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RESEARCH REPORT

The Alberta Interlock Program: the evaluation of a province-wide program on DUI recidivism

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Abstract

Aims. *This study was designed to determine the efficacy of alcohol safety interlocks in reducing recidivism among first and second driving-under-the-influence (DUI) offenders. It also evaluates the overall effectiveness of interlock programs where typically only a small portion of DUI offenders elect to install interlocks.* **Design**. *The driving records of DUI offenders participating in interlock programs for 6 months for first offenders and 2 years for second offenders were compared with similar offenders who chose not to participate.* **Setting**. *A province-wide program in Alberta, Canada.* **Participants**. *Records of 35 132 drivers convicted of DUI between 1 July 1998 and 30 September 1996 were analyzed.* **Measurements**. *Repeat DUI offenses during and after the interlock period.* **Findings**. *While the offenders had interlocks on their vehicles, DUI recidivism was substantially reduced. Once the interlock had been removed and the participants had been reinstated, their DUI rate was the same as other offenders indicating that the interlock reduced recidivism while in place. Because only 8.9% of eligible drivers elected to participate in the interlock program, the program did not significantly increase the overall effectiveness of the province's management of DUI offenders.* **Conclusions**. *Interlocks are associated with a major reduction in DUI recidivism while on the vehicle of the offender. However, because few offenders elect to participate, the program produces only a small (5.9%) overall reduction in the recidivism rate of all DUI offenders.*

Introduction

Current application of interlock programs

The alcohol safety interlock is a device that requires the vehicle operator to blow into an alcohol sensor unit. When the operator has a blood alcohol concentration (BAC) above a low level (usually 0.025 in the United States, 0.04 in Alberta, Canada), this device prevents a vehicle from starting. When used by courts or state motor vehicle departments, it provides DUI offenders with an alternative to full license suspension. This alternative program allows offenders to use their vehicles for work and other necessary driving for a fee

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of about $60 a month for the unit and its maintenance.

This device is now widely used by courts and licensing authorities in North America to control the driving of DUI offenders. Currently, two of the ten Canadian provinces, Alberta and Quebec, have fully implemented interlock programs. In the United States, the National Highway Traffic Safety Administration (NHTSA) issued model specifications in 1992 in the *Federal Register (57[67],* 11772–11787) for interlock devices that besides specifying their sensitivity to alcohol and procedures for preventing circumvention also established a requirement for a data-recording system to log every breath test taken by a motorist on all trips in the instrumented vehicle. As of January 1998, 34 states had enacted legislation providing for interlocks. Currently, an estimated 24,000 interlock devices are in use in the United States. This number is likely to increase because in 1998 the US Congress enacted the TEA-21 Transportation Act, which penalizes states that do not enact a law that would impound offenders' vehicles or, alternatively, that would use interlocks with repeat DUI offenders.

Evaluations of interlock programs

Six studies of interlock programs have appeared in peer-reviewed journals or in the proceedings of scientific meetings (Jones, 1993; Popkin *et al.*, 1993; Weinrath, 1997; Beck, Rauch & Baker, 1997; Tippetts & Voas, 1997; Tashima & Helander, 1999). Several of these studies were previously reported in a review (Coben & Larkin, 1999) that concluded "alcohol ignition interlock programs appear to be effective in reducing DWI recidivism during the time period when the interlock was installed in the car". An important feature of these studies is the license status of the comparison group. Voas, Tippetts & Taylor (1999) demonstrated that offenders with DUIs who have been reinstated have significantly higher rates of DUI offenses, moving violations and crashes than do convicted drunk drivers who have remained suspended. Therefore, it is important when evaluating recidivism during program participation to clarify whether the interlock group is being compared with a group of offenders whose licenses have been fully suspended or with a group of offenders whose licenses have been reinstated. Since typical provincial or state policies have provided the interlock program as an alternative to full suspension, the most relevant research has involved a comparison of DUI drivers in interlock programs with similar, fully suspended DUI offenders.

These quasi-experimental studies appear to support three conclusions: (a) relatively few of the DUI offenders eligible for an interlock program elect to install these devices; (b) while the devices are installed on the offenders' vehicles, recidivism is significantly reduced relative to non-participating offenders; and (c) once the units have been removed, the DUI recidivism rates of participants and non-participants are not significantly different.

Low participation rates. Low participation rates have been demonstrated in interlock programs: 3% of second offenders in West Virginia (Tippetts & Voas, 1998), 2% of second offenders in Michigan, 1% of second offenders in Nebraska, 4% of all offenders in Wisconsin (Simpson, Mayhew & Beirness, 1996), 20% of second offenders in California (Tashima & Helander, 1999, Table B4, p. 103) and 10% of repeat offenders in Texas (Johnson & Cintron, 1998). The reason for this low participation is not clear. It suggests, however, that the inconvenience of being unable to drive or the perceived risk of driving while unlicensed is not sufficiently strong to motivate participation when it involves the annoyance of blowing into the unit repeatedly while driving plus the $60-per-month program costs and the increased insurance costs for individuals convicted of DUI (which can run as high as $1000 a year). Indeed, many DUI offenders did not apply for full reinstatement of their licenses when they became eligible. In California, only 16.4% of second offenders applied for reinstatement within 3 years after becoming eligible following 18 months of full suspension (Tashima & Helander, 1999, Table 16, p. 42).

The two states with the highest participation rates—Texas and California—are those in which interlock programs are made a condition of probation. There is anecdotal evidence that higher participation rates can be obtained by making it a condition of probation (e.g. the failure to conform to probation requirements results in incarceration). In a speech delivered to the Virginia Judicial Conference, April 1996, entitled "DWI Sentencing Policies," Judge Richard D. Culver of Hancock County, Indiana, reported that he is

successful in entering 80–90% of first and second offenders into interlock programs by making the alternative to participation electronically monitored house arrest. This is apparently a more powerful motivator than the alternative available to state motor vehicle departments, which is full license suspension.

Research is needed to validate that a majority of the DUI offenders can be motivated to enter an interlock program through a court probation program requirement, which makes the alternative to the interlock sufficiently unpleasant to ensure general compliance.

Reductions in recidivism while the interlock is installed. Five of the six studies cited above were based on comparing DUI offenders who had elected to install interlocks with a larger number of offenders who had elected not to participate in the program and, therefore, had remained suspended. All found a reduction in recidivism among the interlock participants. The largest difference was 1.6% versus 6.7% recidivism (Tippetts & Voas, 1997), and the smallest was 4.5% versus 5.31% (Tashima & Helander, 1999). The reason for the apparent reduction in recidivism demonstrated by these previous interlock studies is clouded because they were based on naturally occurring, non-randomly selected comparison groups leading to the possibility that self- or court-selection factors resulted in assigning lower risk offenders to the interlock programs. The report by Beck *et al.* (1997) is the only study that has used random assignment to date. However, that study evaluated a requirement that offenders sign a waiver stipulating that they would install an interlock as a condition for having their licenses reinstated. Because only half of these offenders installed interlocks, that study was not an investigation of the interlock itself. This failure to motivate all members of the randomly assigned experimental group to install interlocks illustrates the difficulty in carrying out random assignment studies of the interlock itself. None the less, this study produced results—2.4% DUI recidivism for the interlock group versus 6.7% recidivism for the comparison group—similar to the five other interlock studies.

Post-interlock recidivism. Five of six studies reported on post-interlock recidivism for their experimental and comparison groups. With one exception (Weinrath, 1997), these studies found no significant differences in recidivism between participants and non-participants once the interlock had been removed from the vehicle. Thus, these studies are generally consistent in showing that while the interlock is in place recidivism is lower than for comparable offenders. However, once the interlock has been removed, the experimental group's recidivism returns to the level of the comparison group. This is somewhat surprising in that offenders driving interlock vehicles for periods of up to 2 years might be expected to be conditioned to avoid drinking before driving. This lack of carryover to post-interlock driving led to the accompanying article in this journal by Marques *et al.* (this issue, pp. 1861–1870), which describes the development of an integrated, brief intervention designed to extend the conditioned behavior into the post-interlock period. The fact that the *within-group* recidivism of the interlock users changed substantially after the interlock had been removed suggests that the reduced recidivism while the interlock is in place is not simply due to differences *between* non-equivalent groups.

Methods

The present study, using data from Alberta, Canada, was designed to confirm the three findings described above. In addition, the study was designed to determine the effectiveness of interlock programs for reducing the overall recidivism rate of all eligible offenders (whether or not in an interlock program) over 3 to 5 years.

The Alberta interlock program

The province of Alberta, Canada, introduced an alcohol ignition interlock program in 1990. The program is managed by the Driver Control Board, a quasi-judicial agency that is fully authorized to relicense DUI offenders. Initially, the program was restricted to repeat offenders, many of whom were ordered to have the interlock installed as a condition of reinstatement. Second offenders usually served at least 2 years of suspension and completed a weekend intervention program (called IMPACT) before they were eligible for reinstatement. The interlock was installed for a minimum of 6 months or until the end of the mandatory 3-year suspension. Third-time DUI offenders typically served 3 years of

Table 1. *Number of DUI offenders in each of nine groups used in the interlock study*

Offenders: Dates:	First 10/1/91–3/30/96	Second 10/1/88–9/30/94	Third 7/1/87–9/30/93	Totals
Interlock	1982	781	317	2763
% of eligible	10.1%	6.7%	18.1%	8.9%
Comparison	17 587	10 840	1434	28 427
Ineligible	247	1455	489	1702
Totals	19 816	1376	2240	32 892

license suspension and completed the IMPACT program before entering the interlock program.

In 1994, the interlock program was expanded. First-time DUI offenders were given the opportunity to volunteer for the interlock program. To be eligible, offenders had to complete a short period of license suspension (typically 3–6 months) and attend an 8-hour educational program called "Planning Ahead". Those who elected the program were allowed to drive with the device on their vehicles for about 6 months or until the end of their first year of suspension.

Guardian Interlock Services (the service division of Alcohol Countermeasure Systems, Inc., an interlock manufacturer) operates two interlock service centers in the Alberta Province—one in Calgary, the other in Edmonton. In Alberta, the interlock units had to meet its Qualification Test Specification for Breath Alcohol Ignition Interlock Devices (BAIID) for use in the Province of Alberta, 1992. The Guardian interlock program has used the fuel cell sensor since 1994, which has included a rolling retest requirement (periodic retesting while the vehicle is underway) and a data recorder. The only substantial difference from the US NHTSA model standard was that the lockout level was set at a BAC of 0.04 rather than the 0.025 level specified in the NHTSA model standard.

Subjects

With the support of the Alberta Driver Control Board, 32 892 full driving records of all Alberta residents who had committed a DUI offense between 1 July 1987 and 30 September 1996 were obtained. The distribution of these offenders is shown in Table 1. Overall, 8.9% of the DUI offenders who were eligible for the interlock either chose (94%) or were required (6%) to participate in the program. Although first, second and third offenders were studied, only the results for the first and second offenders are included in this report since the number of third offenders in the interlock program was too small to provide reliable results.

Research design

Data collection periods

There are three periods of interest in the evaluation of an interlock program: (1) the period of suspension between the index conviction and the time when the offenders become eligible to enter the interlock program; (2) the period during the interlock program when the participants are driving and the non-participants are fully suspended; and (3) the period after the interlock has been removed and the participants' licenses have been fully reinstated while non-participants may or may not have been relicensed.

There were three groups of offenders to be considered in the evaluation of the interlock program. Alberta and US state laws require a period of full suspension before an offender can become eligible for the interlock program. If the offender has had another DUI during that full-suspension period, the suspension is extended and he or she becomes ineligible for the interlock program. Thus, only "clean-record" survivors can enter the interlock program. To form an interlock comparison group, it was necessary to select only similar, eligible, clean-record survivors of that license suspension period from among the offenders who chose not to enter the program. DUIs banned from the interlock program by virtue of having had another offense during the suspension period were placed in a third "ineligible" group.

Within this matrix, it was important to consider the license status of the interlock, compari-

son and ineligible offenders. During the license-suspension period, all three groups are fully suspended. During the interlock program period, participants are free to drive the interlock vehicle without restriction while the non-participants and the ineligible offenders remain fully suspended. In the post-interlock period, the licenses of interlock participants are reinstated while the non-participants fall into two subgroups: those who have become reinstated and those who have remained suspended. Those in the ineligible group continue to be suspended since their periods of suspension are generally lengthened by their repeat DUI offenses during the license-suspension period.

Selection criteria for inclusion in the comparative analysis

DUI offenders who elected not to participate in the interlock program were placed in the comparison group. Several criteria were applied to ensure as close a match as possible to interlock participants. The first selection criterion was based on the date of the baseline DUI conviction. To approximate the distribution of interlock cases as to recency of the index DUI offense, second offenders with a conviction date earlier than October 1988 and first offenders with a conviction date earlier than October 1991 were excluded. These limitations were applied because comparison cases of those convicted earlier than these dates would have become eligible for the interlock (after a period of suspension) before the interlock was available to them.

A second selection provision was required to equate the effect of the suspension period before entering the interlock program. An accounting for this period was required because a repeat offense between conviction date and entry into the interlock program made the potential applicant ineligible. Three factors determined the length of this period. First, most candidates had to serve a minimum period based on the number of prior offenses and complete a treatment program before becoming eligible. Secondly, some candidates chose not to enter when first eligible but entered later. Finally, some offenders who had served their suspension periods and applied for reinstatement were required by the Control Board to participate in an interlock program before being reinstated.

The length of pre-interlock suspension varied from 3 months (first offenders) to more than 5 years (third offenders) for the interlock cases. We used the distribution of pre-interlock full-suspension times for those in an interlock program to impute an equivalent length of full suspension for comparison cases before comparing them with interlock participants. For first offenders on the interlock, this observed full suspension ranged from 3 months to 1 year with pronounced modes at 3 months and 6 months. To ensure that we were not biasing the data in favor of rejecting the null hypothesis, we applied a conservative 6-month period to all first-offender comparisons. Non-interlock first-offender comparison cases that were reinstated before serving 6 months of suspension were excluded. Those offenders who re-offended within the first 6 months were placed in the ineligible group.

The distribution of interlock cases indicated that the modal full-suspension time was 2 years for second offenders and 3 years for third offenders. As with the non-interlock first-offender comparisons, these observed suspension lengths of 2 and 3 years were applied to the non-interlock second- and third-offender comparisons, excluding any who re-offended during that 2- or 3-year period. As before, those who did re-offend before their time was completed entered the ineligible group. In this way, all comparison cases achieved the same average amount of "clean" (no re-offense) time as did the interlock cases. This forms a conservative test of the interlock efficacy because, although all interlock participants were known to be residing and driving in Alberta, a portion of those in the suspended comparison groups may not have been driving or residing in Alberta.

Cases with interlock start dates after 30 September 1996 (or for comparisons, their comparable date after the imputed full-suspension period) were excluded since the distribution of DUI offenses had begun to taper off at this point, indicating that the information recorded on the motor vehicle data file after that date was incomplete due to time lags in reporting or posting to the data file. Thus, first offenders were excluded after 30 March1996; second offenders after 30 September 1994; and third offenders after 30 September 1993.

Making comparisons

The data were analyzed using survival analysis

(i.e. survival without re-offending); therefore, the following explanations about forming comparable samples of interlock and non-interlock groups use the language of risk and exposure common in survival analyses.

Offenders were sentenced to varying lengths of time on the interlock. First offenders generally received 6- or 9-month sentences, although a fair proportion were on the interlock for as long as 1 year. Second and third offenders generally were on the interlock for about 1 year, although some were on the interlock as long as 2 years. Comparison cases were analyzed using an equivalent exposure period (e.g. equivalent time of exposure to the risk of a DUI offense). These were for first offenders, up to 1 year after their imputed 6 months of full suspension (i.e. months 7–18 after their conviction); for second offenders, up to 2 years after their imputed 2 years of full suspension (i.e. years 3 and 4 after their conviction); and for third offenders, up to 2 years after their imputed 3 years of full suspension (i.e. years 4 and 5 after their conviction).

To analyze recidivism during the interlock period, each interlock subject's exposure time was censored—which means that the offender was removed from the surviving group due to a re-offense or a reinstatement of the license, or at the end of the arbitrary study period—at the end of the defined period (12 months for first offenders; 24 months for second and third offenders) or at the time of interlock removal or reinstatement if the interlock sentence was shorter than the full length of the period. Similarly, each comparison subject's exposure was censored at the end of the defined period or at the time of reinstatement if that subject's suspension ended before the end of the period. In all cases, if the exposure period ran past 1 October 1996 (the last date of reliably posted data in the file), they were censored.

To analyze recidivism after the interlock period in any group, all participants with exposure time before October 1996 were analyzed for up to 2 years during the post-interlock period or its equivalent. Interlock cases began this post-interlock exposure period on the date that their interlock was removed and were censored at 24 months beyond that point or at the point of a new suspension if earlier. Comparison offenders who continued to be suspended more than 2 years beyond the beginning of the interlock period were formed into a "still-suspended" group. Those comparison offenders who were reinstated within 2 years after entering the interlock period were formed into a "reinstated" group. They were then followed from the date of reinstatement for up to 2 years or were censored before 2 years if they received a new suspension. Tables displaying the results (in the next section) also show the rates of an additional second recidivist offense for those who were "ineligible" for comparison because they re-offended during the initial preinterlock full-suspension period.

Data analysis

Survival analysis (Lee, 1992) is the method of choice for determining differences in recidivism. It uses all the subject days available for analysis in the study database, thereby generally providing the greatest statistical power to detect change. It also allows a more valid comparison of rates as they change over the entire length of exposure, as opposed to one discrete, fixed period of exposure. In the recidivism example, one can test the survival (or hazard) rates of groups given different sanctions or against the rates of a baseline comparison group.

The Kaplan–Meier (1958) procedure provides an analysis of the difference between or among survival distributions across time. It does not assume that the distribution for one group (or level of a factor) is a constant proportion of the survival distribution of another group throughout the period analyzed. A Kaplan–Meier result that shows the two survival curves as different does not provide a measure of how much higher (or lower) one group is than another despite a significant result. To provide comparable measures that are frequently reported in traffic safety literature, the present study reports the cumulative recidivism rate at fixed points in time (3, 6, 12 and 24 months) into the survival distribution, rather than across time summaries (such as a ratio of areas under the recidivism curves). To help interpret the differences between the interlock participants and non-participants, odds-ratios were calculated for each period for descriptive purposes. However, all significance tests were with the Tarone–Ware statistic based on the full record of survival.

In choosing the fixed point at which to "slice" into the survival functions to compute the rates, it is important to ensure that a relatively high percentage of the cases in that group has not yet been censored because the standard error (and

Table 2. *Comparison of recidivism rates of first DUI offenders following 6 months' license suspension*

During interlock period

	Interlock participants ($n = 1982$)	Reinstated	Suspended comparisons ($n = 17\,587$)		Ineligible comparisons ($n = 247$)	
Interlock period	Re-offending		Re-offending	Odds-ratio	Re-offending	Odds-ratio
3 months	0.00%		0.62%	* > 100	0.83%	* > 100
6 months	0.00%	NONE	1.07%	* > 100	2.62%	* > 100
12 months	0.10%		2.23%	22.83	4.61%	48.25
Tarone-Ware (vs. Interlocks):			22.69 ($p < 0.001$)		50.27 ($p < 0.001$)	

After interlock period

	Interlock participants ($n = 1479$)	Reinstated comparisons ($n = 6805$)		Still-suspended comparisons ($n = 6632$)		Ineligible comparisons ($n = 169$)	
Interlock period	Re-offending	Re-offending	Odds-ratio	Re-offending	Odds-ratio	Re-offending	Odds-ratio
3 months	0.29%	0.47%	1.64	0.67%	2.31	0.64%	2.23
6 months	0.85%	1.01%	1.19	1.19%	1.40	2.27%	2.70
12 months	1.70%	1.87%	1.10	1.94%	1.14	—	—
24 months	2.75%	2.63%	0.96	2.48%	0.90	—	—
Tarone-Ware (vs. Interlocks):		0.24 ($p = 0.622$)		1.05 ($p = 0.307$)		0.34 ($p = 0.563$)	

* Indeterminate since interlock participants had 0.00% recidivism

volatility) of the functions increases toward the end of the period when fewer cases remain. For each of the two periods during which recidivism was analyzed (interlock period and post-interlock period), many cases had available exposure at least equal to the prescribed length of the interlock program for that group. So, at the end of these survival functions, the number of cases with exposure still available was statistically adequate (20–40%). The Tarone–Ware statistic, which was used for this report, weights each time point by the square root of the number of uncensored cases remaining at the beginning of that time point. This is the method of choice when sample sizes change substantially over time.

Results

The upper portion of Table 2 presents the recidivism rates during the interlock period following 6 months of license suspension for first-offender interlock and non-interlock participants (i.e. no prior offenses). The odds-ratios provide an indication of the extent of the differences between the program participants who were free to drive the interlock vehicle and the non-interlock comparison groups, all of whom were fully suspended. For example, the odds-ratio of a reoffense at 12 months comparing the group using the interlock versus similar, but suspended, comparison offenders is greater than 22 to 1. The Tarone–Ware statistic shows that differences over the full period of exposure are strongly significant with the interlock participants having substantially lower recidivism rates.

The lower portion of Table 2 shows the comparison of the post-interlock recidivism rates for the program participants compared to two subgroups of the comparison group: those offenders who were still suspended and those offenders who had elected to reinstate their licenses. Once the licenses of the interlock group have been reinstated (and the interlocks removed), there is no significant difference in the recidivism rate between the participants and non-participants (i.e. odds-ratio ~ 1 during the comparable exposure time). Note that the number of subjects shown in the table represents the initial group

Table 3. *Comparison of recidivism rates of second DUI offenders following 24 months license suspension*

During interlock period							
	Interlock participants ($n = 781$)	Reinstated	Suspended comparisons ($n = 10\,840$)		Ineligible comparisons ($n = 1455$)	
Interlock period	Re-offending		Re-offending	Odds-ratio	Re-offending	Odds-ratio
3 months	0.26%		1.08%	4.13	4.01%	15.87
6 months	0.26%	NONE	2.11%	8.20	6.95%	28.38
12 months	0.26%		3.94%	15.59	11.59%	49.79
24 months	0.85%		8.08%	10.27	18.72%	26.88
Tarone-Ware (vs. Interlocks):			24.06 ($p < 0.001$)		80.64 ($p < 0.001$)	
After interlock period						
	Interlock participants ($n = 586$)	Reinstated comparisons ($n = 3061$)		Still-suspended comparisons ($n = 5294$)		Ineligible comparisons ($n = 1150$)	
Interlock period	Re-offending	Re-offending	Odds-ratio	Re-offending	Odds-ratio	Re-offending	Odds-ratio
3 months	0.71%	1.11%	1.56	0.95%	1.34	1.86%	2.66
6 months	1.28%	2.80%	2.21	1.82%	1.43	2.91%	2.31
12 months	4.10%	4.87%	1.20	2.89%	0.70	6.49%	1.63
24 months	7.05%	7.32%	1.04	3.94%	0.54	10.52%	1.55
Tarone-Ware (vs. Interlocks):		0.07 ($p = 0.799$)		4.26 ($p = 0.039$)		5.94 ($p = 0.015$)	

size at the beginning of the period, which then decreased over the duration of the period as cases were censored.

Table 2 also shows that the recidivism rates for the ineligible group (i.e. those who were ineligible to be interlock users and, therefore, were an unsuitable comparison because they had a DUI offense during the initial suspension period) were significantly higher than for the other two groups of offenders. These offenders, despite already having had at least one DUI offense during the initial suspension period, also had higher recidivism rates than the participants or the comparison group in all subsequent periods. The rates shown for these ineligible subjects represent offenses in addition to the offense during the suspension period. Table 3 presents the same data for second offenders.

Figure 1 presents the data in Table 3 for second offenders in the form of survival curves that portray the extent of differences across two exposure periods following the initial 2 years of license suspension: during the 2 years of the interlock program and following the 2 years after the interlocks have been removed. The magnitude of difference between the curves was estimated by the Tarone–Ware statistics presented in that table. Participants spent different amounts of time on the interlock (or for the comparisons, different amounts of time suspended), so their post-interlock period does not necessarily begin exactly at 24 months after the beginning of the interlock period (at the point of the shaded bar splitting this graph) but can be somewhere within the 24-month interlock period. When the subject is reinstated, the case drops (is censored) out of the calculation of the during-the-interlock period curve, and that subject "jumps ahead" to the zero point of the after-interlock-period curve, shown immediately after the shaded bar on the graph. Therefore, the curves in the right portion of the graph are not direct continuations of the curves in the left portion. This figure highlights the negligible recidivism of the interlock group. It also illustrates the similarity of the recidivism rates for the reinstated interlock program and reinstated comparison groups. Note, however, that the comparison

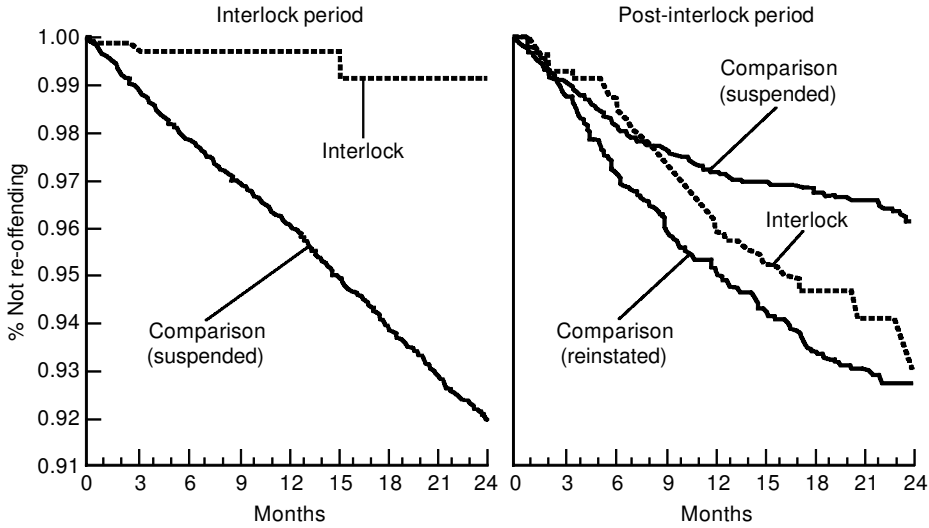

Figure 1. *Survival curves for second DUI offenders following 24 months license suspension.*

group members who failed to reinstate their licenses had lower recidivism rates than either of the reinstated groups.

Tables 2 and 3 and Fig. 1 provide a good picture of the efficacy of the interlock in terms of the relative recidivism during the interlock and the post-interlock periods. They do not, however, provide the information needed to judge the effectiveness of the interlock program overall, which must consider all eligible offenders—participants and non-participants—for 3–5 years after conviction. Table 4 presents the year-by-year DUI offense rates for interlock participants, comparisons and ineligibles, beginning with the index conviction and continuing for up to 5 years after conviction. Table 4 shows that among the first offenders, participants in the interlock program had lower DUI offense rates for the 3 years after conviction (15 per 1000) than did the comparable non-participants (44 per 1000). Comparable figures for second offenders over 5 years were 63 per 1000 for participants and 130 per 1000 for non-participants.

Discussion

The results presented in Tables 2 and 3 clearly demonstrate that, in Alberta, first and second DUI offenders who chose to participate in the province interlock program had markedly lower recidivism rates while the interlock was on their vehicles than DUIs who did not participate in the program. A key issue for this and the previous studies is whether or not this demonstrates the efficacy of the interlock. This issue arises because in this and all except one of the previous studies, participation was based on self-selection or by unspecified court procedures and not on a random assignment procedure that could have ensured that participants and non-participants had similar characteristics.

Since generally less than 10% (8.9% in this study) of the eligible offenders choose to participate in interlock programs, they clearly comprise a highly select group with characteristics that may be quite different from the non-participants. In this study, we were able to control for three important factors: prior offenses, age, and gender. Clearly, however, many other potentially important characteristics were not controlled. Whether these unmeasured characteristics were associated with the probability of being a recidivist is unknown; however, the presence of these unmeasured factors clearly raises the issue as to whether or not these personal characteristics, rather than the interlock, account for the reduced recidivism of the program participants.

Three considerations suggest that personal characteristics do not account for the lower recidivism while the interlock is in place. First, there is strong research evidence that fully suspended DUI offenders drive less and have lower

Table 4. *DUI offenses per 1000 drivers after conviction by year*

Priors	Group	Year 1	Year 2	Year 3	Years 1–3	Year 4	Year 5	Years 1–5
1st offenders	Interlocks	0.6	11.0	3.7	15.3			
	Comparisons	10.6	21.8	11.3	43.8			
	Ineligibles	75.1	44.6	10.8	131.2			
2nd offenders	Interlocks	0.0	0.0	1.4	1.4	26.9	34.7	63.0
	Comparisons	0.0	0.0	43.8	43.8	53.2	33.2	130.2
	Ineligibles	62.6	110.2	133.9	306.7	103.6	67.8	478.0

recidivism than offenders who have been reinstated (Voas *et al.*,1998). The program participants were free to drive anywhere, at any time, as long as they used interlock-equipped vehicles. Reports in the literature indicated that up to 75% of suspended DUI offenders drive while suspended (Ross & Gonzales, 1988). Nevertheless, this leaves 25% who do not drive. Moreover, those offenders who did operate their vehicles reported less driving (Ross & Gonzales, 1988). Voas *et al.* (1998) found that in Ohio the recidivism rate for suspended DUI offenders was half that of those reinstated. Thus, there is every reason to expect that the fully suspended comparison drivers would have *lower*, rather than higher, recidivism rates than the program participants.

Secondly, like most of the previous studies, this study found that once the interlock was removed, the recidivism rate increased markedly (by a factor of 3–9 for second offenders in this study). This is a *within-group* change that cannot be accounted for by the self-selection factors leading to differences *between* the participants and non-participants. Thirdly, the recidivism rates of the participants and non-participants (both in this study and in the previous studies) are essentially the same once both groups have been reinstated and have no limitations on their driving. Thus, there is substantial evidence that despite whatever differences there may be between the selected participants and the remaining offenders in the comparison groups, these differences do not entirely account for the lower recidivism rates while the interlock is on the vehicle.

The evidence described above supports the view that while the interlock is on the vehicle, it is effective in reducing recidivism. However, there is a broader, more practical question regarding the efficacy of interlock programs: given the low participation rate, is the interlock an efficient method of controlling the driving of DUI offenders? While the recidivism rates among first and second offenders in the interlock program was one-third to one-tenth that of comparable eligible non-participants during the 3 years after conviction (Table 4), the fact that less than 10% of all eligible offenders chose to install an interlock resulted in only a small reduction in the overall recidivism rate for *all* eligible offenders. The overall recidivism rate was 41.2 per 1000 drivers for the total group of both participants and non-participants compared to 43.8 per 1000 for the non-participants alone, a 6% reduction.

Thus, unless a procedure is found to increase the offender participation rate, interlock programs will have limited value as an *overall* control method for all DUIs. Nevertheless, a secondary objective of interlocks is to provide a means for offenders to meet critical driving needs without endangering the public. These results and those of earlier programs suggest that for those offenders willing to go to the trouble and expense of participating in the program, the interlock meets that need.

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