

Long-term Effectiveness of Probation, Short-term Intervention and LAI Administration for Reducing DUI Recidivism

ELISABETH WELLS-PARKER, Ph.D.,¹ BRADLEY J. ANDERSON, Ph.D.,² JAMES W. LANDRUM, M.A.¹ & RONALD W. SNOW, Ph.D.¹

¹Mississippi Alcohol Safety Education Program, Social Science Research Center, Mississippi State University, P.O. Box 5287, Mississippi State and ²Department of Sociology and Anthropology, Mississippi State University, Drawer C, Mississippi State, MS 39762, U.S.A.

Summary

Driving under the influence of alcohol (DUI) arrest records were checked for subjects participating in the Mississippi DUI Probation Follow-up project 6 to 9 years after project entry. The efficacy of short-term intervention, probation, and Life Activities Inventory (LAI) administration for reducing long-term DUI recidivism were evaluated using a logit analysis. A small but statistically significant effect of probation for reducing long-term recidivism was found for offenders classified both as low-risk and high-risk drinkers. However, an interaction effect of combining probation with short-term intervention, which was suggested by an earlier 2-year recidivism analysis, was not statistically significant after the longer tracking period. Administration of the LAI questionnaire was found to reduce recidivism only for offenders classified as low-risk, replicating findings after 2 years of recidivism tracking.

Introduction

During the past two decades several large-scale controlled studies have investigated the efficacy of remedial interventions with DUI offenders (Landrum *et al.*, 1982; Nichols *et al.*, 1978; Holden & Stewart, 1981; Reis, 1982a, 1982b). Strengths and shortcomings of these studies have been reviewed, and reviewers generally agree that the results support a weak effect of intervention on DUI recidivism (Mann *et al.*, 1983; Peck *et al.*, 1985). Most studies have tracked offenders for 2-3 years (Landrum *et al.*, 1982; Reis, 1982b; Siegal, 1985). Studies using longer tracking periods have been based on relatively small samples (Vingilis *et al.*,

1981), and treatment often has extended for a year or more into the tracking period. Reported recidivism rates have been less than 25%, although recidivism rates within 'problem' drinker groups occasionally have reached 30% (Landrum *et al.*, 1982; Reis, 1982b).

Low DUI recidivism rates during abbreviated tracking periods, and small sample sizes have reduced statistical power and have limited exploration of critical intervention issues, such as long-term effectiveness, client/treatment interactions, and time dependencies of treatment effects. Techniques that increase statistical power would include quantitative techniques to review large numbers of studies (Light & Pillemer, 1984), larger sample sizes, more sensitive outcome measures, and lengthy follow-up intervals that increase the probability of detecting recidivism. The current study represents an evalua-

Address all correspondence to: Elisabeth Wells-Parker, Mississippi Alcohol Safety Education Program, Mississippi State University, P.O. Box 5287, Mississippi State, MS 39762, U.S.A.

tion of intervention effectiveness using a 6–9 year follow-up of DUI offenders participating in a treatment evaluation study.

In 1976, the National Highway Traffic Safety Administration sponsored the Mississippi DUI Probation Follow-Up Project—an evaluation study of the efficacy of probation, structured group therapy, and education in the form of traditional DUI schools with drinking/driving offenders. An experimental design using a control group and random assignment across conditions was employed. Multiple outcome measures of DUI recidivism, accident involvement, and lifestyle changes were measured following entry into treatment. An evaluation after 2 years of tracking focused on differential recidivism among treatment groups for 3431 program entries (Landrum *et al.*, 1982). Marginal effects of combined probation and education on recidivism were suggested after the 2 year tracking period, although the obtained level of statistical significance was weakened because of non-orthogonal comparisons (Landrum *et al.*, 1982).

The researchers who conducted the study have had an opportunity to consider the results of the project retrospectively. Several ironies have been noted. For instance, subsequent reviewers have suggested that the original report of the study findings (Landrum *et al.*, 1982) under-emphasized the 29% reduction in recidivism rate associated with combining short-term intervention with probation for offenders screened as low risk drinkers (Peck *et al.*, 1985). This finding was not emphasized because only marginal statistical significance was attained due to the small sample sizes and relatively low recidivism rates of the groups compared. Indeed, emphasis has generally been placed on Type I errors in previous research; however, Type II errors can have an equally serious impact if treatments of practical significance go undetected. Another irony was the discovery that repeated measures of lifestyle changes were associated with reduced recidivism when offenders who were assigned to receive the lifestyle outcome measure (i.e. the Life Activities Inventory) were compared to offenders not receiving the measures. Therefore, the measuring instrument was found to function as an intervention factor (Landrum *et al.*, 1982, Neff & Landrum, 1983).

Continued collection of recidivism data on Mississippi DUI Probation Follow-Up Project participants has presented an opportunity to re-analyze the impact of intervention strategies using 6 to 9 years of follow-up data. The current study analyzes long-

term effects of short-term intervention (education or structured group therapy), probation, and LAI administration on DUI recidivism. Availability of lengthy follow-up data from a controlled study of DUI intervention efficacy provides a unique opportunity to examine long-term effects of remedial interventions.

Method

Subjects and Study Design

Drinking and driving offenders from 11 Mississippi cities were referred to the Mississippi DUI Probation Follow-Up Project from September of 1976 through January of 1979. Offenders were classified into a high-risk or a low-risk group based on ten criteria that combined Mortimer-Filkins scores, arrest BACs and number of prior alcohol-related offenses (Landrum *et al.*, 1982). Approximately 60% of offenders were screened into the high-risk category. Regarding socioeconomic characteristics assessed at referral, 33% were black, 51% had completed high school, 8% were female, 79% were employed, and 68% were under 40 years of age.

Following classification, offenders were randomly assigned to one of the following: (1) a year's monthly probation, (2) a short-term intervention, (3) a combination of probation and a short-term intervention, or (4) a control condition. The short-term intervention for screened high-risk offenders was structured group therapy, and the short-term intervention for screened low-risk offenders was education in the form of a traditional DUI school (Landrum *et al.*, 1982). A sub-sample of offenders within each condition was administered the Life Activities Inventory Questionnaire in the presence of a probation counselor at intake, at 6 months, and 1 year after entry. Precoded charts were used by counselors in the field to make LAI assignments. During the first four intake quarters, one out of every five offenders in each condition was assigned to receive LAI. In order to achieve a projected LAI participation quota specified in the contract, the assignment to LAI was accelerated to one out of every two low-risk offenders and one out of every three high-risk offenders during the second four quarters. During the last two quarters all offenders received LAI. Some LAI questionnaires were mailed to participants for completion during the latter two quarters.

Offenders who returned to receive assignment to an experimental condition, hereafter referred to as

program entries, are included in the present analysis. Excluded are offenders who were deceased or for whom highway patrol records were unavailable during the initial 24-month tracking period, and offenders with out-of-state licenses. Approximately 950 individuals failed to return for experimental assignment, a factor which could reduce the external validity of the findings (Neff & Landrum, 1983). It should be noted that all individuals who received their assignment to a condition are retained within their experimental group for analyses whether or not they actually completed treatment. Also, individuals are retained within the LAI sample for purposes of analysis whether or not they returned for subsequent LAI administrations. Retention regardless of completion status eliminates 'experimental mortality' explanations (Landrum *et al.*, 1982; Neff & Landrum, 1983).

Complete descriptions of the legal system, the offender characteristics, the content of modalities, and the administrative system of the Mississippi DUI Probation Follow-Up Project are available in prior reports (Landrum *et al.*, 1982; Wells-Parker *et al.*, 1983; Neff & Landrum, 1983). Additional data on recidivism were collected in November of 1985. Driver's History files available from the Mississippi Highway Safety Patrol were used to identify recidivists in addition to those identified within the initial study. For offenders who entered the project in the fall of 1976 approximately 9 years of tracking data were available, and for offenders who entered the project in January and February of 1979, the last entry months, approximately 6½ years of tracking data were available in the long-term study. The November 1985 check revealed that 45.7% of the sample had recidivated after program entry. For screened high-risk offenders, 51.4% had recidivated, and for screened low-risk offenders 37.3% had recidivated. These rates compare to a rate of 26.6% for the entire sample after the 2-year tracking period. Also after 2 years, 32.4% of the high-risk group had recidivated and 18.6% of the low-risk offenders had recidivated.

Methods of Analysis

Conceptually, the model that is used can be visualized as a $2 \times 2 \times 2 \times 2$ factorial model with two levels for risk group and for each of three treatment variables. Specifically, the variables are: (a) screened high-risk group or screened low-risk group (GRP); (b) probation or no probation (PROB); (c) short-term intervention or no short-term interven-

tion (STI); and (d) LAI or no LAI. However, short-term intervention was different for high-risk and for low-risk offenders. Although assignment to treatment condition was random within each risk group, high-risk offenders received structured group therapy as the short-term intervention, and screened low-risk offenders received a DUI education school as the short-term intervention. Therefore, any interaction observed between risk group and short-term intervention could be influenced by differences in short-term intervention content between the risk groups.

A logit analysis is used to estimate treatment effects, controlling for screened risk group (GRP). Initially, a model is estimated that includes main effects only. Partial chi-square tests are used to determine if interaction effects are present by comparing the likelihood ratio chi-squared statistic for the model including each second-order interaction effect with the main effects only model. The expected odds ratios reflect the relative recidivism rates for the various groups in the analysis.

As mentioned, LAI participation was not selectively assigned during the last two intake quarters. Therefore, in order to avoid confounding, it is necessary to limit the evaluation of the effects of the Life Activities Inventory to the first eight intake quarters. Because random assignment was maintained for probation (PROB) and short-term intervention (STI) throughout the project, we re-evaluate their effectiveness using the complete data set (ten intake quarters).

Probation, short-term intervention and LAI are all hypothesized to reduce recidivism rates; therefore, one tailed-tests of significance are used to test treatment hypotheses. A relatively non-stringent alpha of 0.1 is selected because of concerns expressed earlier regarding Type II errors.

Results

Eight Intake Quarters Analysis

Table 1 shows the recidivism analysis for those offenders who entered the project during the first eight quarters. The primary purpose of the eight quarters analysis is to evaluate the effects of LAI and its interaction with risk group as well as with other treatment modalities. However, in order to completely specify the model's main effects, short-term intervention, and probation are included in the eight quarters analysis.

Table 1. Logit Coefficients and Odds-ratios for DUI Recidivism (N=3035)

Predictor variable	Logit coeff.	Standard error	z-Value	Exponential coeff.	Expected odds-ratio
RECID					
No	0.274**	0.040	6.865	—	—
GRP					
Low Risk	0.340**	0.038	9.019	1.405	1.975
PROB					
Yes	0.053*	0.037	1.430	1.054	1.111
STI					
Yes	0.022	0.037	0.583	1.022	1.044
LAI					
Yes	0.041	0.039	1.048	1.042	1.086

* One-tailed probability <0.10.

** One-tailed probability <0.05.

Within the initial model, which includes only main effects, risk group classification has the strongest main effect on recidivism. Probation is the only treatment modality to have a statistically significant main effect on recidivism ($p < 0.10$), though the effect is modest when compared to risk group. Observed main effects of short-term intervention and LAI on recidivism are in the hypothesized direction, though weak and not statistically significant.

Partial chi-square tests reveal that only one second-order interaction, the interaction of LAI with risk group, is statistically significant (Table 2). The final model includes main effects for risk group, probation, and LAI as well as the risk group by LAI interaction term. This model is parsimonious and provides a good statistical fit with the observed data ($L^2 = 4.24$, d.f. = 11, $p = 0.961$).

Table 2. Tests of Second-order Interaction Effects

Effect	Partial chi-square ¹	d.f.	p
GRP BY PROB	0.0378	1	>0.10
GRP BY STI	0.0150	1	>0.10
GRP BY LAI	4.0735	1	<0.05
PROB BY STI	0.0292	1	>0.10
PROB BY LAI	0.1923	1	>0.10
STI BY LAI	0.0249	1	>0.10

¹ Calculated as the Likelihood Ratio Chi-Square for the main effects model minus the Likelihood Ratio Chi-Square for the model including the specific second-order interaction effect being tested.

Long (1984) has considered estimable functions in log-linear models, and has given rules to deter-

mine if linear functions of parameters are estimable. Because the model includes the LAI by GRP interaction effect, parameter estimates for main effects of LAI and risk group are not invariant to the particular solution (i.e. set of identifying constraints) used. Following Long (1984), we provide total effects, the effect of a change in an explanatory variable on the odds of one outcome versus another on the response variable. Total effects are always estimable and are direct functions of expected odds-ratios; they are invariant to the identifying constraints used. Total effects include both direct effects and interaction effects with other explanatory variables. We also include the specific effect for LAI; this expresses the unique effect of the interaction between LAI and drinking group classification.

For subjects receiving LAI, low-risk drinkers are approximately 2.45 times less likely to recidivate than those classified as high-risk drinkers (Table 3). Among those not receiving LAI, low-risk drinkers are about 1.77 times less likely to recidivate than high-risk drinkers. Notice that the total effect of GRP varies with the level of LAI, the explanatory variable with which it interacts. It is the interaction of GRP with LAI that makes the total effect of GRP dependent on the level of LAI, and vice versa.

The eight quarters analysis suggests that probation has a substantially weaker effect on DUI recidivism than risk group. Subjects given probation are approximately 1.11 times less likely to recidivate than those not receiving probation (Table 3). Among low-risk offenders, LAI reduces the odds of DUI recidivism by a factor of 1.313 (Table 3). The effect of LAI on DUI recidivism is distinctly

different among high-risk drinkers. Indeed, the expected odds-ratio for high-risk drinkers who completed the LAI (0.951) indicates that they are slightly more likely to recidivate than high-risk drinkers who did not complete the LAI. The specific effects for the interaction term indicates that the total effect of LAI is approximately 1.38 times larger for low-risk offenders than for high-risk offenders. The effectiveness of LAI as a treatment for reducing DUI recidivism is clearly contingent on client characteristics that are associated with risk-classification.

Ten Intake Quarters Analysis

The effectiveness of probation and short-term intervention is reevaluated using data for all ten intake quarters of the DUI project. The main effects

of probation and drinking group classification on recidivism are statistically significant at the 0.05 level (Table 4). The effect of short-term intervention is in the expected direction but fails to reach statistical significance. Tests for possible higher-order interaction effects indicate that none are statistically significant. The model selected includes only the main effects of probation and risk group on recidivism ($L^2=1.57$, d.f.=5, and $p=0.91$).

Those classified as low-risk offenders are approximately 1.77 times less likely to recidivate than high-risk offenders. The total effect for probation indicates that those who received probation are about 1.12 times less likely to recidivate than those who did not.

The ten quarters analysis suggests that probation has a small but consistent effect of reducing recidivism, and the effect of probation is constant for high-risk and low-risk groups.

Table 3. Logit and Effect Coefficients for the Selected Model (N=3035)

Predictor variable	Logit coeff.	Standard error	Odds coeff.	Total effect	Specific effect
RECID					
No	0.275**	0.040	1.317	—	—
GRP					
Low Risk	0.367**	0.040	1.443	—	—
(LowRisk LAI)				2.447	—
(Low Risk Non-LAI)				1.772	—
PROB					
Yes	0.050*	0.037	1.051	1.106	—
LAI					
Yes	0.055*	0.040	1.057	—	—
(LAI Low Risk)				1.313	—
(LAI High Risk)				0.951	—
RECID X GRP BY LAI	0.081**	0.040	1.084	—	1.381

* One-tailed probability <0.10.

** One-tailed probability <0.05.

Table 4. Logit and Effect Coefficients for the Selected Model (N=3425)

Predictor variable	Logit coeff.	Standard error	Odds coeff.	Total effect	Specific effect
RECID					
No	0.233	0.352	1.262	—	—
GRP					
Low Risk	0.287*	0.352	1.332	1.774	—
PROB					
Yes	0.058*	0.035	1.060	1.124	—

* One-tailed probability <0.05.

Discussion

Two modalities, probation and LAI, are shown to have long-term effectiveness for preventing subsequent recidivism. Although the magnitude of the effect for probation is small, its effect is constant across risk groups. Long-term analysis sustains the effectiveness of the Life Activities Inventory for reducing recidivism for low-risk offenders, but not high-risk offenders. Clearly, the effectiveness of this treatment is dependent on offender characteristics. Earlier analysis has suggested that the LAI effect after two years is dependent on educational level (Neff & Landrum, 1983). Several other studies document the existence of client/-treatment interactions (e.g. Reis, 1982a, 1982b) and recent development of complex offender typologies is based on the strong assumption that client characteristics specify treatment efficacy (Donovan & Marlatt, 1982; Wells-Parker *et al.*, 1986).

A comparison of results of the long-term follow-up to results of the initial 2-year follow-up study reveal some differences. In the 2-year study, there was a suggested treatment effect of combining probation and short-term intervention (Landrum *et al.*, 1982; Peck *et al.*, 1985); however, in the current analysis of long-term effects, the interaction of probation and short-term intervention is not significant, even at a non-stringent alpha. That is, a small probation effect is sustained after long periods of time, although an interaction of probation and short-term intervention tends to disappear over time. These differences raise the issue of whether effects of specific treatments are dependent on *when* effectiveness is evaluated after treatment. Are treatment effects time dependent?

Both the Mississippi DUI Probation Follow-Up evaluation and the California DUI Project evaluation documented small short-term effects of several interventions with DUI offenders (Landrum *et al.*, 1982; Reis, 1982a, 1982b; Peck *et al.*, 1985), and the current study suggests that at least some intervention effects are sustained over time. We view these results as somewhat encouraging for developing more effective treatments with DUI offenders. However, little is known about the processes by which remedial strategies affect target behaviors (Kunkel, 1983), or interactions between client characteristics and treatment type (Mann *et al.*, 1983). Future data-collection and analysis within the ongoing follow-up study of the Mississippi Project will focus on client/treatment interaction, and the time dependencies of treatment effects

in order to suggest ways in which the effectiveness of intervention could be improved.

Acknowledgement

This research was supported in part by the U.S. Department of Transportation, U.S. National Highway Traffic Safety Administration contract No. DOT-HS-5-01198. Opinions expressed in this article are those of the authors and do not necessarily reflect those of the National Highway Traffic Safety Administration.

References

- DONOVAN, D. M. & MARLATT, G. A. (1982) Personality subtypes among driving-while-intoxicated offenders: relationship to drinking behavior and driving risk, *Journal of Consulting and Clinical Psychology*, 50, pp. 241-249.
- HOLDEN, R. T. & STEWART, L. T. (1981) *Tennessee DUI Probation Follow-Up Demonstration Project Final Report* (DOT-HS-5-01199) (Washington D.C., National Highway Traffic Safety Administration).
- KUNKEL, E. (1983) Driver improvement courses for drinking-drivers reconsidered, *Accident Analysis and Prevention*, 15, pp. 429-439.
- LANDRUM, J., MILES, S., NEFF, R., PRITCHARD, T., ROEBUCK, J., WELLS-PARKER, E. & WINDHAM, G. (1982) *Mississippi DUI Probation Follow-Up Project* (NTIS, No. DOT-HS-806 274) (Washington D.C., National Highway Traffic Safety Administration).
- LONG, J. S. (1984) Estimable functions in log-linear models, *Sociological Methods and Research*, 12, pp. 399-432.
- LIGHT, R. J. & PILLEMER, D. B. (1984) *Summing Up: the science of reviewing research* (Cambridge, MA, Harvard University Press).
- MANN, R. E., LEIGH, G., VINGILIS, E. R. & DEGENOVA, K. (1983) A critical review on the effectiveness of drinking-driving rehabilitation programmes, *Accident Analysis and Prevention*, 15, pp. 441-461.
- MANN, R. E., VINGILIS, E. R. & STEWART, K. (in press) Programs to change individual behavior: education and rehabilitation in the prevention of drinking and driving, in: M. D. LAURENCE, J. R. SNORTUM & F. E. ZIMRING (Eds) *The Social Control of Drinking and Driving* (University of Chicago Press).
- NEFF, R. L. & LANDRUM, J. W. (1983) The Life Activities Inventory as a countermeasure for driving while intoxicated, *Journal of Studies on Alcohol*, 44, pp. 755-769.
- NICHOLS, J. L., WEINSTEIN, E. B., ELLINGSTAD, V. S. & STRUCKMAN-JOHNSON, D. L. (1978) The specific deterrent effect of ASAP education and rehabilitation programs, *Journal of Safety Research*, 10, pp. 177-187.
- PECK, R. C., SADLER, D. D. & PERRINE, M. W. (1985) The comparative effectiveness of alcohol rehabilitation and licensing control actions for drunk driving offenders: a review of the literature, *Alcohol, Drugs and Driving: abstracts and reviews*, 1, pp. 15-39.
- REIS, R. E. (1982a) *The Traffic Safety Effectiveness of*

- Education Programs for First Offense Drunk Drivers* (NTIS, No. DOT HS 806 558) (Washington D.C., National Highway Traffic Safety Administration).
- REIS, R. E. (1982b) *The Traffic Safety Effectiveness of Educational Counseling Programs for Multiple Offense Drunk Drivers* (NTIS, No. DOT HS 806 557) (Washington D.C., National Highway Traffic Safety Administration).
- SIEGAL, H. A. (1985) The intervention approach to drunk driver rehabilitation. Part II. Evaluation, *International Journal of the Addictions*, 20, pp. 675-689.
- VINGILIS, E., ADLAF, E. M. & CHUNG, L. (1981) The Oshawa impaired drivers programme: an evaluation of a rehabilitation programme, *Canadian Journal of Criminology*, 23, pp. 93-102.
- WELLS-PARKER, E., COSBY, P. J. & LANDRUM, J. W. (1986) A typology for drinking-driving offenders: methods for classification and policy implications, *Accident Analysis and Prevention*, 18, pp. 443-453.
- WELLS-PARKER, E., MILES, S. & SPENCER, B. (1983) Stress experiences and drinking histories of elderly drunken-driving offenders, *Journal of Studies on Alcohol*, 43, pp. 751-766.