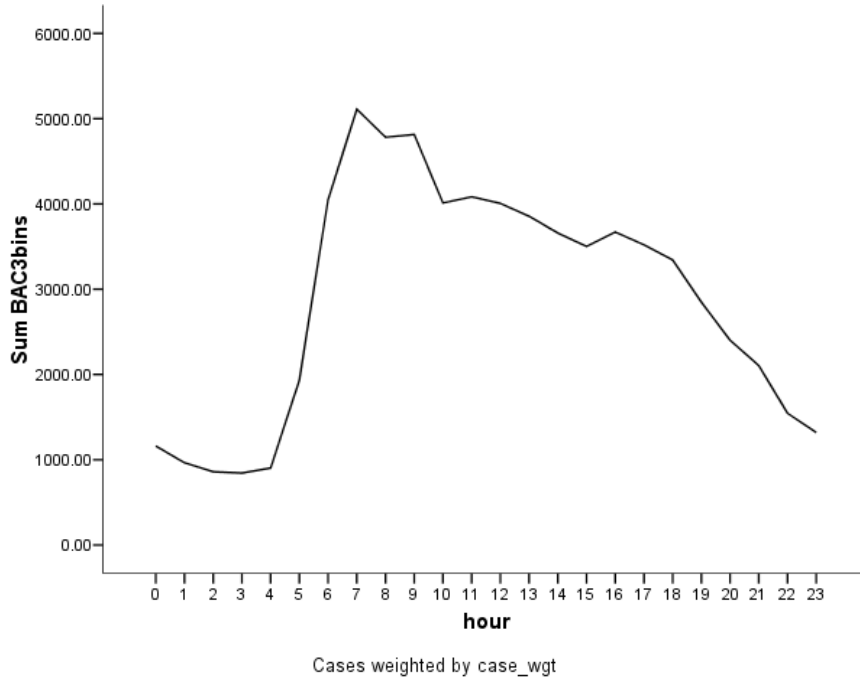
Figure 38. Weighted lockout interlock BAC tests by hour of the day, all days of the week. Lockouts at .05 g/dL or more are emphasized, New Mexico.
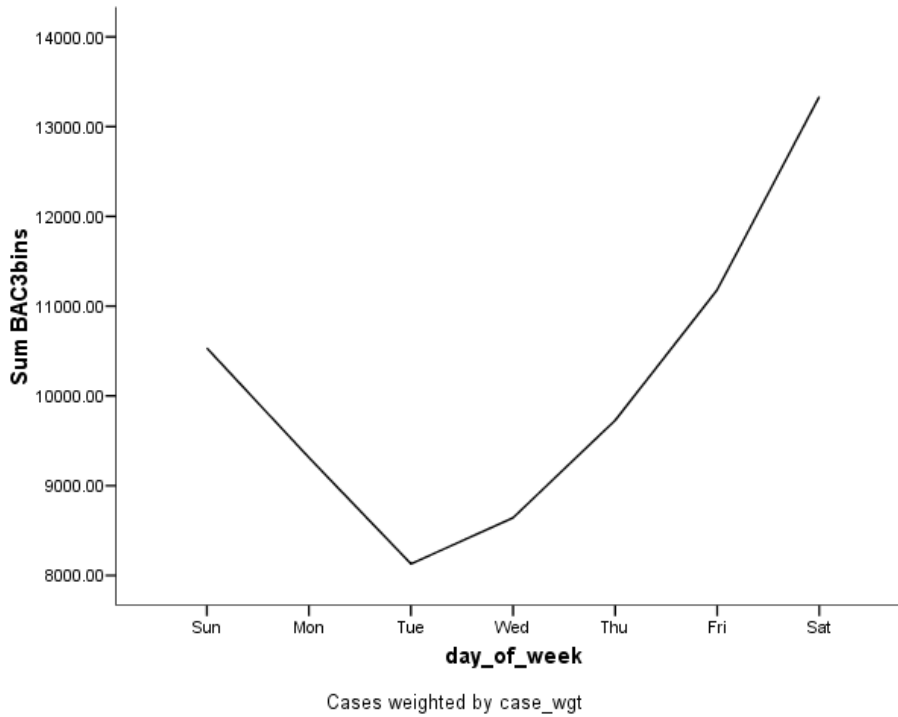
Figure 39. Weighted lockout interlock BAC tests by day of the week. Lockouts at .05 g/dL or more are emphasized, New Mexico.

Comments

The patterns portrayed in this section are in some respects not surprising. It is not very likely that people choose to have a nip of alcohol before setting out to work on the Monday to Friday from 7 a.m. to 9 a.m. The sharp peak in Figure 36 (relative to the Saturday and Sunday pattern in Figure 37) suggests this is the behavior of primarily compliant people who are getting up and driving to their jobs unaware that their BAC is high enough to prevent a start or is likely to be logged as a positive BAC. They might feel a little hangover but likely have not yet learned the relationship between a prior night of drinking and the metabolism rate of alcohol in which the average clearance rate of .017 g/dL per hour (Widmark, 1932) would require approximately 10 hours to clear a BAC level of .17 g/dL—a peak that is close to the average BAC of an arrested drunk driver. Drinking heavily up to bedtime, even if that was 11 p.m., would not result in a peak BAC for another hour or more. So it is not surprising that BAC is still elevated the next morning. This may be the source of some complaints heard from users that the interlock is too sensitive or is not working. The weekend pattern of elevated BAC tests, which shifts to the right by a couple hours and yields a flatter more graded peak, is consistent with this interpretation. Not everyone works the 8-to-5, Monday-to-Friday pattern, but enough do that their patterns define the shape of the aggregate distribution. Similarly, from the earliest report on the patterns in the interlock record (Marques et al., 1999), Tuesday continues to be the day with the lowest BAC results. In New Mexico, as with the other three States and provinces, after Tuesday BAC climbs through the week until Saturday, which logs the high point. It is likely that Saturday (defined here by the clock hours midnight to midnight) is highest because it includes drinking from both the hours after midnight Friday and all through Saturday evening.

Among all the breath-test records now examined and reported in the literature, the patterns shown here have been found repeatedly. The evidence base is very strong, representing approximately 50 million breath tests by 20,000 offenders, from three predominant languages groups, across four jurisdictions, recorded by five interlock companies, in two different countries. On those bases, it is safe to regard these patterns as a stable feature of North American DWI drivers.

STUDY 6: COMPARATIVE ANALYSIS OF PREDICTORS OF RECIDIVISM

Having discussed some of the temporal patterns of passed and failed interlock BAC tests in Study 5, this section examines the relationship between some of those BAC test patterns (e.g., the rates of all elevated tests, the rates of morning hour elevated BAC tests) together with other, more conventional predictors of recidivism, such as prior DWI, age, and arrest BAC. The results will review these relationships, both as simple unadjusted predictors and as variables within a multivariate Cox Regression model in which all variables compete to explain recidivism.

Methods

Potential predictor variables were derived from both the interlock event records, and the CTS data. Some variables were naturally categorical, some were dichotomous, and some were intentionally clustered. Continuous variables were broken into ordinal distributions in order to examine clusters within any one variable. Such data was arranged from lowest to highest (e.g., breath test failure rates) and divided into subgroups. When possible, a full 10 (deciles) of groups with near equal sample size were created. However, for some variables, the zero categories were larger than 10% of the cases. An extreme example is the 76% of the offenders who had zero interlock BAC tests $\geq .05$ g/dL in the morning hours. However, the 24% who do log those high-failed tests are uniquely interesting. Some variables, such as prior DWIs, were clustered into fewer groups. There were people with up to 15 prior DWIs, but we examined just five clusters: 0, 1, 2, 3-5, and 6+. Table 24 lists the variables and subgroups available for study in this analysis.

Table 24. Potential predictor variables examined for interlock recidivism analysis, New Mexico

Variable	Subgroups	Comment	Reference group
Age group	5		Under 21 yrs (7%)
Prior DWI	0-15		0 (1st offender)
Prior DWI group	5		1st offender (36%)
Arrest BAC category (5 ordinal categories plus one group for refusals)	6	BAC test refusals=6	Below .079 g/dL (lowest BAC)
Crash at citation	2	yes, no	No (86%)
Aggravated DWI	2	yes, no	No (54%)
Interlock service providers	6		LifeSafer (29%) (most frequent)
Weeks on interlock	0-375 wks		< 1 week
Decile weeks on interlock	10	~ equal	Decile 1 (< 14 wks)
Deciles trips (startup tests)	10	~ equal	Lowest 10%
Deciles .025+ g/dL at start (fail)	7	38% zeros	Zero
Deciles .050+ g/dL at start (high fail)	5	57% zeros	Zero
Deciles .025+ g/dL any test (fail)	7	35% zeros	Zero
Deciles .050+ g/dL any test (high fail)	5	54% zeros	Zero
Deciles retest refusal rate	8	27% zeros	Zero
Decile retest fail or refusal rate	9	19% zeros	Zero
Deciles .025 g/dL morning start (fail)	5	61% zeros	Zero
Deciles .050 g/dL morning start (high fail)	3	76% zeros	Zero
Deciles circumventions	4	74% zeros	Zero

The occurrence of positive BAC tests at different times of the day was examined and reported in our prior work where we have noted that BAC lockouts during different periods of the week or day were predictive of future recidivism (Marques et al., 2001b, 2003a, 2003b). Evidence supporting the reason for our interest in failed BAC tests during the morning hours as a predictor of recidivism is more completely detailed in Study 5 of this report. Although other time-of-day patterns are also predictive of future recidivism (e.g., nighttime weekend rates of elevated BAC tests), the morning hour elevated tests are potentially more revealing as it was the most frequently represented time interval, and it is very likely trace evidence of a prior night of binge drinking. In a comparison of multiple intervals in other studies, elevated BAC tests in the morning hours were the strongest specific time-of-day predictor. To restrict the analysis of timing of BAC tests to a specific question, we include only the pattern of morning elevated tests here in the evaluation. Morning, as defined here, includes Monday through Friday from 7 a.m. to 9 a.m. and Saturday and Sunday from 9 a.m. to noon.

Two Types of Analyses Conducted

Univariate analyses of recidivism for each unadjusted, ordinalized variable were calculated to allow for a direct comparison of the "during" and "after" periods of interlock-controlled driving. The rates for any single variable provide an estimate of the simple contribution of each variable to recidivism, regardless of the partial correlation with it and other variables. This allows for a comparison of each subgroup, within a variable, relative to total recidivism. To make this simple comparison consistent within the same group of offenders, offenders who had no post-interlock exposure time are temporarily removed from the sample. In this case, 4,000 offender cases were used to compute simple recidivism of selected variables. The variables that entered into the final model of the Cox regression analyses are used for this comparison.

Separate Cox regression analyses were conducted to examine the set of variables that best accounts for recidivism outcomes in both the "during" and "after" period of interlock for all 5,885 subjects in the data file. Variables were entered in a forward conditional stepwise method. In all cases, the reference group is the lowest or youngest with the exception of the interlock service providers where the most frequent provider, Lifesafer, is the reference category.

Results

The average interlock user in New Mexico performed 32 BAC tests per week during the weeks that the interlock was installed; the median number of tests was 20. These values are less than the rates reported for Alberta or Quebec, which were in the range of 7-9 median tests per day (more than twice the rate in New Mexico). During the period of interlock-controlled driving by the 5,885 offenders in the New Mexico dataset, start tests predominate with 4.94 million, of which 33.6 thousand (= 0.68%) were failed (BAC$\geq$ .025 g/dL). Of the 3.6 million running retests, 10.5 thousand (= 0.29%) were failed.

Table 24 summarizes the variables that were available and considered in the predictive model of recidivism both during the interlock and after the interlock. Next to variable names in column 1, column 2 shows the number of discrete subgroups in the categorization. The reference (indicator) subgroup used in subsequent Cox regression analyses is shown in column 4.

Table 25 summarizes the frequency and percentage within each category of variable. On the left side of Table 25, the subgroup composition is shown, with the valid percentage (the true percentage after any missing data are excluded) within each.

The clustering is based on the total sample of 5,885. While 5,885 DWI offenders installed the interlock during the study period, the time available for evaluation of the post-interlock DWI reconviction rates declines continuously. For the purposes of a descriptive exposition of single variables (e.g., age, DWI priors, etc) the recidivism rates are shown at comparable time points during the interlock (6 and 12 months) and after the interlock (6, 12, 18, and 24 months); the right side of Table 25 shows the recidivism rate for a constant 4,000 subjects who had exposure time both during and after the interlock. These are unadjusted rates that allow for direct comparison as if that variable was the only information available. This was done to preserve the apparent importance of any one variable so the nonspecialist can see its contribution to the prediction of recidivism.

Table 25. Unadjusted relationship between ordinal groupings of recidivism predictors both during and after interlock of 4,000 offenders, New Mexico

	Frequency	Percent	Valid Percent	Cumulative Percent	Same 4000 offenders during and after interlock Unadjusted Recidivism Rates					
					During 6 mo	During 12 mo	After 6 mo	After 12 mo	After 18 mo	After 24 mo
AGE group										
1 under 21 yrs	396	6.7	6.8	6.8	0.030	0.096	0.043	0.108	0.169	0.226
2 21-29	1867	31.7	32	38.8	0.013	0.035	0.045	0.069	0.099	0.120
3 30-39	1533	26	26.3	65	0.014	0.038	0.033	0.060	0.085	0.109
4 40-49	1334	22.7	22.9	87.9	0.016	0.030	0.033	0.056	0.079	0.113
5 50+	707	12	12.1	100	0.010	0.025	0.011	0.027	0.053	0.060
Subtotal	5837	99.2	100		0.014	0.032	0.034	0.060	0.088	0.113
Missing	48	0.8								
Total	5885	100								
Prior DWIs group										
First Offender	2128	36.2	36.2	36.2	0.009	0.016	0.025	0.051	0.066	0.088
1 Prior DWI	1434	24.4	24.4	60.5	0.017	0.033	0.031	0.054	0.089	0.112
2 Prior DWIs	1021	17.3	17.3	77.9	0.008	0.028	0.044	0.067	0.099	0.138
3-5 Prior DWIs	1092	18.6	18.6	96.4	0.027	0.057	0.041	0.072	0.103	0.124
6+ Prior DWIs	210	3.6	3.6	100	0.059	0.149	0.101	0.166	0.271	0.322
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113
Interlock Service Provider										
1.00 LifeSafer	1697	28.8	28.8	28.8	0.016	0.037	0.035	0.063	0.109	0.142
2.00 Draeger	1787	30.4	30.4	59.2	0.011	0.024	0.035	0.062	0.093	0.116
3.00 SmartStart	792	13.5	13.5	72.7	0.011	0.024	0.021	0.037	0.051	0.071
4.00 Guardian	737	12.5	12.5	85.2	0.026	0.057	0.046	0.077	0.109	0.147
5.00 ACS	307	5.2	5.2	90.4	0.027	0.275	0.039	0.069	0.094	0.122
6.00 (multiple) or CST	565	9.6	9.6	100	0.018	0.038	0.034	0.061	0.077	0.096
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113

	Frequency	Percent	Valid Percent	Cumulative Percent	Same 4000 offenders during and after interlock Unadjusted Recidivism Rates					
					During 6 mo	During 12 mo	After 6 mo	After 12 mo	After 18 mo	After 24 mo
Deciles of Trips (Car use)										
Decile 1	588	10	10	10	0.016	0.053	0.030	0.049	0.095	0.120
Decile 2	591	10	10	20	0.016	0.029	0.032	0.061	0.099	0.121
Decile 3	584	9.9	9.9	30	0.019	0.036	0.037	0.058	0.095	0.104
Decile 4	588	10	10	39.9	0.026	0.051	0.035	0.062	0.088	0.129
Decile 5	591	10	10	50	0.022	0.061	0.053	0.078	0.108	0.118
Decile 6	590	10	10	60	0.019	0.039	0.029	0.063	0.080	0.115
Decile 7	587	10	10	70	0.016	0.035	0.037	0.067	0.083	0.105
Decile 8	589	10	10	80	0.010	0.027	0.041	0.069	0.086	0.111
Decile 9	589	10	10	90	0.010	0.032	0.018	0.042	0.081	0.110
Decile 10	588	10	10	100	0.012	0.034	0.042	0.070	0.106	0.149
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113
Decile of High Fails (>.05) All Starts										
Zeros	3331	56.6	56.6	56.6	0.012	0.026	0.026	0.042	0.067	0.086
Decile 7	789	13.4	13.4	70	0.005	0.022	0.031	0.051	0.086	0.133
Decile 8	589	10	10	80	0.015	0.034	0.040	0.088	0.121	0.148
Decile 9	587	10	10	90	0.013	0.031	0.060	0.106	0.135	0.172
Decile 10	589	10	10	100	0.051	0.107	0.051	0.100	0.138	0.161
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113
Decile of Fails (>.025) All Starts										
Zeros	2250	38.2	38.2	38.2	0.011	0.021	0.021	0.038	0.066	0.081
Decile 5	692	11.8	11.8	50	0.006	0.017	0.030	0.045	0.066	0.087
Decile 6	590	10	10	60	0.014	0.038	0.033	0.041	0.074	0.106
Decile 7	588	10	10	70	0.010	0.034	0.037	0.075	0.084	0.118
Decile 8	588	10	10	80	0.014	0.039	0.051	0.096	0.131	0.170
Decile 9	589	10	10	90	0.032	0.064	0.048	0.091	0.110	0.149
Decile 10	588	10	10	100	0.034	0.076	0.057	0.103	0.164	0.187
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113
Decile of Fails (>.025) Morning Starts										
Zeros	3607	61.3	61.3	61.3	0.012	0.022	0.025	0.043	0.070	0.086
Decile 7	513	8.7	8.7	70	0.008	0.026	0.035	0.046	0.090	0.125
Decile 8	589	10	10	80	0.015	0.036	0.049	0.093	0.112	0.159
Decile 9	587	10	10	90	0.021	0.069	0.055	0.100	0.135	0.181
Decile 10	589	10	10	100	0.035	0.075	0.051	0.099	0.136	0.164
Total	5885	100	100		0.014	0.032	0.034	0.060	0.088	0.113

Variables

This discussion is restricted to those variables that entered into one or both Cox regression models, either "during" or "after" the interlock period. The Cox regression results appear later in this section.

Age Groups

Age information was missing for 48 of the offenders, less than 1% of the total of overall cases. Ordinarily, as age increases DWI risk declines, such that the 50+ age group has the lowest risk and the youngest drivers have the highest risk, and that is the pattern here. The middle categories line up in an approximate age/risk sequence both during and after the interlock. From Table 25, by 12 months with the interlock, the young group (comprising 6.8% of total) had nearly 10% recidivism (.096). For this group, after the interlock had been removed for 12 months, the recidivism rate was .108, almost the same as with the interlock on the vehicle. This lack of an interlock benefit with the youngest group is evident in Figure 40 in which the slope of recidivism 6 to 12 months during and after the interlock is very similar. This recidivism of the overall group (shown in all the figures by a heavy line) during and after the interlock shows lower slopes and lower absolute level. The youngest group had a recidivism rate of 22.6% at 24 months after the interlock, a 24-month rate that is exceeded only by multiple offenders with six or more prior DWIs (Table 25). This rate will prove to be only slightly lower after other variables are in the regression model, as shown in a subsequent section of this Study 6. This finding suggests that there is a need for a supplemental behavioral intervention while these young people are captive of the interlock program; the program by itself does not seem to be sufficient to change behavior.
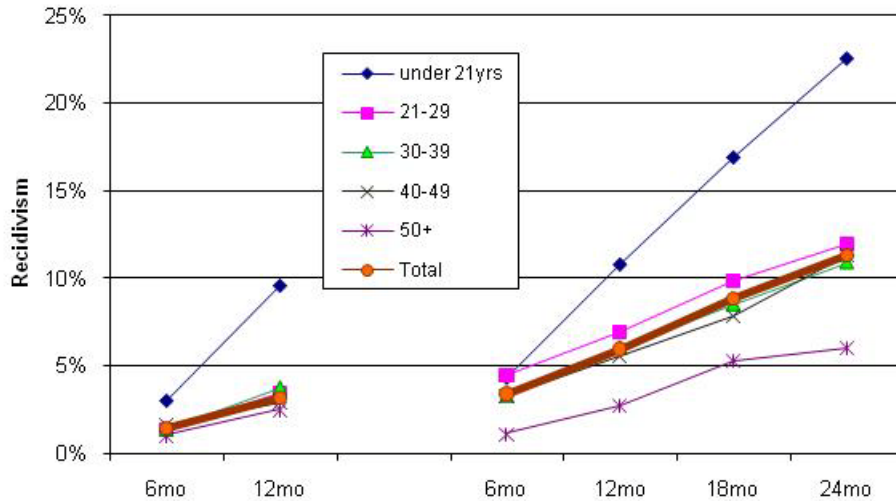
Figure 40. Recidivism up to 12 months during interlock (left), and 24 months after interlock (right) by age subgroups, New Mexico. Heavy line is the overall rate.

Prior DWI Groups

Among the prior DWI groups, first offenders are the most frequent category at 36% of cases, and they have the lowest risk of repeat DWI both during and after the interlock at 1.6% during the interlock at 12 months, and 5.1% after interlock at 12 months. Like most other offender subgroups, the rates more than double at comparable periods after interlock removal. The total

rate for all subjects at 12 months "during" and 12 months "after" is 3.2% and 6.0%, respectively (from Table 25), and is also represented in Figure 41 as the heavy reference line. The six-plus priors (six or more total DWI offenses), although representing only 3.6% of the cases, were about twice as likely as the next lower group to have more offenses both during and after the interlock (15% at the 12-month mark during interlock and 17% at the 12-month mark after interlock). By 24 months, 32% of these high prior offenders had recidivated. A more restrictive intervention may be warranted with this group, such as an ankle bracelet (e.g., electronic monitoring or transdermal alcohol monitoring; Marques & McKnight, 2007), alcohol biomarkers (which provide a longer surveillance window for monitoring drinking), treatment intervention, or all of these (built around a mutually supporting structure of monitoring and intervention).

As a caution, it should be noted that this highest risk DWI group (6 or more priors), at less than 4% of cases, is very small and, according to the CTS file, contains a higher proportion than usual of offenders that abscond or cease participation in the interlock program shortly after beginning it. These are clearly problem drivers, and likely need special attention by probation for monitoring. They may represent a subgroup of alcohol dependent drivers for whom interlocks will never be fully adequate.
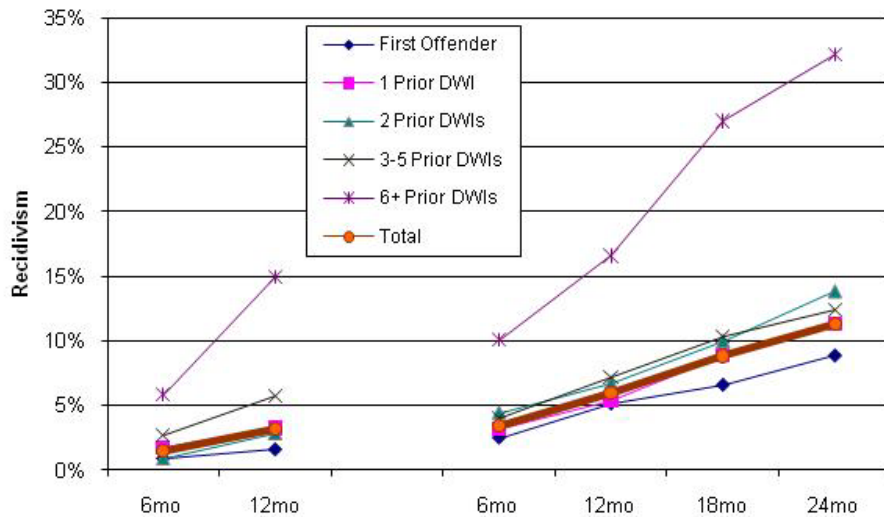
Figure 41. Recidivism up to 12 months during interlock (left), and 24 months after (right) by DWI groups, New Mexico. Group 6+ includes those with 6 to 15 priors. Heavy line is the overall rate.

Interlock Service Provider
Combining the breath-test data from the six interlock service providers (Table 25) introduces several complications because they all code events in slightly different ways. There is some difference by provider with two of the providers, Guardian and ACS, showing the highest rates of recidivism during the installed period at 6 months; ACS' rate at 12 months is quite high and this may be an artifact of its small sample size (5.2%). ACS ceased business in New Mexico mid-study. The post-interlock rates for ACS were in line with other providers. Although all interlock service providers were entered into the Cox regression models, there is not a clear reason for the small differences overall. Presumably, some providers operated in areas with higher clusters of higher-risk offenders. The alternate interpretation is that one or more providers may have had

an interlock that was easier to circumvent. That could explain differences during interlock, but not after interlock. This provider variable is examined further in the multivariate Cox regression.

Deciles of Vehicle Use (Startup Tests)

There was little apparent difference among the subgroups defined by the amount of vehicle use (start tests is a proxy for vehicle use). Nonetheless, once other factors were adjusted for in the Cox regression (Table 26), more vehicle use was associated with lower likelihood of recidivism because this variable entered into the predictive model during the interlock. It may be that those who use their vehicles least are using non-interlock vehicles after drinking and their higher recidivism may mean they spend more time with driving after drinking that is less constrained than others. Although that makes an appealing interpretation, it does not hold up across all 10 deciles.

Deciles of Interlock High Fail Start Attempts (BAC ≥.05 g/dL)

Table 25 shows that 57% of the cases had zero high-fail BAC lockouts. It is similarly apparent that about 43% of the offenders do show high-fail BAC tests ≥ .05 g/dL, and these are distributed in the top four deciles. These rates reflect the number of high fails relative to the total number of start tests performed during the interlock period and, therefore, are adjusted for the amount of driving. The rates of recidivism for the top 30% (top three deciles) are considerably higher than the lower 70%. This is clear in Figure 42 in which the absolute levels of recidivism are higher in the top three high-fail deciles. For deciles 8 and 9, the slopes shift up noticeably in the post-interlock period relative to the during-interlock recidivism, suggesting an excellent suppression in recidivism while the interlock was on the vehicle. Not so for decile 10 and this represents a cohort that probably needs more significant monitoring and control.
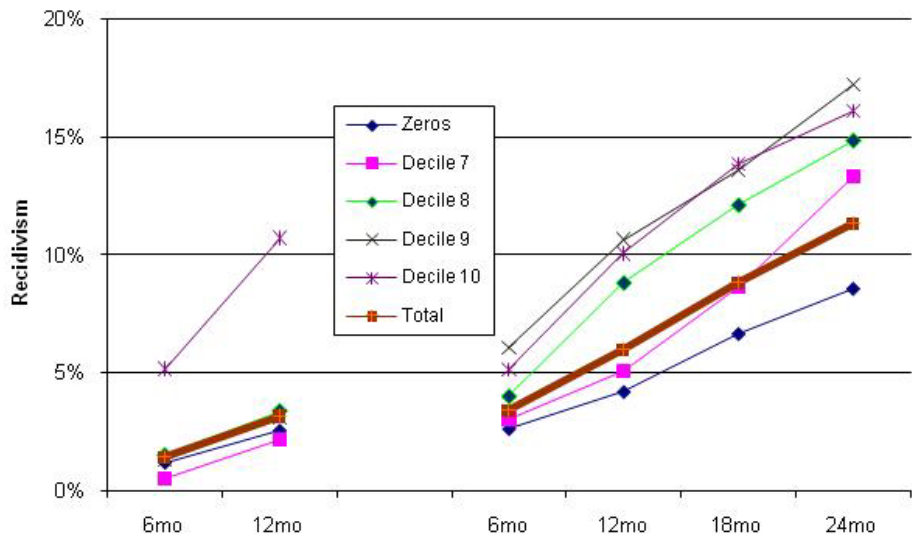
Figure 42. Recidivism up to 12 months during interlock (left), and 24 months after (right) by rates of high-fail BAC start tests (≥.05 g/dL), New Mexico. Heavy line is the overall rate.

Deciles of Interlock Failed Start Attempts (BAC ≥.025 g/dL)

Thirty-eight percent of the group had zero failed starts; 62% of interlock offenders had lockout-level BAC tests at startup, which in New Mexico is .025 g/dL. This group spreads across six deciles with the top two or three deciles showing considerably more recidivism than the overall

group averages. Figure 43 shows that, in the post-interlock period, this variable produced a high degree of spread and discrimination among the subgroups. The top 30% of offenders with failed BAC tests (deciles 8, 9, and 10), have a higher 24-month post-interlock recidivism than 94% of all the offenders scaled according to prior DWI offenses (Table 25). Only the six-plus prior DWI offense group among the priors group has a recidivism rate that exceed the top 30% of offenders who had failed BAC tests.
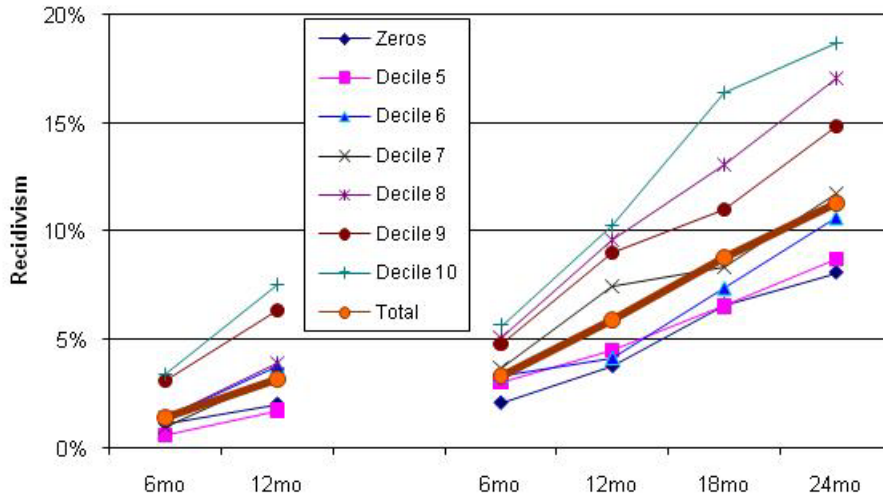
Figure 43. Recidivism up to 12 months during interlock (left), and 24 months after (right) by rates of failed BAC tests (≥.025 g/dL), New Mexico. Heavy line is the overall rate.

Deciles of Morning Interlock Failed Start Attempts (BAC ≥.025 g/dL)

About 40% of the sample had any failed morning BAC startup tests. Figure 44 shows the top 20% (deciles 9 and 10) have 12-month "during" interlock recidivism rates well above average and post-interlock recidivism rates also above average. The failed morning BAC test variable entered into both final Cox regression models. A feature of this variable is the low relative recidivism rates for the zero group after interlock.
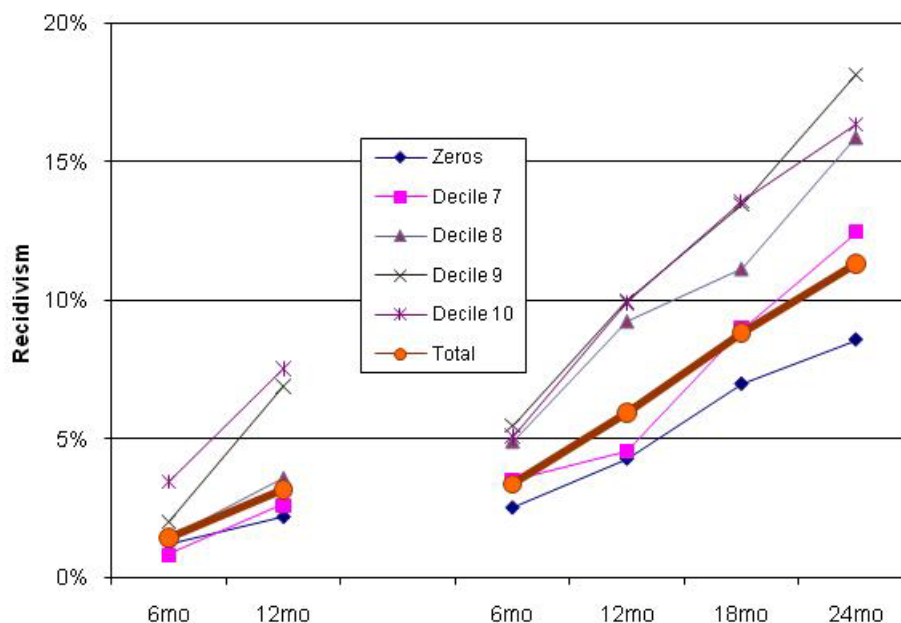
Figure 44. Recidivism up to 12 months during interlock (left), and 24 months after (right) by rates of failed morning BAC tests (≥.025 g/dL), New Mexico. Heavy line is the overall rate.

Arrest BAC

The BAC level reported at the time of arrest was expected to be a predictor of recidivism, but it was not a factor in either the "during" or "after" Cox regressions. The indicator/reference category was a BAC lower than .079, and this we infer to be either underage drinking (.02 g/dL limit) or a drug charge that was processed as a DWI. The first five categories of arrest BACs are ordinal (<.079, .08-.119, .12-.59, .16-.199, .20+), but the top category in the sequence represents those who refuse BAC tests upon arrests. Even when ignoring that category, there was still relatively little differentiation among the subgroup recidivism.

Other Variables

Some potential predictors in Table 24 proved to have relatively little spread or predictive value, and among these surprises was the rate of circumvention attempts and running retest failures or refusal to take running retests, variables that in other jurisdictions have been shown to be predictive of recidivism. However, as noted earlier, in this study we are aggregating data from multiple service providers and each provider can define these events as they choose (there are no government-issued standards), and some providers do not have a variable that obviously represents these compliance events. Evaluation of events restricted within providers might have had a different result if there was sufficient statistical power to ask those questions. It would be helpful if there were more consistency in the definition of variables used by different interlock companies.

Crash events were also thought to be possible predictors, but with only 14% of the citations involving crashes; these were likely too remote to prove predictive.

Cox Regression Results

The next phase of the analysis was to allow all variables to compete to explain the variance in a final model of recidivism. Stepwise forward conditional Cox regressions yielded a final set of

variables to help explain the factors associated with recidivism and the relative importance after final adjustments. The during-interlock period resulted in 192 repeat offense events among the 5,775 cases in the analysis (this is lower than the total number of 5,885 due to a few cases with missing data). In the post-period, 356 recidivism events occurred among the 4,053 cases with post-interlock exposure time.

When the regressions ran, the first variable to enter on the first step during interlock was the high-fail BAC (>.05 g/dL) at startup, the first variable to enter the regression on the first step of the after-interlock regression was the variable representing prior DWIs. However, the Cox regression went through six steps to arrive at a final set of variables for the during-interlock condition, and the after-interlock regression settled into a final model after four steps. All together, a total of seven variables entered into one of the two final Cox regression models for predicting recidivism during or after interlock. The variables and the importance of subgroups of variables relative to reference/indicator values are shown in Table 26, along with the Wald statistic and the *p* value associated with that variable in the final model.

The component of the Cox regressions representing age was consistent with the unadjusted data presented earlier. The large effect of the reference group of drivers younger than 21 was more determinative of recidivism than other subgroups who were older; this was the case both during the interlock period and the period after the interlock. All subgroups during and after the interlock were at least 50% lower than the youngest DWI offenders. It is evident that the youngest offenders need special attention from the monitoring and intervention programs in New Mexico.

A similar situation prevails with the groups defined by prior DWI offenses in which the first offenders have the least risk, and the group with six or more priors has the most. From Table 26, the highest group with six or more prior DWI has more than a 400% higher risk both during and after the interlock relative to other groups.

In the during-interlock regression, both the interlock service provider entered into the predictive model, whereas neither variable entered the regression equation after the interlock. The service provider finding may reflect that ACS was a low frequency provider with 5.2% of the business, and in addition, for a 2 year period September 04-September 06, averaged only 5 or 6 clients per month having transferred many clients to Draeger. So while we do not know why ACS was different, the situation with that provider was unusual.

The amount of driving shows that, after adjusting for the other factors, all of the nine deciles representing more driving (more startup tests taken) had lower recidivism risk than those with the least driving. Or stated conversely, with all other factors accounted for in the regression, those with the least driving had more recidivism. This suggests that there is a reason for interlock programs to log the total amount of driving to ensure that the offender is using the interlock-equipped vehicle. The finding that less driving during the interlock predicts recidivism is in accordance with evidence that about 75% of those rearrested for DWI during the interlock-controlled driving period do so in a vehicle other than the one with the interlock. This evidence is discussed in the next section of this report. The finding of higher recidivism by those with the least driving in the interlock-equipped vehicle might also reflect that seriously dependent drinkers cannot get their vehicles started reliably and might simply stop driving it.

The final three variables that entered the during or after regression models are all from the interlock BAC record and probably, to a great extent, all compete with one another to explain

recidivism variance. In the during-interlock model, high fails (>.05) of BAC tests relative to those with no high fails identified a 171% higher likelihood of recidivism among those in the highest decile, suggesting that this variable usefully detects a unique subset of drinkers. Those with elevated morning BAC tests that lead to any lockouts predicted recidivism, both during and after the interlock. During the interlock, all 40% of offenders with morning BAC failures were in a group that was strongly predictive of recidivism. This means that attention to this variable as a predictor could be used as a trigger for more intensive interventions while offenders are still in an interlock program.

Table 26. Cox regressions during and after interlock, New Mexico

AGE group	Relative Recidivism DURING Wald for Age = 15.8 *p*=.003 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Wald for Age = 45.4 *p* =.000 Final Model Cox Regression - Step 4 Effect Relative to Reference Rate (box)			
under 21 yrs	Sig	Exp (B)			Sig	Exp (B)		
21-29	0.004	0.431	57%	lower	0.000	0.498	50%	Lower
30-39	0.002	0.381	62%	lower	0.000	0.348	65%	Lower
40-49	0.001	0.355	64%	lower	0.000	0.385	61%	Lower
50+	0.000	0.250	75%	lower	0.000	0.188	81%	Lower
Prior DWI Group	Relative Recidivism DURING Wald for Priors = 42.9 *p* =.000 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Wald for Priors = 55.3 *p* =.000 Final Model Cox Regression - Step 4 Effect Relative to Reference Rate (box)			
First Offender	Sig	Exp (B)			Sig	Exp (B)		
1 Prior DWI	0.021	1.747	75%	higher	0.115	1.255	25%	Higher
2 Prior DWIs	0.357	1.279	28%	higher	0.012	1.531	53%	Higher
3-5 Prior DWIs	0.000	2.349	135%	higher	0.001	1.749	75%	Higher
6+ Prior DWIs	0.000	5.826	483%	higher	0.000	5.101	410%	Higher
ISP	Relative Recidivism DURING Wald for ISP = 12.46 *p* =.001 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Effect Relative to Reference Rate (box)			
Lifesafer	Sig	Exp (B)			Sig	Exp (B)		
Draeger	0.000	0.430	57%	lower				
SmartStart	0.043	0.570	43%	lower				
Guardian	0.383	0.819	18%	lower	not in model			
ACS	0.205	1.688	69%	higher				
(multiple) or CST	0.016	0.548	45%	lower				

Deciles of Trips (Car use)	Relative Recidivism DURING Wald for Car Use = 27.6 *p* =.001 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Effect Relative to Reference Rate (box)			
Decile 1	Sig	Exp (B)			Sig	Exp (B)		
Decile 2	0.111	0.561	44%	lower				
Decile 3	0.596	0.838	16%	lower				
Decile 4	0.330	0.725	28%	lower				
Decile 5	0.325	0.730	27%	lower	not in model			
Decile 6	0.073	0.537	46%	lower				
Decile 7	0.011	0.400	60%	lower				
Decile 8	0.001	0.279	72%	lower				
Decile 9	0.001	0.303	70%	lower				
Decile 10	0.000	0.201	80%	lower				
High Fails (BAC≥.05)/Start	Relative Recidivism DURING Wald for High Fails = 23.1 *p* =.000 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Effect Relative to Reference Rate (box)			
Zeros	Sig	Exp (B)			Sig	Exp (B)		
Decile 7	0.456	0.803	20%	lower				
Decile 8	0.798	1.073	-7%	lower	not in model			
Decile 9	0.824	1.062	6%	higher				
Decile 10	0.000	2.711	171%	higher				
Fails/Start (BAC >=.025)/Start	Relative Recidivism DURING Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Wald for Fails = 21.9 *p* =.003 Final Model Cox Regression - Step 4 Effect Relative to Reference Rate (box)			
Zeros	Sig	Exp (B)			Sig	Exp (B)		
Decile 5					0.839	0.955	Nc	Nc
Decile 6					0.637	0.897	10%	lower
Decile 7	not in model				0.993	0.998	0%	lower
Decile 8					0.015	1.659	66%	higher
Decile 9					0.072	1.473	47%	higher
Decile 10					0.000	2.161	116%	higher
Morning Fails (BAC≥.025)/Start	Relative Recidivism DURING Wald for Morning Fails = 20.8 *p* =.000 Final Model Cox Regression - Step 6 Effect Relative to Reference Rate (box)				Relative Recidivism AFTER Wald for Morning Fails = 11.9 *p* =.018 Final Model Cox Regression - Step 4 Effect Relative to Reference Rate (box)			
Zeros	Sig	Exp (B)			Sig	Exp (B)		
Decile 7	0.018	2.118	112%	higher	0.269	1.298	30%	higher
Decile 8	0.000	3.026	203%	higher	0.002	1.801	80%	higher
Decile 9	0.001	2.311	131%	higher	0.021	1.538	54%	higher
Decile 10	0.107	1.529	53%	higher	0.629	1.103	10%	higher

How Do Drivers Reoffend When Under an Interlock Restriction?

Because the New Mexico interlock program is largely judicial, there is no consistently applied action for repeatedly failed BAC tests. Some courts may take prompt action; others may do nothing. The decision to act is often dependent upon probation resources, or the commitment of the local jurisdiction to its interlock program, or both. We know that these failed tests are indicators of recidivism. But what happens when an offender driving under an interlock restriction is rearrested for DWI? And how do they do it?

Until this study, there has been no information about how interlock-controlled offenders recidivate when they do. There is DWI recidivism during the interlock period. Among 5,775 DWI offenders available for analysis during this study, 192 were rearrested for DWI while under an interlock restriction. How was this accomplished? It has been widely assumed in the interlock research community that those who recidivate while under an interlock restriction are doing it the easy way, by driving a different, non-interlock-equipped vehicle. We evaluated this question with arrest data.

To do this, we analyzed the full database of driving records of 15,109 DWI offenders, who installed interlocks between July 1999 and March 2007. Of that complete group, a total of 379 (2.5%) were rearrested for DWI while an interlock was installed in at least one of their vehicles. To identify the fraction that was rearrested in an interlock-equipped vehicle, we selected those recidivists for whom the license plate was recorded both on the interlock installation and on the rearrest citation. This provided a sample of 175 of the 379 rearrested offenders (46%) for whom we could compare the license plate of the interlocked vehicle with that of the vehicle driven at the time of the rearrest. We found that 41 of the 175, or 23% of the offenders, who were arrested while they had an interlock installed in at least one vehicle were actually driving an interlock-equipped vehicle. This means that a fairly high proportion probably found a way to circumvent the interlock. This is a larger proportion than most investigators had assumed. Nonetheless, by inference it means that roughly three of four people who reoffended during an interlock restriction appear to have used a different vehicle.

Offenders arrested for DWI in their interlock-equipped vehicles amounted to 0.6% of all offenders in the interlock program. This is a small, but important, subset that warrants further study. Those arrested for DWI while under a mandatory interlock restriction could be sent to jail, as it is a violation of probation. There is also a law that makes circumvention a crime, but the new DWI charge is more serious than any procedural violation, and for most judges, the more serious charge takes precedence. This small group of interlock protocol violators, like those with other prominent predictors of recidivism, point up a need for alternative objective measures (such as treatment keyed to the interlock, alcohol biomarker monitoring, and transdermal bracelets) as way to assess and support any of a variety of more intensive interventions.

Comments

This evidence from New Mexico's Ignition Interlock Program is in accord with reports from other jurisdictions that have been studied. Age, prior DWI, rate of failed interlock BAC tests, and failed morning BAC tests, all serve as dependable predictors of future recidivism. No other reports of recidivism predictors during the interlock period have been published; the post-interlock predictors have the strongest basis for comparison with other studies.

The predictors of recidivism are represented in this study both as unadjusted simple variables and as part of a multivariate cluster. The reason for doing this is that most monitoring or sanctioning authorities do not have the capability to evaluate factors embedded in relationships with other factors. To make decisions about public-risk exposure, those who find useful information from this report are more apt to do so if it has clear relevance: younger age, more prior DWIs, high rates of failed BAC tests, and failed morning tests. Without knowing the intersecting relationship between these variables and others, it is still a safe bet that each is a useful point of intervention.

One of the unique features of this study is the inclusion of predictors of recidivism while the interlock is still on the vehicle. The data show a weak possibility that those who used their vehicles more were less likely to recidivate than those who used them the least – perhaps a proxy measure for using a non-interlock-equipped vehicle. Those with many prior DWIs is a reliable indicator of recidivism, whether during or after the interlock. For the variables representing morning failed BAC tests, those in all the positive deciles were strongly predictive of recidivism, with three of the four deciles in the Cox regression at 100-200+ percent more likely to be rearrested while the device is installed.

Among the findings in this study, the lack of a significant relationship between procedural violations and recidivism is surprising. Procedural violations include variables such as circumvention attempts, failure to take retests, and failed retest. This may either mean that the ability of those variables to predict recidivism carried no unique information, or else the variables were too inconsistent across manufacturers or there were inconsistencies in the definition or coding of variables across manufacturers. It is more likely the latter problem, as there is no standard of reporting that requires all device manufacturers to adhere to common conventions.

As New Mexico continues to draw more of its offender population into DWI programs, recidivism (and therefore impaired driving) is decreasing. However, these data also demonstrate that there are resistant subsets of offenders, such as young offenders, high multiple-DWI offenders, those with high rates of failed BAC tests. These groups may require more intensive targeted intervention beyond the interlock.

For those who show evidence of drinking problems that impair self-control, it would be worthwhile to intentionally build in support, such as targeted treatment or some form of counseling, for those offenders who become identified while still participating in the interlock program. The interlock is a capable bridge technology between the sanctioning and the helping arms of society; however, there are still many unexploited features of the interlock, such as the breath-test record, that could be used in a way to help achieve road safety goals.

STUDY 7: KEY INFORMANT INTERVIEWS PLUS SOME COUNTY DIFFERENCES

During the project period, the research team attempted to characterize the manner in which the New Mexico interlock laws were affecting the opinions and practices of the people who work in the criminal justice system and who must deal with the laws most directly. The research team engaged skilled interviewers, knowledgeable about interlocks, to visit and interview samples of judges, prosecutors, defense attorneys, and probation officers who deal directly with DWI offenders.

The interviews took place during two intervals separated by approximately 15 months. Whenever possible, the same public servants were interviewed on both the first and second occasion. The first effort took place in mid-2005, and the second effort took place in early 2007. There was no way to ensure that the sample selected would be representative of all public officials, but we did impose logical sampling considerations and random selection of interviewees within jurisdictions. Some follow-up interviews were made by telephone in the second round of interviews, or when a relationship had been previously established that might allow for frank responses, despite the telephone.

Sample Formation

The selection criteria for counties in which to interview public officials followed three strategies: to target the primary DWI population centers, to target a county with the highest concentration of Native Americans, and to target counties that represent thinly populated rural areas and therefore have fewer DWI cases.

- Based on State records, the five counties that annually log the greatest number of DWI offenses are San Juan, Bernalillo, Dona Ana, Santa Fe, and Cibola.

- The county with the most Native Americans is McKinley.

- From among the 16 counties with the smallest number of DWI offenses, three were randomly selected to get two judges willing to talk with the interviewers. In small counties, there was often only one judge handling DWI cases. Those counties where interviews with judges were possible were Guadalupe and Hidalgo.

To help characterize the counties selected, Table 27 portrays 2005 data on income and relative income as Z scores of the New Mexico statewide distribution of income, along with population size for the sample counties. At the end of this section, additional information on the breakdown of New Mexico counties is shown on a map along with further interlock penetration information through 2006.

Table 27. 2005 U.S, Census: Income and population of sampled New Mexico counties

County (major town or city)	Income ($K)	Income Z score	Population (1000s)
Bernalillo (Albuquerque)	41.1	+1.90	574
Dona Ana (Las Cruces)	30.1	+0.06	184
Santa Fe (Santa Fe)	42.9	+2.22	135
San Juan (Farmington)	35.9	+1.04	117
McKinley (Gallup)	26.4	-0.57	78
Cibola (Grants)	28.5	-0.21	26
Hidalgo (Lordsburg)	22.4	-1.24	6
Guadalupe (Santa Rosa)	24.1	-0.96	5

Ten judges in the counties with the most DWI citations were randomly selected from among many (two judges per county were selected as the first choices, and for each county, one alternate was preselected). Also, three judges (to get two) were selected in McKinley, the high-density Native American county (75% of the 75,000 residents are Native American), and finally, three additional judges representing 3 of the 16 counties with the lowest number of DWI citations were selected, resulting in one judge in each of two counties. This sampling system is not necessarily representative, but it does allow for some variety in the caseloads that the interviewees contend with routinely.

Of the 14 judges interviewed during Round 1, the number of cases adjudicated annually ranged from 60 and 100 in smaller counties (DWI arrest rates of 7 to 11% per 1,000 population), to between 400 and 650 in the largest counties (DWI arrest rates of 11.4 to 18.6% per 1,000 population). Of the 13 judges interviewed during Round 2, DWI cases ranged from about 50 in the smallest county up to between 300 and 1,000 in the largest counties.

The process for interviewing key informants other than judges was not similarly systematic. Informants were identified through word of mouth and interviews were based primarily on availability of those willing to speak with our staff.

Quantifiable Opinions

All but one of the questions on the interview was open ended for discussion; one asked for a quantitative response: "On a scale of 1 to 7, how do you rate the overall effectiveness of the interlock programs?" The charts in Figure 45a (2005) and 45b (2007) show relatively little change in opinions. The neutral answer of 4 is highlighted in both charts with a horizontal line. The judges, and possibly defense attorneys, seem slightly more positive about interlocks and the probation officers and prosecutors seems slightly more negative. Of course, the workload probably falls most heavily on probation and prosecutors, and this may reflect the degree to which the interlock has specifically affected their caseloads. Among probation officers, there were only two respondents in 2007 compared to four in 2005..
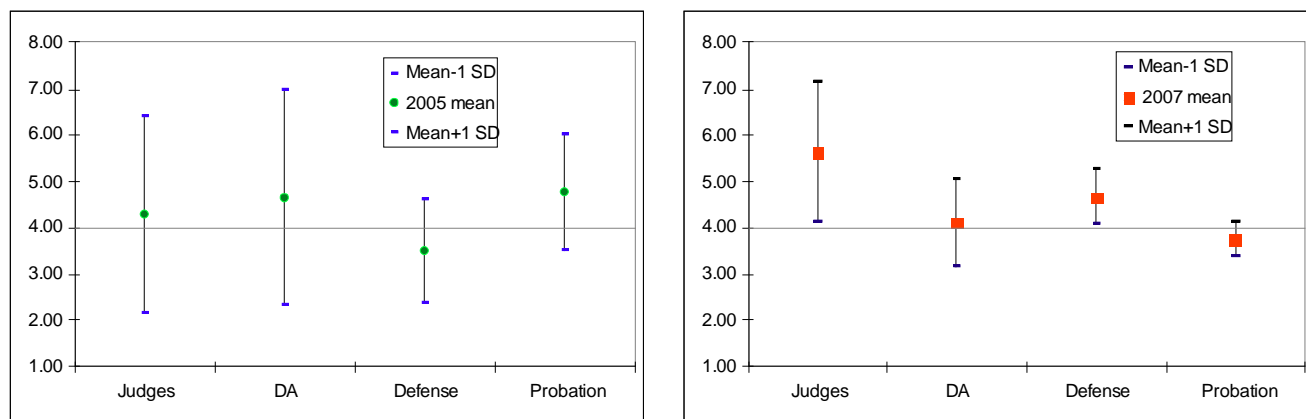
Figure 45a (left) and 45b (right). 2005 responses by four categories of criminal justice roles when asked to rate interlock effectiveness on a 7-point scale (Figure 45a) and 2007, same question (Figure 45b). Mean ± 1 SD.

Open-ended Judges Comments

Judges were the main focus of our efforts to interview key informants and, accordingly, are the most fully represented category of respondents. In each year, 12 judges were willing to take the time to provide comments for the purpose of the interview. The composition of the panel was slightly different each year but was representative of the county sampling system just described.

Judges' Positive Comments 2005 and 2007

The first round of interviews in 2005 found many judges to be optimistic about interlocks' potential value; at that time, however, their opinions were not fully informed by outcomes. They very much liked the idea that the offender is required to provide a breath sample every time before an attempt to start the vehicle.

In 2007, judges were more specific in their views. Several judges noted the interlock is for the honest offender. "It's ideal for those who comply with the law." One or more noted that the interlock helps offenders continue with their lives; that it works for society by saving lives. One judge said: "The goal is to not have people driving drunk, and the interlock is integral to this goal." Many felt that the program is working; that the interlock is a wakeup call to those who have driven under the influence. They felt that the interlock is a daily imposition and therefore is an additional responsibility that serves as a daily reminder to drive sober. Several noted that it is a good tool because it takes what people consider a necessity (driving a vehicle) and gives quick information about the benefits of being sober; the offender sees immediately that he is driving responsibly. Several judges thought the interlock is one of the best resources the court has had for addressing DWI offenders.

As a group, the judges appear to be more positive about interlocks than others in the criminal justice field (based on charts in Figure 45). Overall, the comments in the interviews were more often directed toward problems with interlocks, than with their benefits.

Judges' Concerns, 2005 and 2007

The feelings of disapproval or negativity expressed in 2005 did not change in 2007. There was already concern about the possibility of circumvention (although few knew personally of such episodes). At least one judge was concerned about private companies having access to offender records. Nearly all cited costs to the offenders as a problem. One commented that the interlock only helps fight the battle on the streets, and we need to fight it in the homes, too—alluding to the larger problem of alcohol-affected people, not just drivers. Concern about being unable to directly identify the person blowing into the interlock was cited by judges in both 2005 and 2007. This comment reflects a theme that has emerged in national-level opinion gathering and suggests somewhat of a philosophical division between those who want to use the interlock as a means to enforce abstinence (such as implied by the comments of those judges cited here) and those who believe interlocks have a more important role to play in excluding impaired people from driving a vehicle, independent of any abstinence goals.

In 2007, the specificity of the judges' negative opinions was much greater than in 2005 when fewer interlocks had been installed. Several judges thought all vehicles owned by the offender need to be fitted with an interlock. This becomes problematic for fleet owners, and many States require the interlock on vehicles "owned or operated" by the offender. Many judges commented on the faults of the device, saying it is not foolproof; it is easy for someone to bypass either by wiring around it or by disconnecting it. Several judges told of situations wherein offenders had taught a young child or another family member to blow into interlock. One judge told of being mocked during a "Section" meeting on tribal lands with members of the reservation community, who apparently told him there are many ways known for circumventing the device.

Several judges noted that they have no jurisdiction over nonresidents (of New Mexico), which is a recurrent problem for border counties, because the penalty for mandatory interlock is likely not reported to authorities in the home-licensed State by the New Mexico DMV.[13] There also is still concern expressed by at least one judge that feedback, via monthly performance reports, from interlock providers has been occasionally lacking. (Apparently this was later resolved.)

Some criticism addressed the laws themselves, suggesting loopholes need to be addressed. The 2005 law (1 year, 2 years, and 3 years for first-, second-, and third-time offenders, respectively) conflicts with the New Mexico State statute that limits maximum probation to 1 year for municipal courts. Some thought that the SCRAM (Secure Continuous Remote Alcohol Monitor) device was a much better modifier of behavior than the interlock. The fact that the interlock also does not detect drugs was thought to be a problem. Again, many thought the cost at $60/month is too high. Several judges do not agree with the mandatory interlock on first offense. One judge said he heard from the police that interlock providers are making a windfall.

Several felt the calibration was too sensitive (we assume this means it should not lockout at .025 g/dL, or it reflects early morning lockouts) and having a hearing on each violation, especially those related to false lockouts, takes up valuable time, thereby making the effect counterproductive. (The issue of hearings varies by judge, but it is a problem that can be overcome by not having a hearing on elevated BAC lockouts—but this remedy again alludes to

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[13] In 2008, according to Vickie Evans of MVD, when a non-New Mexico licensee is convicted of DWI, the MVD notifies the MVD of the other State that the person is revoked and mandated to install an interlock. However, the person would not be eligible for an interlock license in New Mexico because of nonresident status, and the New Mexico police do not take the driver's license when it is issued by another State.

the philosophical differences in how to apply the interlock. It is designed to stop attempts to drive impaired, while current practices in some courts intend it be used to enforce abstinence orders.) Another fault attributed to the interlock was "It is impossible to monitor everyone." The judges, it was said, cannot know if the offender is driving someone else's vehicle unless they are caught. One judge had heard stories of providers taking bribes for not reporting violations. Several felt that there needs to be increased regulation of agencies (presumably this comment implied, there should be some consequence imposed on service providers who are found to be engaging in bad faith implementation), because there is no way to be certain that the offender is the one providing the breath sample. A judge asserted that a system with user verification is needed. Finally, improved communication between the providers and the court was also cited as a need. Unrelated to this report, in a 2007 survey project that sampled opinions of key informants from 13 of the 15 U.S. States with the most interlocks in service, it was determined that a philosophical divide has emerged in the United States between those who want interlocks to serve the needs of court abstinence requirements, and those who prefer to see the interlock focus exclusively on preventing impaired driving (Marques, Voas, & McKnight, 2007b). The comments collected through these New Mexico court interviews more clearly reflect the court position on this question.

Finally, a question was added to the 2007 New Mexico interviews because, by then, the new mandatory-for-all-DWI-offenders law had been passed and was in widespread use. The question was "Even though the June 2005 law mandates interlock installation for all convicted offenders, many convicted offenders are not installing. What do you think are the reasons for this?" Virtually all interviewees alluded to the cost of the program as a reason and the intention, expressed by many of the offenders, to not drive a vehicle. One judge said he requires an interlock and, if it is not done within 15 days, he sends the offender to jail for 48 hours. This, however, appears to be the exception.

Open-ended Prosecutors' Comments

Prosecutor/district attorney comments were not very different in character from the judicial comments. In both years, prosecutors in the selected counties were less available for interviews.

In 2005, three district attorneys and one deputy DA were interviewed in three judicial districts. The three DAs supervised a total of 50 prosecuting attorneys.

In 2007, one special prosecutor (State Traffic Safety Resource Prosecutor), two DAs, and two deputy DAs were interviewed. The special prosecutor served as an assistant DA prior to promotion to Traffic Safety Resource Prosecutor. She is responsible for conducting DWI law training sessions for all of the State assistant DAs who take DWI cases. The two DA's interviewed supervise more than 35 prosecuting attorneys.

Prosecutors' Positive Comments 2005 and 2007

In 2007, the respondents felt that the laws are better than in the past and that the interlock is a good deterrent. However, most said that to be fully effective, the interlock must be accompanied with treatment and follow-up and that it is a tool to combat DWI in New Mexico because it provides the intended result—preventing people from driving drunk. "We now have a sober driver who was [previously] driving under the influence." Two commented that the program is becoming more effective in some districts because follow-up monitoring has been established and/or existing departments have been strengthened. Several felt that, if the

program becomes properly administrated, the interlock could be foolproof in that drunks could not drive. "It keeps people working and allows normal life to continue" was a frequent comment. These attitudes expressing hope were more common in 2007, whereas in 2005, there was less known about what effect the interlock programs might have.

Prosecutors' Concerns 2005 and 2007

A problem with interpreting these comments is the difficulty of distinguishing between invalid hearsay and some real problems. Nonetheless, the following was discussed.

In 2005, several felt that jail and mandatory treatment works best. "You can't drive drunk if you're in jail." That "too much time elapses between the violation on the interlock, and reporting the violation to the judge." Further comments recorded were as follows: "If violations were reported (via electronic transmission) to the court as they occur, enforcement could be done in a timelier manner. Loopholes need to be addressed and closed. "The interlock does not stop offenders from driving another vehicle. It is too difficult to monitor compliance." One DA said he heard a rumor that providers were accepting bribes to conceal violations.

In 2007, concerns remained. Among the comments: two DAs reported that some providers (the private companies) do not report minor infractions (such as lockout after the offender claims to have just eaten a type of food that might have fermented fruit, yeast, or other sources of false positives), that many judges are not familiar with the laws, and in those cases when judges do not know the laws, some DA's are not educating the judge that the law requires an interlock to be installed. Often the language ordering an interlock installation is also put in the final order, but no follow-up happens. It was felt by some that all courts in the State need to have court monitors and probation staff. One respondent also said that a compliance (installation) rate of at least 70 to 80% is needed for the law to be effective, and we are not there yet. A better system needs to be in place to prevent fraud. "There are too many loopholes in the law." Several acknowledged that little compliance exists among people who are not honest: "They drive someone else's car; the interlock can be dismantled; DMV doesn't check registration; follow-up between the providers and the court is lacking." One felt that mandatory laws for first offenders are too excessive in rural areas. As an example, in one county, many offenders drive company vehicles at work (vehicles have multiple users), and because of the mandatory law, they lose their jobs. This DA felt that most would not reoffend. Finally, two DAs said that the DMV and the courts do not communicate, and they need to be on the same page.

It is interesting to realize that these comments underscore the philosophical dividing line between the broad public safety initiatives that seek to install as many interlocks as possible to reduce the road toll and these court personnel who are confronted with having to manage the subset of offenders who are not inclined to follow a court order just because a court issued one. If we have court programs, they seem to be saying, we have to find ways to close the loopholes, monitor the implementation, and enforce the order, if we expect these laws to be followed.

Open-ended Public Defenders' Comments

In 2005, 11 New Mexico public defenders from six counties were interviewed in person and by telephone, including three who would only provide anonymous questionnaire forms. In 2007, a total of 10 New Mexico public defenders responded to the request for an interview, one of whom was part of an office of 5 who defended as many as 500 DWI cases annually; some

defended as few as 5. Opinions toward the new mandatory interlock law are summarized as follows:

Public Defenders' Positive Comments, 2005 and 2007

As expressed in 2005, several felt that the interlock could work for the low to moderate alcoholic, but not for the severe alcoholic. The interlock serves not so much as a sanction, but as a "life-saving, educational tool." "It serves as a good deterrent to drunk driving, and it's a limited intrusion that allows for a more normal life (driving to work, school, etc.)." It was also said, that the interlock makes it possible for revoked offenders, who have driven illegally for years, to drive legally again. In 2007, the majority of public defenders agreed that the interlock serves as a continual reminder that drinking and driving do not mix; that it gets to the heart of the problem, driving after drinking. "It is a true deterrent to an impulsive decision to drive drunk," several said. Several noted that the offender can still work. One claimed, for repeat offenders, the interlocks are a very good way to try to ensure that individuals do not drive drunk and that the interlock is a good idea in theory. It seems there may be some shifting of opinions among the public defenders; they may be seeing somewhat more benefit than in the earlier interviews.

Public Defenders' Concerns, 2005 and 2007

In 2005, comments ranged from the constructive to the critical. Among the constructive comments was the suggestion that more public education is needed for the law to be understood, including promotion of public awareness about the availability of the interlock license via the 2003 IILA, and the presence of the indigent fund. Unfavorable comments suggested the mandatory interlock for the first offender is "overkill" and that "poor offenders are discouraged from getting the interlock due to cost and are encouraged to continue to drive after drinking."

Also noted in 2005, "people with an ankle bracelet (referring to electronic monitoring ankle bracelet) can still continue to drive and can even purchase a car. The interlock punishes the offender's family, too, it was said. "It's too easy to get access to another car." Several thought that jail and mandatory treatment are the answers. "It's too easy to leave the interlocked vehicle parked and drive another car." "The cost is prohibitive for many of the poor," adding that, "New Mexico has a large indigent population who receive disjointed and inconsistent services. Much more communication is needed between the DMV and the courts." One felt that installation of the interlock is unenforceable, therefore making the entire program ineffective. "The interlock has been mistaken [as] a panacea for our State's severe DWI problem."

By 2007, the views seemed less negative but still skeptical. Many respondents noted the following: "That the interlock is not user specific; others may blow into it and the system does not recognize this. It is not a deterrent for drug abuse, and the expense is an enormous hardship for indigent defendants." Several respondents still commented that they did not feel the interlock is appropriate for first-time offenders. One person felt that providing more substance abuse information and counseling would be far more effective than forcing people to drive with an interlock in making sure that they do not reoffend.

Surprisingly, even by 2007, none of the five lawyers in one office saw the interlock as having an effect on DWI. They felt that it penalizes folks of limited income. They would prefer to see offenders given more treatment options, spending their money that way rather than putting in an interlock that just controls their behavior temporarily without actually getting them to

change. Also noted, interlock providers in some areas are scarce. One public defender said that there had been no noticeable effect in reducing DWI at all. It just seemed, he said, to provide more grounds to violate one's probation.

These comments suggest, at the very least, that the DWI and temporal association in crash reduction evidence that has been accumulated during the mandatory interlock period (as estimated in Figure 8) should be more intentionally communicated to the public defenders and other members of the criminal justice apparatus in New Mexico.

A written suggestion offered by one public defender: "Increase the use of CCP (Community Corrections Program) with BAC monitoring for felony DWIs (repeat offenders). My clients are all felony DWI cases, and it seems all judges are afraid to authorize CCP with BAC [monitoring] in lieu of mandatory minimums in jail or prison. [The] problem is that alcohol dependent defendants don't learn to be sober in the community when in jail for [the] mandatory minimum time. Judges should consider sentencing to CCP with BAC [monitoring] more often, including time that satisfies the mandatory minimums for incarceration. In some cases, the defense may even agree to this as appropriate for a set sentence that is greater than minimum but less than the maximum. This would allow defendants to avoid jail time, but also not subject them to the maximum penalty if they fail on CCP with BAC [monitoring]."

Open-ended—Probation and Court Compliance Officers' Comments

Five probation officers and court compliance officials were interviewed in 2005, and six were interviewed in 2007.

Probation and Court Compliance Officers' Positive Comments 2005 and 2007

In 2005, positive comments were conditional based on the nature of the offender who was being controlled by the interlock. For example, "If they follow the law, it works well." In 2007, comments were somewhat more nuanced with this group as well. Several respondents felt that the interlock program is a reflection of the offender's accountability: "The higher the level of accountability, the more effective the program." They felt that the success of this program is dependent upon personal honesty. Several noted that the interlock is a therapeutic intervention. All six were pleased that the tool exists. All six felt that the presence of the interlock in a vehicle increases public safety by keeping convicted offenders from driving after drinking. One department noted that the interlock serves as a way to identify problem clients by the number of violations they have.

Probation and Court Compliance Officers' Concerns, 2005 and 2007

In 2005, it was noted that supervised probation is not available in the poorer, sparsely populated outlying counties. There are too many loopholes (i.e., offenders stating that they no longer own a vehicle), and these problems need to be fixed for it to be really effective. It was also noted that there are too many ways to get around the device. It was said that "oftentimes the device needs frequent recalibration, because it's too easily set off by hairspray, mouthwash, etc." The comment was also made that there are too few providers in smaller counties, that the cost of the device is prohibitive for many offenders, and that most courts and attorneys have little knowledge of the indigent fund. Education is needed all the way around to maximize the potential of these programs. It should be noted here that products used by mouth that contain alcohol (e.g., mouthwashes, some foods) do have the potential to influence BAC readings since

their presence in the breath is no different from mouth alcohol, and any BAC test requires time for mouth alcohol to dissipate before testing. Offenders are supposed to be advised to avoid such products within 15 to 30 minutes of using an interlock-equipped vehicle.

By 2007, there was not a clear moderation in these views. These officers noted that the compliance rates are still low. "People evade the system; the program expects honesty. Not all are that way." All felt the loopholes need to be closed; for instance, there is no way to prove that the person blowing is the offender. At present, the Interlock Statement of Compliance signed by the offender at the time of sentencing is meaningless. (The offenders often state they have no access to a vehicle when they do.)

Many probation officers shared one or more observations of a similar type. One was quoted as saying, "Currently, there is no way to determine if the alcohol detected during a blow was mouth alcohol or metabolized alcohol. The interlock does not record who is blowing, and [they believe] the device needs to be more user-specific. Also, it cannot be proven that the offender was the one violating if the vehicle has multiple drivers from one household." Also, all felt that the interlock itself is too sensitive. (Again presumably, "too sensitive" in this case means that the lockout BAC is set too low, or many people are being locked out because they still have elevated morning BACs.) Finally, one person said, "This system depends upon honesty to be effective, and liars get away with finding ways around the system."

Maps of New Mexico Counties

To better represent some of the regional differences in interlock penetration within New Mexico, we examined some of the county differences with geospatial mapping software to help visually evaluate patterns in the data. One pattern that was identified in the 2007 interlock uptake was that counties whose rates of interlocks per convictions exceeded the State average were mostly geographically adjacent counties. This is also true to some extent in the data represented graphically here. The interlock penetration data are from different years and will not match the rates shown in Figure 7 in this Report.
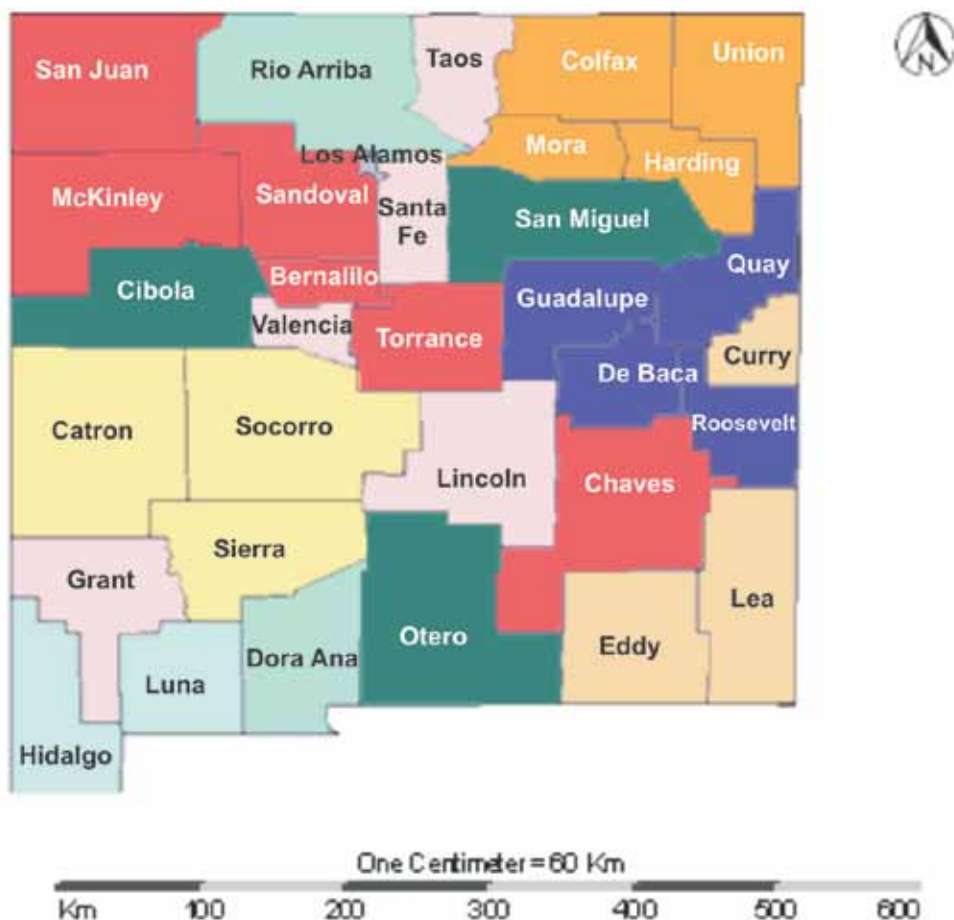
Figure 46. Map of New Mexico counties

Figure 46 shows the counties in New Mexico. The major population centers are Bernalillo County (Albuquerque, New Mexico), Santa Fe County (Santa Fe city, State capital), Dona Ana County (Las Cruces, New Mexico, and near El Paso, Texas), and San Juan County (Farmington, New Mexico). These four counties, with a combined 1.1 million people in a State with 1.95 million people, account for more than 55% of the New Mexico population (based on 2006 estimates from the U.S. Census Bureau).

In the following maps of counties, to equalize sample sizes somewhat when analyzing data, several low-density population counties were grouped, and the maps that follow on subsequent pages will show as the same color density. These include the following clusters:

- North East (Colfax, Harding, Mora, Union)
- South West (Luna, Hidalgo)
- West Central (Socorro, Catron, Sierra)
- East Central (Roosevelt, DeBaca, Guadalupe, Quay)

The clustering reduces 13 of the counties to 4 regions and the total number of counties from 33 to 24 county clusters. The chart in Figure 47 represents the number of interlocks by those counties and clusters as a percentage of arrests. The deepest color density includes Santa Fe and

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Bernalillo Counties (13-31%), and the map shows the spread of interlock use beyond those population centers to counties lying outside to the east. Dona Ana County (9-10%) and San Juan County (2-7%), two of the other major population centers, had a lower density of interlocks at the time the data were available. This is possibly because outlying population centers do not share the same media markets and informal communication networks.
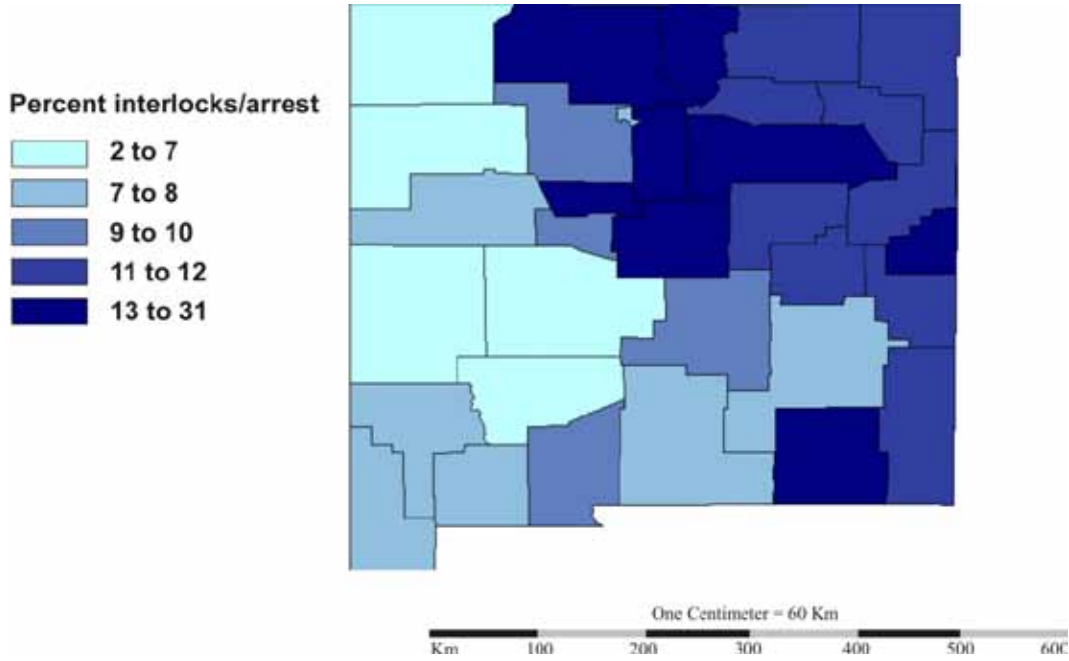
Figure 47. 2003-2006 percentage of New Mexico interlocks per arrest by 5 clusters of counties

Figure 48 shows that McKinley County (Gallup, New Mexico), where 75% of its residents are Native American in a State with a 10% Native-American population, has the highest ratio of convictions to interlocks (e.g., the fewest interlocks per DWI conviction). Much of the land mass of McKinley is within the borders of the Navajo and Zuni reservations. At least one interlock service provider has commented that retrieval of equipment can be a problem when devices are installed on vehicles that belong to tribal members who choose not to continue in the interlock program. It may be that the low density of interlocks among residents in McKinley partly reflects issues related to providing service in this jurisdiction.
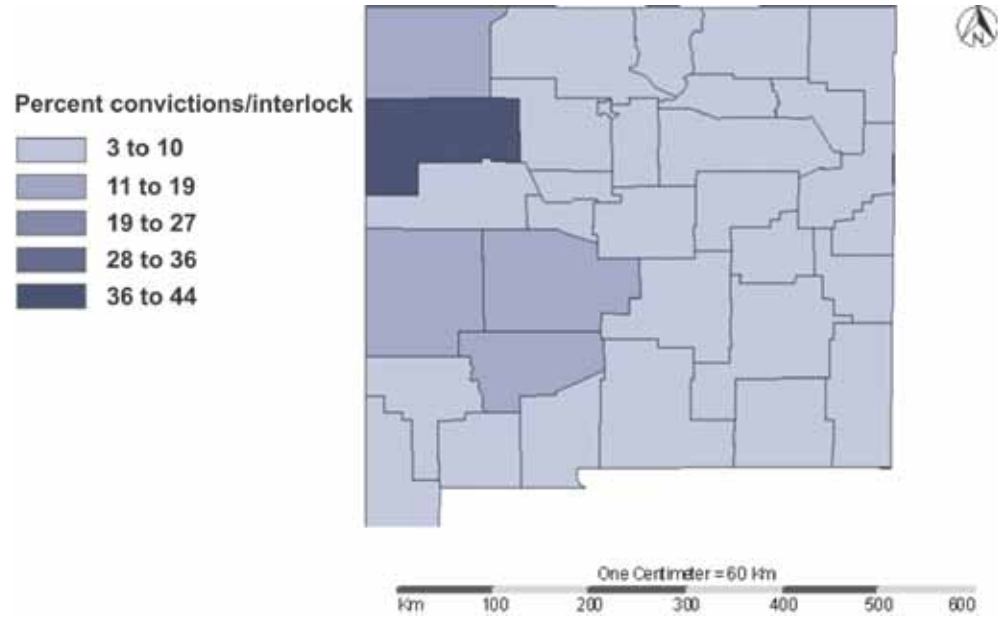

Figure 48. 2003-2006 percentage of New Mexico convictions for each interlock by five clusters of counties

Figure 49 shows crash density relative to the interlock density. Although there are more elegant ways to portray a relationship between interlocks and crashes, such as the data shown earlier in Figure 8, they do not easily allow for an appreciation of spatial relationships. A general observation in many of these interlock density graphics is the approximate inverse relationship between interlock penetration and the median income of the counties. Income is surely not the only factor reducing penetration, but, according to judges' comments, it is an important one.
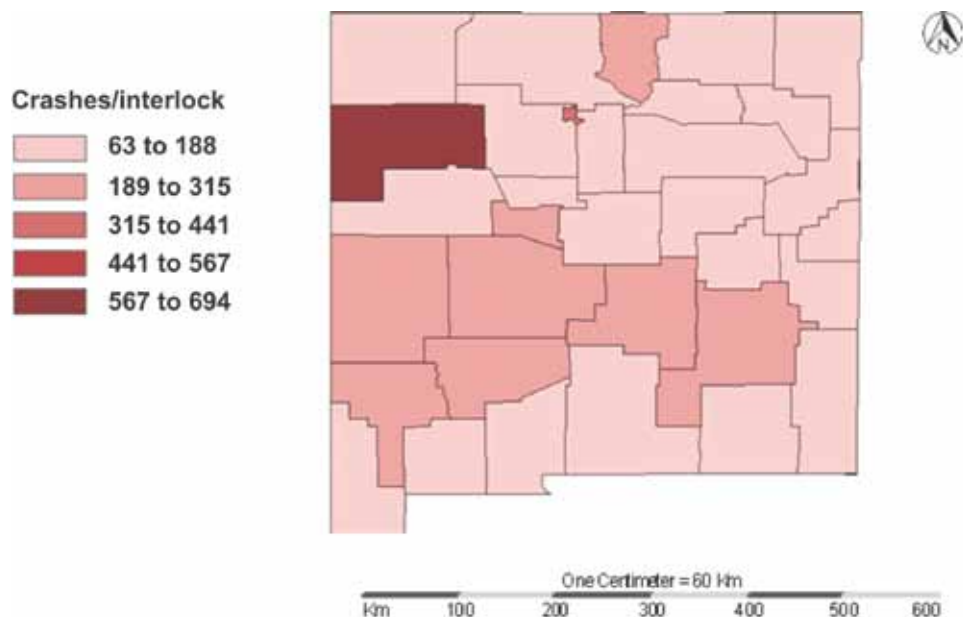
Figure 49. 2003-2006 New Mexico crashes per interlock by 5 clusters of counties

Comments

The interviews have been helpful in understanding the flaws and nuances of interlock program implementation in a statewide mandatory program. Interlock efficacy studies have been mostly restricted to the analysis of programs with offenders who either volunteer for interlocks as a path to early license reinstatement or are in that subset of mandated offenders who are generally compliant with the law. The interesting thing about the New Mexico mandatory program is that, for the first time, its comprehensive nature is drawing more of the hard-to-change offenders into the interlock programs, and State authorities and court authorities have to find ways to manage them. These subgroups of offenders may be made up of more impoverished, less acculturated, and sometimes less compliant and/or more dependent DWI offenders than have been previously studied. It behooves us to pay heed to the views of the public servants on the frontlines who work with these hard-to-change offenders.

If court-based programs are going to improve penetration, they will likely need a higher level of compliance rigor, and therefore, a different type of interlock program than the ones that have worked well for compliant offenders. Many who have commented about interlock programs have advocated for some form of criterion-based sanctioning such that those who prove noncompliant or resistant to entry into the interlock program need to be subjected to a more controlling secondary line of interventions, such as house arrest or SCRAM-type (transdermal alcohol sensor) monitoring (Marques & McKnight, 2007) in lieu of jail. For all the flaws in

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interlock programs at their current state of development, one benefit of interventions that unfold in the community is that they give the offender some opportunity to practice self-restraint, an opportunity unavailable in jail, because there is no choice but to be abstinent in jail. Further, the natural complement between treatment programs and the data in the ignition interlock record could ideally spawn a new approach to alcohol treatment intervention with DWI offenders, since the availability of the breath-test record and a treatment program that proactively uses that information are natural next steps in the evolving sophistication of the technology for DWI intervention.

Finally, many judges are co-opting the interlock program (as they are entitled to do) to help enforce their abstinence orders, but in so doing, they are finding that the interlock, as currently designed, is ill-suited to that task. Interlocks were not designed to help enforce abstinence, but with the number of judges who want that capability, some of the interlock companies are retrofitting their devices so they can take a picture of the person providing the breath sample. Yet, evidence from published studies has shown that people learn to accommodate to an interlock over months of use. The rate of failed BAC tests in most data sets studied declines over time on the program, probably as offenders discover they cannot, for example, drink to excess the evening before work and expect to get their vehicles started. From interviews conducted so far, it seems judges sometimes regard locked-out positive BAC tests as intentional defiance of their abstinence orders, rather than an early phase of learning by offenders (e.g., it takes many hours for an elevated BAC to return to zero). Do the judges realize that about 60% of all people have positive tests during their interlock period? It is not clear. But if they feel it necessary to convene hearings whenever an offender's BAC test results in a lockout, it will require many hearings. Behavior change comes slowly. There is probably a better combination of threats and goads that can achieve the social goals of safer roads than hearings for all elevated interlock BAC tests.

The courts may move the interlock providers to offer positive identification interlocks. Such devices take a photo of the person providing the breath sample so failed tests can be attributed to an individual. At least one of the interlock providers operating in New Mexico has now developed and offers such a product. It may be that interlock programs will eventually evolve toward two devices and two programs for two levels of offender risk.

STUDY 8: OFFENDER FOCUS GROUPS

This section is a summary of the four interlock focus groups held in New Mexico during late 2005. Two were held in Albuquerque, two in Santa Fe, and one was composed only of Spanish-speaking participants. In all, we recruited a total of 36 possible participants; however, 14 failed to appear, which left a total of 22 participants among the four groups. Participants were selected from questionnaires distributed at Victim Impact Panels in 2005. Almost all of the attendees had been on the interlock for at least 4 months; most had been on the interlock for at least 5 months. To arrange for participation in the focus group, the initial contact was made by the focus group moderator who explained the purpose of the focus group. For the Spanish group, initial contact was made by a project employee fluent in Spanish. Sessions were recorded. There is no reason to believe these focus group participants are representative of average interlock offenders, but these discussions do provide some insight into topics of concern to some interlock program participants.

Group Process

After introductions were made, copies of the consent form were distributed. The moderator read the terms of the consent form aloud and responded to questions. The terms of confidentiality were reviewed and discussed. At that point, anyone not interested in participating after hearing the terms of the group had permission to leave. All present in each group stayed to participate. Next, the moderator explained that the Pacific Institute for Research and Evaluation (PIRE) is a nonprofit, independent research and development company that performs research in the areas of public health and safety, and who would be paying their participation fee ($40). The purpose of the project was explained, as was the purpose of group discussion. After consent forms were signed, the tape recorder was turned on. Ground rules were discussed. Participants were told that we expected only one person to talk at a time, that their comments would be used only for group reporting, and that no one would be identified beyond the researchers at PIRE; it was further emphasized that it was expected that each participant would keep what was said during the group confidential as well. The moderator emphasized that the sole purpose of the focus groups was to obtain research information to better understand how interlock users accommodate to interlock programs. They were assured that no one in authority was requiring their participation, and no authority would hear their comments.

Each person introduced himself/herself by first name and indicated how long he/she had been in an interlock program. We then began with the first question, discussed it to flush out divergent opinions, and then went onto the next topic. The facilitators allowed conversation to stray off topic only briefly to facilitate flow, bringing it back to the central issues in order to cover all the topics. The following narrative states the question and then summarizes some of the discussion that followed.

What was your initial response to being ordered to have an Interlock?

Answers varied from anger to acceptance. Several said that they felt being on interlock was better for everyone, better than drinking and then driving, but generally, there was an initial reluctance to have it installed. Several said that having to use an interlock was much better than having to rely on public transportation. One said initially he was very angry and resentful,

thinking he had been treated differently than other offenders but grew to accept having it. Several spoke of embarrassment at having to blow in front of family, friends, and neighbors or a girlfriend. Several agreed that having it was a hassle: it caused frustration, the monthly fees were costly, and having to take the vehicle for monthly readouts was inconvenient. Several did agree that having the interlock allowed for legal driving and was, in a relative way, worth the cost and inconvenience.

What was your family's response?

Most said parents and children were relieved and happy to have their loved ones mandated to drive with the interlock installed because they knew there would be no driving after drinking. There was less worry about the offender's safety when away from home. Several stated that their families were upset that they had been caught driving after drinking in the first place and were upset over having an additional financial burden placed on the family. The interlock placed an inconvenience on other family members by their having to use the interlocked vehicle and having to be careful about their drinking as well. Several stated that the family was supportive and that they had stood by them even in the face of disappointment. One man stated that the money spent for the interlock was less than he spent on beer and that his family was more "tranquil." He said that the interlock was a "blessing." This kind of attitude was not typical. More typical was resigned acceptance.

Who else travels in your car during a normal day?

Most said their wives and children. Several transported fellow workers, friends, roommates, and girlfriends.

Who else uses your car?

Most said no one else uses their vehicle; a few said a spouse or partner. (As a side note, our still unpublished surveys of court-ordered interlock offenders in the neighboring State of Texas determined that the interlock-stipulated offenders are the majority users of 96% of the interlock-equipped vehicles.)

Who benefits from your using the interlock and how?

Initially, most said that they themselves benefited because there was more trust at home (between the offender and his or her family). There was also less stress at home. One offender stated that having the interlock allowed him to reflect upon what driving sober means and made him realize how many people on the roads have been drinking before driving.

Do you think that the interlock device is accurate?

Responses to this question were mixed. Most thought that the interlock was inaccurate because it had prevented driving when they were sure they were sober. Reasons stated for being locked out included eating Chinese food and attempting to start the vehicle, a perfume bottle exploding inside the vehicle, and presence of an air freshener bag hanging from the rearview mirror. Another person claimed to have been locked out after using an asthma inhaler, another because of the presence of fermented fruit in the vehicle, and another after drinking two Dr. Pepper sodas. Others failed to start when the interior of the vehicle was "extremely hot" or when the interlock was extremely cold. Another person who worked with printer's ink and toxic fluids found that his vehicle would not start after the interlock registered a .04 g/dL. It did restart after a 10-minute wait. (The calibrations were reportedly changed after his boss sent a

letter validating his work situation to the provider.) One "failure to start" reportedly occurred when a woman had siphoned gasoline from her vehicle to her lawnmower, then attempted to start her vehicle. Another stated that she did not know if it was accurate at all because she was able to start her car after having a beer.

Have you ever tried to get around (beat or circumvent) your interlock?

Most reported that they had never tried to "get around" their interlock for fear of being detected, causing unneeded complications in their lives. As an aside, here it should be noted that the circumvention detection circuitry in all interlocks are required by device certification protocols to detect and record start attempts that are not preceded by breath tests, or in general, any attempts to bypass the interlock by "hotwiring" a vehicle. Several admitted thinking about it a lot but never trying because it would be hard to do and the consequences of possible jail time would not be worth it. One related a story of having a friend blow to start the vehicle. The user knew the interlock would "go off" 5 minutes later; he had the friend blow a second time. The user knew he then had at least 20 minutes before the interlock went off for the third time. As an aside, here again, the running retest feature of most interlock devices (nearly all State certification protocols require some form of running retest) ordinarily prompts the user for a retest some 10 to 20 minutes after a vehicle is started and underway. Failure to provide such a sample can be recorded as a retest request violation but does not shut off the engine. In the case cited here, the interlock user had a drive to home that was less than 20 minutes, so he drove anyway despite a high BAC. Two people told of having to have auto maintenance. The mechanic had to bypass the system, which each interlock provider has some method for accomplishing. Some interlock companies will provide a temporary code that expires in an hour but allows the interlock to be bypassed for auto maintenance services. In the case cited, the offenders had to take repair slips in as proof to their probation officers of the auto-repair-related bypass. One person added "I doubt that I would ever be drunk enough to try [to override]."

Has having an interlock installed in your vehicle changed the way you drink?

Most said that they were not allowed to drink as a term of their probation, and that yes, having the interlock has changed the way they drink. It reportedly served as a way to keep them from drinking, along with other mandates from the court, such as counseling and strict probation rules. Several said that they no longer went out to drink at bars and that they drank at home. Another said that, after four DWIs in 4 months, he no longer drinks at all, adding that the interlock has completely changed his life and his relationship with his family. Several said that by not drinking, they were able to take the family out and spend more quality time together.

What do you like most about having an interlock?

Again, responses were mixed. One said that there was nothing he liked about it but that it was a good system. Another didn't like it but said it served as a means for people to be accountable for their mistakes and "that's a good thing." Most participants liked the fact that the interlock enabled them to drive legally. One commented, "The interlock is a constant reminder of the DWI offense, and you wouldn't drive drunk with your Mom in the car."

What members liked least about the interlock was the cost and general aggravation over having to deal with the device daily. Another said that the worst part was having to blow while the vehicle's engine was running. Safety was a big factor, not only having to blow while driving (amid other distractions, such as heavy traffic, merging traffic, and screaming kids in the car),

but also having concerns about being unable to start an interlock-equipped vehicle in an emergency. Another told of feeling embarrassed by having to use it in public. There were complaints about the service providers; this included a concern about the lack of basic interlock operational knowledge among technicians and the poorly communicated operating instructions.

Comments

An issue with focus groups is the same as with key informants: there is no way to know whether the views of those who comment can be regarded as representative or meaningful. Nonetheless, there are some themes in the comments that had been raised previously and documented in interlock user surveys. Prominent among these are the reports of public embarrassment, whether with family members or the public, and the resigned acceptance of the device as a means to an end, that is, transportation that the individual controls. The tone of grudging acceptance is probably a good thing and is very similar to the tone found among a group of Texas interlock offenders, where only 19% (of 280) thought it was unfair, and 86% said it changed their drinking-and-driving practices (Marques et al., 2007b).

These focus group comments from interlock users are interesting and generally comparable to those of other interlock users in Canada and the United States when providing open comments in user surveys. It is worth noting that since all participants in the New Mexico focus groups were from the somewhat more affluent areas of the State, it is likely that the views of the most indigent interlock users are not represented.

Another group that we had hoped to have a talk with was composed of people ordered by a judge to install an interlock but decided not to do it. After several efforts to form a group of this kind, we abandoned the effort. The requirement to install was a court order; finding members for this prospective sample who defied the order was difficult, although we were able to find some at Victim Impact Panels. Unfortunately, agreeing to the interview was a problem because the focus group participants would be admitting that they ignored the court order. Nonetheless, we attempted to engage people, but none of those who initially agreed followed through. So regrettably, this information cannot be included in this report. Anecdotally, we understand that cost is an important consideration in deciding not to install, as is a belief that the interlock imposes more inconvenience than would a period of license revocation. This therefore remains one of the unanswered questions, particularly for the more difficult-to-engage offenders. New Mexico has had great success with interlock enrollment, attaining levels up to, and in a few counties in excess of, 50% of all convictions. The second 50% of offenders required to install interlocks are important to understand because many of this group will continue to resist installation. The latter cohort is apt to be among the highest risk subset, and it is important to better understand their characteristics and motivations.

CONCLUSIONS

Interlock devices, the interlock laws that provide for them, and the interlock programs that articulate a set of procedures for managing them are all directed toward reducing the alcohol-related road toll. In this case, we consider the road toll to represent both injuries and deaths. This report provides documentary evidence that alcohol ignition interlock technology has reached an important milestone. The year 2008 is 22 years after the 1986 California legislation authorizing a pilot program of alcohol ignition interlocks. This report demonstrates that the era in which alcohol-sensing technology in vehicles can be successfully deployed to protect the public from alcohol-impaired drivers statewide seems to have arrived. New Mexico data, such as found in Figure 8, has provided the first inklings that the promise of interlock programs to reduce the road toll might be realized if the rate of penetration can be increased so all proven impaired drivers (first offenders along with repeat offenders) are required to drive a vehicle fitted with an interlock and required to participate in an interlock program.

In the Penetration section, we showed that the average New Mexico rate of installed interlocks represents half of all convicted DWI offenders and demonstrates that high rates of interlock use among DWI offenders can be attained at a State level. This level of penetration is a first for any interlock program in any State, and very likely, in any nation or province within a nation.

In Study 4, we showed that the temporary 71% penetration attained during a 2-year Santa Fe County pilot program demonstrated again (as had been shown in a small population study in Hancock County, Indiana) the effectiveness of including a more onerous alternative option for the court interlock program for offenders who claim to have no car or who have no intention of driving. When the interlock is the more desirable of two choices, programs attain a much higher interlock penetration rate. This demonstrates that it is possible to bring down recidivism rates at the county level if penetration is sufficient. The offenders drawn into the Santa Fe program had an on-interlock recidivism rate in the range of other programs with more typical levels of penetration (e.g., approximately two-third reduction in recidivism while installed).

In Study 2, we presented evidence of the positive safety benefit in the first-offender interlock program when there were only 1,461 first offenders in the interlock program that could be used for evaluation. The recidivism reduction effect for first-time offender in New Mexico has now been confirmed in 2008 with more evidence. Recidivism records based on more than 5,000 first offenders now shows an effect magnitude similar to the one detailed in this report.

In Study 5, we demonstrated evidence from the New Mexico interlock event recorder data that confirms the patterns of BAC-positive tests. In Study 6, we showed that the recidivism predictors found in the event log provide several types of evidence that can be used to alert us in advance about the characteristics of those who might be at high risk for recidivism (which is a known predictor of alcohol crashes), and where to look for the evidence. Few States, New Mexico included, are taking advantage of this interlock log file information to sculpt interventions, or require extension of the initial interlock duration, to match the apparent risk to the public posed by those DWI offenders whose interlock event recorders show they are not yet able to control their impaired driving. Similarly, there are no treatment programs (that we know of) in any State that have taken advantage of the BAC log files to mine them as one of the few scarce objective data-driven sources of information about the progress being made by clients in alcohol treatment programs. Nor are there pre-treatment motivational programs that use the interlock event record to engage clients in discussing methods for improving their control over

their impaired driving. Currently, most States require that DWI offenders participate in some form of education, treatment, or counseling to qualify for an interlock program. That is all fine, but there needs to be a strong aftercare component equipped to evaluate actual drinking-driving performance from the breath-test records. New Mexico's novel idea of installing an interlock soon after a DWI conviction (or arrest) is fully compatible with a treatment episode linked to the interlock data record. As of 2008, there is no formal linkage between the interlock BAC data and treatment services in New Mexico.

New Mexico's innovative IILA, which permits any DWI offender to apply at any time for a limited license to operate an interlock-equipped vehicle, has given a boost to the willingness of judges to order the interlock since the law overcomes legal conflicts that we reviewed (Study 1) between driving prohibition and the interlock requirement. We report (Study 3) that the uptake rate of interlock-restricted licenses by previously revoked offenders settled in at about 10% at the time of this evaluation. That penetration rate may improve over time, but it also might not. If it does not, it will not be very surprising since the IILA opportunity somewhat emulates the purely voluntary programs available in other States that allow offenders to drive some or all of their suspension periods with an interlock. An apparent flaw in the New Mexico IILA is the lack of monitoring for those who do elect to install an interlock under the licensing act, independent of any court mandate. That is its strength in one respect, and is its weakness in another. The purely voluntary interlock is under the auspices of the State government, which does not have a division responsible for reviewing performance records.[14] It seems that the only monitoring of offenders' compliance for those who install without a court mandate is provided by the interlock companies. Without monitoring that includes a feedback loop to the State authority, a revoked repeat offender driving with an interlock license might be able to circumvent the device with impunity. We should point out that we know of no documented cases of this occurring, but it seems worthy of some concern.

The public servants who manage the DWI problem for the State provided some useful insight into the mixed feelings that many have about the interlock programs. The arrival of these new interlock laws has added to their daily responsibilities to adjudicate, administer, and monitor the programs. Some of these views were sampled (Study 7) in this report. The people who served as key informants in this report summarize some of the benefits they perceive, and some of the challenges that need to be overcome. It is very plain that many judges who do order interlocks are concerned about the financial burden that the program imposes on families of modest means who are struggling to stay afloat financially. We cannot expect the judges to completely ignore the financial effect of the interlocks (at approximately $65/month if there has been no contribution from the indigent fund), nor should the judges ignore the tradeoff between alcohol costs (usually considerably more than $65/month) and interlock costs.

In Study 8, we turned to some of the interlock users to sample views of this group. The participants in the focus groups are, almost by definition, more compliant than the average interlock offender. Focus group members were also paid a $40 honorarium for participation, and these participants were more urban than some New Mexico offenders (all four focus groups

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[14] Strangely, one group of IILA volunteer offenders is subject to monitoring by the motor vehicle authority; those offenders had exactly three convictions in a 10-year period before June 17, 2005, and no other convictions. The MVD is empowered to require alcohol-free driving for the last 6 months of a minimum of 3 years of interlock for this group before they are eligible for an unrestricted license. That offers them a 3-year revocation period instead of the 10-year denial that was their sanction when they were convicted prior to June 17, 2005, but this is the exception to the general rule.

were in the Santa Fe and Albuquerque areas). With those caveats, we nonetheless determined that there are both complaints and some degree of grudging acceptance of the interlock. Many focus group participants expressed differing degrees of embarrassment for having found their way into this situation.

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