BACKGROUND PAPER

Repeat DUI Offenders

Analysis of Research Needs and Countermeasure Development Strategies

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INTRODUCTION

An identification of research needs relating to any phenomenon should begin with some consideration of the extant knowledge and related underlying theory. Perhaps even more fundamental is the need for a careful definition of terms and classification attributes. A number of terms have been proposed for characterizing high risk driving under the influence (DUI) offenders, such as hard-core, recalcitrant, chronic, persistent, multiple and repeat. The most common thread underlying these terms is that of chronicity and resistance to treatment or conventional sanctions. The very term "repeat offense" implies a group which has reoffended following sanctions and/or treatments imposed pursuant to a previous DUI conviction.

Although a recidivist-based definition has both intuitive appeal and substantive merit, some cautionary admonition is warranted. The idea of identifying a small group of deviant individuals who are responsible for the majority of a societal problem is often not achievable because it is usually based on a flawed statistical paradigm. Recall, for example, the notion of "accident proneness" which was so attractive 50 years ago until it was recognized that very few accidents in a given time period involved drivers who had accidents in previous years. We are not suggesting that the concept of an identifiable hard-core DUI offender group is as subject as are accidents to large stochastic components, but there is still danger of reification and propagating silver bullet myths by suggesting that a sizable percentage of accidents can be attributable to a small statistically deviant subgroup.

The above objection has been largely circumvented by the definition employed by the Traffic Injury Research Foundation (TIRF) in its hard-core drinking driver program (Simpson et al., 1996). TIRF has proposed that hard-core drinking drivers be defined as all repeat offenders and any first offender with a blood alcohol content (BAC) of 0.15 or above. The problem with this definition is that the great majority of all arrested and convicted DUI offenders would qualify. For example, in California, 70 percent of all DUI offenders would qualify as hard-core. Yet we know from California studies that the majority of first offenders are not convicted of a second offense in the subsequent 7 years and, furthermore, that the rate of recidivism has been steadily declining over the past 10 years.

Before presenting a list of prioritized research needs, we would like to briefly summarize what is currently known about repeat DUI offenders and to summarize some relevant findings from a series of California studies. These studies address the following issues:

1. Historical changes in recidivism rates;
2. Long-term recidivism rates and survival curves;
3. Short-term recidivism rates as a function of BAC level and prior number of moving violations;
4. DUI recidivism correlates; and
5. Accident risk as a function of DUI offender characteristics and recidivism status.

Most of the review is based on California studies for two reasons. First, these studies were readily available to the authors. Second, we are not aware of studies and data in other jurisdictions that systematically monitor long-term statewide reoffense and accident rates of DUI offenders.

HISTORICAL RECIDIVISM TRENDS

The very significant national decline in alcohol-related fatal accidents over the past 10 to 15 years has been documented by numerous investigators. California statistics show a similar decline and, in addition, reveal very substantial reductions in DUI arrests. More relevant to this paper are trends in DUI recidivism rates over time. The data plotted in Figure 1 show the reoffense rates of first and second offenders during the 3 years following a DUI conviction in the previous year. Each 3-year time window represents a 1 percent cross-sectional sample of DUI offenders based on DUI convictions reported to the department of motor vehicles during the 20+ year period covered by these data. The database from which these rates are computed for the years 1976-90 is described in earlier TRB papers by Peck (1993 and 1994). The rates for 1990-1996 are based on data contained in Tashima and Helander (1998 and 1999). These latter data have been adjusted to conform to the reoffense definition used for the earlier data.*

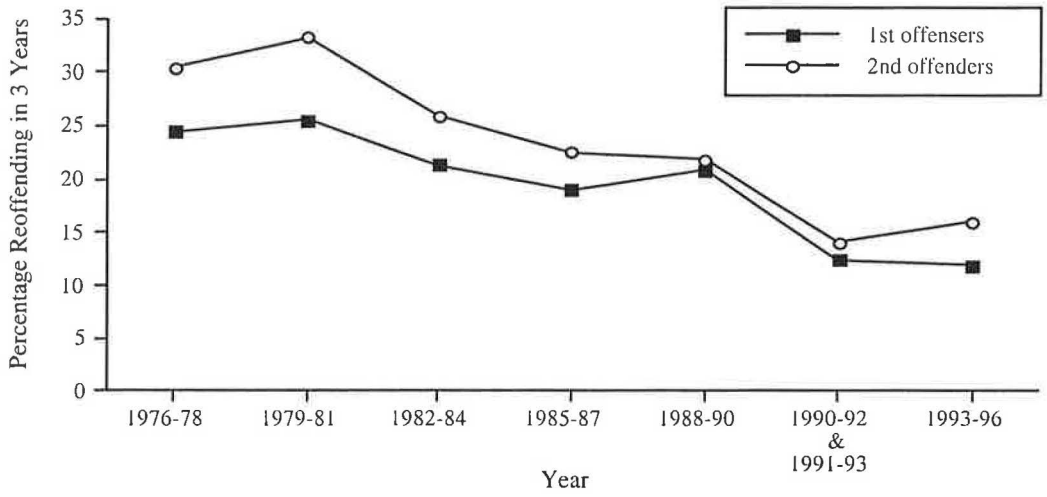


FIGURE 1 Percentage of DUI offenders reoffending (major convictions) 3 years after conviction.

*A recidivism event was defined as conviction for DUI, hit and run, or reckless driving.

These data show a significant linear decline in the reoffense rates of both first-time and second-time offenders. The data also show a trend toward a proportionally greater reduction in recidivism among second offenders compared to first offenders, which could reflect the increasingly severe sanctions and alcohol treatment program requirements for second offenders in California during this period. The precipitous drop in 1990-92 is probably due to California's imposition of 0.08 percent per se BAC and ALS laws in 1990, which resulted in almost all DUI offenders being subject to a pre-conviction license suspension, in addition to post-conviction sanctions and treatment program requirements. By 1993, these data indicate that the 3-year reoffense rate of first and second offenders has declined by 50 percent and that the rates of the two groups have become very similar. These results tend to refute the commonly accepted assumption that repeat offenders have not been responsive to existing sanctions and countermeasures.

Figure 2 displays more recent data on California recidivism rates for first and second offenders from a report by Tashima and Helander (1998). These data are 1-year reoffense rates over the years 1989-1995; in contrast to the data shown in Figure 1, the data in Figure 2 include alcohol-related accidents and ALS actions, along with major violation convictions, as recividist events. Again, we see a consistent and almost linear decline in the rates for both groups over this brief 7-year time span. The second offenders consistently have higher reoffense rates, but the magnitude of the differences are very modest.

The preceding data are concerned with the reoffense rate of drivers who have been previously convicted of a DUI offense (either a first offense or a second offense). Since the reoffense rate of convicted DUI offenders has been declining, one would expect to see an increase in the proportion of DUI offenses involving first-time offenders. This inference is confirmed by the data plotted in Figure 3, which shows the percentage of DUI convictions in California involving first offenders during the years 1989-96. As expected, the proportions have been increasing each year, from 63.0 percent in 1989 to 70 percent in 1996.

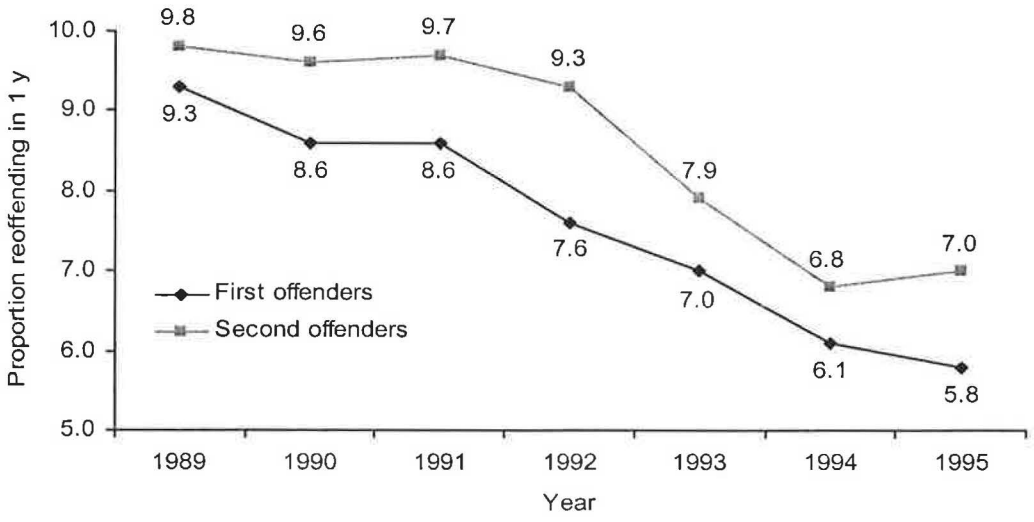


FIGURE 2 Proportion of DUI offenders (arrested in 1989-95) reoffending (DUI incidents) within 1 year after conviction.

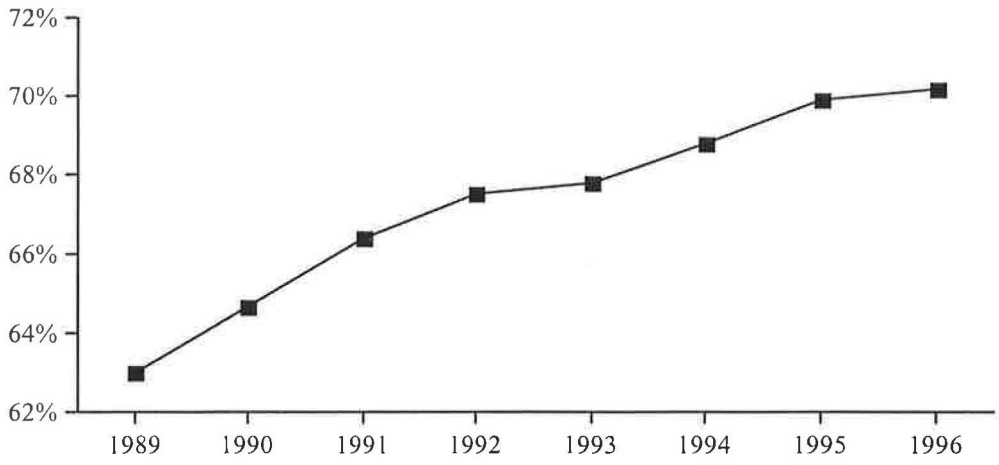


FIGURE 3 Percentage of DUI convictions adjudicated as first offenses, 1989-96.

We need to emphasize that these data do not mean that the absolute rate of first offense DUIs has been increasing and, in fact, we know that the per capita first offense rates have declined in California over this period. However, they have declined at a lower rate compared to previously convicted offenders. As noted above, the most likely explanation for these trends is the specific deterrent effect of the sanctions that are triggered by a DUI conviction (Rogers, 1997; Tashima and Helander, 1999).

DUI SURVIVAL/HAZARD FUNCTIONS

A great deal of insight can be gleaned from an analysis of the average time from a DUI event to the next offense. Figure 4 presents such an analysis for a large sample (N = 52,546) of DUI offenders convicted in 1980. After 9 years, we find that 53 percent of these offenders have been reconvicted of a major offense, either DUI or a typically alcohol-related offense such as hit and run or reckless driving. However, the probability of reoffending is highest in the first few years and declines as the survival length increases. If an offender goes 7 years without reoffending, the probability of a subsequent offense is about 4 percent per year, which is only moderately higher than the probability of any driver being convicted of a DUI offense. A subsequent analysis by Peck (1994) suggests that offenders will continue to be at a very slightly increased risk of reoffending until they have remained DUI-free for a period of 15 to 18 years, at which point roughly 60 percent will have reoffended.

It needs to be emphasized that these data are based on the time period 1980-1990. Since DUI arrest rates in California have declined precipitously since 1990, the current rates of recidivism are substantially lower than those shown in Figure 4. In fact, recent California studies (Tashima and Helander, 1998) suggest that the reoffense rate after 7 years has declined by roughly 50 percent and is now in the range of 25 to 30 percent.

In a previous paper, Peck (1994) fitted several mathematical models to these data and found that the reoffense curves could be closely approximated by a linear exponential hazard model in which the noncumulative failure rates decline as linear function of increasing survival time. This is a very simple model, and it can be used to predict the

probability of a reoffense as a function of number of months of offense-free driving since the last offense.

DUI RECIDIVISM CORRELATES

There have been a large number of published studies aimed at identifying correlates of DUI recidivism. These studies often employ multivariate techniques in constructing equations that differentiate recidivists from nonrecidivists (Peck et al., 1994; Marowitz, 1996; Perrine et al., 1988).

These studies indicate that DUI offenders who reoffend following a DUI conviction or assignment to a treatment program are more likely to

1. Have a very low or very high BAC level,
2. Be younger,
3. Be male,
4. Be unemployed,
5. Be from lower socioeconomic status and blue-collar backgrounds,
6. Have more moving and nonmoving violations and accidents in the previous 3 years,
7. Have a prior history of DUI-related convictions
8. Have criminal arrest histories,
9. Be problem drinkers as measured by psychometric tests and clinical assessments, and
10. Be single or divorced.

However, the predictive accuracy of the models has not been high. For example, Peck et al. (1994) reported a cross-validity coefficient of 0.209 in predicting recidivism status over a 4-year follow-up period using many of the variables listed above. Although

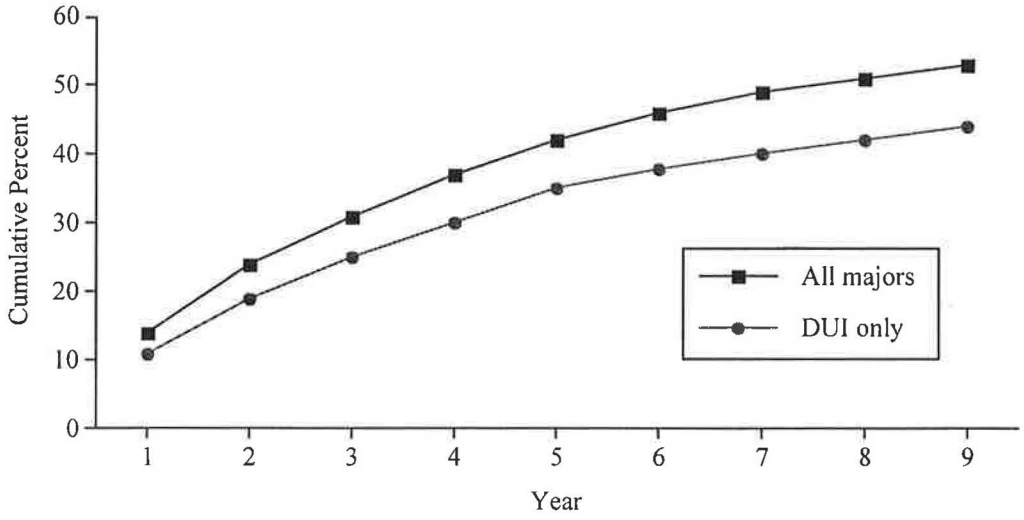


FIGURE 4 Length of time between 1980 DUI conviction and subsequent offense (N = 52,546).

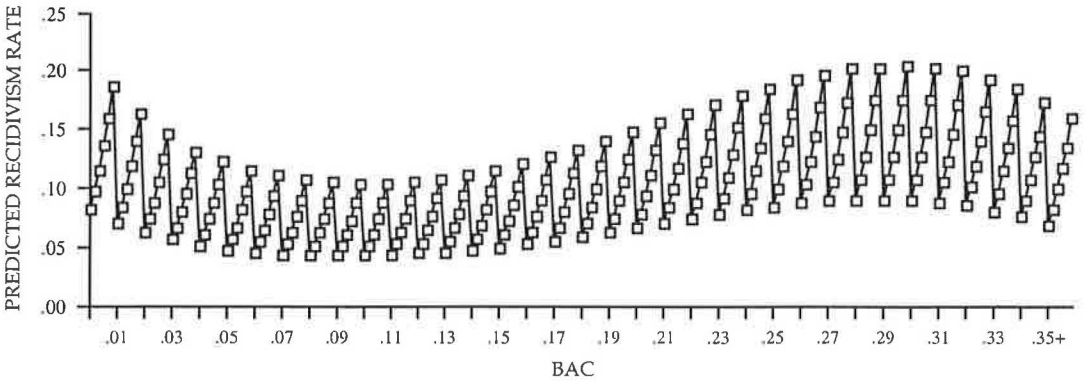
not sufficiently accurate for most purposes in making predictions, the predictive accuracy was substantial for offenders with extremely high predicted reoffense likelihoods, such as offenders in the highest risk decile. Peck et al. (1994) also found a substantial degree of heterogeneity in the accident rates of first offenders. Those in the lowest recidivism risk quartile had accident rates which were only slightly higher than those of the general driving population, whereas first offenders in the highest recidivism risk quartile had accident rates which exceeded the rates of repeat offenders.

Another interesting finding of the above study concerns treatment program compliance. In California, most DUI offenders are required to complete DUI educational and alcohol treatment programs. Peck et al. (1994) found that program compliers could be discriminated from noncompliers much more accurately than recidivists could be discriminated from nonrecidivists. In addition, offenders who were predicted to be noncompliers were over twice as likely to recidivate.

The above study also reported that increased recidivism likelihood was associated with increasing BAC levels (on the DUI conviction) and with an increasing number of nonmajor traffic convictions on the offender's prior driver record. In fact, the number of nonmajor traffic convictions was the single most powerful predictor—a finding which is consistent with numerous other studies in the literature.

More recently, Marowitz (1996) used logistic regression analyses to model how recidivism status was related to BAC level, number of prior moving violations and various demographic and psychometric variables.

Figure 5 shows the relationship between BAC level, the number of nonmajor moving traffic convictions in the preceding 2 years, and the probability of reoffending in the subsequent year. BAC levels are on the horizontal axis and the number of traffic convictions are represented by the six squares plotted within each BAC level. Each square represents a conviction increment, from zero to more than five.



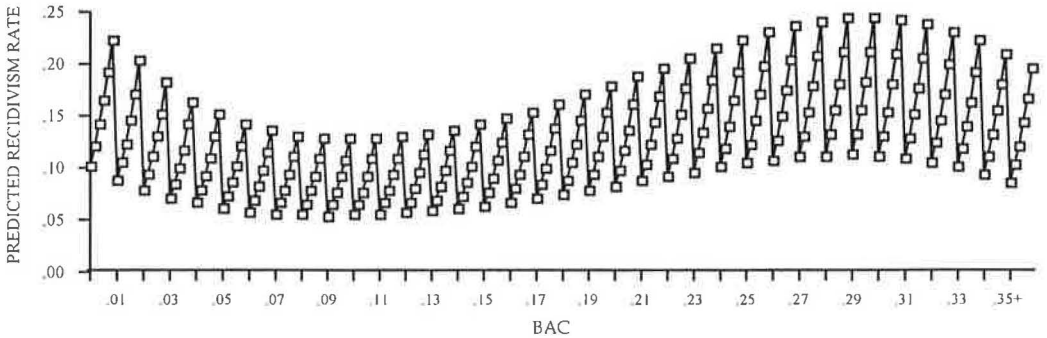
Note. Each BAC level has six points associated with it indicating predicted recidivism rates for DUI convictees with 0 to 5+ (reading left to right within each BAC level) prior 2-year total convictions.

FIGURE 5 Predicted probabilities of DUI recidivism based on BAC, BAC^2, BAC^3, and 2-year prior total convictions for first offenders.

The relationship between BAC level and recidivism status is notably nonlinear, requiring a cubic polynomial equation for adequate fit. The recidivism rate is highest for BACs close to zero, declining to its lowest level at 0.08-0.10 and then rising gradually, peaking at a BAC of 0.29. However, within each BAC level, we find a monotonically increasing recidivism risk as a function of the number of moving traffic convictions. In fact, the number of nonmajor moving traffic convictions proved to be a much stronger predictor than did BAC level. The highest risk would be posed by an offender with a BAC of 0.29 and more than five convictions. Such an offender has a 21 percent chance of recidivating in the next year. The lowest risk would be posed by an offender having a BAC of 0.08 and zero moving traffic convictions. Such an offender would have a 4 percent chance of reoffending. Note that an offender with more than five convictions and a BAC of 0.08 has a 11 percent chance of reoffending, which is actually higher than the reoffense probability of DUI offenders with BAC levels of 0.29 and zero moving traffic convictions.

Figure 6 shows the results of the same analyses for second-offenders. Again, we find an almost identical cubic relationship between BAC level and reoffense rate and the same pattern of recidivism variance as a function of the number of nonmajor moving violations. The recidivism risk gradient reaches its highest point for offenders having BACs of 0.29 or 0.30 and more than five prior moving traffic convictions. Such offenders have a 25 percent chance of reoffending in the next 12 months. By contrast, only 5 percent of offenders with BACs of 0.08-0.10 and zero moving traffic convictions would be expected to reoffend. However, the reoffense rate for this moderate BAC group increases to 13 percent among offenders with more than five moving violations in the previous 2 years. Note again that this rate actually exceeds the recidivism rate of DUI offenders with BACs of 0.29 or 0.30 who have zero nonmajor moving violations on their driving record.

The relatively high reoffense rate for offenders with zero or low BAC levels warrants explanation. As Marowitz points out, these low BAC offenders are likely to be drug paired, and the fact that their reoffense rates are high suggests that drug-impaired drivers have a chronicity which is identical to that of hard-core drinkers and alcoholics. Moreover, Marowitz found that BAC levels on their reoffense also tended to be low, which provides further support of the drug impairment hypothesis.



Note. Each BAC level has six points associated with it indicating predicted recidivism rates for DUI convictees with 0 to 5+ (reading left to right within each BAC level) prior 2-year total convictions.

FIGURE 6 Predicted probabilities of DUI recidivism based on BAC, BAC^2, BAC^3, and 2-year prior total convictions for repeat offenders.

DUI OFFENDER ACCIDENT RISK

The role of alcohol impairment as a major causal factor in accidents, particularly fatalities, has been firmly established. However, the extent to which accident risk varies as a function of the number of DUI offenses on a driver's record is less clear.

Table 1 is taken from an earlier TRB presentation by Peck. This table shows the relationship between the number of major violations on a California driver's record over a 3-year period and accident-involvement rate in the prior 5-year period. As one would expect, the accident rate increases monotonically with increasing number of DUI-related convictions. Drivers with two or more major violations have almost 2.5 times as many accidents as do drivers with 0 majors. In interpreting these rates, it is important to keep in mind that the accidents have been accumulated in a period prior to the major violation convictions.

Table 2, in essence, shows a reversal of the temporal relationship. Here we show the relationship between the number of DUI-related convictions in a 5-year period and accident rates in the subsequent 3-year period. Note that the risk gradient is much flatter than in the previous table and that the relationship is no longer monotonic. The accident rate of repeat offenders is actually lower than that of first-offenders and their relative risk of 1.08 indicates only a slightly inflated risk compared to the general driving population.

This seeming paradox is readily explainable once one realizes that the period for accumulating accident counts is a 3-year period directly following the DUI convictions. Thus, these rates would be attenuated by any effects of the sanctions and license control actions emanating from the convictions. In a sense, the accident rates prior to the DUI convictions represent the intrinsic risk of DUI offenders whereas the subsequent rates represent the residual risk after sanctions have been applied. In California and many states, repeat offenders are subject to more severe court sanctions, longer license control actions, and more intensive alcohol treatment program requirements than are first offenders.

The question arises as to which set of risks is more relevant in formulating policy and identifying research needs. The answer, of course, depends on the question being asked, but a strong case can be made for use of subsequent accident and DUI reoffense rates in developing repeat offender countermeasures and associated research needs.

TABLE 1 Rate of Prior Total Accidents in 1984-88 by Number of Major Citations in the Subsequent 3-Year Period (1989-91)

Subsequent major citations (1989-91)	Number of drivers	Mean prior total accidents (1984-88)	Relative risk index (1984-88)*	Percent prior accident-free drivers (1984-88)
0	136,146	0.265	1.00	78.28
1	2,860	0.468	1.77	65.07
2+	479	0.649	2.45	55.74

NOTE: Pearson correlation = 0.063 ($p < 0.01$)

*Represents the relative increase in each group's total accident rate compared to the zero group's total accident rate.

TABLE 2 Rate of Subsequent Accidents in 1989-91 by Number of Major Citations in the Prior 5-Year Period (1984-88)

Prior major citations (1984-88)	Number of drivers	Mean subsequent total accidents (1989-91)	Relative risk index (1989-91)*	Percent subsequent accident-free drivers (1989-91)
0	134,531	0.146	1.00	87.15
1	4,119	0.187	1.28	83.95
2+	835	0.158	1.08	86.23

NOTE: Pearson correlation = 0.013 ($p < 0.01$)
*Represents the relative increase in each group's subsequent accident rate compared to the zero group's subsequent accident rate.

It is important to keep in mind that the alcohol-related major convictions in Table 1 and 2 occurred over 10 years ago and predate California's ALS and 0.08 percent per se laws. We know from data presented earlier and from a series of California annual reports by Tashima and Helander (1999) that DUI arrests rates, DUI reoffense rates and alcohol-related accidents have been declining, and the rate of decline increased following enactment of California's ALS and 0.08 percent laws. Since the present paper relates to repeat offenders, it is instructive to consider more recent data on accident rates as a function of the number of priors. Table 3 is taken from a recent report by Tashima and Helander (1999). It displays accident means for the 3-year period following a DUI arrest in 1994. Looking at the total accident column, note that the accident rates decline monotonically and that the rate of 4-time offenders is just one-half that of first offenders. The fatal/injury accident rates (column 2) shows a similar directional pattern, although it is much flatter. Only when the analysis is limited to alcohol-related accidents (column 3) is there any evidence of an increasing rate for multiple offenders, which is highest for those with three offenses in 7 years. However, the increased risk is relatively moderate, with four-time offenders having an alcohol-related accident rate that is only 19 percent higher than that of first offenders.

Again, these data must be viewed in the context of California's DUI control system, which imposes lengthy license suspensions and treatment program requirements on repeat offenders. For example, all DUI offenders convicted of a third or fourth offense would be revoked for at least 3 years. Hence, most or all of the accidents that occurred in the 3-year period covered by these data involved DUI offenders who were revoked. Under a perfect system, the accident rates for these offenders should have been zero.

A frequently asked question in defining target groups relates to "pay off" potential. There are a number of parameters which influence the expected return from a countermeasure allocation, and these are described in a paper on risk management which the first author presented at a 1992 NHTSA-sponsored workshop on target group identification (Peck, 1992). A key parameter to any management model is the expected number of future accidents that could be prevented by concentrating resources or countermeasures on a specified target group. This expected value is bounded by risk the total number of accidents that a given group would be involved in, had additional countermeasures not been employed.

TABLE 3 Subsequent 3-Year (1995-97) Total, Fatal/Injury and Alcohol-Related Accident Means by Number of Prior DUI Offenses

DUI offender status	Total accidents	Fatal/injury accidents	Alcohol-related accidents
All	0.1137	0.0391	0.0290
1st DUI	0.1257	0.0416	0.0273
2nd DUI	0.0937	0.0347	0.0316
3rd DUI	0.0743	0.0318	0.0372
4th+ DUI	0.0615	0.0290	0.0325
Non DUI population*	0.165	0.049	0.006

Sex adjusted 3-year accident rate for drivers with no DUIs in prior 7 years for the period 1989-1991.

Using longitudinal data from the California Driver Record study and a simple model† for estimating accident events from driver involvement frequencies, it is possible to determine how many accidents would be prevented if a given group were effectively removed from the driving population. Obviously, it is never possible to achieve this objective but the analysis provides a theoretical upper bound.

Figure 7 simulates the subsequent accident shares for DUI offenders with one and two DUI convictions in 7 years. The figure compares the number of drivers in those groups with their share of California's accident total in the subsequent 3-year period. These results suggest that effective removal of all offenders with one DUI would eliminate 3.6 percent of the driving population and prevent 6.5 percent of California's accident total. If all repeat offenders were effectively removed, we would eliminate 1.4 percent of all drivers and prevent only 2.4 percent of all accidents. In terms of relative risk, the repeat offenders' accident share is 1.7 times

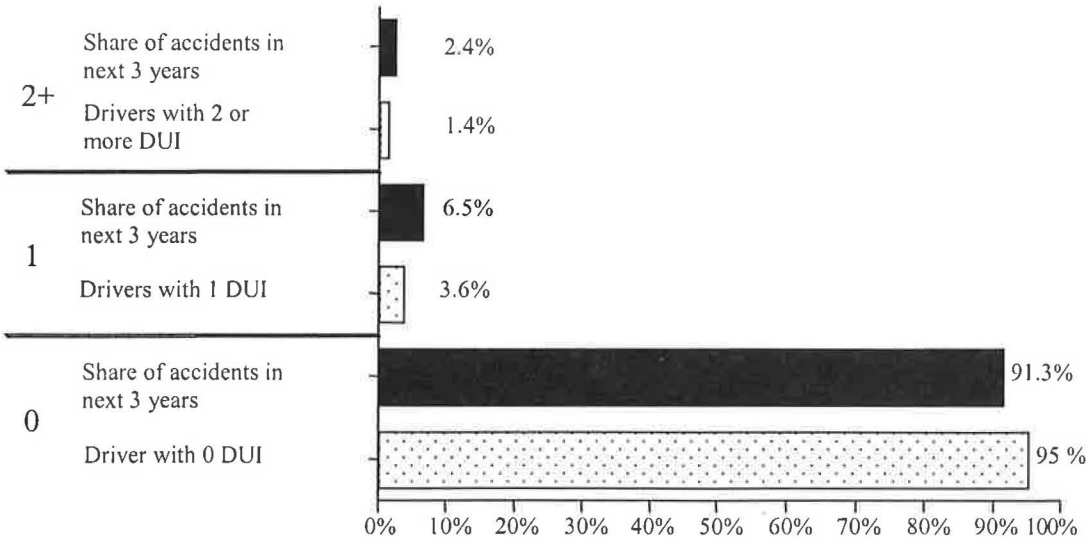


FIGURE 7 Percentage of total accidents in the next 3 years (1988-90) involving drivers with different prior 7-year (1981-87) DUI conviction records.

† This procedure is described in technical notes dated April 15, 1985 and June 1999 by R.C. Peck and Michael Gebers, respectively. Copies can be obtained from the author.

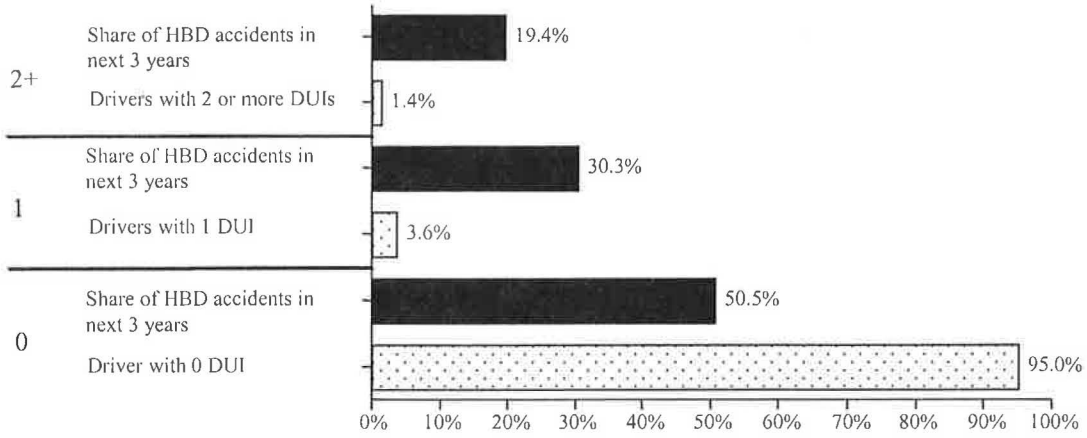


FIGURE 8 Percentage of total accidents in the next 3 years (1988-90) involving drivers with different prior 7-year (1981-87) DUI conviction records.

higher than population parity. But the net total is very low, particularly when one realizes this is an upper bound and that no countermeasure short of permanent incarceration for the entire 3-year period could ever prevent all, or even most, of these accidents.

Figure 8 portrays the same analysis, but is limited to subsequent accidents known to involve alcohol. Here we find the pay-off potential to be more dramatic, with 30.3 percent and 19.4 percent of the subsequent accidents involving, respectively, first and repeat offenders.

The accident share of repeat offenders in HBD accidents represents a 14-fold overinvolvement, which is much higher than the 1.7 relative risk index for total accidents. Thus, when repeat offenders have accidents, there is a high likelihood that they involve alcohol.

In interpreting the above results, we need to keep in mind that the time period represented is 1984-1991. Since DUI arrests and accidents have declined precipitously since that time, the simulated accident shares would be substantially lower if based on current data.

In an earlier section of this paper, we summarized evidence from a study by Marowitz concerning the predictive power of nonmajor moving violations in predicting DUI recidivism. The fact that an accumulation of moving violations increases the accident risk among DUI offenders has been found by several investigators. In their study of risk DUI correlates, Peck et al. (1994) offered the following observation which is pertinent to the present paper.

The resultant DUI-offender typologies suggest that the two most important dimensions underlying drunk driving are the extent of aggressive unlawful driving (moving and nonmoving violations) and severity of the offender's drinking problem. DUI offenders with elevated driver-record point counts were significantly more likely to be involved in subsequent accidents and DUI offenses than were DUI offenders with clear records or average levels of prior traffic convictions and accidents. It may therefore be important to distinguish, as previously suggested by Simpson (1977), between "the problem driver who drinks" and "the problem drinker who drivers." These appear to represent different offender types presenting different levels of traffic safety risk (p. 676).

We would like to illustrate the joint influence of the number of DUIs and moving traffic violations on accident risk, using data from the California Driver Record Study database. Table 4 presents a two-way matrix of accident means over a 7-year period as a function of the number of DUI convictions and the number of nonmajor moving violations in the same period. Looking first at the row and column total means, we see that both variables exert a monotonic effect in increasing accident risk. For DUIs, the largest risk increment occurs in going from zero to one DUI, after which the risk increments are quite modest. Within each DUI level, there is a wide variation in risk depending on the number of moving violations. In general, DUI offenders with more than six moving violations have 2.5 times as many accidents as those with zero violations. Note also that first offenders with more than six convictions have an accident expectancy that is almost twice that of three time offenders with zero moving violations. In fact, first offenders with as few as three moving violations have an accident expectancy that is higher than that of third offenders with zero moving violations.

What are the implications of the above finding? We will address this question briefly in the final section of this paper, but it seems clear that impaired driving is far more risky when committed by drivers who are prone to drive in an unlawful and risky fashion irrespective of any involvement with alcohol.‡ We believe the "problem driver who drinks" paradigm, as suggested in 1977 by Simpson, may prove to be a more important target group dimension than the "problem drinker" or hard-core DUI offender.

ANALYSIS OF RESEARCH NEEDS AND COUNTERMEASURE DEVELOPMENT

At the outset of this paper, we stated that an analysis of research needs relating to repeat DUI offenders should begin with a consideration of that is known and not known. It is also important to assess the practical payoff potential associated with the new knowledge gained from any research venture. A strategic analysis of the payoff potential associated with a given countermeasure involves the interaction of several parameters:

1. Size of the target group,
2. Accident-risk level of the target group,
3. Responsiveness of the target group to remediation and/or control,
4. Effectiveness and feasibility of the countermeasures, and
5. Delivery system for identifying the risk group and implementing the countermeasure.

It is readily apparent that much progress has been made in reducing impaired driving and alcohol-related accidents both nationally and in California. If the evidence from the California studies can be generalized to the entire nation, major reductions in accident risk and reoffense rates have occurred among both first time and repeat offenders.

In California, all repeat offenders are subject to pre-conviction ALS actions, post-conviction suspensions, and lengthy alcohol treatment programs. A number of evaluations have shown these programs to be effective—a conclusion which is further substantiated by

‡ Some of the association between accident risk and number of moving violations could be do to covariation with exposure (miles driven).

the meta-analysis conducted by Wells-Parker et al. (1995). It would appear that these actions have achieved the objective of reducing the accident rate of repeat offenders to below that of first offenders. In addition, analyses of California data indicate that the majority of total accidents and alcohol-related accidents involve drivers with zero prior DUIs. When a prior DUI is evident, it is much more likely to be an offender with only one prior. Although the role of alcohol and repeat offenders would be expected to be higher in fatal accidents, the fact remains that only 4.5 percent of drivers involved in fatal accidents nationally have a DUI on their driving record in the prior 3 years. Of course, this percentage would increase if a longer prior record were used for counting priors, and it is also much higher for fatal accidents involving alcohol.

Given the above, we believe that first-time DUI offenders offer more pay-off potential because there are more of them and it makes more sense to develop and implement countermeasures which deter first time offenders from becoming second offenders. Once a first time offender becomes a second offender, a combination of license suspension and alcohol treatment should be used, perhaps supplemented by ignition interlock after the license suspension has terminated.

The term "hard-core" offender is best reserved for DUI offenders who continue to accumulate accidents and impaired driving incidents while under suspension or revocation and to offenders who drop out and do not comply with treatment program requirements. We believe the term "hard-core" is more applicable to these groups and that these groups also represent problem drinking offenders with exceptionally high risks of recidivism and accident involvement. Having established a general vision of the direction of DUI countermeasure development, we outline below a programmatic research agenda for establishing the necessary empirical foundation.

Problem: Studies of DUI offender characteristics, recidivism tracking, process analyses, outcome evaluation, etc. require longitudinal data on large probability samples of drivers and DUI offenders. California is one of the few states that has developed the longitudinal driver record databases for conducting these types of analyses on a continued basis. However, such studies are necessarily representative of only California.

TABLE 4 Accident Risk as a Function of DUI Citations and 1-Point Citations over a Concurrent 7-Year (1985-91) Period (N = 145,645)

	Total 1-point countable citations							
DUI citations	0	1	2	3	4	5	6+	Total
0	0.233	0.377	0.482	0.572	0.649	0.757	0.935	0.357
1	0.441	0.556	0.668	0.735	0.841	0.985	1.129	0.628
2	0.557	0.658	0.815	1.078	0.905	1.128	1.283	0.778
3+	0.676	0.784	0.837	0.767	1.379	0.818	1.294	0.817
Total	0.240	0.387	0.496	0.589	0.669	0.779	0.959	0.371

RESEARCH AGENDA

Development of a National Driver Record and DUI Offender Database

Solution: NHTSA should develop a national driver record and DUI offender database for conducting longitudinal studies of DUI offender recidivism rates, reoffense correlates, countermeasure effects and State or regional variations in countermeasure effectiveness. In addition to this relatively short-term solution, a feasibility study should be conducted on establishing a national single driver license/single driver record system similar to that required for interstate commercial drivers. In addition to greatly facilitating the conducting of DUI research, such a system would enable states to identify high-risk DUI offenders using a record system that has not been compromised by failure to link DUI-related events accumulated in different states. Current systems for state linkage, such as the National Driver Record Register and driver license/nonresident violator compacts, are either incomplete or inadequate for the above purposes

Payoff: Not quantifiable at this juncture. However, to the extent that we can identify those offender groups at the greatest risk of crashes and recidivism, we can aid in the development of special countermeasures for these high-risk subgroups and increase the potential payoff of any countermeasure.

Development and Evaluation of a Model DUI Offender Classification System

Problem: Numerous systems and typologies have been proposed and/or developed for classifying and treating DUI offenders. Although research on complex systems for treating alcoholics based on multivariate typologies has not proved encouraging (Project Match Research Group, 1997), a relatively simple customized treatment system may have potential with drunk drivers. Among the candidate dimensions would be age, BAC level, drinking consumption indices and indicators of problem driving, such as moving violations.

Solution: Develop and evaluate the efficacy of a system for assigning treatment based on offender characteristics. The simplest system would be to treat all first offenders with high recidivism expectancies as second offenders. A more complex variant would be to develop drug-oriented programs for low BAC offenders.

Payoff: An additional 25 percent reduction in the reoffense and accident rate of 25 percent of all first offenders.

Determine the Optimum Length or Time Window for Defining Repeat Offenders

Problem: States currently differ in the driver record retention period used for defining a repeat offender. There are also differences in the extent to which states differentiate between the number of repeat offenses (2 in 7, 3 in 10, etc.). Research is needed to define an opti-

mum time window for considering a DUI as a prior. This optimum time window would be a function of the recidivism expectancy over time.

Solution: Longitudinal survival hazard rate studies need to be conducted on the DUI offender populations of a sample of states. Parametric and nonparametic survival models, similar to those developed in California, would be applied to the data in determining at what point a prior DUI offense is no longest predictive of an increased risk of reoffending.

Payoff: Not yet quantifiable.

Evaluate the Feasibility of a Three-Tier System That Graduates Sanctions Based on BAC Level and Total Traffic Conviction History

Problem: Some states currently have 0.08 percent per se laws and NHTSA is advocating that all states establish 0.08 percent as the maximum permissible BAC level. There is also advocacy for even lower permissible limits. A problem created by lowering BAC limits is that it does not recognize the extreme variance in accident risk and problem drinking magnitude between, offenders at, say, BACs of 0.08 percent and 0.20 percent. The latter offender is much more likely to be an alcohol dependent problem drinker and to represent a much higher accident risk. Similarly, the sanction standard could be modeled to capitalize on the predictive history of an offender's conviction.

Solution: Development and evaluation of sanction standards that utilizes BAC and driver record conviction history as a determinants of sanction severity.

Payoff: Not yet quantifiable.

Perform a Large Scale Evaluation of the Effectiveness of Vehicle-Impoundment and License Plate Confiscation as Sanctions for Hard Core DUI Offenders

Problem: DUI offenders who continue to drive and reoffend after their license has been suspended or revoked are obviously not responsive to traditional sanctions. Evidence from a California study of vehicle impoundment (DeYoung, 1998) is promising, but evidence regarding license plate confiscation is mixed. In any event, these countermeasures need to be more rigorously evaluated with respect to DUI offenders than has been possible to date.

Solution: Implement a multistate evaluation of the effectiveness of vehicle impoundment, and other methods of vehicle incapacitation, on reducing DUI recidivism and alcohol-related accidents.

Payoff: The California study by DeYoung reported over a 25 percent reduction in accidents among sanctioned offenders. What's more, vehicle impoundment showed the largest reduction (–38 percent) among repeat offenders. The size of the annual target population in California is estimated to be several hundred thousand suspended or revoked DUI offenders.

Identify DUI Recidivism Correlates Using a Long Follow-Up Period

Problem: Many recidivism studies have utilized inadequate follow-up periods or have been conducted on nonprobability samples or samples from a single county or region within a state. Analyses of the type performed by Marowitz (1996) need to be done using much longer follow-up periods and, ideally, more than one state.

Solution: Perform a multistate recidivism analysis over 5- and 10-year follow-up periods.

Payoff: Not quantifiable at this juncture.

Develop and Evaluate a System for Reinstating Suspended or Revoked Repeat DUI Offenders on a Probationary Basis Subject to Imposition of Ignition Interlock and, Where Indicated, Other Conditions

Problem: DUI offenders can automatically apply for reinstatement in many states after the suspension term has lapsed and are often reinstated unconditionally. Many of these offenders are probably still at increased risk to reoffend due to drinking problems. A protocol should be developed for assessing risk and determining when reinstatement should be conditioned on installing ignition interlock and/or enrolling in a follow-up treatment program or under the care of a physician.

Solution: Develop and initiate the above program on an experimental or demonstration project basis in one or more states.

Payoff: Not yet quantifiable.

Evaluate the Use of Community-Service Supplemented by Electronically-Monitored House Arrest as an Alternative to Jail

Problem: The DUI statutes of all states impose some jail for DUI offenses, particularly repeat offenders, and the minimum length of jail time generally increases as a function of the number of priors. California studies (Tashima and Helander, 1999) have questioned the effectiveness of jail as a deterrent. It is also frequently the case that jail overcrowding prevents the entire jail sentence from being served, and many courts impose community service as an alternative. An obvious alternative or supplement to jail, which is now feasible, is electronically monitored home confinement. This option would also make longer sentences more feasible.

Solution: Perform an experimentally controlled study of a combined community service-home confinement sanction in lieu of jail in one or more states.

Payoff: Potential not yet quantifiable.

Assess the Magnitude and Risk Level of the Permanently Suspended DUI Offender Population

Problem: Studies in California (Sadler et al., 1991; Tashima and Helander, 1999) indicate that a large percentage of the suspended and revoked repeat DUI offender population do not reinstate even after becoming eligible for reinstatement of their driving privilege. It is believed that a sizable percentage of the population eligible for reinstatement are never reinstated, at least in California. Among the reasons for nonreinstatement is the inability to meet all of the requirements, particularly the mandatory insurance requirement. The long-term effects of nonreinstatement on traffic safety are not clear, nor is it clear how many of these drivers continue to drive, impaired or otherwise.

Solution: Conduct a statistical study of this group in California. The study should include interviews with the identified group.

Payoff: Not clear.

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