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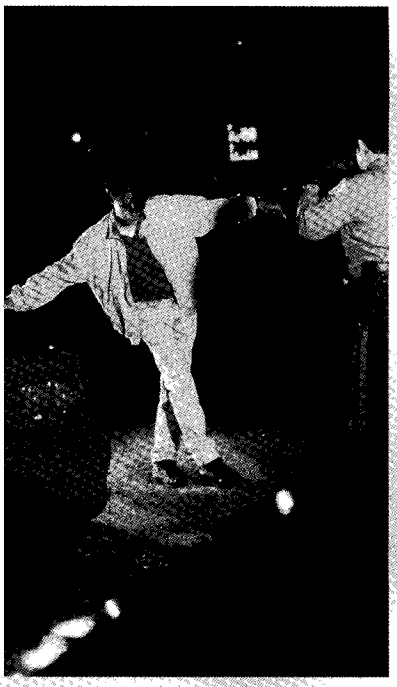
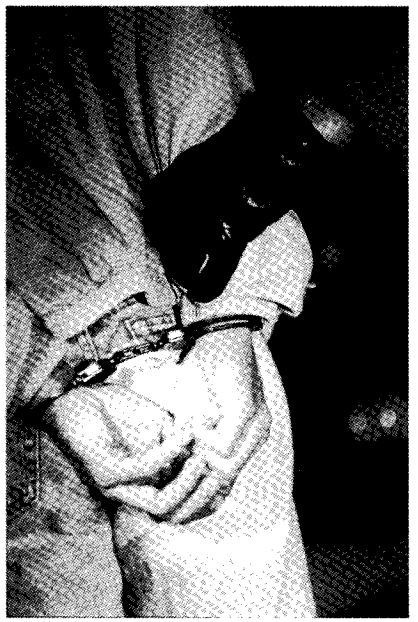
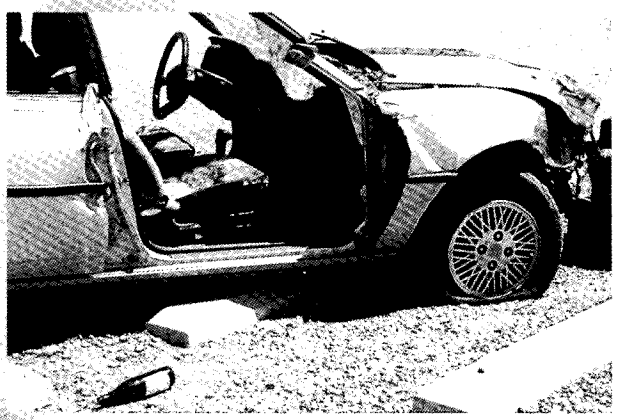
March 2000

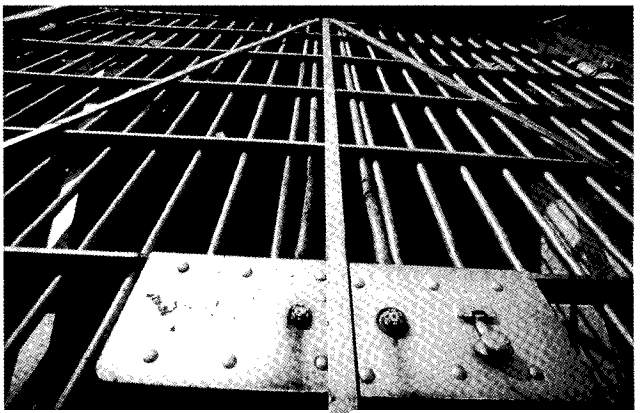




State of Knowledge of Alcohol-Impaired Driving

Research on Repeat DWI Offenders





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16. Abstract

Reviews the scientific literature since 1990 about drivers who have been convicted more than once of driving while impaired by alcohol (DWI). Covers the role of such drivers in alcohol-related crashes, their characteristics, and the nature and effectiveness of countermeasures designed to reduce their alcohol-crash involvement. The review was performed as a part of a larger review of the state of knowledge about alcohol-impaired driving at the millennium.

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EXECUTIVE SUMMARY

This report is a review of the scientific literature about drivers who have been convicted more than once of driving while impaired by alcohol (DWI). The main focus of the review was on issues such as the role this category of drivers plays in alcohol-related crashes, their characteristics and the nature and effectiveness of countermeasures intended to reduce their alcohol-crash involvement.

Based on the literature examined in this review, we conclude that repeat DWI offenders comprise a small, but not negligible, percentage of drivers involved in traffic crashes. Unfortunately, there are very little data on the actual magnitude of that percentage, but data from California suggest that it could be in the 8% range for *alcohol-related* fatal crashes, and data from the Fatality Analysis Reporting System (FARS) suggest a figure of some 2%-3% for *all* fatal crashes. Thus, even if all alcohol-related fatal crashes involving repeat offenders were eliminated, at least 90% of all fatal crashes would still remain.

California data also indicate that, for *alcohol-related crashes* of all degrees of severity, crash risk increases with number of priors in near linear fashion. However, crash risk actually decreased for *crashes of all types* (alcohol-related and non-alcohol related). Thus, the involvement of repeat offenders in *crashes of all types* may actually be less than that of first offenders, possibly because sober repeat offenders may drive more carefully than sober first offenders, or may not drive at all because their license was suspended.

We found no literature concerning the number of repeat offenders as a percentage of all drivers on the road at a given time, nor was there any literature addressing the effect of blood alcohol concentration (BAC) on repeat offenders' relative risk of a crash. The risk of an alcohol-related crash relative to that with no prior DWIs was found to increase steadily with number of prior DWIs in California, perhaps amounting to about 1.4 for repeat offenders as a whole in 1995. By contrast, the risk of any crash decreased with number of prior DWIs. By comparison, FARS data indicate that the risk of a *fatal crash* involving a driver with one or more DWI convictions in the past three years relative to the risk of a fatal crash involving a driver with no DWI convictions in the past three years was also about 1.4 in 1997.

With respect to the characteristics of repeat DWI offenders, we conclude that such offenders share many of the characteristics of first offenders. Some older studies have in fact found no first-offender group that was distinguishable from a repeat-offender group. The literature we found was devoted almost entirely to repeat offenders who had been arrested and, in most instances, were participating in some kind of post-conviction program. No literature was found on the characteristics of repeat offenders in crashes, and there was a lack of multivariate studies of repeat offender characteristics.

An unexpected finding on repeat offender characteristics was the relatively small practical difference in their mean BAC from that of first offenders (.18 and .16,

respectively). Also important was a general downward time trend in the one-year recidivism rate of repeat offenders in California, from nearly 10% in 1989 to 7% in 1995.

We found much more, and higher quality, evaluative literature on repeat offender countermeasures than in prior reviews, nearly all of which was concerned with the specific deterrent effect of various sanctions. Sanctions classified as alternative sanctions appeared especially effective, offering potential reductions in recidivism in the 15% to 90% range. License suspension or revocation combined with treatment continues to look effective, with the potential for reducing recidivism by as much as 50%.

Three major recommendations flow from this review. First, more studies (perhaps at the state or local level) of crashes are needed using available databases such as those maintained by state motor vehicle departments. These studies should include information on the characteristics of persons in crashes, as well as on other groups of drivers such as offenders referred to treatment or other post-conviction programs. There is a particular need for new studies of a multivariate nature that allow one to identify high-risk and high-incidence groups of multiple offenders. Where possible, personality and psychosocial variables quantified through appropriate assessments should be merged with crash data to support such studies.

Second, we recommend that new evaluations of the effectiveness of legal countermeasures (sobriety checkpoints, jail, license, etc.) for repeat offenders be conducted, especially in states other than California which already has a continuing evaluation program of such countermeasures. There is an especial need for evaluations of general deterrence effects of countermeasures for repeat offenders. For specific deterrence, few evaluations have used designs with random assignments of subjects to experimental and comparison groups. Countermeasures that have been found to be effective for repeat offenders, but have used other designs that may not fully account for differences between the experimental group and the comparison group, need confirmation through evaluations employing random assignment.

Finally, we recommend additional research be conducted to determine the exposure of repeat offenders to traffic crashes so that the risk of this group can be estimated more accurately. For example, roadside surveys that are conducted periodically could incorporate a component that would retrieve the driving records of its subjects to determine which of them have how many prior DWIs.

1 - INTRODUCTION

This report is a review of the scientific literature about drivers who have been convicted more than once of driving while impaired by alcohol (DWI). Following convention, we refer to these drivers as "repeat DWI offenders," since virtually all drivers who drive while impaired do so more than once. The review covers the scientific literature published since 1990, and does not include research performed in studies that were not documented in the open literature. Such research includes special studies performed for state agencies using data from state files. Of particular interest in this review is the role of repeat DWI offenders in alcohol-related crashes, their characteristics, and the nature and effectiveness of countermeasures designed to reduce their alcohol-crash involvement.

The review was performed as a part of a larger Mid-America review being conducted for NHTSA which involves a comprehensive review of the state of knowledge about alcohol-impaired driving at the millennium. The larger review will cover the entire spectrum of related research, from the nature of the societal problem created by alcohol-impaired driving on through the description and effects of programs that have addressed that problem.

2 - REPEAT OFFENDERS AND CRASHES

Crashes

There is evidence that drivers with prior DWIs are more likely to be involved in severe traffic crashes than are other drivers. Older studies provide some clues on the extent of this over-involvement. For example, a study by Fell (1991) using data from the U.S. Department of Justice found that, in 1988, 3.3% of all licensed drivers had been arrested for DWI in the past three years, but that data from NHTSA's Fatality Analysis Reporting System (FARS) indicated that 5.7% of all drivers in fatal crashes had been arrested and convicted for DWI in the past three years[1]. This suggests that drivers with one or more DWIs were over-represented among fatal-crash involved drivers by a factor of at least 1.8. The "at least" qualifier applies, since not all of the arrested drivers would have been convicted. Note that this figure includes first offenders as well as repeat offenders.

The latest FARS report (U.S. Department of Transportation NHTSA, 1998), indicates that, in 1997, 3.3% of licensed drivers involved in fatal crashes had one or more DWI convictions in a three-year period preceding the crash, about 42% lower than in 1988. Using the same procedure as used by Fell for 1988 data, we estimate that only about 2.3% of *all* licensed drivers had been arrested for DWI in the past three years, about 30% lower than in 1988. The net result is that drivers with one or more DWIs were over-represented among fatal-crash involved drivers by a factor of at least 1.4 in 1997, about 22% lower than the 1.8 figure calculated for 1988.

FARS data for 1997 also indicate that there were an average of about 1.5 drivers per fatal crash, indicating that roughly 2.2% of all fatal crashes (810) involved a driver with one or more DWI convictions.

Another study of "hard-core" drinking drivers by Simpson and Mayhew (1991) also cited data from FARS, but differentiated first offenders from repeat offenders. The data indicated that 55% of fatally injured drivers with two or more DWI convictions in the preceding three years had a BAC of .20 or more, and that some 85% had a BAC of .10 or more. The average BAC of the repeat offenders was .21 compared to .17 for the first offenders.

A study by Gould and Gould (1992) described later in this report (page 10) examined the prevalence of repeat offenders in Louisiana crashes of all degrees of severity, not just fatal crashes. They found that repeat DWI offenders were some 50% more often involved in both alcohol-related traffic crashes and non-alcohol related crashes than were first offenders. The average BAC of the repeat offenders was also higher than that of the first offenders (.18 versus .15).

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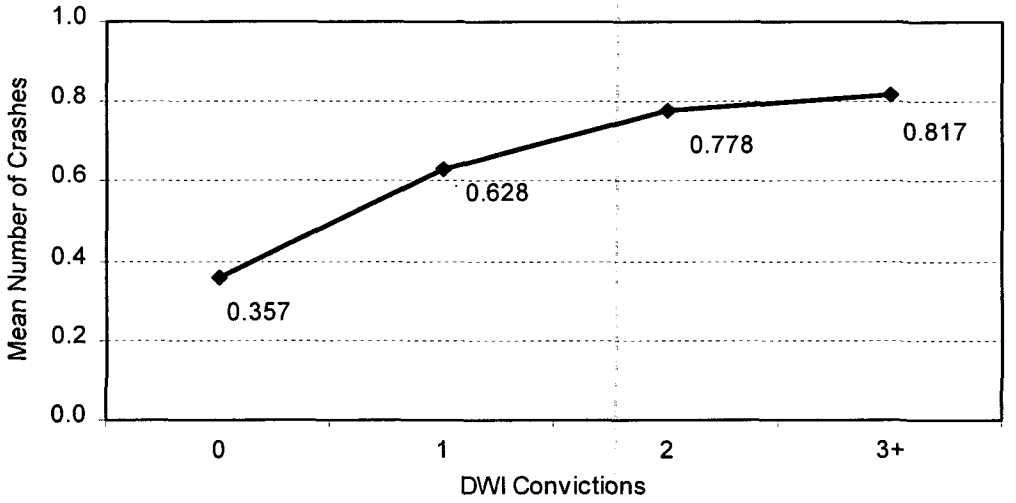
[1] FARS is limited to three years in its definition of conviction, since states vary in the amount of time convictions are kept on record.

Recently, Peck and Helander (1999) examined how the mean number of traffic crashes during 1985-1991 in California varied as a function of DWI convictions in the same period. The data are plotted below.

Figure 1: Mean Number of Traffic Crashes in California in 1985-1991 by Number of DWI Convictions in the Same Period

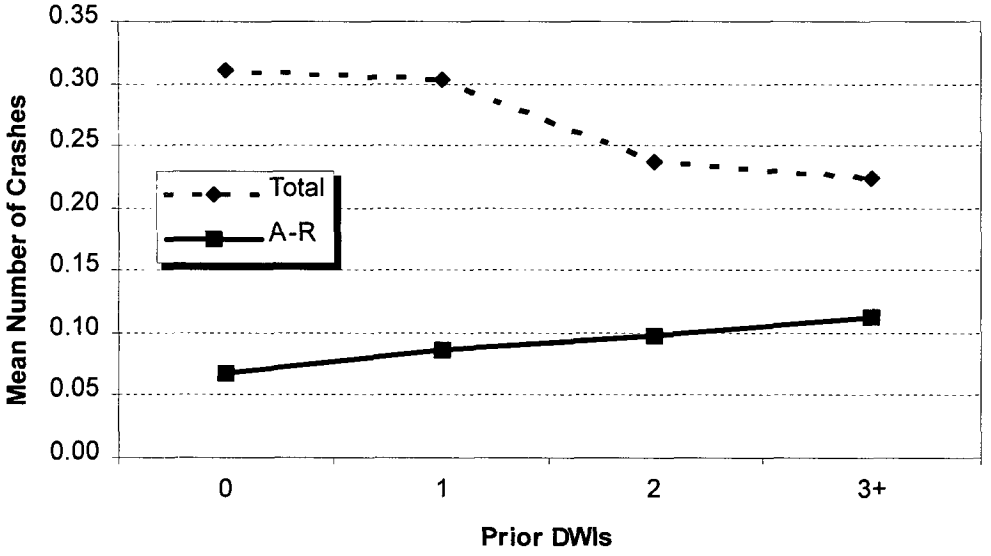


Drivers who had no DWI convictions in that period had the least number of crashes, and the largest incremental increase in crashes was from no convictions to one conviction (.357 to .628, 76% increase). By contrast, very little percentage increase in crashes occurred in the 2-3+ range (5%).

Tashima and Helander (1998) included some later California data on the crash risk of repeat offenders in their annual report of the California DUI Management Information System. Out of 17,189 alcohol-involved fatal or injury crashes, 42.5 % involved drivers with no DWI priors or alcohol-reckless convictions. Drivers in 40.8% of the crashes were convicted of a DWI growing out of the crash, but only about 17% of crashes involved drivers who had been convicted of one or more DWIs occurring prior to the crash. Further, an even smaller percentage (8%) of the 810 alcohol-involved *fatal* crashes involved drivers who had been convicted of one or more DWIs occurring prior to the crash.

The report also included data on the number of subsequent crashes of various types by number of prior DWI convictions. Figure 2 is a plot of the data for a group of drivers who were arrested for DWI in 1989 and were tracked for seven years following their arrest. The data show a steady, linear increase with priors for alcohol-related crashes of about 20% per prior, but a *decrease* with priors for crashes of all types. Fatal/serious injury crashes (not shown) remained about the same as a function of priors.

Figure 2: Mean Number of Crashes of California Drivers Arrested for DWI in 1989, Seven Years After Arrest, By Prior DWIs and Type Crash



Jones, Joksch and Wiliszowski (1991) studied the driver records of 7,449 persons who had been arrested for DWI in California in 1987 and asked to submit to a chemical test of their BAC. It was found that repeat DWI offenders who had refused the test had more post-arrest "had-been-drinking" crashes than did first offender refusers, about twice as many among refusing drivers of age 31 and higher. Non-refuser repeat offenders had more had-been-drinking crashes than non-refuser first offenders, but the difference between the number of crashes of the two groups was much smaller than it was for the same two groups of test refusers.

The effect of vehicle type on alcohol-related crashes involving repeat offenders does not seem to have been examined to any extent in documented studies. An exception is a small-scale study of injured motorcycle riders admitted to trauma centers in Maryland, which found that 13 out of the 145 drivers (9%) were repeat DWI offenders (Soderstrom et al.,1991).

Non-Crashes and Crash Risk

No literature was found on alcohol usage among repeat offenders using roads but not involved in crashes. Thus, no sound estimate of the alcohol-crash risk or relative risk of repeat offenders is possible. However, because of their increased exposure due to heavier use of alcohol in locations that require driving after drinking (see discussion in the *Drinking-Driving* section below), one could speculate that their alcohol-crash risk per unit time or per unit mile traveled would be considerably higher than that of drivers as a whole. Speculating further, because of their general tendency toward problem drinking and alcohol addiction and resultant alcohol

tolerance, one could imagine that their relative risk of a crash (i.e., the probability of a crash given alcohol divided by the probability of a crash given no alcohol) at a given BAC would be less than that of drivers as a whole. We have not found any hard data on the magnitudes of these risk factors.

Summary and Conclusions

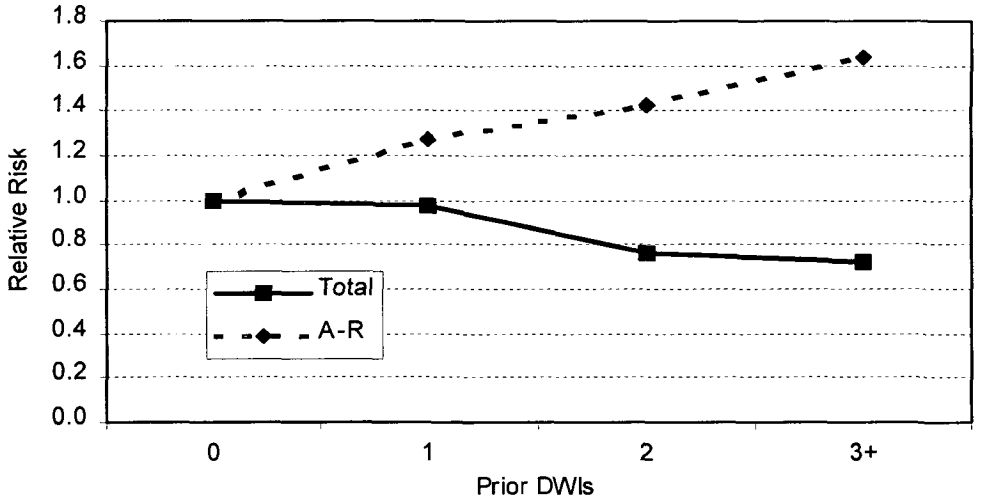
We found surprisingly little literature dealing explicitly with the crash involvement of repeat DWI offenders. The FARS annual reports are a good source of information on fatal crashes involving drivers with high blood alcohol concentrations (BAC), but contain only summary material on prior DWI offenses and fatal crashes. Certainly, there are databases at the state level that contain the information necessary to develop good estimates, but few of these data have found their way into reports or journal articles. (The California Department of Motor Vehicles database is a notable exception.)

Thus, the magnitude of the alcohol-crash problem created by repeat DWI offenders nationwide cannot be stated with any degree of confidence. FARS data for 1997 suggest that 2.2% of all fatal crashes involved a driver who had been convicted for DWI in the past three years, but we do not know how many of these drivers were repeat DWI offenders.

With respect to crash risk of repeat offenders as a function of BAC, the situation with respect to data is much worse, with any conclusions having to be made on a purely speculative basis. However, some estimates can be made of repeat offender risk relative to that of drivers with no prior DWI offenses from the California data presented in Figure 2 above. A plot of the resultant relative risk is shown in Figure 3 below. For alcohol-related crashes, relative risk increases with number of priors in near linear fashion, rising to over 1.6 after 3+ priors. For crashes of all types, however, relative risk decreases as could be surmised by the discussion above, becoming only about .7 after 3+ priors.

By comparison, the risk of a fatal crash involving a driver with one or more DWI convictions in the past three years relative to the risk of a fatal crash involving a driver with no DWI convictions in the past three years was about 1.4 in 1997. This calculation was made using FARS data as indicated above.

Figure 3: Relative Risk of a Traffic Crash in California by Prior DWIs and Type of Crash



Thus, available data from the literature indicate a higher alcohol-crash involvement among repeat offenders than among drivers with no priors or just one prior. Exactly how much higher nationwide cannot be said with any degree of confidence. Oddly enough, the involvement of repeat offenders in *crashes of all types* may actually be less than that of first offenders, possibly because sober repeat offenders may drive more carefully than sober first offenders, or may not drive at all because their license was suspended.

Nevertheless, in terms of sheer number of crashes of all types, both serious and non-serious, persons with no priors at all appear to show the highest involvement in total crashes and in alcohol-related crashes of all degrees of severity. In a recent paper, (Peck and Helander,1999) cited California DMV data in stating that:

> "... analyses of California data indicate that the majority of total accidents and alcohol-related accidents involve drivers with zero prior DUI's. When a prior DUI is evident, it is much more likely to be an offender with only one prior." (page 19)

3 - CHARACTERISTICS OF REPEAT OFFENDERS

Some earlier studies have analyzed the driver records of DWI offenders to identify characteristics that would, among other things, identify characteristics that would differentiate repeat DWI offenders from first offenders. Perrine, Peck, and Fell (1989) reviewed some of this literature and observed that DWIs are, in many respects, a unique group that are different not only from the general driving population, but also from such groups as problem drivers, alcohol-crash involved drivers, and alcoholics. These researchers conclude that while DWIs share some of the characteristics of these groups, they also have "a substantial proportion of unique DUI-offender characteristics."

One of the studies reviewed by Perrine and associates was reported by Arstein-Kerslake and Peck (1985) who performed an extensive taxonomic study of California DWI offenders, including drivers not necessarily involved in crashes. They found no first-offender group that was distinguishable from a repeat-offender group, a finding that suggested to Perrine and associates (1989) that "most first offenders are problem drinkers who have simply not yet had their second offense" (page 33). This implies that most multiple offenders are also problem drinkers.

The research cited below is representative of that documented since 1989, and is gleaned from studies most of which were less concerned with identifying the distinguishing characteristics of repeat offenders, than with documenting and evaluating DWI countermeasure programs. Thus, the subjects were repeat offenders who were studied in the evaluations, and were not necessarily representative of repeat offenders in general

Biographical

In a Mississippi study reported in 1991 (Wells-Parker et al., 1991), the authors found that 37% of male DWI offenders referred to a statewide treatment program were repeat offenders compared to only 18% of the females. In an Erie County, New York study of "severe DWI offenders" (including repeat offenders), 90% were male and 81% were white (Wieczorek, 1992). Driver records data obtained by Donovan (1993) indicate that some 14% of male drivers of age 21-25 years in Colorado had a prior alcohol-related driving conviction, compared to only about 3% of female drivers in the same age group.

Langworthy and Latessa (1993) reported a number of characteristics of repeat DWI offenders studied in an evaluation of a treatment and education program for chronic drunk drivers in Hamilton County (Cincinnati), Ohio. The 731 subjects had been adjudicated during the period February 1988 through December 1989. Ninety-three percent of the subjects had more than two prior DWIs, and 11% had more than six priors. The average number of priors for the group was nearly four. Males comprised 92% of the group, and whites 76%. Seventy-six percent were age 40 or

less, and 47% had less than 12 years of formal education. Seventy-eight percent of the group had been employed prior to incarceration, and the mean annual income of the group was between $13,000 and $14,000. Eighty percent were currently unmarried, and 62% had children.

Gould and Gould (1992) studied a random sample of the driver records of 723 males over the age of 17 who were arrested for DWI in Louisiana in 1985. They found that 47% were repeat offenders. A comparison of the repeat offenders with first offenders showed no significant differences between these two groups with respect to: age, race, number of years licensed, average educational level, socioeconomic level, and marital status. However, the two groups differed significantly with respect BAC at time of arrest ($p<.005$). The repeat offenders had a mean BAC of .178 compared .151 for the first offenders.

With respect to BAC at time of arrest, a recent report by Tashima and Helander (1998) provided the mean BACs of drivers arrested for DWI in the state of California as a function of number of prior DWIs. The results are surprisingly close to those reported in the above Louisiana study, about .18 for repeat offenders and .16 for first offenders.

Jones, Wiliszowski, and Lacey (1996) summarized some characteristics of 506 repeat DWI offenders assigned to an intensive supervision probation program in Milwaukee County, Wisconsin during 1992 - 1994. Most of the subjects (63%) had only one prior DWI, and only a few (3%) had three or more priors. Most of the subjects (69%) were age 40 or less, and very few (10%) were older than 50. As with most DWI populations, the great preponderance of these subjects were male (91%), and most (74%) were either single or divorced. The racial makeup was largely white (78%), the remainder including 16% African-American.

The same study listed the age, sex, and prior-DWI distributions of another group of 639 repeat DWI offenders assigned to an electronic monitoring program in Los Angeles County during 1992 - 1994. Here, the great majority of subjects (76%) had two or three prior DWIs, and only 22% had just one prior. The age distribution was quite similar to that of Milwaukee County group, again with 69% age 40 or less. Again, the group was largely male (86%).

The biographical characteristics of drivers convicted of DWI in Rockdale County, Georgia during the 1993-1997 were provided in a report by Jones and Lacey (1998a). About half of the 869 drivers studied were repeat offenders, 48% of whom had only one prior. Interestingly, 14% of the repeat offenders had four or more priors.

The same authors (Jones and Lacey,1999) analyzed biographical data on 2,841 felony DWI offenders in Maricopa County, Arizona (which includes the city of Phoenix). These offenders had been assigned to post-incarceration programs during 1992 - 1997. The study identified four groups having *much higher* recidivism rates than the overall two-year recidivism rate of 8%. The group with the highest rate (14.9%) was made up of repeat DWI offenders with two prior DWIs. Other attributes

of this group were: 35+ years of age; 1 to 3 prior probations; non-white collar employment status; and non-white race.

In a study of the effect of ignition interlocks on the recidivism of repeat DWI offenders, Beck, Rauch, and Baker (1997) summarized some of the characteristics of their 1,380 subjects. Ninety percent were male, and 84% were white. The median age was 33, and 82% had a high school education or less. Seventy-one percent were unmarried, and 75% had annual incomes of less than $25,000. The mean number of prior alcohol traffic violations was 3.6.

In a recent study, Wiliszowski et al. (1996) examined why some individuals repeatedly drive while under the influence or intoxicated, even after being convicted of DWI. Qualified interviewers (trained counselors and probation officers in the substance abuse field), asked repeat offenders directly about their experiences with the legal and adjudication process, as well as their personal backgrounds. Specifically, reasons for repeating the behavior, countermeasures or sanctions experienced, perceptions about those measures, and any suggestions repeat offenders had for discouraging or stopping DWI were sought. One hundred and eighty-two (182) interviews with individuals convicted of driving under the influence, or while intoxicated or impaired, were conducted at three sites (Phoenix, Arizona; Pittsburgh, Pennsylvania; and the 18th Judicial District in Colorado) between February and October 1995. Most interviews were approximately one hour in duration.

The subjects were selected from lists provided by staff at the sites. At two study sites, subjects were identified by the local assessment agency. At the third site, a list of names and telephone numbers was provided by the court, and former DWI offenders were contacted by project staff. Participation in the study was voluntary, and there was a high refusal rate. The subjects were predominately male (85%), and 87% had more than one prior DWI conviction (Table 1). Overall, nearly 40% had three or more priors. The males had more priors than did the females - 89% of the males had two or more as compared with 74% of the females.

Table 1: Prior DWI Offenses of Interviewed Subjects by Subject Sex

Priors	Male %	Female %	Total %
1	11.0	25.9	13.2
2	47.7	44.4	47.3
3+	41.3	29.6	39.6

Nearly 90% of the subjects were under the age of 50 years, with the age distribution peaking in the 30-39 range (Table 2).

Table 2: Age Distribution of Interview Subjects

Age	%
19-29	26.9
30-39	35.7
40-49	26.9
50-59	8.8
>60	1.6

Drinking

Repeat offenders were more likely to drink in multiple locations than were first offenders (63% vs. 50%) in a study of New York state offenders by Wieczorek, Miller, and Nochajski (1991). A New Mexico study of DWIs referred for alcohol-related assessment found that repeat offenders were 40% more likely to drink at a party than at home (Chang, Lapham, and Barton, 1996). The study also found that repeat offenders' association with away-from-home drinking locations increased their risk of being involved in a fatal crash. Another study in San Jose and Sacramento found that 17% of bar patrons had been cited for DWI (Caudill, Kantor, and Ungerleider, 1990).

Two studies (Wieczorek, Miller, and Nochajski, 1990; Veneziano and Veneziano, 1992) also found that repeat offenders were more likely to be alcohol-dependent than were first offenders. The great majority of "severe DWI offenders" in the Erie County, New York study cited above were found to have participated in an alcohol abuse treatment program: 83% had participated in non-AA type programs and 91% had participated in an AA-type program. Treatment history was also significantly correlated with alcohol dependence in this study.

The study by Wiliszowski et al. (1996) described above presented a number of self-reported drinking-related attributes of repeat offenders. The most frequently reported drinking locations were bars (87%), home (64%), and homes of friends or relatives (42%). Home was the usual destination where participants were driving to after drinking, both at the time(s) of arrest for DWI (65%) and the times when undetected (78%). All other destinations (such as homes of friends, bar hopping, liquor store, partying while driving, etc.) ranged from 15% to less than 1% of the responses.

Beer was the beverage of choice for most of the 182 participants in this study, with 147 people (87% of the men and 48% of the women) reporting they consumed beer all or most of the time. Forty-two (42) of the subjects said they drink liquor all of the time or most of the time (19% of the men and 44% of the women). Seventy-seven percent (77%) of respondents said they usually drink with others when they drink alcoholic beverages, 15% usually drink alone. The remainder reportedly drink alone and with others at about equal rates.

Drinking-Driving

Other recent studies have collected data on prior drinking-driving incidents among various groups of drivers. For example, Eby (1995) found that 45% of a sample of the driving records of Michigan DWIs were repeat offenders. Driver records data from the study by Wieczorek, Miller, and Nochajski (1989) indicate an average of about two prior DWI arrests on the records of 461 drivers referred to an alcohol-treatment program in New York State.

Several studies published in the 1990s examined the post-arrest or post-conviction records of repeat DWI offenders. The study by Donovan et al. (1990) cited above, which examined the driver records of 39,011 Washington State drivers, illustrates the effect of having a prior arrest for DWI on the probability of a subsequent arrest for DWI. Nearly 20% of the drivers with priors were arrested again during a three-year follow-up period, compared to only 2.0% of the drivers with no priors.

Jones and Joksch (1991) analyzed the police records and the driver records of 6,399 persons arrested for DWI in Chattanooga in 1985 and 1986. Prior DWIs and prior criminal offenses had the same effect on recidivating after 24 months, tripling the recidivism rate of 8% with no prior DWIs and 6% with no prior criminal.

In a study of implied consent laws, Jones, Joksch, and Wiliszowski (1991) examined the driver records of persons in four states (Illinois, Missouri, Virginia, and California) who refused and who did not refuse to submit to a chemical test for BAC in 1987. A total of 24,424 such records were studied. Overall, the study found that the percentage of subjects refusing the test was higher for repeat DWI offenders and increased with the number of prior DWI offenses. Repeat DWI offenders had higher one-year recidivism rates than did 1st offenders, 23% to 79% higher in one analysis of the adjusted recidivism rates of 30-year old male non-refusers.

In *Illinois*, 28% of the 7,496 drivers were test refusers. Among refusers, repeat DWI offenders had more subsequent DWIs than did non-refuser repeats. Also, refuser repeat offenders had 50% higher DWI/refuse recidivism than did refuser first offenders (18% vs. 12% after one year), and were also more likely to be convicted for DWI with criminal sanctions and for refusal.

Half of the 7,979 *Missouri* drivers were test refusers. Again, refusers who were also repeat DWI offenders had more subsequent DWIs than did non-refuser repeats, and refuser repeats had 73% higher DWI/refuse recidivism than did refuser first offenders. A smaller sample of drivers (1,500) was obtained in *Virginia*, 42% of whom were chemical test refusers. In this state, refuser-repeat offenders had more than twice the DWI/refuse recidivism of refuser first offenders. Also, refuser repeat offenders were 57% more likely than refuser first offenders to be convicted of DWI and a refusal.

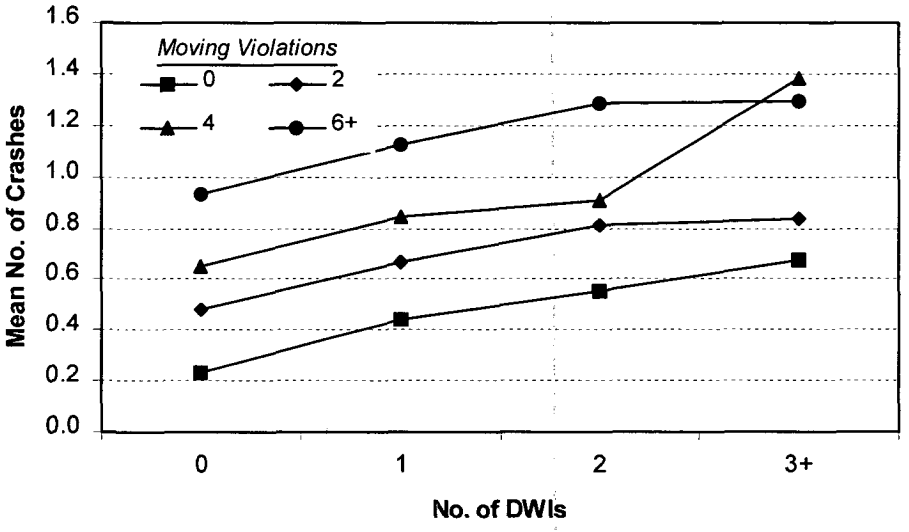
In *California*, 7,449 drivers were studied. Of these, 54% were chemical test refusers. Further, 60% of the refusers were repeat offenders, with the percentage

increasing with number of prior DWI offenses. Finally, refuser repeat offenders had 71% higher DWI/Refuse recidivism than did refuser first offenders.

Some of the best studies of DWI recidivism have been conducted in California. In an evaluation of treatment programs in California, Peck, Arstein-Kerslake, and Helander (1994) analyzed the effect of treatment programs on the subsequent four-year driving records of 7,316 first-offender and multiple-offender DWIs (see page 24 below). They found that recidivists were more likely than non-recidivists to: have more prior and reckless driving offenses; have more non-alcohol moving-traffic violations; have more non-moving traffic violations; and have more single-vehicle and more alcohol-related crashes.

Peck and Helander (1999) provided some additional California data on the mean number of crashes of all types in a seven-year period as a function DWI convictions and moving traffic violations in the same period. The data are plotted in Figure 4.

Figure 4: Mean Number of Traffic Crashes in California in 1985-1991 by Number of DWI Convictions and Number of Moving Violations in the Same Period

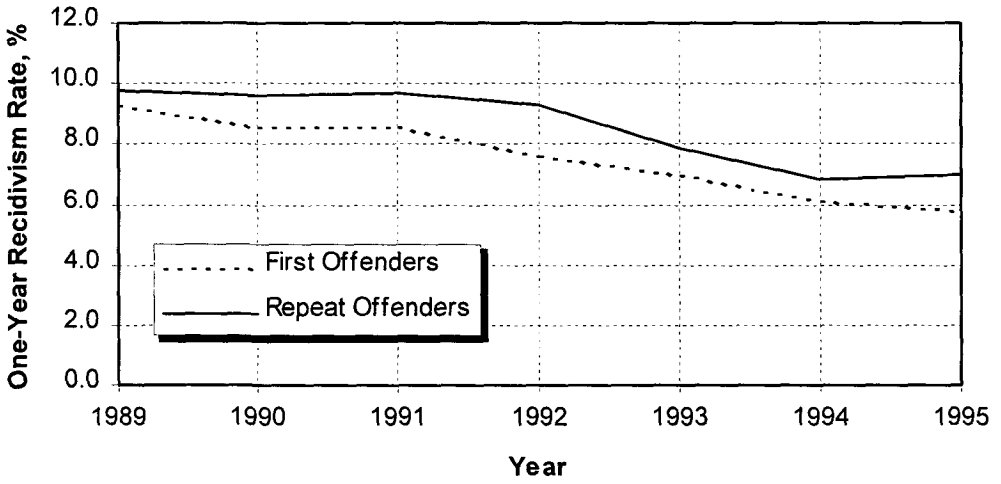


The figure shows that, in general, the number of crashes increased with number of DWIs and also with number of moving violations such that, for example, drivers with one DWI and four moving violations had about twice as many crashes as drivers with one DWI and no moving violations.

In the same paper, Peck and Helander presented an interesting summary of the recidivism of California repeat offenders, showing among other things how recidivism rates have varied over time. Their data (Figure 5) indicate that the one-year recidivism rates for repeat offenders and first offenders alike decreased in the 1989-1995 period, from nearly 10% to 7% for repeat offenders, and from about 9%

to 6% for first offenders. Peck and Helander also listed a number of correlates of recidivism of DWIs in general, and showed how the predicted recidivism of repeat offenders varies with arrest BAC and number of priors.

Figure 5: Recidivism Trends In California, 1989-1995



Jones, Wiliszowski, and Lacey (1996) examined the effect of prior DWI convictions on the DWI recidivism of 506 repeat DWI offenders assigned to an intensive supervision probation program in Milwaukee County, Wisconsin during 1992 - 1994 (see page 26 for a description of the program). These researchers found the more priors a subject had, the higher that subject's recidivism at any given time. For example, 28.3% of treatment-group subjects with four priors were predicted to recidivate after one year, compared to 7.8% of such subjects with two priors.

However, the same large effect did not occur for a group of 639 repeat DWI offenders who participated in an electronic monitoring program Los Angeles County, California in 1992 - 1994 (see page26). Although recidivism did increase with number of prior offenses, the increase was very small and not statistically significant ($p=.17$). These findings are documented in the report cited in the preceding paragraph.

In the Rockdale County, Georgia, study of individualized sanctions on DWI recidivism, Jones and Lacey (1998a) found that each prior DWI increased an offender's two-year recidivism by about 8% (See page 29). The study also found that having a prior DWI offense was significantly associated with all sentence components imposed by the judge. Compared to offenders without priors, offenders with priors:

- got more days in jail and more days of house arrest,
- were more likely to have to participate in Alcoholics Anonymous,

- were more likely to have to submit to periodic breath-alcohol tests, and
- were more likely to have to undergo electronic monitoring.

This is generally consistent with the findings of an earlier study of the sentencing practices of 79 Colorado county court judges who sentenced DUI offenders (Lange and Greene, 1990). They were asked to answer questionnaires distributed at their annual judicial conference in September 1987. Identical questionnaires were mailed in October 1987 to any judges who had not previously participated. The questionnaire consisted of a short introduction, four vignettes, questions concerning the vignettes and attitudinal and demographic questions. Two variables were manipulated within each vignette: blood alcohol level of the driver and the number of prior DUI convictions. Judges sentenced defendants in all four vignettes, and each vignette reflected a unique combination of the two levels of the two independent variables. The study found that the number of prior convictions had a greater impact on sentences than did BAC. Further, judges assigned more jail time to repeat offenders than to first offenders, and repeat offenders were more likely to be sentenced to the most intensive alcohol treatment, regardless of their BAC at arrest.

Most recently, Jones and Lacey (1999) reported the results of a evaluation of another program for repeat DWI offenders in Maricopa County, Arizona (which includes the city of Phoenix). The program was a Day Reporting Center (DRC), a highly structured non-residential facility for individuals who had been arrested for and charged with a felony DWI offense. The evaluation (see page 29 for a description of the program and the evaluation) measured the DWI recidivism of 176 persons who entered the program during 1992 through 1997. Once again, it was estimated that the more priors a subject had, the higher that subject's recidivism after entering the program. For example, the recidivism model used in the study to adjust for covariates estimated that, within two years after entering the program, 8% of offenders with two priors had been convicted of another DWI. However, nearly 13% of offenders with six priors (by any measure, "hard-core" offenders) had been convicted of another DWI after two years.

As indicated above, the study by Wiliszowski et al. (1996) examined the reasons why repeat offenders continue to drink and drive. Most of the subjects gave multiple reasons for driving after drinking, the most frequent being that the person thought he or she was "OK to drive." (Table 3)

Table 3: Reasons Given for Driving After Drinking by Repeat Offenders

Reasons For Driving After Drinking	% of Responses
Thought he/she was OK to drive	32.2
Just did not think about it	21.0
Lacks control over him/herself after drinking	18.6
No one available to drive for him/her	14.4
Would be OK if careful (to avoid accident/arrest)	13.8

Subjects were also asked if they ever planned not to drink or to drink only a certain amount of alcohol when they knew they would be driving afterward. Twenty-two percent indicated that they planned to drink when they knew that they would be driving afterward, and this percentage increased with increasing number of prior DWIs: six percent of those with one prior planned to drink; 18% of those with two priors planned to drink; and 31% of those with three or more priors planned to drink.

When asked what they thought the likelihood of police detection was before their first offense, almost 44% said they just had not thought about the possibility of being detected and arrested by police before that first offense. The percentage dropped for subsequent offenses to 16.8% with twice as many males giving this response as females.

Finally, the responses indicated that the majority of persons interviewed thought they were intoxicated at the time of an arrest, and more individuals thought they were intoxicated for first and second offenses than for third or higher offenses, but the difference was not statistically significant at the .05 level.

Personality and Psychosocial

We have found practically no recent literature on the personality and psychosocial characteristics of repeat DWI offenders. Prior literature on this aspect of the alcohol-crash problem was reviewed by Jones and Lacey (1998b), who concluded simply that

> "recent studies continue to confirm prior studies *that impaired drivers (especially young drivers) with certain personality/psychosocial characteristics appear more frequently among DWI populations.*" (Page 37).

Such characteristics included relatively high levels of verbal hostility, assaultiveness, sensation-seeking, impulse expression, tobacco and drug (including alcohol) use, and personal problems, and relatively low levels of responsible values and parental compatibility. The extent of these problems among repeat offenders relative to that of first offenders was not indicated, but certainly may be expected to be at least as great as those of first offenders.

Contacts with the Criminal Justice System

Gould and Gould (1992) compared the criminal histories of repeat DWI offenders and first DWI offenders in Louisiana. Seventy-two percent of the repeat offenders had a prior criminal record (exclusive of DWI arrests) compared to 54% of the first offenders. Repeat offenders and first offenders were also compared according to their placement on the INSLAW scale which is sometimes used by criminologists for identifying "career criminals." The mean score for the repeat offenders was 43.4 compared to 26.3 for the first offenders ($p<.01$). (A score of 47 or more has been used to classify an offender as a career criminal). Thirty percent of the repeat offenders had a score in excess of 47, compared to only 4% of the first offenders. Another interesting finding was that the repeat offenders were over-represented by a factor of four among reported robberies, and by a factor of two for burglaries and for assaults. Also, the mean number of homicides of the repeat offenders was about 10 times as high as that of the first offenders (.0734 vs. .0079)($p<.001$).

No other pertinent study of the criminal records of repeat DWI offenders was found in our literature search. However, the study by Jones and Joksch (1991) found that the criminal history file of a group of 6,399 DWI offenders (first offense and repeat offense alike) arrested in Chattanooga, Tennessee in 1985 and 1986 contained a total of 41,766 charges, 23,402 of which were criminal. The remaining 18,364 were traffic offenses, including 10,846 DWI offenses. Twenty-two percent of the criminal charges were for crimes against persons, and 17% were for property crimes. The entire cohort averaged about 1½ person-and-property crimes per person. One could reasonably expect this to be a lower limit to the average for *repeat* DWI offenders in this jurisdiction during the time period studied.

Summary and Conclusions

What is known from the recent literature about repeat offenders is summarized in Table 4. There are few surprises. Repeat offenders are nearly always male, and are typically under age 40, white, low income, unmarried, not college educated, and employed in non-white collar occupations. Their BAC at arrest is typically slightly higher than that of first offenders; they often have alcohol problems; and they commonly suffer from alcohol addiction.

Table 4: Summary of Attributes of Repeat Offenders

Variable	Value
Sex	Predominately male, typically over 90%
Age	Usually (~75%) under 40, mean around 35
Race	White
Income	Low
Marital Status	Unmarried
Education	HS or less
Employment	Non-white collar
BAC	.18+ at arrest; higher in fatal crashes
Prior DWIs	Typically 2 or 3, higher for some in treatment programs
Prior Other Traffic Infractions	Several
Prior Criminal Offenses	Yes, more than first offenders, include serious crimes against persons
Alcohol Problems	Often have problems, alcohol dependency common
Personality & Psycho-social Problems	Yes, probably more common and severe than those of first offenders
Drinking Locations	Multiple locations favoring bars; at home; parties. Often plan to drive after drinking
Final destinations	Home
Beverage	Mostly beer, often distilled spirits
Recidivism	~10%+ per year, increasing with number of prior DWIs
Implied Consent	More than 50% are BAC test refusers
Sentences	Traditional, treatment often
Reasons for DWI	Thought he/she was fit to drive
Perceived Detection	Low for first offenders, increases with priors

They prefer to drink beer and distilled spirits in bars at multiple locations, thus increasing the probability of their driving while impaired. Because they are such experienced drinkers, they very often believe they are quite capable of driving after drinking and do so knowing that they may be arrested for DWI. Personality and psychosocial problems are common among this group.

By definition, they have prior DWI offenses, usually two or three, but those who have been assigned to treatment programs often have more. But they also have a record of other, often non-major, traffic infractions, an attribute that has been found to be a very powerful predictor of DWI recidivism. In addition, they usually have a record of criminal offenses that include serious crimes against persons as well as against property. When stopped for suspicion of drunk driving, they often refuse to submit to a chemical test for alcohol. When convicted of DWI, they are given traditional sanctions (jail and license suspension), but are also often required to participate in alcohol treatment programs.

Countermeasure programs designed to deal with this group of drivers are discussed in the next section of this report.

4 - COUNTERMEASURES FOR REPEAT OFFENDERS

Deterrence and Incapacitation

Deterrence is based on the precept that fear of punishment will prevent persons from engaging in a proscribed behavior, in this case driving while impaired by alcohol. According to theory, the punishment must be swift, certain and suitably severe. Two forms of deterrent effect are of concern, that which prevents the reoccurrence of the behavior by those whose have been punished for that behavior (called specific or special deterrence), and that which prevents the occurrence of a behavior by individuals who have not yet experienced any punishment for engaging in the proscribed behavior (called general deterrence).

Traditionally, three types of punishment have been used to create the deterrent threat: incarceration in a jail or prison (called simply "jail" in this report), actions against a driver's license, and fines. This section is concerned with these types of punishment; other punishments that have been termed "alternative sanctions" (such as impounding or confiscating a driver's vehicle) are discussed in a later section.

Prevention of drinking driving can also be accomplished simply by making it impossible or difficult for an offender to drive at all. Thus, jail accomplishes this incapacitation effect as well as specific deterrence, and some other sanctions aimed at specific deterrence (such suspension of a driver's license) can also incapacitate.

Note that enforcement action alone may be considered a punishment and create deterrence for some drivers. In this case, simply creating a greater fear of arrest without changing legal sanctions may increase deterrence. Tennessee's recently evaluated sobriety checkpoint program is an example of this, resulting in a decrease of 20% in alcohol-related (driver BAC=.10+) fatal crashes (Lacey, Jones, and Smith, 1999).

Prior reviews have examined the general deterrent and specific deterrent effects of a number of enforcement-based and sanctions-based countermeasures. However, most of the evaluations reviewed dealt with drivers in general rather than with repeat drinking driving offenders. A series of California evaluations are notable exceptions, *viz*: (Hagen, McConnell, and Williams, 1980; Perrine 1984; Sadler and Perrine, 1984; Temer et al., 1987; Tashima and Peck, 1986; Peck, 1987). In general, these evaluations found that for repeat offenders, license suspension was more effective than treatment or license restriction, and that suspension plus treatment was better than suspension alone. More recent literature pertaining to the repeat-offender target group of interest in this report is examined in this section.

Recent literature on deterrence of repeat offenders has been concerned with sanctions-oriented rather than enforcement-oriented countermeasures. Evaluations of such enforcement-oriented countermeasures as sobriety checkpoints and BATmobiles have not differentiated between first offenders and repeat offenders in their design or findings. A study by DeYoung (1997a) that was principally

concerned with the effect of treatment on subsequent driving-related variables also studied the effects of other sanctions in comparison to treatment. The design of the evaluation is summarized in the *Treatment and Rehabilitation* section of this report, beginning on page 25. He found that for second offenders receiving license suspensions alone, the mean number of subsequent 18-month DWI convictions was about .14, which translates to a one-year recidivism rate of roughly 8.9%. Comparable data for first offenders were not included in the paper, but first offenders who received a suspension plus jail, had a one-year recidivism rate of about 6.7%.

We note that Beirness, Simpson, and Mayhew (1997) evaluated both the general deterrence effect and the specific deterrence effect of administrative license suspension (ALS) and vehicle seizure and impoundment (VSI) combined, but did not differentiate between first offenders and repeat offenders. Both programs had been implemented in Manitoba, Canada in 1985. They found that the combined sanctions decreased: drinking-driving fatalities by 12%, nighttime single-vehicle crashes by 26%, repeat DWI offenses within four years by 44%, and traffic crashes among DWI offenders in the 97 days following a DWI offense by 69%.

A later evaluation (Voas, Tippetts, and Taylor, 1998) did consider the effect of ALS on the recidivism of multiple offenders. This study examined the driving records of 45,788 drivers who were convicted of driving under the influence (DUI) in Ohio between July 1, 1990 and August 30, 1995. Several analyses were performed, the most pertinent of which to this review was an analysis of the DUI recidivism of two cohorts of drivers, the first cohort convicted before the ALS law, and the second convicted after the ALS law. The analysis showed that one year after their arrest, about 19% of the before group had recidivated, compared to only about 5% of the after group. However, as the authors indicate, not all of this large reduction in recidivism can be attributed to ALS, since new legislation strengthening and extending the vehicle impoundment and immobilization occurred at the same time as the ALS law.

Treatment and Rehabilitation

This class of countermeasures is targeted at dysfunctional drinking related to drinking-driving. Rehabilitative educational programs are included in this category. Nearly all of these countermeasures are operated in conjunction with those that use the Traffic Law System to deter and incapacitate drunk drivers. They are more related to specific deterrence countermeasures than to general deterrence countermeasures, because they require that a drunk driver first be brought to the attention of the treatment and rehabilitative agents. The enforcement and adjudicative components of the Traffic Law System typically act as the case finders in this process.

Jones and Lacey (1991) reviewed the literature on treatment and rehabilitation countermeasures published in the 1980 - 1991 time period. They concluded that the evaluations did not provide strong support for the hypothesis that alcohol-related

crashes can be reduced by treatment and rehabilitation. This conclusion applied to programs for first offenders as well as to programs for repeat offenders. Jones and Lacey observed that "there appears to be a disturbing tendency for the better designed and executed evaluations to show little or no impact, and for the less rigorous evaluations to show an impact" (page 61). Nevertheless, they found that the more recent studies continued to confirm past studies indicating that rehabilitative sanctions can be effective when applied in addition to traditional sanctions such as driver's license suspension or revocation.

A later examination of the pertinent literature involved a meta-analysis[2] of the efficacy of so-called "remediation" (i.e., treatment and rehabilitation as traditionally defined) with drinking-driving offenders (Wells-Parker et al., 1995). A total of 215 independent evaluations were studied. The methods used in the studies were rated using scales and protocols developed by expert panels. The authors found that better methodological quality was associated with smaller effect size, and that the better studies suggested that treatment and rehabilitation reduced drinking-driving recidivism by an average of about eight to nine percentage points over no treatment and rehabilitation. (This means, for example, that a two-year recidivism rate of 20% would be reduced, on average, to roughly 18%.) A similar effect size was found for alcohol-involved crashes. Their research also suggested, as had prior reviews, that combinations of treatment modalities were more effective than other evaluated individual modes for reducing drinking-driving recidivism.

The above findings of Wells-Parker and associates apply to DWIs in general, including first offenders as well as repeat offenders. The recidivism of repeat offenders was not analyzed separately, although two of the three risk categories studied ("moderate" and "high") appear to have contained significant numbers of repeat offenders. The authors found "...some evidence that 'moderate risk' offenders –a category that included multiple offenders–might be more responsive to treatment than either severe or low risk offenders but, because risk type was confounded with treatment type..., this finding is only suggestive" (page 924).

Three recent studies were found that examined the effect of treatment and rehabilitation countermeasures for repeat offenders. The nature and results of these studies are presented below.

As indicated above, Langworthy and Latessa (1993) evaluated Turning Point, a program in Cincinnati, Ohio, designed to treat and educate chronic drunk drivers. This program was an attempt to limit the period of incarceration and improve the behavior of "chronic" drunk drivers, therefore easing the strain on jails. Program participants had to have served at least 30 days in jail, and then had to complete a 28-day residential program followed by a six months post-release aftercare program.

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[2] Meta analysis is the use of statistical methods in literature reviews to compare and synthesize the findings of studies.

The evaluation sought to determine whether Turning Point subjects performed better than other chronic drunk drivers did after they were released from custody.

The study group consisted of 531 repeat DUI offenders who participated in the Turning Point program during the first 23 months of project operation. The comparison group consisted of 200 repeat DUI offenders who were adjudicated during the same period, but who did not participate in the Turning Point Project. Random assignment to the two groups was not used, making it necessary to use statistical methods (logistic regression) to control for differences between the groups.

The study found that 33% of Turning Point subjects had new charges within the next 18 months, 8% of which were DUI. By contrast, 40% of the comparison group had new charges, 10% being DUI. From this, the authors concluded that the Turning Point project had its intended effect and that Turning Point subjects were more likely to succeed than comparison group subjects. Note, though, that the observed statistical relations were weak, with the Turning Point subjects doing just marginally better than comparison group subjects.

Langworthy and Latessa (1996) did a follow-up of their original study which extended the tracking data to more than four years. The data dealing with Turning Point participants revealed that about 60% had new arrests since release, and that 25% had further DUI arrests. For the comparison group, it was seen that 58% had a new arrest and that 28% had a new DUI arrest. Subjects with three or more prior DWIs did slightly better in relation to the comparison group.

Peck, Arstein-Kerslake, and Helander (1994) analyzed the effect of treatment programs for first-offender and multiple-offender DWIs on a number of criterion measures, including post-treatment DWI recidivism. The subjects studied were 7,316 DWI offenders in Sacramento County, California who were randomly assigned to several treatment and control groups following their conviction in the period September 1977 through January 1981. The subjects included 2,685 repeat offenders. These treatments were represented in the study by a system of 0-1 dummy codes following the procedure used the earlier study cited above (Arstein-Kerslake and Peck, 1985). For first offenders, the dummy variables represented the following treatment conditions: (1) no-treatment control; (2) in-class educational program (four 2.5-hour sessions); and (3) home study program. For multiple offenders, the treatments were: (1) no-treatment control; (2) therapeutic counseling; (3) counseling plus chemical therapy; and (4) bi-weekly contacts without counseling or chemical therapy.

The authors found that none of the treatments affected recidivism for first offenders or repeat offenders, concluding that:

> ... the present study found no evidence even suggesting a positive impact for the first-offender home study program or the multiple-offender biweekly contact (without counseling) program. In addition, none of the multiple-offender treatments produced effects approaching conventional significance levels. (Page 676)

However, the authors cautioned that their conclusions were limited to the specific data analyzed and should not be interpreted as a general conclusion that all DUI treatment programs are ineffective.

DeYoung (1997a) re-examined the effectiveness of California's treatment programs which had undergone some changes since 1981. In 1997, California had three types of outpatient alcohol education and treatment programs. *First-offender* programs were typically three months in duration and consisted of a minimum of 10 hours education (e.g., the effects of alcohol on the body and on driving, DWI laws, etc.), 10 hours counseling and 10 additional hours of education/counseling. It was also required that the client maintain "close and regular" face-to-face interviews with program staff.

Second offenders (within 7 years) could be sentenced to attend an 18-month "SB 38" (named after the sponsoring legislation) program. SB 38 programs were 18 months in length and required at least 12 hours of education, 52 hours of counseling and bi-weekly face-to-face interviews. *Third and higher offenders* were required to participate in a 30-month program consisting of a minimum of 18 hours education, 117 hours counseling, 120-300 hours of community service, and "close and regular" face-to-face interviews. In 1997, there were less than 500 annual enrollments in 30-month programs.

The DeYoung study examined the effectiveness of these three levels of alcohol treatment programs, comparing them to other sanctions, singly and in combination with others, which were typically prescribed for DWI offenders convicted in California. Drivers studied were all licensed California residents who were convicted of a DWI in a California Court between July 1990 and June 1991. The sample included 88,552 first offenders and 27,293 repeat offenders.

The study found that combining treatment with drivers license action was associated with reduced recidivism for repeat offenders and first offenders as well. For *repeat offenders with one prior*, the mean number of subsequent DWI convictions within 18 months of the index conviction was .096 for offenders assigned to the treatment program *and* receiving driver's license suspension or restriction, and .139 for drivers receiving driver's license suspension or restriction alone. Thus, those receiving license revocation alone were about 1.5 times as likely to recidivate as those receiving license revocation *and* the 30-month program. For *repeat offenders with three or more priors*, a similar effect was noted, with those receiving license revocation alone having about 1.7 times the risk of recidivating as those receiving license revocation *and* the 30-month program.

Alternative Sanctions

Traditional criminal sanctions for DWI have included jail, fines and actions against the driver's license. Treatment and rehabilitation sanctions of the types discussed in the preceding section have become so commonplace that they, too, might well be considered traditional. Alternative or non-traditional sanctions that

have been tried for DWI include community service in lieu of or in addition to jail, impoundment or forfeiture of vehicles or license plates, visits to a hospital emergency room that treats traffic crash victims, and using license plates that identify the vehicle owner as a DWI offender, among others. Examples of other alternatives that have also been used for offenders convicted of non-traffic offenses include shock incarceration or "boot camp" programs, intensive supervision probation, day reporting centers, house arrest and home confinement, community service, victim restitution, and expanded use of fines (i.e., much larger fines that are made more difficult to avoid). Often, these sanctions have been used in combination with traditional sanctions, a practice that makes their evaluation more difficult.

More recently, such alternatives to incarceration have received increased attention, partly because of the lack of jail space for holding persons convicted of a variety of offenses (including DWI). This section describes some of these alternative sanctions that have been tried and evaluated as countermeasures for DWI.

Treatment and Probation-Oriented Alternative Sanctions. NHTSA has sponsored a series of recent evaluations of this class of alternative sanctions. The general nature of the countermeasures and the characteristics of the subjects of these evaluations are discussed above.

Jones, Wiliszowski, and Lacey (1996) reported the evaluation of two alternative sanctions in a single report, "Evaluation of Alternative Programs For Repeat DWI Offenders." The alternative sanctions and their sites were:

- Intensive Supervision Probation (ISP) - Milwaukee County, Wisconsin; and
- Electronic Monitoring (EM) - Los Angeles County, California.

The ISP program evaluated was officially entitled *The Milwaukee County Pretrial Intoxicated Driver Intervention Project.* It was coordinated by the Wisconsin Correctional Service (a non-profit corporation) in cooperation with the District Attorney's office. The program was an early intervention program aimed specifically at engaging repeat DWI offenders in treatment shortly after arrest with ongoing monitoring and supervision throughout the pretrial period. The Milwaukee program became operational in October 1992 and had a capacity of about 50 new clients per month.

The official title of the EM program was *The Los Angeles County Electronic Monitoring/Home Detention Program.* It employed electronic monitoring (EM) and was coordinated by the Los Angeles Pretrial Services Division. The program engaged repeat DWI offenders (and also other non-violent offenders) immediately after conviction and sentencing with ongoing home monitoring and supervision as ordered by the courts. Program fees ranged from $1-$1,000 per day, with an average cost to program participants of $15 per day. Offenders may also be required to pay fines, make restitution, submit to drug/alcohol testing, attend counseling and/or treatment programs, or provide community service. Offenders have a transmitter on

a band that is placed securely on their ankle using a tamper-resistant strap. The transmitter is waterproof, shock-resistant, and equipped with a tamper alarm, so that if an attempt is made to remove it, a signal is sent to the central computer station.

The EM program also became operational in October 1992. At the time of project selection, it had a projected caseload of 40 to 50 repeat offender DWIs per month, a projection that turned out to be accurate for the period over which it was evaluated.

The ISP impact analysis sought to measure the recidivism of offenders participating in the program and to determine how it compared with the recidivism of offenders given traditional sanctions.

Recidivism was defined as the probability of an alcohol re-arrest (and / or re-conviction, depending on the nature, completeness, and reliability of available data) for a given offense (in this case, DWI) on or before time **T**. The term "alcohol-related" included, in addition to DWI, such traffic offenses as refusal to take a breath-alcohol test, among others.

The recidivism of the treatment group was compared to that of a comparison group that did not participate in the ISP program. Since Wisconsin law mandates a jail sentence for repeat offenders, all members of the comparison group had to have received a jail sentence. To help ensure that members of both groups had an equal chance of a re-arrest, subjects from both groups were convicted of a repeat DWI during the same time period. Since random assignment to the treatment and comparison groups was not possible for this site[3], analytic adjustments of the data (discussed below) were made to account for differences between the treatment group and the comparison group known to have a strong effect on DWI / refusal recidivism. For example, group differences in number of prior arrests / convictions for alcohol-related traffic offenses, age, and sex, could affect recidivism and thus confound the effect of the program on recidivism. Data for the impact analysis were obtained from the following three sources: the ISP program office, the Milwaukee County Court, and the Wisconsin Department of Motor Vehicles.

The primary technique used for the impact analysis was survival curve analysis, and the formal factor reflecting the evaluation design was a variable indicating whether the subject belonged to the treatment group or the comparison group. Factors available for use in controlling for differences between the treatment and comparison groups (that is, the analytical "matching" of the two groups) were number of prior alcohol-related driving offenses, age, sex, race, marital status, the jail sentence imposed for the index offense, and the fine imposed for the index offense.

The survival analysis used the time from conviction of the index offense to the first "failure" (for example, an arrest for DWI) as the dependent variable. The time-

[3] The program was ongoing, and assignment procedures were locked in place by the various participating agencies.

varying recidivism (that is, probability of a failure) as a function of group (treatment or comparison) was of primary interest.

Analysis of the recidivism curves for the treatment and comparison groups based on the raw data showed the one-year recidivism for the treatment group was 5.9% compared to 12.5% for the comparison group. These differences are highly significant (p=.0001), but do not account for any possible differences in the characteristics of the two groups which may influence recidivism.

Further analyses indicated that the following characteristics of the subjects had a significant effect on recidivism: group (treatment or comparison), age, number of priors, and length of jail sentence. All of these had p's in the .0001 - .002 range, and all of the non-significant factors had p's in the .30-.40 range. A comparison of the modeled recidivism of the treatment group compared with that of the comparison group showed that the one-year recidivism for the treatment group was 5.6% compared to 10.7% for the comparison group (p=.0002), a decrease of 48%.

The ISP program, as evaluated, was not designed to be self-sufficient from a cost standpoint, and the cost it saved by reducing jail time did not outweigh the cost of the program. However, the cost of the program to the county could be reduced by charging higher fees to offenders.

The evaluation design of the EM program in Los Angeles County was similar to that of the ISP program in Milwaukee. Data were obtained from the Los Angeles County Probation Department and the California Department of Motor Vehicles (DMV).

In the recidivism analysis, the comparison group was composed of offenders who had been sentenced in all courts in Los Angeles County, including courts that had sentenced treatment-group (EM) offenders. This would have biased the comparison group toward a higher recidivism rate if the comparison-group subjects from treatment-group courts were "tougher" (because of having been found ineligible for the EM program) and more likely to recidivate than were comparison-group subjects from comparison-group courts. Then, the comparison of the recidivism rate of the treatment group with that of the comparison group would have been biased to favor the treatment group.

Before proceeding with the comparison of the two groups, the authors examined the recidivism of two sub-groups of comparison-group subjects. Sub-group "A" was composed of subjects from courts having 10 or more treatment subjects. Sub-group "B" was composed of subjects from all other courts. They found no significant difference at the .05 level in the recidivism of the two sub-groups and therefore used the combined sub-groups as the comparison group.

The recidivism analysis found that the EM program reduced a relatively low reconviction recidivism rate of about 6% after one year by about one-third. In contrast to the ISP program, the EM program was designed to be self-sufficient, with the clients paying the cost of the monitoring. The cost of the program to Los Angeles County was therefore minimal, with the county reaping significant cost benefits by eliminating the cost of jail space for participating offenders.

A third, more recent, NHTSA-sponsored study (Jones and Lacey, 1999) examined the effectiveness of a Day Reporting Center (DRC), a highly structured non-residential facility that provides supervision, reporting, employment, counseling, education and community resource referrals to probationers who had been convicted of a felony DWI. The DRC studied was operated by the Adult Probation Department of the Maricopa County, Arizona Superior Court and provided a continuum of correctional services to augment intensive supervision, residential programs (e.g., halfway houses, work release centers, etc.), and regular supervision. The evaluation approach was similar to that used the evaluations of the Intensive Supervision Probation and the Electronic Monitoring programs, addressing the effectiveness of the Maricopa County DRC in reducing DWI recidivism, in reducing the cost of post-conviction sanctioning operations, and in relieving the pressures on jail facilities in carrying out the court-imposed sanctions.

The study found that the DRC program was no more effective in reducing recidivism than was a standard probation program in use by the study jurisdiction. Both programs had a reconviction recidivism rate of about 8% after two years, quite low for this group of offenders. However, other measures of effectiveness yielded more positive results, indicating that the program was more helpful than standard probation in assisting in the reintegration of the offenders into society and provided correctional services at a significantly lower cost than jail. In Maricopa County, it costs $36.79 per day per individual to keep an offender in jail versus $19.69 per day for DRC. The DRC offender typically is incarcerated for sixty fewer days than comparison group members who completed their period of incarceration followed by standard probation. This $17.10 per day savings translates into $1,026 per offender if they are in DRC rather than jail.

The study of sanctioning practices in Rockdale County, Georgia alluded to above (page 15), compared the rearrest recidivism of a group of DWI offenders who received an individually tailored mixture of traditional and alternative sanctions with a group of DWI offenders who generally received only the minimum sanctions required by state law (Jones and Lacey, 1998a). The subjects included both first offenders and repeat offenders.

The Rockdale County program was implemented in 1992 by Judge William F. Todd, Jr. of the State Court of Rockdale County, Georgia. His sentencing approach was characterized by the use of a wide variety of punitive, rehabilitative, and treatment sanctions offered in packages that are carefully tailored to each offender.

The Todd Program differed in two ways from other sanctioning programs that include several components. First, the range of sentencing options was much wider than that available in most jurisdictions (especially jurisdictions of moderate size, such as Rockdale County). In addition to the traditional sanctions of fines and jail time, the judge could include house arrest (with or without electronic monitoring), intensive supervision probation, frequent breath-alcohol testing, work release, and participation in a wide variety of treatment programs that include Alcoholics Anonymous (AA) and in-patient treatment for up to four months. Pictures of

convicted DWI offenders were published in the newspaper along with a description of their sentences. All DWI offenders were required to attend a victim's impact panel, and all had to serve some jail time.

A second feature of the Todd approach was that the judge did his own pre-sentence investigation using a data base that he developed and maintains with the support of his staff. The tailoring of sanctions was based on information elicited by the judge from the offender during the sentencing process, and on criminal records and driver records available to the judge during sentencing. In 1998, the judge's data base contained records on some 1,800 offenders. Most of Judge Todd's alternative sanctions were imposed as a condition of probation. Todd relied on a private probation company (paid by offender fees) to supervise probation to ensure that the required conditions were met.

The primary statistical technique used for the impact analysis was survival curve analysis. The effect of number of prior DWI offenses on recidivism was indicated above. The data also permitted an analysis of the effect of the individualized sanctioning program just on repeat offenders. One year after the index violation, 8.6% of the repeat offenders in the individualized sanctioning program had been arrested again for a DWI, compared to 15.1% of the repeat offenders in the comparison group that generally received the minimum sanctions.

Vehicle-Oriented Alternative Sanctions. The idea of removal of an offender's vehicle (or access to it) as an alternative sanction has been around for some time, but has not been used to any great extent until fairly recently. Several variations on this basic theme have been studied.

DeYoung (1997b) evaluated the effect of two 1995 California laws which provided for the impoundment / forfeiture of vehicles driven by drivers with suspended or revoked licenses (S/R) and by unlicensed drivers[4]. Data used in the evaluation were obtained from police and court records in four jurisdictions (Riverside, San Diego, Stockton and Santa Barbara) that had record systems which would allow impoundment data to be linked to driver record data in the state DMV database.

The study compared the 1-year subsequent driving records of subjects whose vehicles were impounded with similar subjects (i.e., S/R and unlicensed drivers) who would have had their vehicles impounded, but who did not because their driving offense occurred in 1994, the year before the impoundment / forfeiture laws were implemented. Statistical controls were used to attempt to control potential biases resulting from pre-existing differences between the groups.

The study examined three measures of recidivism:

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[4] The study was also published as a NHTSA report: DeYoung, DJ. (1997). *An evaluation of the specific deterrent effect of vehicle impoundment on suspended, revoked and unlicensed drivers in California.* Washington, DC: National Highway Traffic Safety Administration.

- subsequent convictions for driving while suspended or driving while unlicensed (DWS/DWU),
- subsequent total traffic convictions, and
- subsequent crashes.

The effect of impoundment on subsequent DWI convictions *per se* was not studied, although a DWI conviction would also trigger a license suspension or revocation. The results showed that repeat DWS/DWU offenders who were impounded had 34.2% fewer DWS/DWU convictions, 22.3% fewer traffic convictions and 37.6% fewer crashes, than did similar drivers whose vehicles were not impounded. By comparison, drivers with no prior convictions for DWS/DWU whose vehicles were impounded had, relative to similar drivers whose vehicles were *not* impounded, 23.8% fewer (DWS)/(DWU) convictions; 18.1% fewer traffic convictions and; 24.7% fewer crashes.

DeYoung (1998) also examined the *general deterrent* effect of impoundment on suspended and revoked (S/R) drivers in California. His analysis involved a comparison of the crash rates of all drivers who were suspended or revoked between January 1992 and January 1997 to a 1% random sample of drivers not suspended or revoked during the same period. An interrupted time series design was used, the intervention occurring at January 1, 1995, when the impoundment law went into effect. DeYoung found that there was a statistically significant reduction in crash rates for *both* groups when the groups were analyzed separately, but that there was no significant reduction for the S/R group ($p=0.099$) when the series for the non-S/R group was used as an input series. He concluded that the study "failed to find compelling evidence of a general deterrent impact of vehicle impoundment/forfeiture in California." Note that this study examined the effect of the impoundment law on drivers who been S/R for any reason, not necessarily DWI.

Voas, Tippetts, and Taylor (1997, 1998) evaluated the effects a variation on the impoundment theme, *temporary* vehicle impoundment and/or immobilization in two counties in Ohio. The period of immobilization provided by the Ohio law is 30 days for the first DWS offense, 60 days for the second and vehicle forfeiture for the third DWS offense. Second DWI offenders are subject to 90 days, and third DWI offenders to 180 days immobilization--and the vehicles of fourth offenders are subject to forfeiture. The law applies both to the vehicle owned by the offender and, if the offender was driving a vehicle owned by someone else, to that vehicle as well.

The first evaluation (Voas, Tippetts, and Taylor,1997) was in Franklin County, Ohio, which includes the city of Columbus. The recidivism of groups of drivers who had their vehicles impounded and/or immobilized were compared to groups of drivers who did not have their vehicles impounded and/or immobilized. Random assignment to the experimental group and the comparison group was not possible in the study. Of particular interest here was the DWI recidivism of DWI offenders. The analysis technique used to study the recidivism of these groups (Kaplan-Meier) did

not control for differences between the two groups with respect to such variables as income and employment status.

The study found that during the period of impoundment and/or immobilization, 1.8% had committed another DWI offense by the end of their 90-days period of impoundment and/or immobilization. However, 3.8% of the DWI offenders with one prior DWI in the comparison group had committed another DWI offense after 90 days. This reduction (53%) was statistically significant at the .025 level. A similar effect was found for DWI offenders with two prior DWIs, with the comparable recidivism percentages for the two-priors group after 180 days being 2.4% and 6.6%, respectively, an effect (64%) that was significant only at the .094 level.

After the period of impoundment and/or immobilization, the effect size was much smaller and only significant for DWI offenders with one prior, 5.0% vs. 8.0%, an effect size of 38%.

The second study of vehicle impoundment in Ohio by Voas, Tippetts, and Taylor (1998) was conducted in Hamilton County which kept the vehicles impounded throughout the applicable sanction period. The applicable sanction period for DUI varied by number of prior DUIs, being 90 days for offenders with one prior and 180 days for offenders with two prior offenses. The principal objective of the Hamilton County study was to provide an independent replication of the results of the evaluation of the immobilization law in Franklin County.

The study found that impoundment decreased recidivism by large percentages both during the period of impoundment and after the period of impoundment. For repeat offenders with one prior DUI, the reduction in DUI offenses was 80% during the impoundment period and 56% after the impoundment period. For repeat offenders with two prior DUI offenses, the reductions during and after the impoundment period were 56% and 58%, respectively. Recidivism curves depicting the probability of recidivating on or before given times were not provided in the paper.

Rodgers (1994) evaluated a Minnesota law that provided for the impoundment of the license plate of DWI offenders with two prior DWIs in five years or three or more prior DWIs in ten years. The law took effect in August 1998, and required that such drivers surrender for destruction the license plates of all vehicles registered in their name. Further, the law stipulated that the violator could not sell any vehicle with impounded plates without permission from the Department of Public Safety. To protect innocent persons who depended on a vehicle from being deprived of a vehicle, the law allowed the violator to apply for a special license plate with a distinctive pattern of characters that can be recognized by police but not by the general public.

Initially, the license was to be surrendered in court, but less than 5% of the offenders who should have surrendered their plates were required to do so by the court. The law was subsequently changed to provide for the administrative impoundment and destruction of the plates by the arresting officer, and by the Department of Public Safety, if the officer did not perform the impoundment. In the

first 21 months of the law, there were 6,993 violations to the law and 4,494 impoundment orders, a percentage of 64%.

The impact of the law as amended to provide for administrative impoundment is of particular interest here, since the court-based version was clearly not successful from a practical standpoint. Three groups were studied in the assessment, all of whom had violated the law during the 21 months from January 1991 through September 1992. The groups were composed of:

- 1,457 violators who received no impoundment order
- 1,243 violators whose plates were impounded and destroyed by the arresting officer
- 1,893 violators who were ordered by mail by the Department of Public Safety to surrender their plates to a local law enforcement agency

The analysis examined the recidivism of all three groups. The study found that violators whose licenses were impounded had much lower recidivism rates that did those whose plates were not impounded. The rates for violators with three recorded DWIs and with four recorded DWIs are shown in Table 5. The officer-impounded groups had the lowest rates. Three-time violators with officer-impounded plates had about half the rates than did violators with mail-order impounded plates. However, for four-time violators, the rates of the two impounded groups were about the same, and still less than those of the non-impounded group.

Table 5: Recidivism Rates After 12 Months and 24 Months For Three Groups Studied by Rodgers (1994)

DWIs on Record	Months After Order	Group		
		Impounded by Mail Order	Impounded by Police Order	Not Impounded
3	12	11%	8%	16%
	24	19%	13%	26%
4	12	11%	10%	18%
	24	18%	17%	26%

Finally, we note a study of the effect of vehicle seizure by Crosby (1995) that may not be readily available to some readers. The study examined the recidivism of drivers sanctioned under Portland Oregon's forfeiture ordinance and found that "perpetrators whose vehicles were seized could reliably expected to be rearrested on average half as often as those whose vehicles were not."

Ignition interlocks that test a driver's BAC and prevent those whose BAC exceeds a specified value have been evaluated in a number of jurisdictions. Coben and Larkin (1999) reviewed six of these evaluations published in the 1990 - 1997 time period, extracting the summary data shown in Table 6, below.

Table 6: Recidivism Effect of Six Evaluations of Ignition Interlocks (After Coben and Larkin, 1999)

Study	Outcome Measures	Relative Risk	Prevented Fraction	P Value
The EMT Group, 1990	DWI recidivism	.71	30%	>.05
Popkin et al., 1992	DWI recidivism	.38	64%	<.05
Morse and Elliott, 1992	Re-arrest for DWI	.33	69%	<.05
Jones, 1992	Re-arrest for DWI	.85	16%	.05
Weinrath, 1995	Impaired driving	.40	66%	<.05
Beck et al., 1997	Re-arrest for DWI	.36	65%	<.05

All six of the evaluations compared the recidivism of a group of repeat offenders who participated in an interlock program to a comparison group that did not participate in an interlock program. The "prevented fraction" column in the table indicates that the interlock participants had recidivism rates that were 16%-69% less than those of the participants in the comparison groups. Note that these figures were for the period during which the interlocks were attached. One of the studies (Popkin et al., 1992) also examined the recidivism rates after the interlock was removed, finding that the recidivism returned to higher levels after removal. The sanctions given the comparison group participants varied widely – they included a conditional license (Popkin et al., 1992), a matched license suspension (Morse and Elliot, 1992), all other DWI offenders in the state (Jones, 1992), license-suspended impaired drivers (Weinrath, 1995), and "usual post-licensure treatment" (Beck, Rauch, and Baker, 1997).

Only the study by Beck and associates assigned its participants randomly to the interlock group and the comparison group. A total of 1,380 persons participated, and their recidivism was tracked for one year after their assignment to the interlock group or the comparison group. Subjects in the interlock group were required to drive an interlock-equipped vehicle for the entire one-year period. The study found that 2.4% of the interlock group had committed an alcohol traffic offense, compared to 6.7% of the comparison group.

Another study of the use of interlocks in Alberta, Canada, also found them effective for second offenders during the period in which they were required to be installed (Voas et al., 1999). The Alberta interlock program was introduced in 1990 as a required program for repeat offenders, but, according to the paper, was changed

in 1994 to a voluntary program for first offenders. In this study, only about seven percent of repeat offenders eligible chose to participate. In addition, all participants (and all comparison group members who did not participate in the interlock program) were required to have their license suspended prior to entry into the interlock program, with the length of the suspension for the participating second offenders having a mode of two years.

The Alberta study used survival analysis techniques to compare the recidivism of the interlock participants with that of the non-participants, finding that during the program period, the recidivism of the interlock group was less than 1% after one year, and the recidivism of the suspended comparisons was about 4%. However, during the period that the interlocks were removed, the recidivism of the participants was about 4% after one year, and the recidivism of the still-suspended comparison group was about 3%. Also, during the removal period the recidivism of the *reinstated* comparison group was about 5%.

It has also been suggested that, rather than impound or confiscate a convicted DWI's vehicle, one might "confiscate" the driver's vehicle registration. Two States, Oregon and Washington, enacted legislation in 1990 and 1988, respectively, establishing a procedure by which law enforcement officers, upon apprehending a driver whose driver's license has been suspended (for DWI or other applicable offense), could take possession of the driver's vehicle registration. In such cases, the driver was given a temporary registration certificate, and a striped ("Zebra") tag was placed over the annual sticker on the vehicle license plate. A new annual sticker could only be obtained by the owner demonstrating that he or she was properly licensed. The Oregon law and the Washington law differed mainly in that the latter applied only to suspended or revoked drivers who own the vehicles they are operating, while the former law applied to all suspended or revoked drivers, regardless of whether the driver owned the vehicle.

The specific and general deterrence effects of this "Zebra" Tag Law for DWIs in general (first offenders and repeat offenders alike) were evaluated by Voas and Tippetts (1995), who found a general deterrent effect in Oregon (on moving violations and crashes) but none in Washington. Available data did not permit an evaluation of the effect of the law on recidivism in Washington, but the Oregon data indicated a reduction of more than 50% in mean number of subsequent DWIs. The effect of the laws on *repeat* offenders was not determined, but the results suggest that the effect of such a tag would not be limited just to first offenders.

Summary and Conclusions

More and better evaluative literature was found in this review than in prior reviews. Nearly all of it dealt with specific deterrent effects rather general deterrent effects, and it is clear that a number of countermeasures can reduce recidivism. Our rough estimates of ranges of recidivism reductions over the various comparison groups studied are:

- License Suspension with Treatment: 10% - 50%
- Treatment and Rehabilitation: 0% - 50%
- Alternative Sanctions
  - ✓ Treatment and Probation-Oriented Alternative Sanctions: 33% - 90%
  - ✓ Vehicle-Oriented Sanctions: 15% - 80%

Some alternative sanctions had positive effects other than recidivism, for example, cost savings and relieving pressures on jail space.

The self-reported data from the study by Wiliszowski et al. (1996) shed some light on repeat offenders' own perceptions about the effectiveness of alcohol-crash countermeasures, indicating that deterrence-based countermeasures that enhance the fear of arrest and ensuing criminal justice system actions can, as hypothesized, impact DWI behavior of repeat offenders. Individualized sanctions that include punitive, preventive, and treatment components also appeared promising. Supervision and direction were seen as important components of post-conviction programs to assure compliance with any court ordered treatment or monitoring plan, with monitoring and periodic reassessment to continue for a longer period of time.

5 - CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on the literature examined in this review, we conclude that repeat DWI offenders comprise a small, but not negligible, percentage of drivers involved in traffic crashes. Unfortunately, there are very little data on the actual magnitude of that percentage, but data from California suggest that it could be in the 8% range for *alcohol-related* fatal crashes, and data from the Fatality Analysis Reporting System (FARS) suggest a figure of some 2%-3% for *all* fatal crashes. Thus, even if all alcohol-related fatal crashes involving repeat offenders were eliminated, at least 90% of all fatal crashes would still remain.

California data also indicate that, for *alcohol-related crashes* of all degrees of severity, crash risk increases with number of priors in near linear fashion. However, crash risk actually decreased for *crashes of all types* (alcohol-related and non-alcohol related). Thus, the involvement of repeat offenders in *crashes of all types* may actually be less than that of first offenders, possibly because sober repeat offenders may drive more carefully than sober first offenders, or may not drive at all because their license was suspended.

We found no literature concerning the number of repeat offenders as a percentage of all drivers on the road at a given time, nor was there any literature addressing the effect of blood alcohol concentration (BAC) on repeat offenders' relative risk of a crash. The risk of an alcohol-related crash relative to that with no prior DWIs was found to increase steadily with number of prior DWIs in California, perhaps amounting to about 1.4 for repeat offenders as a whole in 1995. By contrast, the risk of any crash decreased with number of prior DWIs. By comparison, FARS data indicate that the risk of a *fatal crash* involving a driver with one or more DWI convictions in the past three years relative to the risk of a fatal crash involving a driver with no DWI convictions in the past three years was also about 1.4 in 1997.

With respect to the characteristics of repeat DWI offenders, we conclude that such offenders share many of the characteristics of first offenders. Some older studies have in fact found no first-offender group that was distinguishable from a repeat-offender group. The literature we found was devoted almost entirely to repeat offenders who had been arrested and, in most instances, were participating in some kind of post-conviction program. No literature was found on the characteristics of repeat offenders in crashes, and there was a lack of multivariate studies of repeat offender characteristics.

An unexpected finding on repeat offender characteristics was the relatively small practical difference in their mean BAC from that of first offenders (.18 and .16, respectively). Also important was a general downward time trend in the one-year recidivism rate of repeat offenders in California, from nearly 10% in 1989 to 7% in 1995.

We found much more, and higher quality, evaluative literature on repeat offender countermeasures than in prior reviews, nearly all of which was concerned with the specific deterrent effect of various sanctions. Sanctions classified as alternative sanctions appeared especially effective, offering potential reductions in recidivism in the 15% to 90% range. License suspension or revocation combined with treatment continues to look effective, with the potential for reducing recidivism by as much as 50%.

Recommendations

Three major recommendations flow from this review. First, more studies (perhaps at the state or local level) of crashes are needed using available databases such as those maintained by state motor vehicle departments. These studies should include information on the characteristics of persons in crashes, as well as on other groups of drivers such as offenders referred to treatment or other post-conviction programs. There is a particular need for new studies of a multivariate nature that allow one to identify high-risk and high-incidence groups of multiple offenders. Where possible, personality and psychosocial variables quantified through appropriate assessments should be merged with crash data to support such studies.

Second, we recommend that new evaluations of the effectiveness of legal countermeasures (sobriety checkpoints, jail, drivers' license suspension, etc.) for repeat offenders be conducted, especially in states other than California which already has a continuing evaluation program of such countermeasures. There is an especial need for evaluations of general deterrence effects of countermeasures for repeat offenders. For specific deterrence, few evaluations have used designs with random assignments of subjects to experimental and comparison groups. Countermeasures that have been found to be effective for repeat offenders, but have used other designs that may not fully account for differences between the experimental group and the comparison group, need confirmation through evaluations employing random assignment.

Finally, we recommend that additional research be conducted to determine the exposure of repeat offenders to traffic crashes so that the risk of this group can be estimated more accurately. For example, roadside surveys that are conducted periodically (e.g., Voas et al. 1998) could incorporate a component that would retrieve the driving records of its subjects to determine which of them have how many prior DWIs.

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