THE EFFECTS OF "NO ACTION" NEGLIGENT OPERATOR HEARINGS AS AN ALTERNATIVE TO HEARINGS RESULTING IN PROBATION

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The results indicated that no statistically significant driver record differences existed between the randomly assigned groups, either 12 months prior, or 12 months subsequent, to treatment. However, the possibility that removal of departmental actions from the individual hearing setting may have had a detrimental effect could not be entirely dismissed. The societal savings associated with the observed (nonsignificant) decrease in fatal and injury accidents, for those drivers not receiving actions, may result in a positive net financial impact for an implemented no action program.

The high risk group was examined in an attempt to determine if the high risk screening criteria used in this study were valid. An analysis of the characteristics of the low and high risk groups suggested that the high risk group did not, in fact, have a higher accident expectancy than the nonhigh risk group.

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ABSTRACT

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The high risk group was examined in an attempt to determine if the high risk screening criteria used in this study were valid. An analysis of the characteristics of the low and high risk groups suggested that the high risk group did not, in fact, have a higher accident expectancy than the nonhigh risk group.

Final program implementation recommendations are awaiting the outcome of the related study on probation-by-mail (which will evaluate the traffic safety implications of not holding a hearing but taking an action).

PREFACE

In 1975, the Department of Motor Vehicles' Office of Program Development and Evaluation developed an inventory of identifiable programs which potentially could be modified to result in cost or work force reductions. This list was transmitted internally under the title "Targets of Opportunity" and has been used as a guide in the department's cost/work force reduction efforts.

The "Targets of Opportunity" recommendations regarding the negligent operator program consisted of two alternative strategies to the standard individual hearing process. In response to those recommendations, three interrelated research efforts were developed to explore the feasibility and implications of the recommended alternatives.

This study, which was conducted under the general direction of Ronald S. Coppin, Chief of Research, represents the completion of the second phase of a three phase effort. As such, any final decision on implementation must await the completion of Phase III.

Acknowledgment and appreciation are due to the many Department of Motor Vehicles' personnel who provided valuable assistance for this study. However, special recognition must be given to former Research Analysts William Marsh, who was the principal investigator of this study in the developmental phase, and Debra Halon-Soto, who was responsible for the subject processing phase of the study. Major contributions were also made by Maureen Miller, Michael Ratz, and William Epperson, Research Managers.

The tasks of screening the individual hearing reports and assigning the negligent operators to treatment groups were performed by the Division of Drivers Licenses under the guidance of Sandreno Marchi. Also appreciated are the contributions of the Division of EDP Services. Cost figures were provided by William Howe, Management Analyst.

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INTRODUCTION

The Department of Motor Vehicles' driver improvement system consists of a series of negligent driver countermeasures which are taken sequentially according to accident and conviction accumulation. Section 12810 of the California *Vehicle Code* (1977d) provides the formula for using driving record information to compute negligent operator point counts, which are used by the department for determining the level of driver control intervention. Drivers are defined as negligent operators when their records show a point count of four or more in 12 months, six or more in 24 months, or eight or more in 36 months.[1] Upon entry into the driver improvement system (before reaching negligent operator status), drivers receive a warning letter (W/L). Those who continue to accumulate citations, and in some cases culpable accidents, receive further treatments of increasing severity. The department's series of countermeasures includes (in sequential order):

- Attendance at a Group Educational Meeting (GEM)
- Attendance at an Individual Hearing (I/H)
- Attendance at a Probation Violator Hearing (P/V)

For several years, the department has utilized a post licensing control reporting and evaluation system (PLCRES) to monitor and evaluate the driver improvement system. The PLCRES data have indicated that the countermeasures, as a whole, are cost-effective in terms of accident reduction (Kadell, Peck, & Howe, 1978; Kadell, Peck, Howe, & Epperson, 1977). The driver improvement system is costly, however, and the department continually searches for more cost-beneficial alternatives to the standard programs.

The largest expenditure in the driver improvement system is for the individual hearing (I/H) program, due to the cost per hearing and the volume of drivers who attend hearings. The department's current policy is to require negligent operators to attend an individual hearing, under threat of license suspension, if their driving records continue to be "negligent" after receiving a W/L and attending a GEM. The purpose of an individual hearing is to provide the department with an opportunity to interact on an individual level with negligent operators. A driver improvement analyst (DIA) reviews, with the driver, his driving record and determines if a license sanction is warranted. These hearings currently result in approximately 60% of the drivers being placed on probation,[2] with the remainder of drivers receiving a variety of actions (suspension, revocation, no action, etc.).

An examination of the current I/H program resulted in the recommendation of two alternative strategies, both of which were designed to reduce costs. In response to those recommendations, three interrelated research efforts were developed to explore the feasibility and traffic safety implications of the recommended alternatives.

The first of the three research efforts (Phase I), the probation-by-mail program, was developed to determine if it was legally necessary or cost-beneficial to require all negligent operators to attend a hearing. A feasible alternative was to allow the driver to decide whether or not to attend a hearing. In a pilot study examining this alternative (Sherman & Epperson, 1977), negligent operators were sent a "Notice of Probation" letter which provided drivers with an option to attend a hearing if they wished to dispute their probationary license status. Drivers who did not request a hearing retained their probationary status. If a driver did request a hearing, the probation action on his license was stayed and a hearing was scheduled. This process serves the dual purpose of giving the driver a choice and potentially reducing costs by eliminating unnecessary hearings. The results of the pilot study indicated that the program would be cost-beneficial: 73.2% of negligent operator hearings were avoided, producing a projected annual savings of $254,000. However, this Phase I effort did not address the relative effectiveness of the new program in reducing accidents, convictions and subsequent departmental

[1] Persons who drive 25,000 miles or more per year become eligible for a negligent operator hearing at point counts of six or more in 12 months, eight or more in 24 months, or ten or more in 36 months (CVC 12810.5).

[2] This estimate was derived from two separate sources: (a) Sherman and Epperson (1977), and (b) California Department of Motor Vehicles (1977c).

actions. A much larger study was initiated to evaluate the traffic safety implications of the probation-by-mail approach, Phase III (Sherman & Ratz, under preparation).[3] The Phase III effort was considered particularly critical in view of the fact that the individual hearing program has been found to be effective (Kadell et al., 1978). It is possible that elimination of the in-person hearing could reduce or eliminate the I/H program's impact.

The second research effort (Phase II), the no action hearing program, was designed to evaluate the second alternative to the individual hearing process. This alternative, the logical complement of the probation-by-mail concept, is to require all negligent operators to attend a hearing, but refrain from taking an action against their drivers' licenses. A procedure such as this would eliminate the costs associated with issuing, maintaining and removing a probation or suspension license sanction.

This report, which constitutes the Phase II final report, evaluates the influence of not taking actions on drivers licenses subsequent to individual hearings. The purpose of this evaluation was to determine whether or not the action taken by the department in these hearings has any traffic safety benefit. The economic and system impact of not taking drivers license actions following hearings will also be addressed.

[3]The final report on Phase III is due in July, 1979.

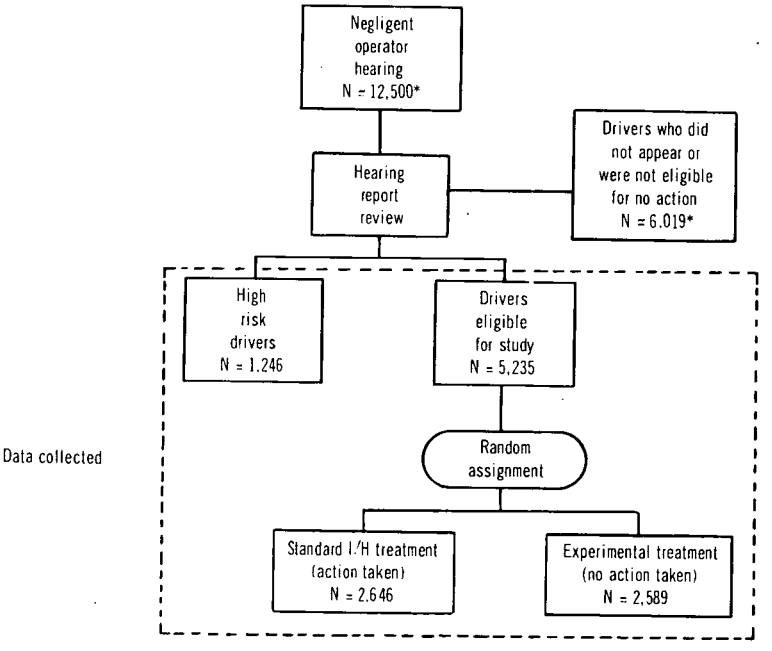
METHOD

Research Design and Subject Selection

Figure 1 presents the research design for the no action hearing study. The procedure of assigning subjects to treatment groups began in September, 1976, and was terminated in February, 1977. During this time, 6,481 negligent operator hearing attendees entered the study's data collection phase. The actual selection of drivers for the study was performed manually after the hearing was held, on the basis of the hearing outcome.

Figure 1

Research Design for the No Action Hearing Study



*Estimates from California Department of Motor Vehicles (1976, 1977c).

As can be seen in Figure 1, at the outset some negligent operators were eliminated from the data collection phase of this study. These drivers included those who:

- Did not appear for the hearing
- Did not possess a valid California driver's license
- Were subjects in other driver improvement research studies
- Had been scheduled for the hearing as a result of being involved in a fatal accident
- Received no action as a result of the hearing (the determination was made that the driver was not a negligent operator)

Of the 6,481 drivers who entered the data collection phase, 1,246 drivers (19%) were judged to be inappropriate candidates for no action consideration on the basis of the hearing disposition. These "high risk" subjects were all those whose hearings resulted in recommendations for:

- Probation with an alcohol clause (due to causes which were alcohol related)
- Probation with other special restrictions
- Suspension or suspension pending proof of insurance coverage
- License revocation

Data were collected for the high risk group in an attempt to examine the validity of the screening criteria used to determine eligibility for the no action program.

The drivers who were not eliminated at the outset or classified as "high risk" were randomly assigned by drivers license terminal digit to either (1) the group which received a probationary or other sanction as recommended (standard treatment, or (2) the group which received a no action letter (experimental treatment). (See Exhibit I.)

Method of Analysis

The primary purpose of the evaluation was to determine whether or not deletion of the probation action decreased the effectiveness of the regular I/H procedure (i.e., hearing + probation) in reducing traffic convictions and accidents.

Statistical tests of mean accident and conviction frequencies were conducted for the randomly assigned, nonhigh risk groups. Analysis of covariance was used to adjust the group means for any slight differences existing between groups prior to treatment and to increase the power of the test by removing additional sources of variance from the error term. All statistical tests were conducted using a 10% alpha level (two-tailed) except for bias checks. A 20% alpha level (two-tailed) was used for the bias checks because not detecting differences which exist between groups (Type II errors) is relatively more critical when checking for biases.

The high risk group was compared to the randomly assigned nonhigh risk drivers. The purpose of this comparison was to evaluate the validity of the risk screening process by comparing low and high risk groups on prior and subsequent driver records. Both unadjusted and regression-adjusted driver record means were used for these analyses. (Groups were adjusted for age, sex, and prior driving record variables.) This analysis also permitted a rough assessment of the effects of the actions taken against the high risk drivers, although no definitive conclusions could be drawn due to lack of an equivalent comparison group.

Cost Analysis Parameters

A cost comparison was performed between the regular I/H procedure and the experimental no action procedure to derive the potential cost savings of the no action program.[4] The cost structure parameters used in executing this comparison are as follows:

- A certain portion of the total cost is considered to be "fixed", in that those costs would remain constant even if the I/H program were terminated.
- A certain portion of the total cost is considered to be "direct", and would be eliminated if the I/H program were terminated.
- A certain portion of the total cost is considered to be comprised of "indirect" costs, of which a certain percentage is considered to be reducible if the I/H program were terminated.

The direct cost category is comprised of those costs which are directly associated with the I/H procedure. All of the direct costs are included in the estimate of total reducible costs.

The indirect cost category contains indirect labor costs (such as supervision and variable operating expenses) that can not be directly attached to the I/H procedure but are necessary to ensure completion of the I/H. The reducible components of the indirect cost category are not known; therefore, a subjective "best estimate" was made of the percentage of indirect costs which could be reduced.[5] The portion of the total costs which could be saved by eliminating the I/H program is comprised of all of the direct costs and the reducible percentage (60%) of the indirect costs.

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[4]The cost-benefit analysis performed for this study does not provide all of the information necessary for implementation decisions, in that only a one-year horizon was used to produce baseline comparisons. Any effects occurring after the end of the one-year probation term or any departmental systems impact considerations have not been taken into account.

[5]The use of "best" estimate of reducible indirect costs was first addressed by Kadell et al. (1977); however, the validity of the percentage reduction used has not been established and it is possible that the estimate deviates substantially from the "true" value.

It should be noted that projected cost savings as estimated in the Departmental Economic Impact and used in the Cost-Benefit Analysis sections of this report represent maximum estimates of potential savings should the no action program be implemented. Any implemented program would probably not realize maximum savings in that the dollar savings would be converted to personnel positions. Such positions can be eliminated only when justified by sufficiently accumulated work volume reductions.

Power Analysis

Power analysis evaluates the sensitivity (power) of a statistical test. Its purpose is to determine whether or not the statistical tests being used have sufficient sensitivity to detect a specified effect. The effect size specified should reflect the smallest difference that is considered important. The power analysis for this study was conducted to determine the sensitivity of the statistical tests to detect (1) 10% differences in accident and conviction rates, and (2) an accident increase of sufficient magnitude to offset the savings involved in implementing the no action program. (See Appendix A for a complete discussion of the computational procedures used for determining effect sizes.)

Before presenting the results of the power analysis, the issue of alpha levels should be discussed. The alpha level of 0.10 was chosen for this study, but the adoption of a more relaxed (higher) alpha level conceivably could have been justified in that the no action program is an alternative being compared to an existing departmental program (the I/H) that is known to be effective. It is very important that management not alter or eliminate existing program components if there is a substantial risk that the alteration will decrease program effectiveness. To this end, the adoption of a more relaxed alpha level (e.g., 0.20 - 0.40) would have been a more conservative testing strategy because it would have reduced the risk of rejecting a cost-effective program component (i.e., the action).

Table 1 presents the results of the power analyses for detecting one year 10% mean accident and conviction differences (α = .10) as well as an array of power estimates (using different alpha levels) for detecting cost-effective accident differences based on two estimates of monetary societal loss due to an accident. These two estimates were derived by adjusting the nationwide estimates provided by the National Safety Council (NSC), and National Highway Traffic Safety Administration (NHTSA) for inflation and to be applicable to California negligent operators with their high proportion of fatal and injury accidents (Kadell & Peck, 1979).

Table 1

Power Estimates for Detecting Specified Treatment Effects by Alpha Level

Type of effect size	Effect size	Alpha level (two-tailed tests)			
		.10	.20	.30	.40
10% real difference in mean accidents	0.0206	0.48	*	*	*
10% real difference in mean convictions	0.1454	0.95	*	*	*
Cost-effective accident difference using NSC[1] societal loss estimate ($3,426)	0.0023	0.10	0.21	0.31	0.41
Cost-effective accident difference using NHTSA[2] societal loss estimate ($6,741)	0.0012	0.10	0.20	0.30	0.41

*Not computed.
[1]National Safety Council.
[2]National Highway Traffic Safety Administration.

As can be seen in the table, the statistical tests in this study have only a 10% chance of detecting a real cost-effective accident difference, should one exist, at a 10% alpha level. While the power for detecting a 10% accident difference is greater, it still gives less than an even chance of detecting such an effect (where $\alpha = .10$).

Low power estimates, such as those found here, have important implications when no significant differences are detected. Since the likelihood of detecting a *real* cost-beneficial difference by the techniques used in this study is so low (0.10), there is very little chance of finding statistically significant cost-beneficial differences if the true cost-benefits are only marginal. Had a higher Type I error rate ($\alpha = .20, .30,$ or $.40$) been allowed, the power to detect the effect sizes of 0.0012 and 0.0023 would have increased substantially, but would still be less than 0.50. Unfortunately, the preferred method of increasing power (increasing the sample size) would have required extending the subject identification period to an extent that was prohibitive.

RESULTS

Age, Sex, and Prior Record Comparisons

A bias check was performed between the two randomly assigned, nonhigh risk groups for the variables age, sex, and prior three-year driving records (accidents and convictions separately). As can be seen in Table 2, all tests showed no significant differences, indicating that the random assignment procedures resulted in comparable groups.

Table 2

Experimental and Standard Group Means or Proportions and Statistical Tests for Demographic and Prior Three-Year Driving Record Variables

Criteria	Experimental no action treatment	Standard I/H treatment	Statistical test	p value
Proportion male	0.939	0.941	$x^2(1) = .07$	$> .70$
Mean age	27.078	27.151	$t(5234) = .26$	$> .75$
Mean prior accidents	0.835	0.846	$t(5234) = .41$	$> .65$
Mean prior convictions	7.827	7.840	$t(5234) = .15$	$> .80$

Subsequent Treatment Effects

The effects of utilizing the no action option were analyzed by examining subjects' 12-month subsequent driving records using analysis of covariance. The covariates for these analyses were age, sex, prior convictions, and prior total accidents. (See Appendix B for the analysis of covariance summary tables.)

The group means and adjusted group means are presented in Table 3. The results of the statistical tests indicated that the groups did not differ significantly on any of the subsequent driving record measures.

Table 3

Subsequent Twelve-Month Driving Record Means and Adjusted Means by Group (per 100 drivers)

Criteria	Unadjusted group means		Adjusted group means		Statistical test between adjusted means	p value
	No action treatment (N = 2,589)	Standard I/H treatment (N = 2,646)	No action treatment (N = 2,589)	Standard I/H treatment (N = 2,646)		
Total accidents	21.549	20.631	21.564	20.617	$F(1, 5225) < 1$	$> .45$
Fatal and injury accidents	7.683	8.235	7.688	8.230	$F(1, 5225) < 1$	$> .45$
Convictions and FTA's	149.963	145.443	150.014	145.393	$F(1, 5225) = 1.00$	$> .30$

It should be noted that the obtained accident difference (.2156 - .2062 = .0094) and conviction difference (1.5001 - 1.4539 = .0462) are well below the 10% effect levels that traditionally have been used for power calculations in prior California driver improvement studies. The power to detect the obtained accident increase, assuming that a 0.0094 increase represents the true population parameter, is less than 0.50.

An examination of Table 3 reveals a directional change in means for the no action group; the no action group accrued slightly more total accidents and convictions than the I/H group, but fewer fatal and injury accidents. The total accident category is comprised of two types of accidents: (1) fatal and injury (FI), and (2) property damage only (PDO). If the no action group accrued fewer FI accidents, the larger total accident mean for the no action group would reflect a larger number of PDO accidents.

The existence of a difference in accident type would suggest either (1) that the treatment had a differential effect on those two types of accidents (PDO vs. FI), or (2) a reporting bias with the group who received license sanctions as recommended (I/H) being more reluctant to report accidents not attended by a peace officer (a large portion of those accidents involving property damage only).

In order to examine the data for an accident type difference, the proportion of FI accidents were compared to the proportion of PDO accidents that occurred for each group (see Table 4).

Table 4

Proportion of Property Damage Only and Fatal and Injury Accidents by Group (12-month data)

Criteria	Experimental no action treatment	Standard I/H treatment group
Property damage only accidents	.643	.601
Fatal and injury accidents	.357	.399

An alpha level of 0.20 was used for this comparison to reduce the possibility of not detecting differences between groups. If treatment had a differential effect on these two criterion variables (types of accidents), it would be important to detect those differences in order to weight the cost-benefit analysis accordingly. The statistical test indicated that the groups differed significantly in their proportional types of accidents at the 0.20 level, $\chi^2(1) = 1.96$, $p < .20$.

Departmental Economic Impact

Potential departmental savings were derived on the basis of the estimated cost involved with each of the programs. The I/H cost estimates were obtained from a *Post Licensing Control Reporting & Evaluation System* (PLCRES) status report (California Department of Motor Vehicles, 1977a); the no action program cost estimates were derived by conducting a task analysis of the I/H process and removing those tasks which would be eliminated by the no action process. The task elimination analysis was based on several assumptions concerning departmental policies should the no action process be implemented. A discussion of these assumptions as well as the task analysis procedures are presented in Appendix C, along with the procedures used to project annual cost savings.

Table 5 presents an overview of the estimated cost of the regular I/H process in contrast with the estimated cost of the proposed no action hearing process for those drivers included in the projected annual volume of no action eligibles (21,589). This comparison resulted in estimated departmental cost savings of $173,000 (an 18% reduction).

Table 5

Estimates of Departmental Savings

Type of hearing	Estimated annual cost
Standard I/H process	$971,000
No action process	798,000
Annual savings	$173,000

As mentioned previously, this estimate of departmental savings represents maximum potential savings and would be realized in its entirety only if $173,000 in personnel positions could be eliminated. Definitive estimates of personnel savings are unavailable at this time; however, an informal estimate indicated that from $78,000 to $150,000 (45%-87%) of the estimated maximum savings would be reducible in terms of personnel positions.

It should be mentioned at this time that the estimate of departmental cost savings does not include any differences between the I/H and no action programs in terms of subsequent treatment volumes for those drivers who continue to recidivate. Study data could not be used as a basis for inference because no special procedures were implemented for this study to ensure equivalent treatment between groups subsequent to the I/H or no action hearing. Therefore, any differences in follow-up activity occurring in this study could reflect rather arbitrary, self-imposed decision rules concerning the point at which the two groups should receive a follow-up treatment. It should also be mentioned that follow-up treatments are largely based on subsequent conviction activity. On the basis of the study data, there is no reason to predict a difference in subsequent treatment activity since the conviction difference between groups was nonsignificant (see Table 3).

Cost-Benefit Analysis

Because the difference in post-treatment accidents between the I/H and no action programs was not significant, a cost-benefit analysis could reasonably assume that the benefits of both programs (in terms of accident reduction) were equal. However, low power does not permit a sufficiently confident dismissal of the possibility that the observed differences were real. In any case, the empirical means are the best unbiased estimate of real population parameters under a wide variety of circumstances. Statistical tests notwithstanding, they represent the "best unbiased estimate" of the effects of both programs in terms of accident reduction.

For the purpose of this analysis, accidents were divided by type (property damage only [PDO] vs. fatal and injury [FI]) because there was evidence the groups differed in their proportional types of accidents (see Table 4). The mean total accident difference obtained (0.0094), when divided by accident type, resulted in the following mean differences: the no action group accrued 0.01489 greater mean PDO accidents and 0.00542 *fewer* mean FI accidents than the I/H group.

Results of the cost-benefit analysis are presented in Table 6 in terms of total expected financial impact for a one-year period (departmental savings vs. the societal cost of the projected difference in accidents). The net benefits derived from this analysis (using both the NSC and NHTSA adjusted estimates of monetary societal loss due to an accident) indicate the financial impact of the slight decrease in FI accidents outweighs the financial impact of the slight increase in PDO accidents for the no action group.

Table 6

Financial Impact Projections for
the No Action Program
(per year)

Financial impact estimate	Expected financial impact	Potential range of financial impact (90% confidence intervals)	Probability of net loss
High accident cost estimate (NHTSA)	+$1,687,000	−$2,800,000 to +$6,173,000	.27
Low accident cost estimate (NSC)	+$ 886,000	−$1,416,000 to +$3,188,000	.26

NOTE: Negative indicates a net loss, positive a net savings.

If the I/H group introduced a reporting bias by underreporting PDO accidents to a greater extent than the no action group, these figures represent conservative estimates of net benefits. That is, the PDO accident difference between groups would be smaller or might favor the no action group if the I/H group had actually underreported accidents to a greater extent. On the other hand, if the difference in FI accidents is not real, the estimated cost-benefits would reflect increased PDO accidents without an offsetting savings in FI accidents. The result would be a negative net benefit estimate (-$66,000).

The table also presents estimates of the degree to which these expected values may be in error (90% confidence intervals). Stated roughly, the low and high values of the 90% confidence intervals define the range wherein there is a 90% chance that the real outcome of program implementation will fall. So, for example, using a low cost estimate (NSC's), program implementation would be expected to result in a total financial savings of $886,000. However, to have a 90% chance of being right, it is only possible to say that the result of program implementation will fall somewhere between a loss of $1,416,000 and a savings of $3,188,000.

The magnitude of these ranges results from the high variability associated with accident data and the relatively large number of negligent drivers to be treated (21,589). The method of assigning societal costs to the difference within accident category (PDO and FI) also substantially increases the size of the intervals. The presence of both negative and positive values in each range stems largely from the fact that treatment did not result in a statistically significant difference in accidents.

The estimated probability that implementation of the no action program would result in a net financial loss to society ranges from 0.26 to 0.27, depending on the accident cost estimate used. Because the validity of attaching a dollar value to accidents is controversial, Table 7 presents the data in terms of the absolute number of projected accidents, fatalitites, and injuries.

Table 7

Accident and Financial Impact Projections (per year)

Variable	Quantity
Total increase in accidents	204.4
Increase in property damage only accidents	321.5
Decrease in injuries	114.4
Decrease in fatalities	2.6
Departmental program savings	$173,000

In interpreting the above, it must be kept in mind that the relative cost-benefits are based on accident differences that did not approach statistical significance. If the observed differences do not represent real effects (i.e., the no action and I/H programs have identical effects), the expected financial impact would be equal to the potential departmental savings ($173,000) resulting from implementing the no action program.

High Risk Drivers

The criteria used to extract certain drivers as potentially high risk were based entirely on the DIAs' recommendations following the individual hearing. These recommendations are based on prior driving record, the driver's attitude during the hearing and other related factors. The difference in severity of departmental actions between groups was examined by tabulating the DIAs' recommendations for all drivers in this study.

Table 8 presents the percentages of departmental actions which were recommended for drivers in each of the three groups. An examination of this table reveals a clear delineation of action severity between the high risk and nonhigh risk groups. This finding was, of course, to be expected since action severity was used to define the high risk group.

Table 8

Percentages of DMV Actions Recommended For Drivers by Group

DMV actions	Subject group			
	Total	Standard I/H treatment	Experimental no action treatment	High risk
Total	100.00	100.00	100.00	100.00
Revocation	5.29	0.04	0.04	27.35
Suspension and/or proof	1.40	0.00	0.04	7.22
Probation (alcohol clause)	11.99	0.19	0.00	61.98
Probation	70.78	86.73	87.01	3.13
Other	9.62	11.73	12.00	0.16
No action	0.92	1.31	0.91	0.16

It should be noted here that the large percentage (62%) of high risk drivers placed on probation with an alcohol clause suggests that these drivers had more two-point violations (drunk driving and other majors) than the nonhigh risk groups.

Several variables were examined in order to evaluate the differences between high risk and nonhigh risk drivers: age, sex, driving record prior to departmental action, and driving record subsequent to departmental action. Table 9 presents the demographic and prior driving record means or proportions along with the statistical test for each variable. The demographic analyses revealed that there was no significant difference in sex, but the groups did differ on age, the high risk group being the older of the two.

Table 9

High Risk and Nonhigh Risk Group Means or Proportions for Demographic and Prior Three-Year Driving Record Variables

Criteria	High risk group	Nonhigh risk group	Statistical test	p value
Proportion male	0.933	0.940	$x^2(1) = .67$	$> .30$
Mean age	29.842	27.112	$t(6479) = 8.30$	$< .001$
Mean prior accidents	0.917	0.840	$t(6479) = 2.36$	$< .02$
Mean prior convictions	6.488	7.834	$t(6479) = -12.57$	$< .001$

Prior driving records were examined in order to determine whether or not the high risk group had accumulated more accidents and/or convictions than the nonhigh risk drivers. As can be seen in Table 9, the high risk drivers had accrued significantly more accidents and significantly fewer convictions than the nonhigh risk drivers. Unfortunately, a breakdown of the type of prior convictions was not available; however, on the basis of the DIAs' recommended actions (see Table 8), it is likely that the high risk drivers had accrued more major (two-point) violations (driving under the influence, reckless driving, and hit and run) and, therefore, had achieved higher point count totals than indicated by their lower mean number of convictions.

The high risk and nonhigh risk groups of drivers have, thus far, been shown to differ on actions recommended by the DIAs as well as on age and pre-treatment accidents and convictions. In order to relate these differences to post-treatment driving performance, a stepwise multiple regression was performed on the nonhigh risk standard I/H treatment group, regressing prior driving record and demographic variables on subsequent accidents and convictions. The regression weights were then applied to the high risk group's prior driving record means and demographic variables in order to predict their subsequent driving records, had they been treated the same as the standard I/H group (i.e., if they had received less severe departmental actions). This analysis is based on the assumptions (1) that these noncross-validated regression weights are accurate, and (2) that the relationship between age, sex, and prior record variables and subsequent record is similar in both the high and nonhigh risk population. Because it is doubtful that these assumptions have been strictly met, the regression adjustments should be interpreted with caution and are offered only as rough approximations.

Table 10 presents the subsequent mean number of accidents and convictions accrued by the high risk and I/H groups, along with the adjusted high risk group means obtained from the regression analysis. The high risk drivers accrued significantly fewer accidents and convictions than the drivers who received standard I/H treatment. Since the high and nonhigh risk groups differed at the outset on certain variables (e.g., prior driving record) and also received different actions, the cause of the subsequent record difference cannot be determined with complete assurance. However, examination of the adjusted means provides some basis for evaluating the impact of the high risk actions (relative to the less severe actions taken with nonhigh risk drivers) on subsequent driving record (A vs. B).

Table 10

High Risk and I/H Group Means and Adjusted High Risk Group Means for Subsequent Twelve-Month Driving Record Data (per 100 drivers)

Driving record criteria	A High risk group means	B Adjusted high risk group means	C Standard I/H treatment group means	Statistical test (A vs. C)	p value
Total accidents	13.804	19.212	20.672	t (3890) = 4.49	< .001
Convictions and FTAs	113.001	121.912	145.443	t (3890) = 5.44	< .001

As can be seen from Table 10, the adjusted high risk group means are also lower than the means for the nonhigh risk drivers (B vs. C). This suggests that the drivers judged to be high risk are actually lower risks than the nonhigh risk drivers, casting doubt on the validity of the risk screening process.

The lower accident and conviction rate for high risk drivers before, as opposed to after adjustment (A vs. B), might be interpreted as an indication that the more severe actions taken against this group had a positive effect. In conclusion, then, the data do not fully support the process by which certain drivers were screened as high risk; however, there is some suggestion that the more severe actions taken against the high risk group reduced subsequent accidents and convictions.

DISCUSSION

Nonhigh Risk Drivers

The results of this study indicated that no statistically significant driving record differences existed between the no action and I/H groups, either prior to or subsequent to the individual hearing. However, the possibility that removal of departmental actions from the individual hearing may have had a detrimental effect cannot be entirely dismissed. An examination of the means for subsequent total accidents and convictions indicated that those drivers who received departmental actions had slightly better subsequent driving records. Although the effects, if real, were of a very small magnitude (less than 10%), effects even smaller than this could have cost-benefit implications. This caution is especially true since a statistical power analysis indicated a low degree of power (0.10) for detecting small reductions in program cost-benefits. (The use of an alpha level of 0.40 would also have resulted in no significant accident differences, but with a much greater power index of 0.40.)

As mentioned previously, there were no established procedures to ensure that both randomly assigned groups were treated equivalently during the 12-month follow-up period. As a result, one of the groups could have received a greater number of later treatments than the other. For example, the no action group might be expected to receive more follow-up individual hearings than the I/H group if the scheduling DIA was influenced by the driver's having received no action instead of probation. On the other hand, the I/H groups would be expected to receive more probation violator hearings than the no action group since 62% of the I/H group was placed on probation. If such was the case, the treatment comparisons would reflect not only the effect of the initial treatment, but also the effect of any differential types of follow-up treatments. While no definitive assessment of the extent of the problem can be made, it is unlikely that the data were critically affected because (1) the majority of negligent operators at the I/H level do not receive subsequent treatment, and (2) those that do tend to receive that treatment late in the follow-up period.

Projected annual departmental savings which could accrue by eliminating the setting of probation as a standard procedure are estimated to be $173,000. A formal cost-benefit analysis revealed that net financial impact estimates are extremely sensitive to increases and decreases in accidents. Based on the slight trend toward decreased fatal and injury accidents, and the high costs associated with these types of accidents, the expected financial impact of implementing the no action program would be positive using either of two estimates of societal loss due to a motor vehicle accident (National Highway Traffic Safety Administration [NHTSA] and National Safety Council [NSC] estimates modified to be applicable to California negligent operators). If one assumes the nonsignificant difference to be random error (no treatment effect difference), the cost-benefit result would still favor the no action program ($173,000 savings).

There is one area where an operational no action program would not replicate the conditions of the present experiment. In the present study, subjects in the no action group were, in most instances, told that they would probably be placed on probation, but they subsequently received a no action letter instead. (This was necessary because the selection of someone as a study subject depended on the decision made after the hearing as to the action to be taken. For example, if suspension or revocation was deemed appropriate, the individual was placed in the high risk group.) If the no action decision were standard policy, the DIAs would no longer inform hearing attendees of probationary license status recommendations at the end of the hearing (as is usually done under current procedures). Instead, the DIAs would inform hearing attendees that no action was the department's standard policy or that they were recommending no action. There is no immediate way to determine the effects, if any, of this difference in procedures. The present authors do not believe that this small difference would be critical.

System impact considerations--Presently, the third component in the driver improvement countermeasure system is an individual hearing. Probation is set as a result of these hearings in an estimated 60-70% of the cases.[6] Drivers who then recidivate while on probation become eligible for a probation violator hearing (the fourth countermeasure in the driver improvement system).

The no action program, if implemented, would remove the imposition of probation in the majority of cases. The implementation of this program would leave drivers who reach the individual hearing stage without a sequential countermeasure should they recidivate, since the criteria for a probation violator hearing includes a probationary license status. In order to resolve this conflict, departmental policy decisions would have to be made regarding a change in the driver improvement system at the stage between the individual hearing and probation violator countermeasures.

The policy change could take one of several forms. For drivers who continue to violate following the no action hearing, two possibilities include: (1) a probation-by-mail action, or (2) a second individual hearing which could result in probation or suspension. The costing of the no action program does not include the system impact cost associated with the reconstruction of the sequential countermeasure system, since such an effort would be highly sensitive to policy decisions that cannot now be anticipated.

High Risk Drivers

The high risk group was examined in an attempt to determine if the high risk screening criteria used in this study were valid. The prior record and recommended action comparisons indicated that the DIAs based their action recommendations on drivers' prior accidents and prior major convictions, particularly drinking related convictions. Action severity was clearly delineated between groups, with high risk drivers receiving a more harsh mix of departmental actions. These findings reflect departmental practice with respect to risk assessment, and a belief that drivers with major violations should be treated with greater care than other drivers. For this reason, such drivers were screened out of the no action study to prevent them from receiving inappropriately lenient actions. The results suggest that the screening process may not be valid.

Subsequent record comparisons indicated that the high risk group had significantly better post-treatment accident and conviction records than nonhigh risk drivers. In the absence of a high risk control group, no definitive conclusion can be drawn about the cause (population differences or differences in severity of licensing sanctions). However, a comparison of the regression adjusted high risk group means with the nonadjusted high and nonhigh risk group means provides sóme basis for speculation.

When conviction means were adjusted to eliminate the effects of more severe licensing sanctions, only about a third of the difference was accounted for. This would suggest that, while the more severe sanctions did contribute to the lower conviction means among high risk drivers, population differences played a larger role. The difference in accident means, on the other hand, appears to have been largely accounted for by action severity. Yet even when the effect of severity is adjusted for, high risk drivers have a slightly lower subsequent accident mean than nonhigh risk drivers. This tends to raise serious questions about the validity of the high risk screening criteria.

As mentioned previously, it is likely that the high risk drivers had accrued more prior major (two-point) violations and, therefore, had achieved higher point count totals. Nonhigh risk drivers who had equivalent point counts would, therefore, have more total convictions. It has been shown that both prior accidents and prior major violations are poor predictors of accidents (Coppin, McBride, & Peck, 1967) and accidents following driver

[6]Although the 60% estimate was obtained from other sources (see footnote 2), approximately 70% of the sample obtained for this study received probation as a recommended action. The discrepancy probably results from this study's sample consisting only of those drivers who appeared for the individual hearing. The prior estimates included all drivers scheduled for an individual hearing and therefore reflected those drivers who did not appear for the hearing and subsequently received license suspension.

improvement contact (Harano, 1974; Marsh & Hubert, 1974; Peck, 1968). The best predictors of accidents appear to be total prior one-count convictions (moving violations), and possibly the summation of all convictions into a total conviction variable (Coppin et al., 1967). The criteria currently being used to identify high risk drivers do not utilize these prediction findings, and in fact, incorporate the poorer of the predictor variables.

It should be mentioned that the correlational procedures used in the prediction studies cited above can lead to findings which are misleading in that the large majority of drivers have neither been convicted of driving under the influence nor been involved in an accident. The disproportionately large number of drivers in any given random sample who had not accrued accidents or majors would tend to mask any relationships existing between prior and subsequent records for those few drivers who had accrued prior major convictions.

The above discussion would seem to indicate that drivers with a history of driving under the influence are not truly higher risk (by comparison to negligent operators with the same total point count and no majors) in terms of expected subsequent accident rate. However, this does not necessarily mean that those drivers should not be given an I/H instead of a no action hearing. It is possible that alcohol-involved drivers are more receptive to the I/H process than other negligent operators, but this possibility could not be rigorously evaluated by the present research design.

This analysis, then, indicates a clear need to empirically evaluate the high risk issue, not only in terms of expected subsequent accidents, but also in terms of receptiveness to particular treatments. Any resources devoted to giving the I/H treatment to a particular type of driver should result in cost-beneficial reductions in traffic accidents.

Conclusions

Before any final decision can be made on the implementation of a no action hearing program, or on the kinds of drivers who should be eligible for such a program, it is necessary to await the outcome of the related study on probation-by-mail (Phase III). The Phase III study will evaluate the traffic safety implications of not holding a hearing but taking an action. The probation-by-mail and no action studies, together, examine two logically complementary alternatives to the present individual hearing countermeasure.

An administrative abstract will be released concurrently with publication of the Phase III report (estimated July, 1979). The abstract will contrast the two program alternatives in terms of costs versus benefits, thereby providing the information necessary for definitive policy recommendations.

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APPENDIX A

APPENDIX A

Effect Size Computations for Power Analysis

Power estimates in prior California driver improvement studies have generally been based on an assumed 10% effect size (McBride & Peck, 1970; Marsh, 1971; Kadell et al., 1977; Peck, 1976). This reduction represents a subjective estimate of the greatest reduction that could reasonably be expected. In the present instance, 10% treatment effects correspond to mean differences on accidents and convictions of 0.0206 and 0.1454, respectively.

Power computations based on the minimum effect size necessary for a program to be cost-beneficial are feasible only with the accident criterion, since conviction reduction does not have clear-cut cost-benefit implications. The effect size needed for the no action program to be more cost-beneficial than the present program is based on the marginal costs and benefits associated with both programs.

As reported in the PLCRES report (California Department of Motor Vehicles, 1977a), the I/H program has a total reducible cost of $44.96 per treatment and saves 1.94 accidents per 100 drivers treated. As estimated for this study (see Appendix C) the no action program has a cost of $36.94 per treatment. The smallest effect size of interest is the point at which the ratio of marginal benefits to marginal costs is equal to one. That is:

$$\frac{\text{monetary value of accidents saved}_{(I/H)} - \text{monetary value of accidents saved}_{(\text{no action})}}{\text{cost p/treatment}_{(I/H)} - \text{cost p/treatment}_{(\text{no action})}} = 1$$

The conversion of accidents saved to dollar benefits requires the application of some estimate of monetary societal loss due to a motor vehicle accident. Such an estimate is provided by two well-known sources, the National Safety Council (NSC) and the National Highway Traffic Safety Administration (NHTSA). The estimates provided by these two sources were adjusted upward for inflation and to be applicable to California negligent operators with their high proportion of fatal and injury accidents (Kadell & Peck, 1979). These adjustments resulted in the following two estimates of accident cost: $3,426 (NSC) and $6,741 (NHTSA). Using these two estimates, the above equation was solved for the number of accidents per driver the I/H program would have to save over and above those prevented by no action in order for the marginal benefits-cost ratio to equal one. The calculations resulted in two estimates of the smallest effect size of interest: 0.0023 accidents (NSC) and 0.0012 accidents (NHTSA).

Basing power on a minimum cost-beneficial effect size illustrates an inherent difficulty in traffic safety research. The cost of an accident to society is large in proportion to the cost of a treatment. (For example, the National Safety Council's adjusted estimate of the cost of an accident is $3,426, whereas the cost of an I/H is $44.96.) The difference in these cost estimates result in extremely small differences in accidents having a dramatic effect on the cost-benefit ratios associated with a program. Therefore, the difference in accidents that would reflect a reduction in the programs' marginal benefit-cost ratio (so that the ratio is equal to one) is very small (0.0012 - 0.0023 accidents for the I/H vs. the no action program). It is not realistic to expect satisfactory power for detecting differences this small.

The power to detect the 10% accident and conviction differences and the cost-beneficial effect sizes is presented in the body of the report.

APPENDIX B

APPENDIX B

Table A

Analysis of Covariance Summary Tables for Subsequent Twelve-Month Data

FATAL AND INJURY ACCIDENTS

Source of variance	Sum of squares	*df*	Mean square	*F*
Treatment	0.04	1	0.04	< 1
Zero slope	2.75	4	0.69	8.35**
Error	430.96	5,229	0.08	
Equality of slope	0.32	4	0.08	< 1
Error	430.64	5,225	0.08	

**$p < .001$

TOTAL ACCIDENTS

Source of variance	Sum of squares	*df*	Mean square	*F*
Treatment	0.12	1	0.12	< 1
Zero slope	16.28	4	4.07	18.12**
Error	1174.41	5,229	0.22	
Equality of slope	0.77	4	0.19	< 1
Error	1173.64	5,225	0.22	

**$p < .001$

CONVICTIONS AND FTAS

Source of variance	Sum of squares	*df*	Mean square	*F*
Treatment	2.79	1	2.79	1.00
Zero slope	1173.04	4	443.26	159.07**
Error	14571.18	5,229	2.79	
Equality of slope	2.75	4	0.69	< 1
Error	14568.43	5,225	2.79	

**$p < .001$

APPENDIX C

APPENDIX C

No Action Task Analysis and Cost Savings Projections

Total cost of a regular I/H, as reported in the PLCRES report (California Department of Motor Vehicles, 1977a) was $60.34. This figure is comprised of $3.10 (fixed), $26.14 (direct), and $31.10 (indirect). Using a 60% "best" estimate of the percentage of reducible indirect cost, an estimated total reducible cost of $44.96 was obtained ($26.14 [direct] + .60($31.10) [indirect]).

Work standards (California Department of Motor Vehicles, 1977b) were examined and those tasks were extracted which could be eliminated if a standard no action hearing procedure were implemented. Table B presents the tasks which were extracted, along with the associated unit cost. The unit costs represent all of the direct costs but only a small proportion of the indirect costs associated with the tasks removed. The actual proportions of indirect costs that would be reduced by eliminating those tasks are unknown at this time.

The decision to extract those tasks shown in the table was based on several assumptions. Among these were, that should the no action hearing be implemented as a standard procedure:

- The writing of a final hearing report would not be necessary
- A complete review process, as is currently performed, would not be necessary

There are many feasible alternatives to the writing of a final hearing report. The type of alternative chosen for an implemented program would depend on decisions by departmental policymakers. For the purpose of this study, the assumption was made that the alternative chosen to replace a final hearing report would involve negligible costs.

Table B

No Action Study Task Analysis
(Tasks Eliminated by the No Action Hearing Program)

Task description	Unit cost[1]
All reducible regular hearing tasks	$44.96
All hearing tasks saved	$ 9.15
Prepare hearing report	2.41
Type final report	1.31
Review typed report	0.46
Supervisor review (90%)	1.44
Process probation[2] notice	1.88
Terminate probation	1.65

[1]Costs are associated with several departmental divisions.

[2]The cost-savings estimates and analysis were based only on the costs associated with the setting and removing of probation (even though a proportion of individual hearing attendees receive actions other than probation) for two reasons: (1) the majority of hearing attendees do receive probationary license actions, and (2) the costs of setting and removing probation are representative of the costs of setting and removing other departmental actions.

One such alternative could be the completion of a form letter, computer generated at the time the driver becomes eligible for an individual hearing (at an estimated cost of $0.90 per driver). The form letter would be produced in duplicate and would contain the violations which qualified the driver for treatment (thus documenting the incidents which led to the hearing). Should the Driver Improvement Analyst reaffirm the computer's selection of the driver as a no action candidate, he would so indicate on the letter, place one copy in the driver's file and mail the other copy to the driver. If no action were deemed inappropriate, he would complete a regular hearing report and recommend a license sanction in the current manner.

California law (CVC 14105) requires that recommendations resulting from hearings be reviewed by the department. In order to comply with this regulation, a review process would need to be retained, but need only to consist of a brief review to verify that the "no action" recommendation was warranted. To this end, the task of supervisor review has not been eliminated but reduced by 90% to reflect the retention of a brief review process. (It should also be noted that the department is currently considering legislation to eliminate the need for the review process.)

A procedure such as that described above would eliminate, for those drivers receiving no action, the tasks of preparing the hearing report, the typing and reviewing of that report, and the manual preparation of individual "Notice of Action" letters to inform drivers of the hearing outcome.

The projected annual volume of informal hearings (26,653)[7] was first adjusted to separate potential high risk drivers from no action eligibles. Of the sample obtained for this study, 19% of the drivers were considered high risk; therefore, 19% of the projected volume was excluded as high risk (26,653 - 5,064 = 21,589). The no action eligibles were then subdivided into two groups: those that would normally be expected to receive no action (approximately 14%) and those who would normally receive probation or another license sanction (approximately 86%).

For those drivers who would be expected to receive a license sanction under current procedures, all of the tasks presented in Table B would be eliminated. However, for those drivers who would be expected to receive no action under current policy, the unit cost for terminating probation ($1.65) would not be applicable. (The unit cost of processing a probation notice can be applied to drivers who receive no action as a representative cost of processing a no action notice.)

The estimated cost of a no action hearing was calculated by (1) subtracting the cost of the eliminated tasks from the total reducible cost per hearing, and (2) adding an estimated cost for generating a "no action" letter.

Costs for drivers expected to receive probation or other license sanction under current policy were estimated to be: $44.96 - 9.15 + .90 or $36.71. Costs for drivers expected to receive no action under current policy were estimated to be: $44.96 - 7.50 + .90 or $38.36. These costs were then applied to their respective volumes (18,567 and 3,022) and combined to obtain total projected costs for an implemented no action program. The weighted cost of a no action hearing was calculated to be $36.94. Results of the cost projections are presented in the text.

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[7] Obtained from Kadell and Peck (1979).

EXHIBIT I

STATE OF CALIFORNIA—BUSINESS AND TRANSPORTATION AGENCY

DEPARTMENT OF MOTOR VEHICLES

DIVISION OF DRIVERS LICENSES
P. O. BOX 2590
SACRAMENTO, CALIFORNIA 95812

*In reply refer to File*_____

Dear

You will be pleased to know that the Department has decided to take no action as the result of your recent hearing.

It is our expectation that you have now become aware of your personal responsibility to observe all the traffic laws and that you will now make the necessary effort to avoid traffic violations and traffic collisions.

Any further additions to your driving record will cause immediate review of your case, making you subject to loss of your driving privilege.

Very truly yours,

Driver Improvement Analyst

R&D 7/79 750 REPRODUCED BY DMV, SACRAMENTO