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Comparative Study and Evaluation of SCRAM Use, Recidivism Rates, and Characteristics

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16. Abstract

SCRAM (Secure Continuous Remote Alcohol Monitoring) is an ankle bracelet that conducts transdermal readings by sampling alcohol vapor just above the skin or insensible perspiration. It provides continuous monitoring of sobriety. The impact of SCRAM on the rate of repeat drinking and driving offenses (i.e., recidivism) was assessed for the first two years following arrest for 837 offenders in WI (avg. 85 days on SCRAM) and 672 offenders in NE (avg. 87 days on SCRAM). SCRAM offenders, as compared to a Comparison group, recidivated (i.e. were rearrested for an alcohol offense), at higher rates in both states (7.6% versus 6.2% in WI; 9.8% versus 7.7% in NB, neither of which were statistically significant). However, there was virtually no recidivism while on SCRAM and those SCRAM offenders who did recidivate did so at a later time (360 days from original arrest for SCRAM versus 271 days for the Comparison group in WI, $p<.05$; 458 versus 333 in NE, $p<.01$). It was felt that the SCRAM population may represent a particularly high risk group of offenders (not fully controlled for in the current study) thus higher long-term recidivism was expected. However, SCRAM did delay recidivism even for this high risk group.

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I. Introduction

Impaired driving continues to cause hundreds of thousands of alcohol-related crashes each year, many resulting in serious injury or death. Arrest, conviction and sanction remain the first building block of our efforts to control impaired driving offenders. These offenders are typically referred to as driving or operating while intoxicated (DWI/OWI) or driving or operating under the influence (DUI/OUI), with either term used interchangeably. Typical sanctions for these offenders include fines, jail, license revocation, and mandatory community service (Fell, Lacey, Brito, & Voas, 2006). However, many offenders are repeat offenders despite the sanctions and court processes that attempt to dissuade offenders from reoffending. Some of the more recent efforts to address the problem, such as intensive supervision and probation, DWI courts, and breath alcohol ignition interlocks, provide alternative sanctions to suspensions and jail time in order to prevent alcohol-related crashes. Continuous alcohol monitoring (CAM) devices may have a role to play when repeat offenders are court-ordered to maintain a state of sobriety.

CAM Devices

Continuous alcohol monitoring devices typically consist of an ankle bracelet that conducts transdermal alcohol readings by sampling perspiration on the skin. Data regarding transdermal alcohol concentration (TAC) are stored on the device itself and are transmitted, at least once a day, to a service provider. Secure Continuous Remote Alcohol Monitoring (SCRAM) refers to a device commercially available from Alcohol Monitoring Systems, Inc., (AMS), which in 2013 spun off its Denver-based product division into SCRAM Systems. The SCRAM device continuously monitors for the presence of alcohol in perspiration and measures alcohol levels. Additionally, the device monitors for tampering attempts by the offender. The readings are stored on the device and are transmitted to AMS via a modem placed in either the wearer's home or workplace. Transmission requires that the wearer be physically near the modem at pre-determined times. Transmitted data are encrypted and stored in a Web-based system referred to as SCRAMNet, which is administered by AMS (Robertson, Vanlaar, & Simpson, 2007). While there are other CAM devices, SCRAM is currently the most widely used.

Marques and McKnight (2009), in a controlled laboratory and field evaluation, have shown that the SCRAM device rarely provides a false positive reading. True positives were detected 79 percent of the time, though occasionally the device reported a TAC of less than .02 g/dL when the blood alcohol concentration (BAC) was actually greater than .02 g/dL about 22 percent of the time.

How It Works

When ingested, alcohol first passes through the gastrointestinal system and then enters the blood stream. As it passes through the liver, alcohol is metabolized. Over time, about 95 percent of the alcohol is processed by the liver. The remaining alcohol is excreted through the

kidneys, lungs, and skin and is thus detectable in urine, breath, and sweat (Swift, 2003). Breath alcohol detection devices detect alcohol concentration in the air expulsed by the lungs whereas transdermal devices such as SCRAM detect alcohol concentration in otherwise undetectable vapors passed through the skin or insensible perspiration. Unlike breath alcohol detection devices, the transdermal detection devices do not require the active participation of the offenders and alcohol consumption can be monitored continuously with a minimal degree of invasiveness (Alcohol Monitoring Systems; Dougherty, Charles, Acheson et al., 2012).

Current Use

Judges may order sobriety as a condition of probation for alcohol offenders. Judges may also order home detention typically with permission to leave home for work, school, church, and for compliance with court-ordered sanctions. Many offenders have been convicted of impaired driving for a second or subsequent time. SCRAM can both monitor their use of alcohol continuously and verify that they are in their homes at the time of day and day of week when they are required to be at that location. Use of the device has grown rapidly in recent years. Several hundred thousand driving and non-driving offenders have worn SCRAM or a similar CAM ankle bracelet.

McKnight, Fell, and Auld-Owens (2012) conducted six case studies of jurisdictions currently using SCRAM. They concluded that: use of this and similar devices was increasing nationally; SCRAM and other similar devices appear to provide reliable readings; and program administration is relatively manageable. Judges and probation officers appreciate that an objective measure of alcohol consumption is continually being monitored and costs are typically borne by the user and not the court.

Rationale

It is important to know whether someone convicted of DWI continues to consume alcohol, both in terms of the success of the sanctioning process and to protect the public. DWI offenders are often required to remain alcohol-free as a condition of probation. Self-reports of drinking behavior are inadequate for monitoring consumption. Incarceration will help to ensure sobriety but at considerable expense, and jail is overall not an effective countermeasure in preventing future problems with alcohol. A review of eighteen studies of mandatory jail policies concluded that jail was ineffective and in some cases may even increase alcohol-related crashes (Wagenaar, Zobek, Williams, & Hingson, 2000).

Process and programmatic discussions with the Nebraska Probation Administration indicate that CAM devices reduce staff time and resources used in the surveillance of DWI offenders while on probation. CAM devices offer a reliable, less invasive alternative in determining if a DWI offender has been consuming alcohol. Monitoring serves as a deterrent to drinking, when an offender is sanctioned to a period of sobriety and enhances treatment outcomes.

In this context, the promise of electronically monitoring for alcohol consumption becomes apparent. Being able to continuously monitor the offenders has many potential advantages. In addition to its ability to detect and regularly report alcohol use, it is not easily tampered with, it is worn in such a way that its use is not obvious to others (i.e., hidden by slacks), it is generally paid for by the offender, and it allows the offender freedom to work and meet family obligations. The popularity of continuous monitoring stems from these advantages and it is increasing in use. There were 13,723 devices in use in 2005 and 293,607 devices in use to date in 2013 (AMS, 2012).

Prior Research

It is not known what CAM devices accomplish in terms of rehabilitating offenders. However, they do discourage drinking while the device is in use. Very few studies exist that sufficiently explore long-term recidivism. So far, exploratory studies show mixed results.

Flango and Cheesman's preliminary study (2009) compared 114 DWI-convicted offenders who wore SCRAM with a non-SCRAM comparison group drawn from statewide data. They found that DWI recidivism was very low while the bracelet was worn (typically about 70 days). However, overall recidivism rates returned close to statewide averages after about two years. This was not true for offenders who wore SCRAM for 90 days or longer. Based on a small sample, it appeared that reduced recidivism persisted after the device was removed.

Kessler (2012) examined the use of SCRAM in Portage, Ohio. Data was analyzed for 1,847 offenders of which 312 used the SCRAM device. Recidivism results were mixed. This study showed that probation violations were more often detected. Although the study did not indicate the type of probation violations, it did indicate that those offenders who were placed on the SCRAM device were detected at lower cost to the court.

II. Project Overview

Project Objectives

This project's objectives were threefold: (1) investigate recidivism rates among a large population of SCRAM- and non-SCRAM-assigned offenders; (2) describe characteristics of current SCRAM users; and (3) document characteristics of the monitoring systems using SCRAM devices.

Site Selection Criteria

Contact was made with the Regional offices of the National Highway Traffic Safety Administration, with State Highway Safety Offices, and with Alcohol Monitoring Systems (AMS) and companies that sell or distribute CAM devices for current use of such devices to identify programs using SCRAM, as well as other continuous alcohol monitoring devices (CAMs). Current users with the largest numbers of DWI/OWI clients were identified. This initial screening criteria ensured that any site selected could provide a large-enough sample size.

Prospective programs identified as having large numbers (over 1,000 devices in use) of DWI offenders were then contacted to gain a basic understanding of their program, confirm the numbers of offenders monitored in the program, determine the willingness of program personnel to participate in the study, and to determine the availability of offender data, both from the SCRAM program, from the State DMV, and from the courts. Programs in two States were selected to participate in the study: Nebraska (Supreme Court, Department of Probation Services); and Wisconsin (Wisconsin Community Services). Detailed descriptions of each program follow.

Program Descriptions

The following information has been assembled from information gathered during meetings with Nebraska and Wisconsin. Other information includes state statutes, program administration descriptions and evaluation reports. Some project description information was obtained from the SCRAM case study summaries provided by NHTSA (Mcknight, Fell, & Auld-Owens, 2012).

Nebraska

The SCRAM pilot program was launched on February 18, 2007, when the Nebraska Supreme Court Office of Probation Administration began using continuous alcohol monitoring as a pilot effort for approximately 500 offenders who were on probation. Assignment to CAM typically involves a judge or parole board determining the offender's need for abstinence and/or monitoring. The typical offender assigned to the CAM program is an adult offender that requires abstinence from alcohol as a condition of supervision, as well as offenders engaged in a chemical

dependency treatment program that have demonstrated an inability to refrain from the use of alcohol while under supervision. The CAM program is managed by the Nebraska Supreme Court/Office of Probation Administration. This is a *post-conviction program* operating in approximately 25 of Nebraska's 93 counties.

The Nebraska Supreme Court Office of Probation Administration oversees nearly 18,000 adult offenders on probation at any given point in time. An estimated 53 percent of these offenders are DUI offenders. Historically, approximately 3,140 offenders (from all sources) have been assigned to CAM since 2007: 500 in the 2007 pilot; 779 in 2008; 899 in 2009; and 962 in 2010. A referral to CAM is made by a judge or parole office/parole board to the registered CAM provider via a supervising probation or parole officer. The individual to be placed on CAM contacts the identified provider to schedule installation. Once the SCRAM bracelet is attached to the offender's ankle, it continuously samples transdermal alcohol concentrations and stores time-stamped readings on a chip within the device. At least once per day, the offender is required to be near a SCRAM modem which transmits the stored data to AMS via a secure, Web-based data system (SCRAMNET) maintained by AMS. AMS provides regular reports of the results of these tests (confirmed alcohol events or confirmed tampering events) to the offender's supervising agency. Confirmation (or alternative resolution) of such alerts is provided to the supervising agency (probation or parole) for appropriate action with the offender.

The period of CAM monitoring is 85 days on average. Usually the judge or parole board specifies not only that a person should be subjected to CAM but also specifies the period of time one is to be monitored. Number and severity of past offenses serve to determine the specific period of time for which an offender will be monitored. Financial aid is another factor involved in determining the duration of the monitoring period. Funding for CAM is based on a combination of offender-pay and financial assistance. The maximum period for which an offender can receive financial assistance is 120 days. Thus any monitoring going beyond 120 days must be paid for by the offender. Offenders who pay the full price are charged $25 for installation, $25 for removal and $12 per day for monitoring. If offenders are unable to pay, a sliding-scale financial assistance program administered by the Office of Probation Administration is offered. The financial assistance does not cover juveniles, so this technology is not currently being used by juvenile offenders.

Overall, the rate of non-compliance from 2007 to 2010 was 18 percent and the rate of non-compliance for *confirmed alcohol-positive* TAC readings was 5 percent. The rate for non-compliance for *confirmed tampering events* from 2007 to 2010 was 14 percent. *A*pproximately 3 to 4 percent of all offenders registered *both alcohol positive and tampering events*. There was an average of 2 to 3 *alcohol-positive events* per confirmed alcohol-positive offender and there was an average of 3 to 4 *tampering events* per confirmed tamperer. Confirmed alcohol positive events are determined by AMS staff who are trained to distinguish between readings due to possible (albeit unlikely) interfering substances (e.g., perfume, hand sanitizers) and readings due to alcohol consumption.

Consequences for tampering with monitoring equipment are case-specific, with tampering generally considered a violation of probation. A confirmed drinking event is usually

treated differently than a tampering event. Probation and parole officers have the authority to impose a wide array of sanctions for tampering and/or a positive alcohol event, ranging from verbal reprimand or elevated supervision, up to a notice to the county attorney concerning a violation of probation and request for revocation of probation. In the event of a confirmed alcohol consumption event, the supervising officer generally warns the offender of the noncompliance. Some offenders with drinking events are required to stay longer on the monitoring program and, in some instances, different and /or additional sanctions are administered. Sanctions may include fines, alcohol education and/or treatment, increased meetings with supervisor and possible jail time. Sanctions are at the discretion of the judge or supervising officer.

Approximately 1,800 DWI offenders are on alcohol ignition interlocks in Nebraska at any one point in time. Some offenders are placed on CAM and interlock devices simultaneously, and although precise data were not available, state agencies have hinted that a large proportion of offenders on CAM are also placed on interlocks at some point. In a similar vein, electronic house-arrest monitoring is also used in Nebraska, at the discretion of the presiding judge. GPS tracking during monitoring is not currently used by the Nebraska Probation.

The CAM program is most often used in conjunction with substance abuse treatment programs in Nebraska as both treatment and probation personnel indicate that treatment is more effective when the offenders are sober.

Wisconsin

The SCRAM program in Wisconsin is primarily a *pre-trial* program that is part of a larger intensive supervision program (ISP) and is administered by Wisconsin Community Services Inc. (WSC), a nonprofit service agency. The Pretrial Intensive Supervision Program concept was introduced to Wisconsin in 1993. The same year, Milwaukee County introduced the Intoxicated Driver Intervention Program (IDIP) also run by WCS. Continuous alcohol monitoring began in 2005, as part of the Milwaukee County IDIP. The positive outcomes demonstrated by the pilot program included a reduction in OWI recidivism among repeat offenders. The two years following the program's inception saw crashes involving alcohol-impaired drivers in Milwaukee County decline by more than 20 percent and alcohol-related injuries and fatalities reduced by over 30 percent. Services have since been expanded to other counties, primarily in southeastern Wisconsin. Some post-conviction offenders are assigned to SCRAM by the sheriff's departments in these counties but the majority of offenders available for study are pre-trial, multiple OWI/OUI offenders.

The transdermal monitoring program provides monitoring services primarily for six counties: Waukesha, Kenosha, Sheboygan, Milwaukee, Jefferson, and Ozaukee. WCS also provides monitoring services throughout the State. The program uses the SCRAM device from AMS exclusively. The monitoring device currently used by WCS is the SCRAMx. This device offers the flexibility of including a house-arrest monitoring component. Among WCS' offenders assigned to transdermal monitoring, the house arrest sanction is imposed by the judiciary as an

alternative to incarceration for some offenders. Transdermal monitoring is used in four pretrial ISPs that WCS operates: (1) Milwaukee County; (2) Kenosha County; (3) Waukesha County; and (4) Sheboygan County. All four ISPs use transdermal monitoring as a component of supervision. However, the largest numbers of pre-trial SCRAM offenders have been processed in two study counties, Milwaukee and Waukesha.

The Intensive Supervision Program is criteria-based. All participants begin their involvement in the ISP with an orientation into the program and participate in a formal intake/screening process using various risk assessment tools. At this time, they are interviewed to assess their level of risk and needs, educated on the process of the program and pretrial supervision, and sign off on program rules/conditions. These WCS programs provide pretrial supervision for persons charged with a first OWI with injury, homicide by OWI, and/or a second or subsequent OWI offense. Admission to the program is ultimately determined by program administrators. Assignment to SCRAM is based upon one of the following: (1) First-time OWI offenders if injury was involved or if "high-risk" scores were noted on a risk assessment tool; (2) second-time OWI offenders if injury was involved with their charge; (3) third-time OWI offenders with BACs of .16 or greater, when the offender's last OWI conviction was less than 24 months from the current charge, and/or whenever accident or injury was involved with their charge; (4) all fourth-time or greater OWI offenders; (5) all offenders who have more than one pending OWI charge; and (6) all offenders who have two consecutive positive in-office breath tests, missed office visits, and who are not enrolled in treatment.

Waukesha County developed slightly different criteria for the courts to refer pretrial offenders to CAM in conjunction with the ISP. The following offenders are normally assigned to transdermal monitoring by the court when bail is being set: (1) all fourth and subsequent OWI offenders; (2) all second and third offenders with BACs of .15 or greater; (3) all repeat offenders under the age of 21; (4) anyone charged with a criminal OWI offense who then is charged with a subsequent OWI charge while "out on bail"; and (5) any offenders in other cases if the Court deems transdermal alcohol monitoring is appropriate.

On average, WCS has 300 offenders on transdermal monitoring on any given day. From the program's inception in November 2005 to February 2011, WCS monitored more than 4,600 individuals. Currently 260 SCRAMx devices are in use. The length of the monitoring period varies among the counties involved, averaging 40 days in Milwaukee County and about 90 days in Waukesha County.

Milwaukee County pays for SCRAM monitoring within the Pretrial IDIP, as well as post-conviction through the Milwaukee County Sheriff's Office. WCS offenders who are not supervised by Milwaukee County self-pay and are offered a payment-plan option. In some cases, reduced/sliding-scale fees are offered. If an offender becomes non-compliant he/she must pay all fees. Waukesha County provides limited funding to WCS for SCRAM services for indigent clients. Waukesha County also covers some of the costs for offenders within the Alcohol Treatment Court Program. Typically, the county pays for 45 of the 90 days of required monitoring for those in the alcohol treatment program, and the offender is responsible for the remainder.

Once equipped with the CAM, offenders are required to do a daily download (same time each day at a designated location) to the base station. The data is then transmitted to AMS where an AMS analyst reviews the data. AMS sends a report to WCS every morning. Following a confirmed event by AMS, court officials (or other contact people as specified for the offender) are notified. These officials determine the appropriate action.

WCS Intensive Supervision Programs monitored more than 1,200 offenders with an 89.25 percent compliance rate in 2009. Milwaukee County ISP reports that 1,831 offenders were placed on transdermal monitoring from November 2, 2005, to January 31, 2011. The average total number of wear days for an individual offender was 44.4 days. Seven percent of the offenders monitored during this time period tested positive for alcohol use. Comparable numbers for the Waukesha County ISP (from October 1, 2008, to January 31, 2011) indicate that 341 offenders were placed on transdermal monitoring. The average total number of wear days per offender was 76 days. Of the 341 offenders monitored during this time period, 14 (7%) tested positive for alcohol use.

WCS is not involved with the ignition interlock device. Instead, WCS uses the SCRAMx, which allows for house-arrest monitoring where deemed necessary. House arrest cases, used as a sanction in the WCS Day Report Center and Alcohol Treatment Court Programs, are a small part of the monitoring done by WCS. Fourth offense alcohol-impaired driving offenders enrolled in the WCS Alcohol Treatment Court are placed on SCRAMx during phase one of the program, as an alternative to incarceration.

The Milwaukee County Sheriff's Office uses a combination of GPS units and SCRAMx; as well as house arrest with SCRAMx. Most of the offenders involved in WCS-operated programs are enrolled in treatment as a requirement of their program participation. Among the WCS-operated programs for DWI offenders, 75 to 85 percent or more, comply with their requirement to enroll in treatment. Using the SCRAMx device was noted to enhance the intensive supervision program as it acts as a 24/7 or continuous monitoring agent of offenders.

III. Method

Obtaining the Data or Data Sources

Department of Motor Vehicles records were examined of alcohol-related driving offenders who were placed on the SCRAM device and who had an arrest from January 1, 2007, to December 31, 2009. Data on the SCRAM program was obtained from AMS and its SCRAMnet data system, from program managers in Nebraska and Wisconsin, from program evaluators in Nebraska, and from DMVs in Nebraska and Wisconsin. Note that the Wisconsin data was limited to Milwaukee and Waukesha counties. Memoranda of Understanding and Privacy Act agreements with the proper agencies were developed prior to requesting any data.

DMV data was also obtained for all offenders who had an alcohol-related offense occurring in or after 2007. The data included all alcohol-related arrests between 2002 and 2011. The data prior to 2007 was used to establish the number of prior alcohol-related arrests. Rates of recidivism were established by looking at rearrests occurring after the first eligible arrest in 2007 to 2009. This first eligible arrest is further referred to as the "target offense." A fixed, 2-year "look forward" interval was used to determine if a subject recidivated. That is, if an additional drinking and driving offense occurred within 2 years of the target offense, it was considered an instance of recidivism.

Data obtained from the SCRAMnet database included all SCRAM participants in Nebraska and Wisconsin from 2007 through 2011. This data included the dates that offenders started using the SCRAM device, the date they were taken off the device, the total number of days on SCRAM; the date; time; and type of each alert (tamper or alcohol) and, in the event of an alcohol alert, the TAC associated with that alert. Any one individual may have had multiple instances of using a SCRAM device (i.e., they could have worn the device over separate distinct time periods). For instance, one may be sanctioned to SCRAM on multiple occasions; may have re-offended and been sanctioned again; or may have been assigned to SCRAM, taken off then re-assigned at the discretion of the judge or probation officer. The AMS data were used to identify which offenders in the DMV dataset were users of the SCRAM device. The DMV and SCRAM data were combined using offenders' first name, last name, and date of birth as a basis for merging. Merging offender data allowed the linkage of arrest date to a particular assignment to SCRAM and subsequent arrests, where applicable.

Matching Procedure

SCRAM status (i.e., on-SCRAM versus control) was determined in slightly different ways in the two States. Wisconsin is a pre-trial SCRAM state. As such, offenders were considered on-SCRAM if they were equipped with the devices between date of arrest and date of adjudication. Offenders in Nebraska may be equipped with SCRAM after adjudication, and thus offenders were operationally defined as on-SCRAM if they were assigned to the devices during the period between the date of arrest and up to 30 days after adjudication. There were a few instances in which a single SCRAM event was nested within multiple arrest-adjudication

periods. When that was the case, the arrest closest in time to the SCRAM installation date was used as the target offense.

Offenders were assigned to the control (non-SCRAM) group if they had an arrest between January 1, 2007, and December 31, 2009, and were not assigned to SCRAM (as operationally defined). Control group offenders are usually subject to the same monitoring or supervision as SCRAM offenders, which may include regular visits to a probation or county supervision officer, drug testing, community service and alcohol education or treatment if ordered. The main difference between SCRAM and non-SCRAM offenders is simply use of the SCRAM device. If one had more than one alcohol-related arrest during the 2007-2009 period, the target offense was randomly picked from the eligible arrest dates. Offenders identified as on-SCRAM were matched to control offenders based on: (1) county of conviction; (2) number of prior offenses (0, 1, 2 or more); (3) sex; (4) age at time of target offense; and (5) number of days since last prior (for those with a prior). Only arrests occurring in the 5 years prior to the target arrest were considered when determining number of priors and number of days since last prior. Control and SCRAM offenders were matched exactly, based on sex, county, and number of priors. A looser match was used for number of days since last prior and age. Specifically, a control offender was matched to a SCRAM offender if the number of days since last prior was within +/- 200 days and if age at time of target arrest was within +/- 9 years. When a SCRAM offender had multiple potential matches, the control closest in age was selected as the final match. When no matched control offender could be identified with these criteria, the criteria were loosened. Under the looser criteria, county of arrest was ignored and number of prior (no priors, 1 prior, 2 or more priors) was changed to prior (no priors or, any priors). The loosened match was not needed in Wisconsin and used for less than 1 percent of the Nebraska sample.

IV. Results

Wisconsin

Demographics and Alcohol History

Offenders were matched to control offenders based on county; number of prior offenses (0, 1, 2 or more); sex; age at time of target offense; and number of days since last prior (for those with a prior). Following the matching procedure, a total of 1,674 offenders remained, all of whom had at least one OUI/OWI offense in the 2007-2009 period. Half the offenders (N=837) were on SCRAM after the target offense; half (N=837) were not on SCRAM. Since the SCRAM and control groups were matched as exactly as possible, there really is very little difference between the two groups at the outset, as shown in Table 1. The proportion of offenders in each of the two counties involved was the same: 84.5 percent of SCRAM offenders were from Milwaukee County and 15.5 percent were from Waukesha County; 84.5 percent of control offenders were from Milwaukee County and 15.5 percent of control offenders were from Waukesha County. The proportion of males and females was the same in both the SCRAM and control group as well (89.1% male, 10.9% female) and mean age was 41 years for both groups (40.7 years for SCRAM and 40.6 years for the control).

Table 1. Wisconsin: Distribution of Matching Variables by SCRAM/Control

		SCRAM	Control
County	**Milwaukee**	N=707	N=707
	Waukesha	N=130	N=130
Sex	**Female**	N=91	N=91
	Male	N=746	N=746
Age	**(Mean)**	*M*=40.7	*M*=40.6
N Priors	**None**	N=356	N=356
	1	N=414	N=414
	2 or more	N=67	N=67
Days Since Prior	**(Mean)**	*M*=465	*M*=485

Table 2 shows the distribution of the number of days SCRAM offenders were monitored. Males assigned to SCRAM were monitored for 88 days on average whereas women were monitored for an average of 63 days (t-test showed this difference to not be significant, $p > 0.05$). Distribution by age group shows that 60 percent of the offenders were between 36 and 50 years of age (Table 3). The majority of offenders in both groups were white/caucasian (non-Hispanic), with African-Americans forming the second largest group (see Table 4 for details).

Table 2. Wisconsin: Distribution of Days on SCRAM

Days on SCRAM	N	%
<30	56	6.7%
30-44	450	53.8%
45-59	136	16.2%
60-89	80	9.6%
90-179	62	7.4%
180-269	18	2.2%
270-359	5	0.6%
360-539	5	0.6%
540-719	5	0.6%
720 and over	20	2.4%
Total*	N=837	100.0%

Table 3. Wisconsin: Age Group Distribution (%) by SCRAM/Control

Age Group	SCRAM		Control	
	N	%	N	%
<21	8	1.0%	6	0.7%
21-35	292	34.9%	296	35.4%
36-50	502	60.0%	508	60.7%
51 and over	35	4.2%	27	3.2%
Total*	N=837	100.0%	N=837	100.0%

* Percentages may not add up to 100 due to rounding.

Table 4. Wisconsin: Ethnicity Distribution (%) by SCRAM/Control

Race	SCRAM		Control	
	N	%	N	%
Asian-American	2	0.2%	5	0.6%
African-American	106	12.7%	143	17.1%
Hispanic	83	9.9%	97	11.6%
Native American	14	1.7%	23	2.7%
Caucasian	632	75.5%	565	67.5%
Unknown	0	0.0%	4	0.5%
Total*	N=837	100.0%	N=837	100.0%

* Percentages may not add up to 100 due to rounding.

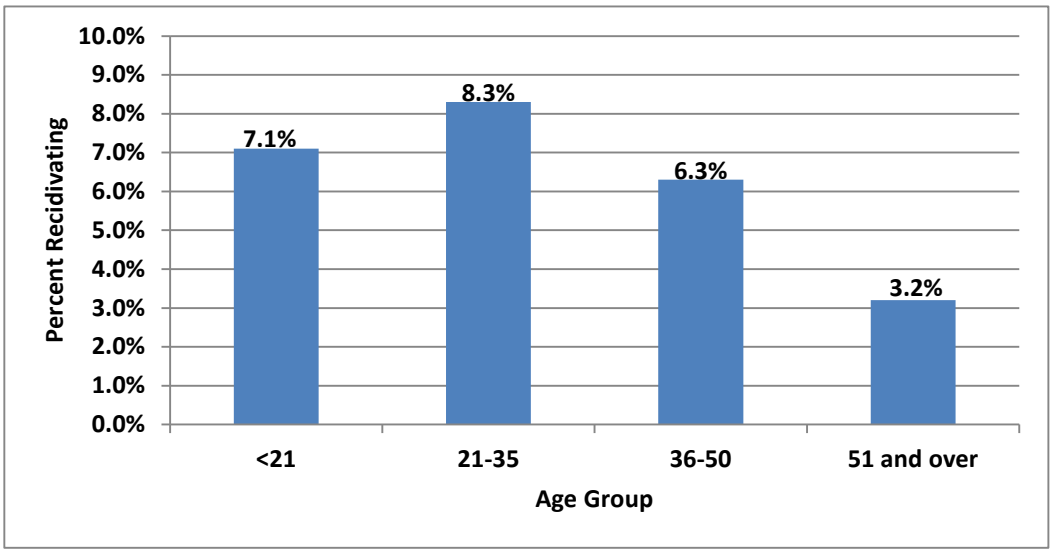
Number of prior arrests ranged from 0 to 5, with priors defined as any OUI/OWI offense occurring in the five years prior to the target offense. Since groups were matched on number of prior arrests, there was no difference between SCRAM and control offenders and the average number of arrests was less than 1 (0.66) in either group. As it was controlled in the matching procedure, there was no difference in percentage of offenders with a prior, with 57.5 percent of both SCRAM and control offenders showing a prior offense. For those with a prior, the mean number of days between a prior offense and the target offense was 465.02 days (1.27 years) for

SCRAM and 485.31 days (1.33 years) for control offenders (not significant). Thus both control and SCRAM groups were closely matched on a number of variables related to potential recidivism.

Recidivism

Recidivism rates were determined by looking at those offenders who were rearrested for an alcohol driving offense. Recidivism rates were slightly higher in the two younger groups (<21, and 21-35), but results of the chi-square test revealed this to be non-significant (Figure 1). Recidivism rates did not differ significantly across sexes (7% for males, 6% for females) or counties (6.4% Milwaukee, 9.6% Waukesha), but did differ significantly by prior arrest: 8.3 percent for those with a Prior arrest, 5.1 percent for those without (W (1) =6.61, p<.05).

Figure 1. Wisconsin: Percent Recidivating by Age Group (including SCRAM and Control)



Offenders equipped with SCRAM during the period from the date of the target offense to the date of adjudication were considered as SCRAM offenders; those not equipped with SCRAM in the same period were control offenders. Recidivism was defined as any OUI/OWI citation within 2 years of the target offense.

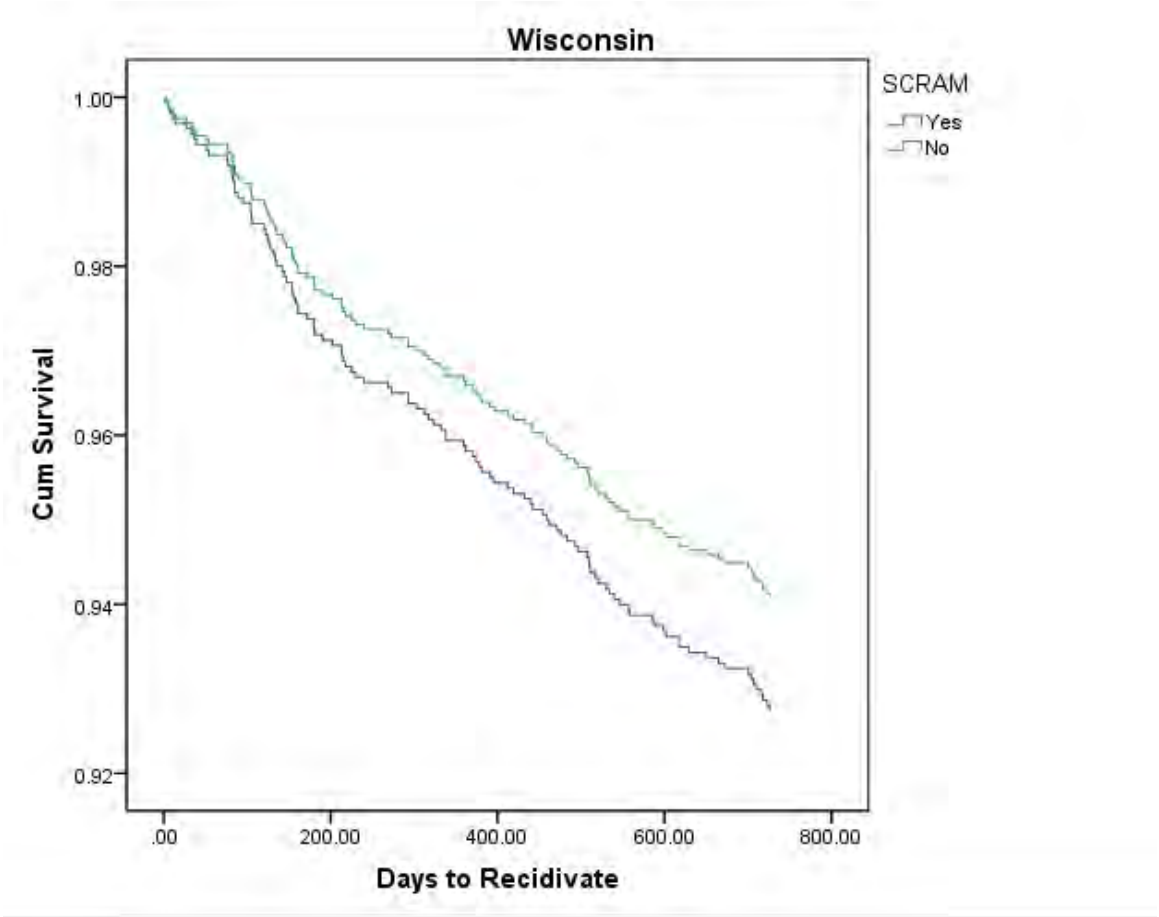
A Cox regression survival analysis was performed to assess the impact of the SCRAM device on the occurrence of recidivism after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest (Milwaukee, Waukesha). Table 5 shows regression coefficients, degrees of freedom, p values, and odds ratio for each covariate. The overall model showed a significant effect, G^2 (5) =14.26, p<.05, as did one of the predictors (prior). None of the other predictors, including SCRAM, were significantly related to recidivism. The absence of a prior arrest decreases the risk of recidivism by 34 percent.

Table 5. Wisconsin: Cox Regression Analysis of SCRAM, Age, Sex, Prior, and County on Occurrence of Recidivism

Covariate	*B*	*Df*	Prob.	Odds Ratio
Sex	- 0.145	1	.649	0.865
Age	- 0.015	1	.088	0.985
County	0.378	1	.095	1.460
Prior	- 0.410	1	.048	0.664
SCRAM	0.210	1	.260	1.234

Figure 2 plots the cumulative percentage of people who survived over time (i.e. did not recidivate) by SCRAM status. Looking at all offenders over time, the plot shows that a higher percentage of offenders with SCRAM recidivate compared to non-SCRAM users. Although SCRAM users may have a higher percentage of recidivism than non-SCRAM users, SCRAM may still have an impact on how quickly one recidivates. This is explored in the analyses below.

Figure 2. Wisconsin: Survival Function of the Adjusted Likelihood of Not Recidivating by SCRAM Status



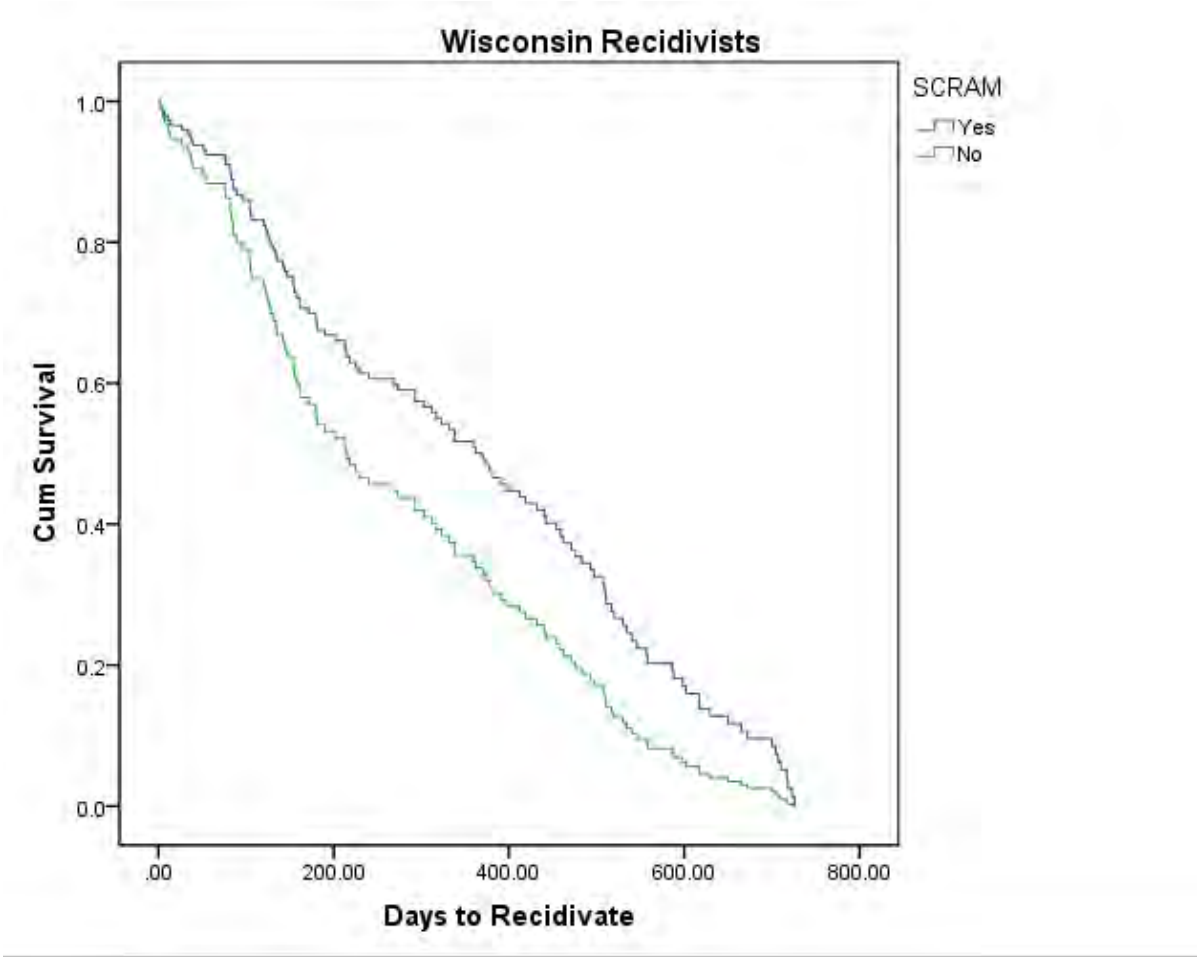
A follow up survival analysis was conducted looking only at *recidivists* to explore how being assigned to SCRAM may affect the onset of recidivism (i.e. how many days to recidivate). A Cox regression survival analysis was performed after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest (Milwaukee, Waukesha). Table 6 shows regression coefficients, degrees of freedom, *p* values, and odds ratio for each covariate. There was a statistically significant effect of SCRAM, G^2 (1) = 4.78, $p<.05$ but none of the remaining covariates showed a statistically significant effect on number of days to recidivate. SCRAM was the only variable to significantly predict survival time and as such was the greatest contributor. Being assigned to SCRAM delayed the onset of recidivism by 36 percent. Thus, among recidivists, SCRAM users are shown to take more days to recidivate than non-SCRAM users.

Table 6. Wisconsin Recidivists: Cox Regression Analysis of SCRAM, Age, Sex, Prior, and County on Number of Days to Recidivate

Covariate	*B*	*df*	Prob.	Odds Ratio
Sex	0.238	1	.496	1.269
Age	-0.005	1	.589	0.995
County	-0.024	1	.919	0.976
Prior	0.166	1	.460	1.180
SCRAM	-0.450	1	.027	0.638

Figure 3 plots the cumulative percentage of recidivists' survival rates over time by SCRAM status. The plot shows that the control offenders actually recidivated earlier than SCRAM offenders.

Figure 3. Wisconsin Recidivists: Survival Function of the Adjusted Likelihood of Not Recidivating by SCRAM Status



A series of logistic regressions examined further elements regarding the proportion of recidivists and mean days to recidivate. Although a slightly higher percentage of SCRAM offenders were found to recidivate (7.6% versus 6.2% for control), this difference was not significant. Among the recidivists, SCRAM offenders took significantly longer to recidivate (360 days) than did control offenders (271 days), F (1,114) =5.09, p<.05. Less than 2 percent of SCRAM users (14 out of 837) recidivated while wearing the device. Thus, among recidivists, wearing a SCRAM device delayed the onset of recidivism of DUI offenders.

A further analysis explored the impact of the number of days monitored (i.e., days wearing SCRAM) on recidivism rates. Only offenders equipped with SCRAM were included in this analysis. Recidivism rates of offenders assigned to SCRAM for less than 3 months (89 days or less) were compared to those of offenders assigned to SCRAM for 3 months of more (90 days and above). A Cox regression survival analysis was performed after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest (Milwaukee, Waukesha). Table 7 shows regression coefficients, degrees of

freedom, *p* values, and odds ratio for each covariate. The overall model showed a significant effect, G^2 (5) =18.05, $p<.05$, as did one of the predictors (age). None of the other predictors, including time on SCRAM, were significantly related to recidivism. Each increase of year of age decreases the risk of recidivism by 3 percent. Number of days monitored on SCRAM did not show an effect on recidivism rates.

Table 7. Wisconsin: Cox Regression Analysis of Time on SCRAM, Age, Sex, Prior, and County on Number of Days to Recidivate

Covariate	*B*	*Df*	Prob.	Odds Ratio
Sex	- 0.533	1	.304	0.587
Age	- 0.029	1	.019	0.971
County	0.223	1	.477	1.250
Prior	- 0.526	1	.073	0.591
Time on SCRAM	-0.500	1	.103	0.607

Nebraska

Demographics and Alcohol History

Offenders were matched to control offenders based on county; number of prior offenses (0, 1, 2 or more); sex; age at time of target offense; and number of days since last prior (for those with a prior). Following the matching procedure, a total of 1,344 offenders remained, all of whom had at least one DUI/DWI offense in the 2007-2009 period. Half the offenders (N=672) were on SCRAM following the target offense; half (N=672) were not on SCRAM. Since the SCRAM and control groups were matched as exactly as possible, there really is very little difference between the two groups at the outset, as shown in Table 8. The final sample had offenders representing 59 of Nebraska's 93 counties. The proportion of males and females was the same in both the SCRAM and control group as well (77.2% male, 19.8% female, 3% unknown). The mean age was 32 years for both groups (32.1 years for SCRAM and 32.1 years for the control).

Table 8. Nebraska: Distribution of Matching Variables* by SCRAM/Control

		SCRAM	Control
Sex	**Female**	N=133	N=133
	Male	N=519	N=519
Age	**(Mean)**	*M*=32.1	*M*=32.1
N Priors	**None**	N=457	N=457
	1	N=169	N=167
	2 or more	N=46	N=48
Days Since Prior	**(Mean)**	*M*=853	*M*=844

*More than 50 counties were represented, so county was excluded from this table

Table 9 shows that SCRAM offenders were monitored for 86.9 days, on average (range less than 24 hour to 1,349 days). Males assigned to SCRAM were monitored for 87 days on average whereas women were monitored for an average of 88 days (t-test showed this difference to not be significant). Distribution by age group shows that 56 percent of offenders were between 21 and 35 years of age (Table 10). The majority of offenders in both groups were caucasian (see Table 11 for details).

Table 9. Nebraska: Distribution of Days on Scram

Days on SCRAM	N	%
<30	90	13.4%
30-44	60	8.9%
45-59	157	23.4%
60-89	151	22.5%
90-179	184	27.4%
180-269	14	2.1%
270-359	6	0.9%
360-539	8	1.2%
540-719	0	0.0%
720 and over	2	0.3%
Total*	N=672	100.0%

Table 10. Nebraska: Age Group Distribution (%) by SCRAM/Control

Age Group	SCRAM		Control	
	N	%	N	%
<21	89	13.2%	84	12.5%
21-35	379	56.4%	379	56.4%
36-50	151	22.5%	159	23.7%
51 and over	53	7.9%	50	7.4%
Total*	N=672	100.0%	N=672	100.0%

* Percentages may not add up to 100 due to rounding.

Table 11. Nebraska: Ethnicity Distribution (%) by SCRAM/Control

Race	SCRAM		Control	
	N	%	N	%
Asian-American	3	0.4%	3	0.4%
African-American	23	3.4%	30	4.5%
Hispanic	37	5.5%	34	5.1%
Native American	16	2.4%	30	4.5%
Caucasian	564	83.9%	532	79.2%
Other/Multiple	7	1.0%	22	3.3%
Unknown	22	3.3%	21	3.1%
Total*	N=672	100.0%	N=672	100.0%

* Percentages may not add up to 100 due to rounding.

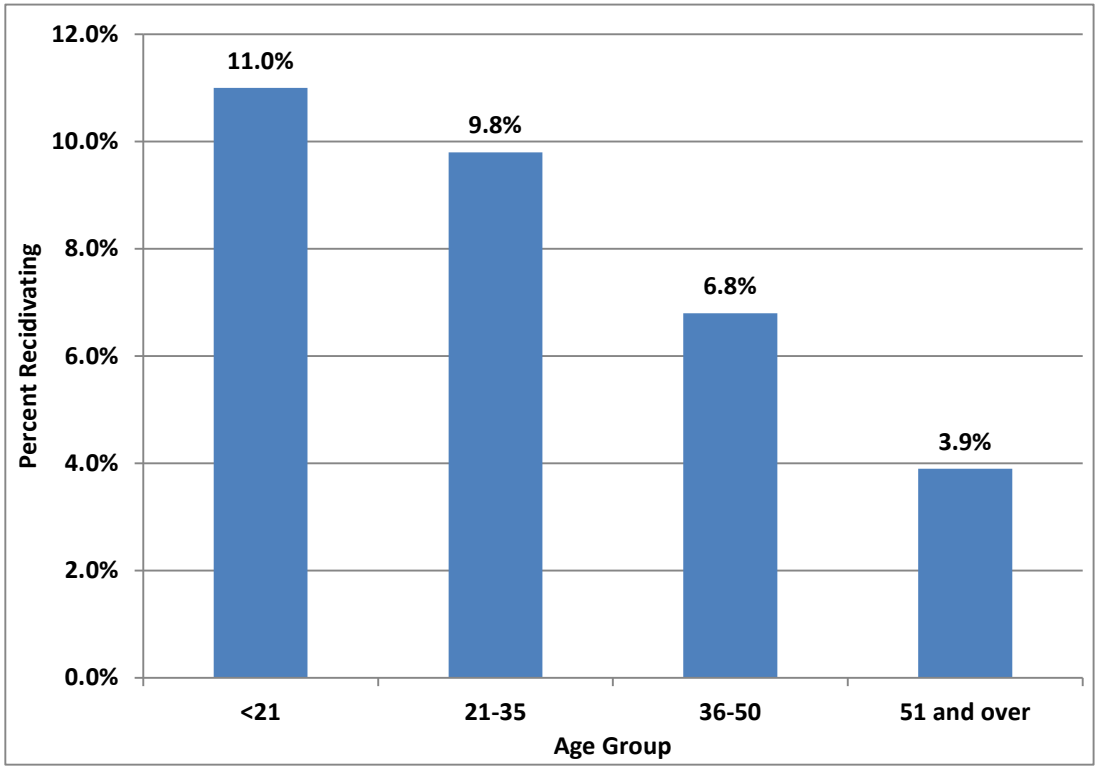
Number of prior arrests ranged from 0 to 4, with priors defined as any DUI/DWI offense occurring in the 5 years prior to the target offense. Overall, there was an average of 0.39 arrests

for SCRAM and 0.41 arrests for control offenders. As it was controlled in the matching procedure, there was no difference in percentage of offenders with a prior, with 32.0 percent of both SCRAM and control offenders showing a prior offense. For those with a prior, the mean number of days between a prior offense and the target offense was 853.4 days (2.34 years) for SCRAM and 843.42 days (2.31 years) for control offenders. This difference was not significant.

Recidivism

Recidivism rates were determined by looking at those offenders who were rearrested for an alcohol driving offense. Occurrence of recidivism was slightly higher in the two younger groups (<21, and 21-35), but not significantly so (Figure 4). Leaving out persons of unknown sex, recidivism rates varied significantly across sexes (10% for males, 5% for females), W (1) =5.26, p<.05. Recidivism rates did not differ significantly by prior arrest (10.0% for those with a prior arrest, 8.2% for those without).

Figure 4. Nebraska: Percent Recidivating by Age Group (including SCRAM and control)



Offenders equipped with SCRAM during the period from the date of the target offense to 30 days after adjudication were considered as SCRAM offenders; the remainder were control offenders. Recidivism was defined as any DUI/DWI citation within two years (730 days) of the target offense.

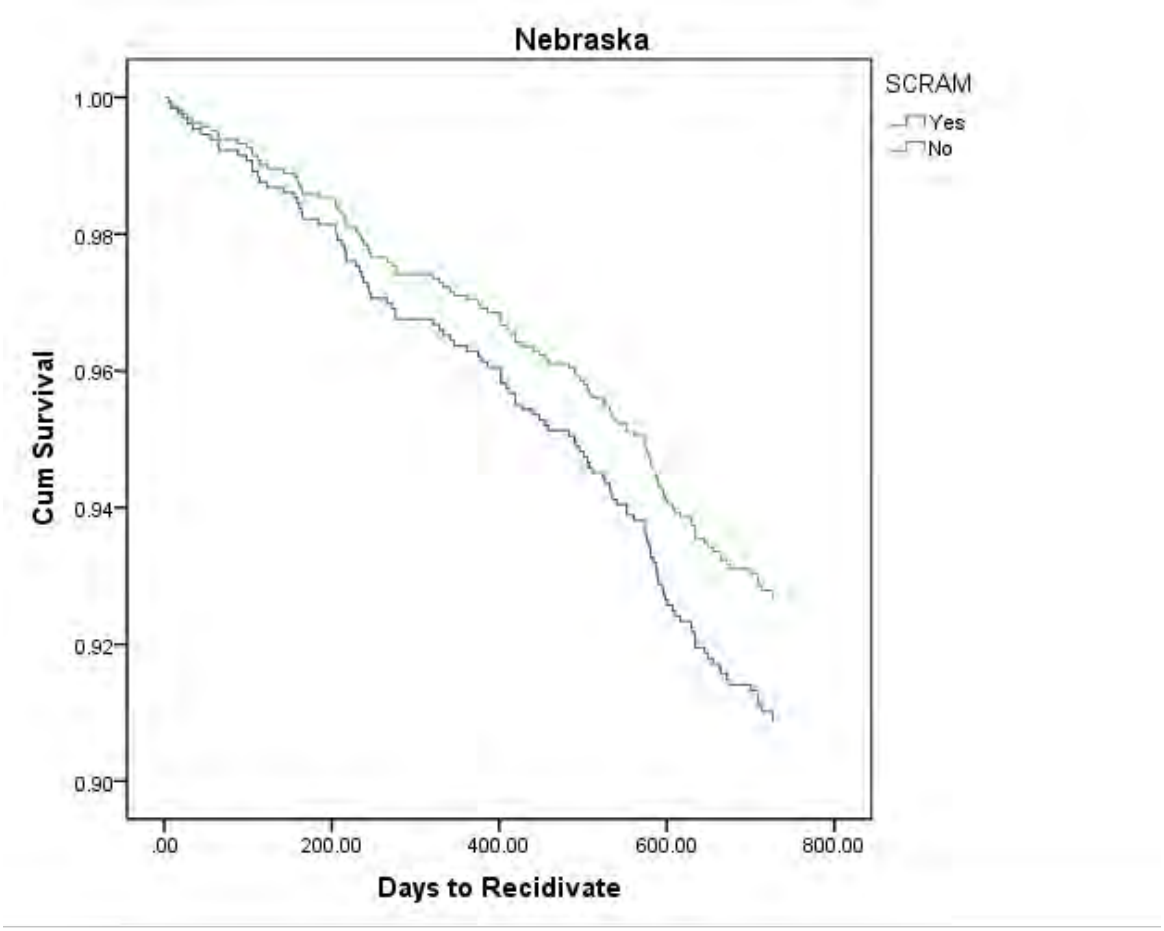
A Cox regression survival analysis was performed to assess the impact of the SCRAM device on the occurrence of recidivism after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest. Table 12 shows regression coefficients, degrees of freedom, *p* values, and odds ratio for each covariate. The overall model showed a significant effect, G^2 (5) =15.51, $p<.05$, with two of the predictors (sex, age) shown to be significantly associated with occurrence of recidivism. None of the other predictors, including SCRAM, were significantly related to recidivism. Sex was the strongest predictor and showed that being male was associated with a 40 percent increased risk of recidivism. The age factor showed a 2 percent decrease in risk of recidivism with each year of age.

Table 12. Nebraska: Cox Regression Analysis of SCRAM, Age, Sex, Prior, and County on Occurrence of Recidivism

Covariate	*B*	*df*	Prob.	Odds Ratio
Sex	- 0.514	1	.030	0.598
Age	-0.022	1	.015	0.978
County	0.005	1	.184	1.005
Prior	-0.173	1	.367	0.841
SCRAM	0.229	1	.216	1.258

Figure 5 plots the cumulative percentage of people who survived over time (i.e. did not recidivate) by SCRAM status. The plot suggests that offenders with SCRAM recidivate in higher numbers than control offenders.

Figure 5. Nebraska: Survival Function of the Adjusted Likelihood of Not Recidivating by SCRAM Status



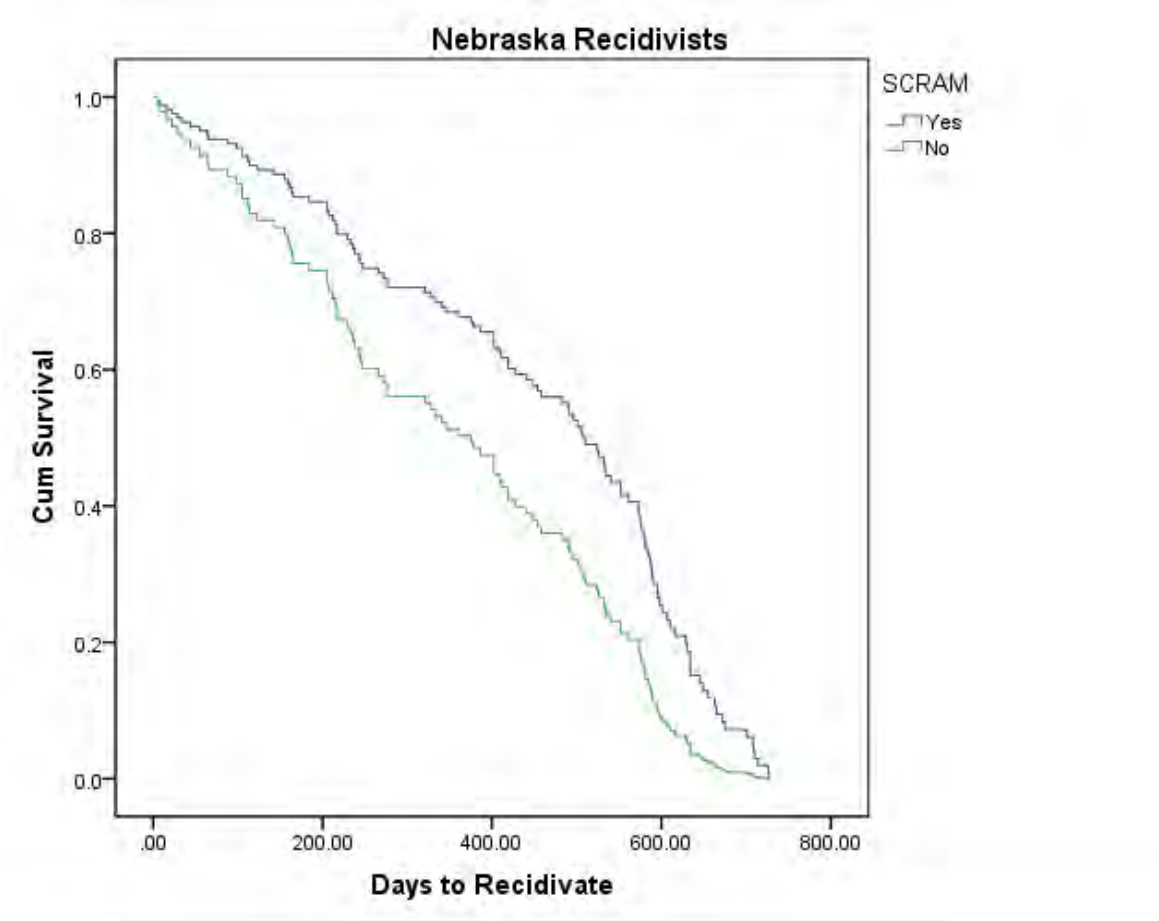
A follow up survival analysis was conducted looking only at recidivists to explore how being assigned to SCRAM may affect how quickly one recidivates. A Cox regression survival analysis was performed after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest. Table 13 shows regression coefficients, degrees of freedom, *p* values, and odds ratio for each covariate. After controlling for the effects of sex, prior, age, and county, SCRAM was found to have a statistically significant effect on onset of recidivism, G^2 (1) =8.10, $p<.05$. The final model also showed a significant effect of county. SCRAM and county significantly predicted survival time with SCRAM being the greatest contributor. Given the large number of counties represented (53), pinpointing the precise effect of county was not pursued. Results demonstrate that being assigned to SCRAM delays the onset of recidivism by 43 percent.

Table 13. Nebraska Recidivists: Cox Regression Analysis of SCRAM, Age, Sex, Prior, and County on Number of Days to Recidivate

Covariate	*B*	*df*	Prob.	Odds Ratio
Sex	0.384	1	.095	1.468
Age	0.017	1	.071	1.017
County	-0.008	1	.049	0.992
Prior	-0.190	1	.336	0.827
SCRAM	-0.566	1	.004	0.568

Figure 6 plots the cumulative percentage of recidivists' survival rates over time by SCRAM status. The plot shows that the control offenders recidivated more quickly than SCRAM offenders.

Figure 6. Nebraska Recidivists: Survival Function of the Adjusted Likelihood of Not Recidivating by SCRAM Status



A series of logistic regressions examined further elements regarding the rates of recidivism and mean days to recidivate. Although a slightly higher percentage of SCRAM offenders were found to recidivate (9.8% versus 7.7% for control), this difference was not significant. Among the recidivists, SCRAM offenders recidivated significantly more slowly (458 days) than control offenders (333 days), F (1,116) =10.88, p<.01. These analyses seem to suggest that although SCRAM offenders recidivate at a higher rate than control offenders (although not significantly so), wearing the SCRAM device may serve to delay the onset of recidivism. Less than one percent of SCRAM users (1 out of 672) recidivated while wearing the device.

A further analysis explored the impact of the number of days monitored (i.e., days wearing SCRAM) on recidivism rates. Only offenders equipped with SCRAM were included in this analysis. Recidivism rates of offenders assigned to SCRAM 89 days or less (less than 3 months) were compared to those of offenders assigned to SCRAM for 90 days or more (3 months of more). A Cox regression survival analysis was performed after adjusting for the effects of four covariates. These covariates were: sex; prior arrest (yes, no); age at time of target offense; and county of arrest. Table 14 shows regression coefficients, degrees of freedom, p values, and odds ratio for each covariate. After controlling for the effects of sex, prior, age, and county, time on SCRAM was found to have a statistically significant effect, G^2 (1) =6.79, p<.05. The final model also showed a significant effect of sex and age. Time on SCRAM was the strongest predictor and showed that being assigned to SCRAM for at least 90 days was associated with a 113 percent decreased risk of recidivism. The age factor showed a 2 percent decrease in risk of recidivism with each year of age. Being female showed a 61 percent decrease in risk of recidivism. Overall, being assigned to SCRAM for at least 90 days was associated with a strong decrease in recidivism.

Table 14. Nebraska: Cox Regression Analysis of Time on SCRAM, Age, Sex, Prior, and County on Time to Recidivate

Covariate	*B*	*Df*	Prob.	Odds Ratio
Sex	- 0.945	1	.013	0.389
Age	- 0.025	1	.041	0.975
County	0.006	1	.257	1.006
Prior	- 0.068	1	.795	0.934
Time on SCRAM	0.757	1	.015	2.133

V. Discussion

Data from more than 3,000 drinking and driving offenders in two States were explored to investigate the impact of SCRAM on rates and speed of recidivism. Some similarities were apparent between the two States. Overall time spent on SCRAM after the target offense was approximately 86 days (85 in WI, 87 in NE). Offenders using SCRAM showed a higher percentage of recidivism than control offenders in both States (WI: 7.6% for SCRAM, 6.2% for control; NE: 9.8% for SCRAM, 7.7% for control). Despite the higher percentage of recidivism showed in SCRAM offenders, recidivists using SCRAM tended to take more days to recidivate than control recidivists. This was true in both States (WI: 360 days for SCRAM, 271 days for control; NE: 458 days for SCRAM, 333 days for control).

The two States also showed some noticeable differences. Recidivism rates were overall higher in Nebraska (8.8%) than in Wisconsin (6.9%), but offenders in Wisconsin had faster recidivism (320 days) than those in Nebraska (403 days). Offenders in Wisconsin also had a higher number of prior arrests on average (0.66) than did those in Nebraska (0.39). Wisconsin had a higher percentage of offenders with a prior arrest (57.5%) than Nebraska (32.0%). Also, offenders in Wisconsin were about 10 years older overall (41 years) than their Nebraska counterparts (32 years). Survival analyses did show an effect of prior arrest in Wisconsin, but not in Nebraska. Conversely, survival analyses showed a significant effect of sex and age in Nebraska, but not in Wisconsin.

The two states also differ in the criteria used for assignment to SCRAM and it may be worth revisiting those conditions. In Nebraska, any adult offender that requires abstinence from alcohol as a condition of supervision is typically assigned to SCRAM, as are offenders engaged in a substance abuse treatment program (especially those demonstrating an inability to refrain from the use of alcohol while under supervision). The CAM program is most often used in conjunction with substance abuse treatment program in Nebraska as both treatment and probation personnel feel that treatment will be more effective if the offenders are sober.

Wisconsin's criteria for assignment to SCRAM differ slightly between counties. In Milwaukee, first-time offenders are assigned to SCRAM if they are charged with an injury, and if they are determined to be "high risk" based on a risk assessment tool. Also assigned to SCRAM are second-time offenders if an injury was involved; third-time offenders with BACs of .16 or greater if their last OWI conviction was less than 24 months from the current charge, and/or whenever accident or injury was involved with their charge; fourth-time or greater OWI offenders; all offenders who have more than one pending OWI charge; and all offenders who have two consecutive positive in-office breath tests, missed office visits, and who are not enrolled in treatment. In Waukesha County, the following offenders are normally assigned to transdermal when bail is being set: (1) all fourth and subsequent OWI offenders; (2) all second and third offenders with BACs of .15 or greater; (3) all repeat offenders under age 21; (4) anyone charged with a criminal OWI offense who then is charged with a subsequent OWI charge while "out on bail"; and (5) any offenders if transdermal alcohol monitoring is deemed appropriate.

Despite differences in the administration of the SCRAM program, both States showed that SCRAM can have a positive impact, if not regarding the occurrence of recidivism, at least regarding the number of days to recidivate. Overall, rates of recidivism were higher among SCRAM users than among non-SCRAM users. However, it seems that SCRAM had an impact on how quickly the offender recidivated. Indeed, odds ratio revealed that being assigned to SCRAM delayed recidivism by 36 percent in Wisconsin and by 43 percent in Nebraska (among those who did recidivate).

The crucial finding is that being assigned to SCRAM delayed the onset of recidivism. Also of note is the fact that, while on SCRAM, recidivism rates were extremely low. Less than 2 percent (14 out of 837 in WI, 1 out of 672 in NE) of SCRAM users recidivated while wearing the device. At least one state showed that spending more time on SCRAM delayed recidivism. Indeed, results in Nebraska showed that, among SCRAM users, offenders assigned to SCRAM for at least 90 days had significantly lower risk of recidivism. Thus, being assigned to SCRAM for at least 90 days was associated with a strong decrease in recidivism. This suggests that SCRAM does delay future drinking and driving events in at-risk populations. It may be the case that assigning offenders to SCRAM for longer periods of time may delay recidivism even further than what was observed in these two States. This is a question that should be investigated in the future.

One limitation of the current study is the fact that offenders were not randomly assigned to SCRAM. As such, there exists the possibility that some of the differences uncovered may be a function of the offenders themselves, and not due to the use of the device. An attempt to control for such extraneous factors was made by matching SCRAM and control offenders on a number of relevant variables: county of conviction; number of prior offenses; sex; age at time of target offense; and number of days since last prior (where applicable). However, a related limitation may be that under the criteria used by the courts, SCRAM devices may tend to be assigned to offenders that are more likely to recidivate. If this is indeed the case, the finding that these high-risk individuals recidivate in higher numbers than those not assigned to SCRAM is not unexpected. The finding that, among recidivists, SCRAM users take more days to recidivate than non-SCRAM users is important and suggests that CAM devices do have a beneficial effect. Still, further research using a longitudinal design that includes random assignment to CAM would be needed to precisely isolate the impact of the device on recidivism.

CAM has been shown to be an effective tool when monitoring alcohol sobriety for DWI offenders. CAM identifies all confirmed alcohol events and eliminates the need for probation or other court officers to conduct frequent and random in-home offender monitoring. This aspect of offender monitoring saves time and resources (manpower and fiscal) for other types of monitoring and probation efforts. It also appears that offenders who maintain sobriety while undergoing treatment have better treatment outcomes.

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