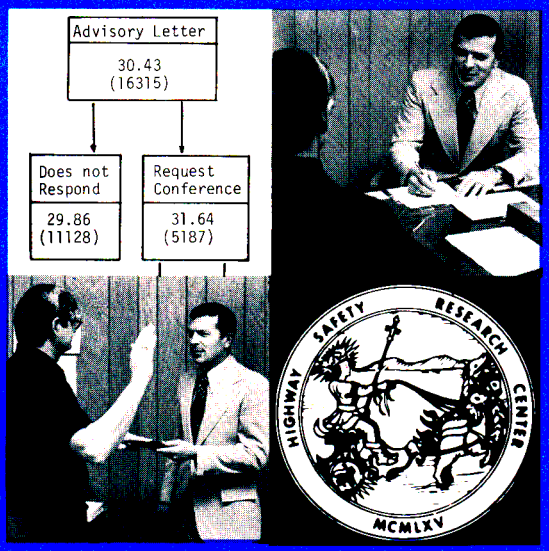
driver improvement measures: an evaluation based on conviction and crash records



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ABSTRACT

The study presented in this paper is an evaluation of one aspect of North Carolina's driver improvement program; i.e., the processes utilized by the Department of Motor Vehicles (DMV) to retard the accumulation of traffic violations by drivers with incipient driving difficulty. Specifically, this study is an evaluation of one type of advisory letter (sent by the Department after the driver accumulates seven points on his driver record); the individual meeting with a hearing officer (in the form of a conference, preliminary hearing, or a hearing); the driver improvement clinic, per se; and the two types of curriculum utilized by the clinic instructors.

Due to the formidable moral and legal problems of conducting well-controlled randomized experiments to evaluate the various aspects of the program enumerated, this study utilized data from official driver records maintained by DMV. Hence, there are inherent weaknesses in this type of evaluation, such as selection, regression to the mean phenomenon, age and sex biases, as well as other weaknesses such as differences in exposure, present in any such evaluation. Every effort, however, was made to use various built-in comparison groups and to the extent possible minimize the potential biases.

The main criterion variable utilized was average number of convictions (and also crashes) in the year subsequent to the driver improvement measure under evaluation. Other criterion variables used were percentage of drivers conviction free and crash free in the subsequent year. These analyses were preceded by determining comparability of prior record of comparison groups. Analyses were done within age and sex groups.

In general, results were not dramatic. However, based on convictions, trends favored clinic participants when compared with drivers assigned to the clinic but not attending or completing the course.

Differences between groups of drivers failing to attend a meeting with a hearing officer, or failing to even respond to the advisory letter, and the corresponding groups attending the meeting and then completing the clinic were not great and in some cases favored the failed-to-attend group. However many biases were present in this

aspect of the analysis such as a greater proportion of drivers in the failed-to-attend group receiving suspensions and/or revocations.

Finally, little difference was found between the traditional curriculum and The Defensive Driving Curriculum (DDC) developed by the National Safety Council. There was a slight trend for males to respond more favorably to the traditional curriculum and for females to respond to the DDC although very few differences were significant.

In summary, drivers who attended the clinic tended to fare somewhat better on the basis of subsequent citations, although the finding was not consistent for all age and sex groups. It should be recognized, however, that the value of the driver improvement system probably cannot be judged solely on citation and collision data. The fact that a driver improvement program exists may be having a positive effect on drivers that would not be reflected in the data in this study.

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I. INTRODUCTION

Kaestner (1968) states that "driver improvement programs usually consist of multistage evaluation and treatment processes. The first phase of the program often involves a warning or advisory letter to the driver with incipient driving difficulty. Continued traffic entries on the record of the recipient of a warning letter trigger the second stage of the program: the driver improvement interview, sometimes called a hearing. During the interview, the interviewee is variously cajoled, threatened, or educated in an effort to improve his driving performance. For those recalcitrant drivers who fail to drive trouble-free after the interview, the third and final phase of the driver improvement program is invoked. This usually consists of a suspension of the driving privilege for varying intervals."

The most expensive phase is the second, the interview or group meetings. This is also the stage that has evoked the greatest number of evaluation efforts. Unfortunately, most of the evaluations which have been conducted have several of the pitfalls that plague this type of research. Donald Campbell (1969) has examined carefully a number of these pitfalls, spelling out in detail the sources of potential problems and, where possible, the measures that can be taken to alleviate difficulties. Two of the most troublesome and serious problems confronted in evaluating driver improvement activities are what are called selection and regression artifacts.

Campbell describes selection as biases resulting from differential recruitment of comparison groups. An example of this bias would exist if an evaluation of a driver improvement clinic utilized clinic participants as the experimental group and the drivers who appeared before the judge but were not assigned to the clinic as the control group. Naturally, the judge would decide which drivers were to be assigned to the clinic based on his evaluation of potential benefits for each individual driver. A favorable finding that clinic participants had better subsequent records would not necessarily be a result of the clinic experience but could have resulted from the selection of the

clinic group based on decisions of the judge as to who would respond more favorably to a rehabilitative measure. The control drivers may have had poor attitudes or other problems not conducive to improvement in subsequent driving performance.

The other issue worthy of some detail is the regression to the mean phenomenon. There is considerable evidence (Forbes, 1939; Stewart and Campbell, 1972) that indicates that drivers accumulating excessive violations and crashes in one time period are not the same ones, for the most part, who are excessively involved in a subsequent time period. Therefore, drivers who enter a driver improvement measure because of a large number of violations accumulated within a period will, for the most part, experience a decrease in violation activity due to this phenomenon independent of any benefit they may derive from the curriculum. To claim a program is successful based merely on the evidence that the treated driver gets better is erroneous.

Ideally, the way to avoid these two pitfalls is to design an evaluation incorporating equivalent control groups. Participants should be randomly assigned either to the experimental or the control group, and subsequent driving performance of the control group should be compared to the subsequent driving records of the experimental group.

Unfortunately, designing and conducting a well-controlled experiment in this area is difficult, raising formidable moral and legal problems. There is a basic assumption among administrators that any driver improvement program must be more beneficial in protecting the future life of the driver in difficulty (as well as the lives of those he encounters) than no program at all. Therefore, to assign a driver randomly to a control group and deprive him of these benefits would be not only negligent but inhumane. Even if one could get administrative clearance to conduct the study, the question still remains as to how to gain the cooperation of judges or interviewers to assign drivers randomly to treatment and control groups. After all, a judge's stock in trade is judgment, and one of the main functions of a judge or interviewer is to recommend a treatment which he judges will be optimal for the individual needs of each driver.

Kaestner (1968) reviewed the seven driver improvement programs which he considers the most adequately evaluated. It should be cautioned however, that due to the many problems inherent in evaluating driver improvement programs, none of the studies is free of bias. Four programs were group sessions; three were individual hearings.

There were many differences among the programs with regard to objectives and content, personnel background and training, length of

time required, size of classes, prior driving records, and age and sex of driver participants. Many differences also existed in the methodology used to evaluate the program, including criterion variables and length of follow-up, although all seven studies incorporated some form of control group. For purposes of this report, only a summary of the findings will be discussed.

In general, the typical duration of follow-up in these studies was between one and two years. All seven reported the programs were effective in reducing traffic violations as compared to the control groups. Only two of the seven, however, reported programs effective in reducing subsequent crashes.

Age was examined in six studies to evaluate differential effects on driver improvement. Two of the California studies showed no differences with regard to age. Two studies indicated that the youngest drivers benefited the most from the programs. One study reported that drivers over age 25 benefited the most; the sixth study reported that both the youngest (less than 24) and the oldest (51-55) drivers appeared to respond more favorably. Obviously, there were no consistent age trends. Of the two studies which investigated sex differences, one found no differences whereas the other reported females benefiting more from the program.

Since Kaestner's review in 1968, at least one additional study has been conducted which is worthy of mention. This study was one conducted in California (Marsh, 1971) and compared five group meeting techniques and two individual hearing procedures with a control group. Two of the five group meetings and one individual hearing were especially designed by an experienced psychologist. He incorporated the most effective group procedures known at that time and in addition supervised the extensive training of eight special driver improvement analysts involved in the programs. Two additional group meetings were developed by Department of Motor Vehicles (DMV) staff. The final group meeting and final individual hearing included for analysis represented a standard program for California.

In regard to subsequent convictions, four of the treatment groups were significantly better than the control group. However, in regard to subsequent crashes, only one program (new group meeting designed by DMV) had a collision rate that was significantly better than the control group. The drivers attending the other six programs fared worse in terms of subsequent crashes than the control group, and one program (the other group meeting designed by DMV) fared significantly worse.

In summary, results of these studies indicate that the evaluated driver improvement programs were more likely to be effective in reducing convictions than crashes. No clear findings as to age and sex trends have been documented.

The study presented in this paper is an evaluation of one aspect of the driver improvement program utilized in North Carolina. This state's program contains essentially the three phases presented by Kaestner, discussed earlier. A driver is issued a warning letter at certain times, including after accumulating 4 points and also after accumulating 7 points on his driver record within a three year period for various violations. In the 7 point letter, he is invited to attend an individual conference with a trained Department of Motor Vehicles hearing officer. If he accepts the invitation and attends, he may be given the opportunity to attend the driver improvement clinic, with the incentive that if he completes the course, DMV will remove three points from his record.

There are two other circumstances for which a driver would interact with a hearing officer. The North Carolina DMV has a review section to which four hearing officers are assigned. One of the responsibilities of these hearing officers is to review driver records. If suspension of driving privilege is authorized, the reviewers will either order suspension or schedule a preliminary hearing with the driver. The driver is assigned an appointment time with a hearing officer to provide the driver an opportunity to discuss his record. As a result of the evidence presented at this preliminary hearing, the hearing officer has the option of not suspending, of granting probation, or of suspending the license. At the preliminary hearing, the officer may recommend the driver improvement clinic (if the driver has not previously attended one) in lieu of suspension or in lieu of a portion of suspension.

If, on the other hand, the reviewers consider suspension or revocation definitely in order, they inform the driver by letter that his driving privilege will be suspended or revoked. The driver is instructed to turn in his driver's license. If the driver takes the initiative and informs the Department that he would like a hearing to have his case reconsidered, he is granted one unless a preliminary hearing has previously been conducted on the case. Again the hearing officer may recommend the driver improvement clinic.

Because of the moral and legal considerations discussed earlier, it was not feasible to design a series of prospective randomized controlled evaluations of the various phases of the program. Knowing the difficulties in obtaining clearance and cooperation from all the

necessary administrators and personnel and realizing the inherent weaknesses that would still remain in this type of prospective study, it was decided to evaluate the program based on the official driver records maintained by DMV. Every effort was made to use various built-in comparison groups and in addition, to the extent possible, to control for the pitfalls such as selection, regression to the mean phenomenon, and age and sex biases. It must be emphasized, however, that even though many controls were incorporated, it was not possible to completely compensate for the deficiencies in this type of data. It is essential to keep this in mind when interpreting the results.

The study is presented in three parts: first, the evaluation of the driver improvement clinics; second, the evaluation of the individual contact with the hearing officer (conference, preliminary hearing, or hearing, whichever is applicable) in combination with the driver improvement clinic; and third, the evaluation of the two different curricula in use at the time of this study. One curriculum was the traditional curriculum used by DMV since 1958. This curriculum was of an informative nature and tended to view the participant as a violator. The other curriculum in use was the Defensive Driving Course (DDC) developed by the National Safety Council. In contrast to the traditional curriculum, the DDC was designed to teach the driver how to drive defensively and avoid crashes. Little or no mention is made of past or future "fault." Instead, the emphasis is on positive action to avoid crashes regardless of responsibility.

II. METHOD

All drivers who were sent an advisory letter, had a preliminary hearing scheduled, or requested a hearing in 1967 were included in the study sample. In addition, all drivers assigned to the driver improvement clinic by the courts during this year were included. A systematic sample was pulled from the entire driver file to provide a baseline group for comparison. The year 1967 was selected for two reasons. This year enabled the use of drivers records for a five-year period (three years prior to the improvement action and two years subsequent to the action). Second, at that time, the state was in transition from the traditional curriculum to the defensive driving curriculum. Hence, there were clinics using each curriculum and the number of clinic participants receiving each curriculum was about equal.

Preparation of Data Base

The major effort in this evaluation was in preparing and extracting all the necessary data files, then linking these files, and finally in rectifying the discrepancies which resulted. Since the data utilized were not organized for research purposes, considerable time and effort were spent in data preparation.

The main data file was an extract from the official driver file of all drivers receiving a warning letter or scheduled to attend some type of meeting with a hearing officer during 1967. These drivers were grouped into ten categories:

(1) Received advisory letter, no conference with hearing officer requested.

(2) Received advisory letter, requested conference but failed to report.

(3) Received advisory letter, requested and attended conference but not assigned to clinic.

(4) Received advisory letter, requested and attended conference and assigned to clinic (further subdivided into failed to complete clinic and completed clinic).

(5) Scheduled preliminary hearing but failed to report.

(6) Scheduled and attended preliminary hearing but not assigned to clinic.

(7) Scheduled and attended preliminary hearing and assigned to clinic (further subdivided into failed to complete clinic and completed clinic).

(8) Requested hearing but failed to report.

(9) Requested hearing but not assigned to clinic.

(10) Requested hearing and assigned to clinic (further subdivided into failed to complete clinic and completed clinic).

These groups are presented pictorially in Figure 1. If a driver fell into more than one category during 1967, a priority was established. A hearing had priority over a preliminary hearing which had priority over a conference.

A questionnaire was sent to clinic instructors to identify the curriculum taught in each clinic during the time period under study. Data from Driver Improvement Clinic Assignment and Completion Forms were coded to determine which clinic a driver attended. These two additional data banks were concatenated into the driver history file extract.

Drivers assigned to the driver improvement clinics through the courts were identified through a DMV registration list. The driver records for these drivers were pulled.

Finally, a data file consisting of a systematic sample of 2797 drivers was pulled from the entire driver file to serve as a baseline with which the special study groups described above could be compared.

Criterion Variables

Many criterion variables were considered. Using the difference in number of citations or crashes from the time interval preceding the improvement measure to the interval subsequent to the measure as a variable would be inappropriate because of the regression to the mean phenomenon and because of the selection process for being included in the improvement program. That is, every person receiving a 7 point letter would, by necessity, have had at least one violation in the six-month interval prior to the letter. Therefore, improvement from this time period to the six-month interval subsequent to the letter would be inevitable. On the other hand, since drivers were not assigned randomly to study groups, wide diversity in prior numbers of citations and crashes could exist among the groups. It would therefore be inappropriate to completely neglect the prior records. The decision was made to determine comparability of prior records (using the third year prior to the improvement measure) of appropriate study groups. This prior time period has a disadvantage in that there is an uncertainty concerning exposure. It is possible that some drivers in the study group would not have been residents of North Carolina three years prior to the improvement action or may have been residents but not licensed drivers at that time. In spite of this disadvantage, the time period was preferable to any period closer to the improvement measure due to the artificiality of number of convictions in these time periods. Most of the comparability tests of prior convictions were nonsignificant, confirming the legitimacy of comparing study groups based on average conviction records

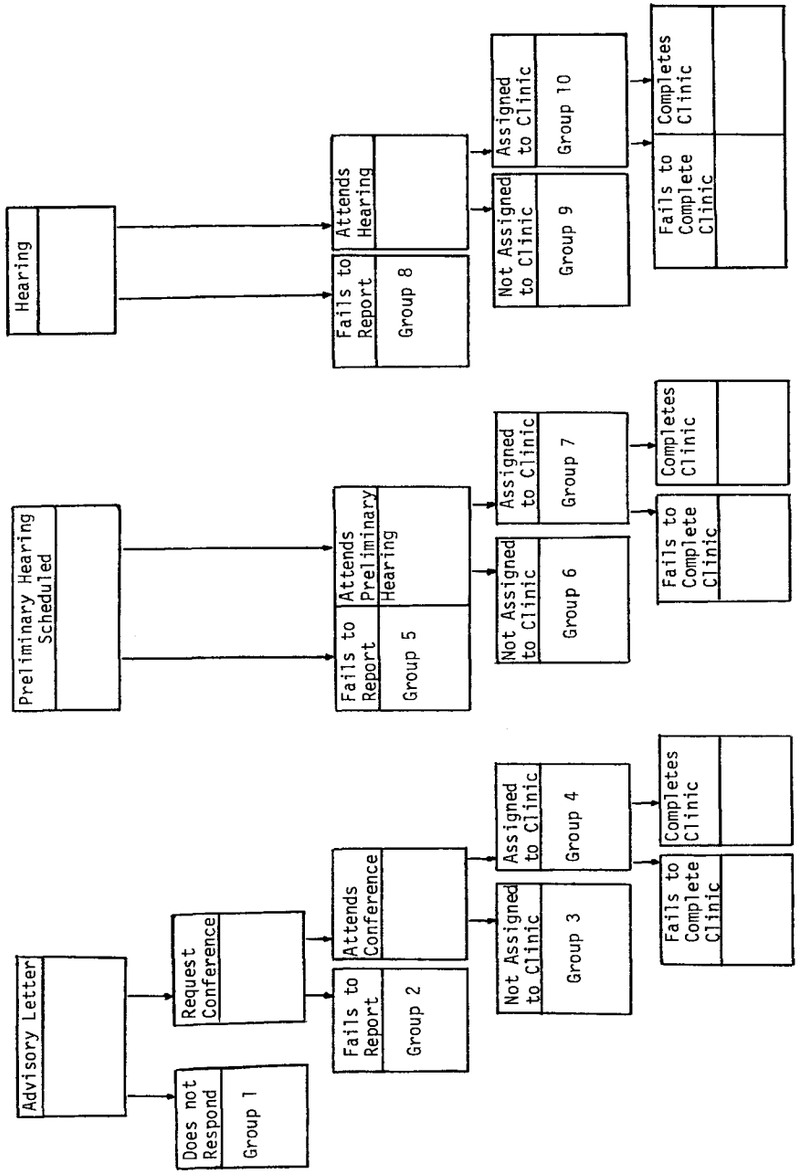

Figure 1. The ten driver groups used in this study.

in the year subsequent to the measure; this variable was computed by averaging the conviction rate per hundred drivers for the two-six month intervals composing the year. Primary attention was focused on convictions since drivers are selected into the program on this variable. However, additional analyses were performed using crashes as a criterion variable since first, crash reduction is a more important highway safety goal than violation reduction, and second, the Defensive Driving Curriculum is focused on reducing collisions.

Control Variables

Since, in general, females and older drivers have less activity on their driver records, analyses were done within age and sex groups. The two age groups were drivers less than 25 and drivers 25 and older. Analysis was also done within race groups to determine possible differential benefits associated with race.

Exposure

No measure of exposure was available. In fact, the major shortcoming in this evaluation is that the driver record does not indicate how much a driver was driving, whether or not he was driving at all, or whether or not he was even licensed to drive in the state for the entire five year period under consideration. In addition, many of the drivers in the study group had suspensions or revocations during the five year period. If all drivers having a suspension or revocation are excluded prior to analysis, sample size decreased to a point making analysis impossible in some groups. Coppin and Van Oldenbeek (1965) found that 33 percent of suspended negligent drivers and 68 percent of revoked negligent drivers drove during suspension or revocation periods as judged by conviction and accident records on file. Hence, since these percentages are based only on those drivers who were apprehended during suspension, they probably considerably underestimate the percentage of drivers that actually drove during these periods. For this reason drivers were not excluded from analysis in this study based on presence of suspensions or revocations; however, the percentage of drivers within each comparison group who fall into this category is presented.

Statistical Tests

The following Chi-square statistic was used to compare study groups.

$$\chi^2 = \frac{(M_1 - M_2)^2}{se_1^2 + se_2^2} \quad \text{or} \quad \frac{(M_1 - M_2)^2}{\frac{V_1}{n_1} + \frac{V_2}{n_2}}$$

where M_i = mean for the variable under study for the ith study group

se_i = standard error of the variable for the ith study group

V_i = variance of the variable for the ith study group

n_i = number of drivers in the ith study group

Three levels of significance were utilized (.05, .10, .20). The .20 level was included because it has been argued that during early efforts at evaluation, it would be more harmful to reject an effective program than to retain an inefficient one (Marsh, 1971).

III. RESULTS

Description of Sample

Age.

From Figure 2 it can be observed that the average age of drivers having a conference with a hearing officer was 32.7; a preliminary hearing, 30.6; and a hearing, 30.2; whereas the drivers sent to the clinic through the courts represent a younger group of drivers with a mean age of 23.2. The average age of the sample of drivers representing the licensed driving population was 35.3.

It is of interest that, of drivers receiving the advisory letter, those drivers not responding were younger than those requesting a conference ($p < .05$); those failing to report to the conference were younger than those who attended ($p < .05$); and finally, those who failed to complete the clinic were younger as a group than those who completed it ($p < .05$). These trends held for those drivers who scheduled a preliminary hearing. The Failed to Report to Preliminary

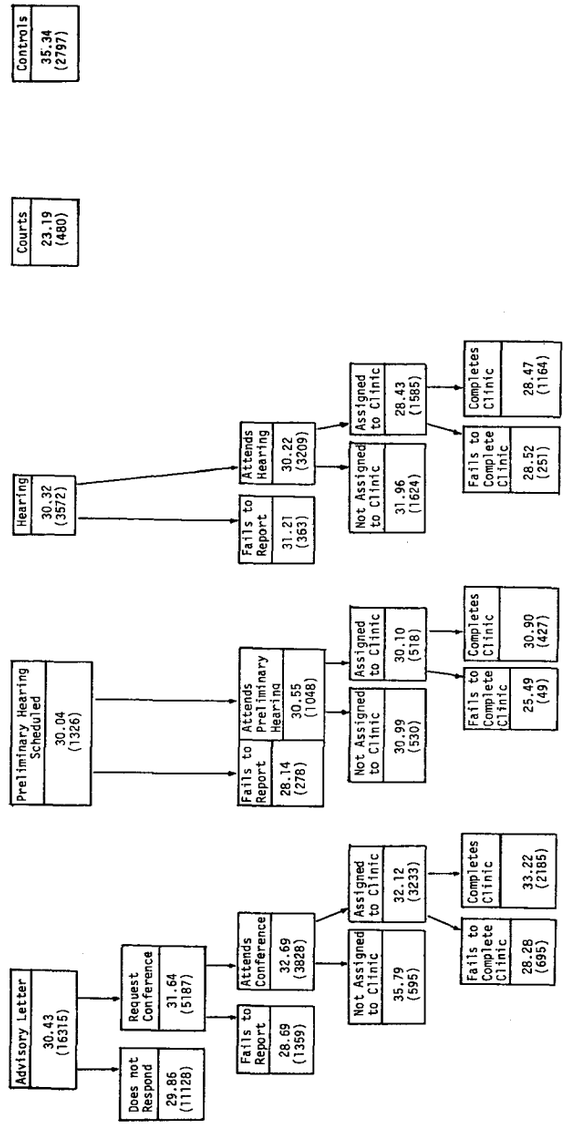

Figure 2. Mean age by study group.

Hearing Group was younger than the attendees ($p < .05$) and the drivers in the Failed to Complete Clinic Group were younger than those in the Completed Clinic Group ($p < .05$). This was not the case for drivers scheduling a hearing where average age showed little variation.

Sex.

A significantly larger percentage of the drivers in the study group were males than in the general licensed population: 92 percent of the drivers having contact with DMV were males, 91 percent of the drivers assigned to the clinic through the courts were male, whereas 56 percent of the drivers in the general licensed population were males (see Figure 3). There was a significantly greater proportion of males in the Failed to Report to Conference Group than in the Attended Conference Group ($p < .05$); likewise there was a significantly greater proportion of males in the Failed to Complete Clinic Group than in the Completed Clinic Group ($p < .05$). The corresponding comparisons between those who failed to report and those who attended the preliminary hearing or hearing did not produce significant results. In addition, the differences between those who failed to complete and those who completed the clinic subsequent to a preliminary hearing or a hearing were not significant.

Race.

A significantly greater proportion of Whites failed to respond to the advisory letter ($p < .05$); whereas a significantly greater proportion of Non-whites failed to report to the conference once they had made the appointment ($p < .05$, see Figure 4). Likewise, a greater proportion of Non-whites failed to report to the preliminary hearing or to the hearing after it was scheduled (both $p < .05$) and a greater proportion of Non-whites failed to complete the clinic subsequent to a preliminary hearing or a hearing ($p < .05$). This difference was not found in those who failed to complete the clinic subsequent to a conference.

Suspensions and revocations.

Figure 5 presents for each study group the percentage of drivers who had a suspension or revocation in the three-year period prior to the driver improvement action. A slightly but significantly greater proportion of the Failed to Respond to Advisory Letter Group had a suspension or revocation in the time period than the Requested Conference Group ($p < .05$, see Figure 5). In addition a significantly greater proportion of the drivers in the Failed to Report to Conference Group had a suspension or revocation than the Attended

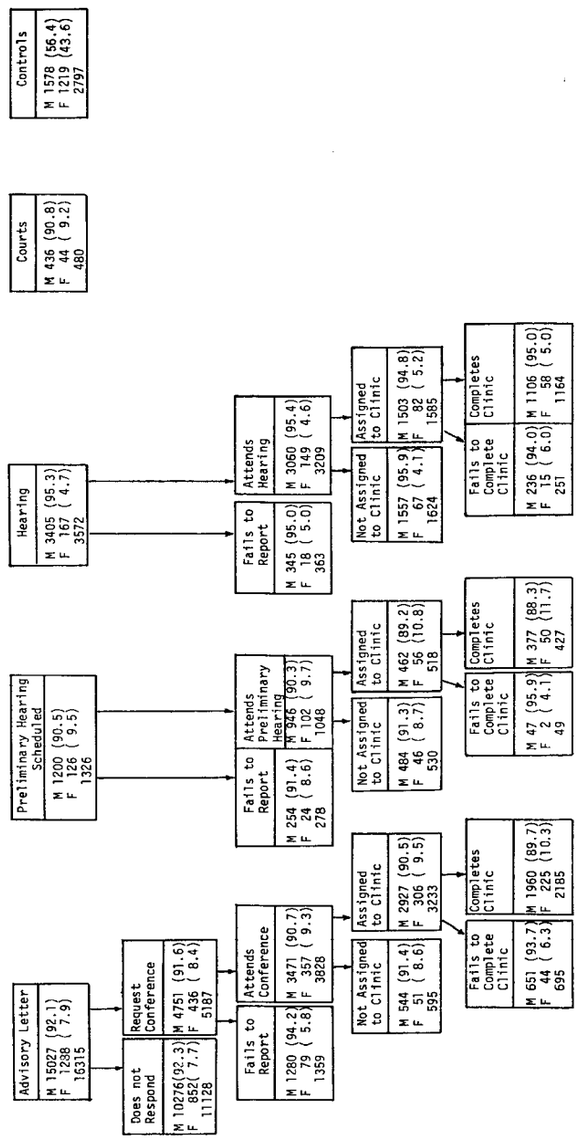

Figure 3. Sex distribution by study group. Male (M) Female (F)

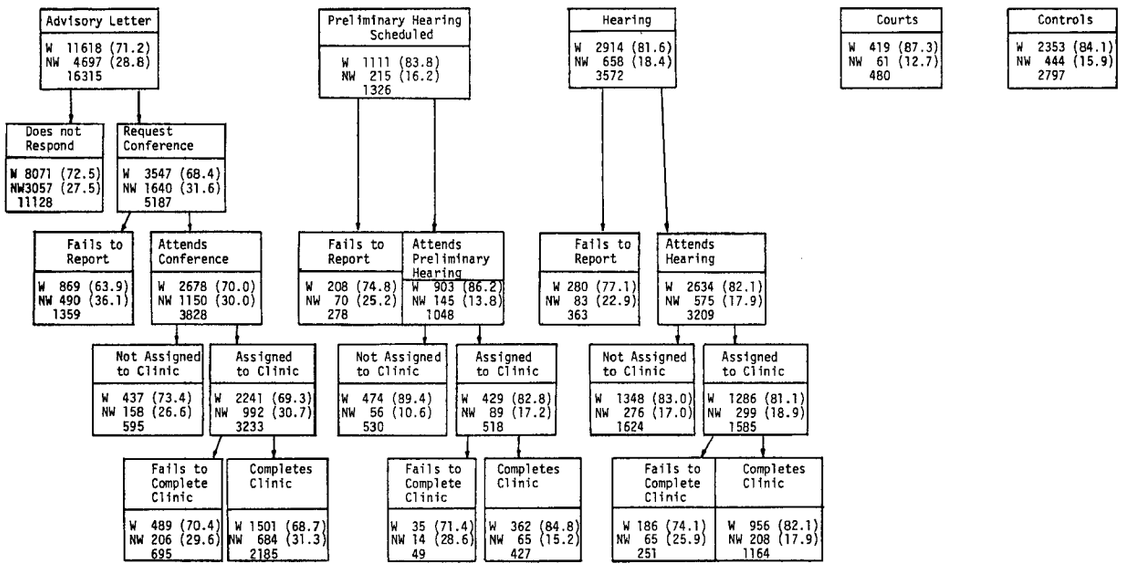

Figure 4. Race distribution by study group. White (W)
Non-white (NW)

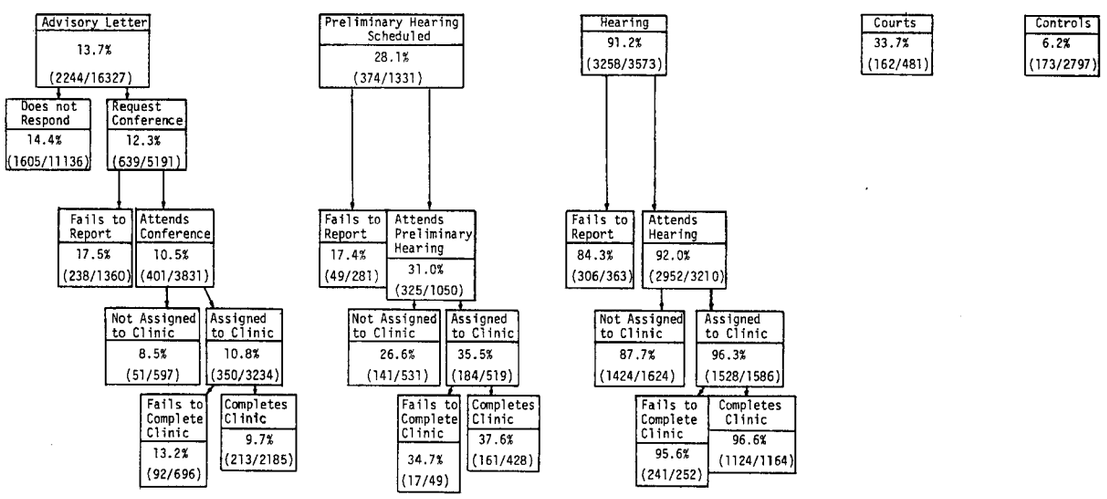

Figure 5. Percentage (number) of drivers with a suspension or revocation within the three years prior to the improvement measure.

Conference Group and a greater proportion of the Failed to Complete Clinic Group had a suspension or revocation in the prior time period than the Completed Clinic Group ($p < .05$). Those drivers in the Failed to Report to Preliminary Hearing Group and in the Failed to Report to Hearing Group had significantly fewer drivers under suspension or revocation in the prior time period than the corresponding groups who attended the meeting ($p < .05$). However, as seen from Figure 6, a significantly greater proportion of drivers in the Failed to Report to Preliminary Hearing Group had a suspension or revocation in the total time period ($p < .05$). This confirms that a license is often suspended or revoked if the driver fails to report to the preliminary hearing.

Evaluation of Driver Improvement Clinic

To evaluate the clinic experience, comparisons were made between those drivers who failed to complete the clinic with those who successfully completed it. Comparisons were made for those drivers who were assigned as a result of a conference, a preliminary hearing, or a hearing. Self-selection is a problem in using such comparisons because factors exist that result in drivers not completing the clinic. Whether these factors affected the number of convictions or crashes the groups accrued is unknown. For precautions, comparisons were made within age/sex and age/race classifications and comparability of prior records was examined.

Convictions as criterion variable.

Figures A1 through A12 present the conviction rate per hundred drivers for each of the ten six-month intervals for each of the study groups involved in these comparisons. From these graphs, the artificiality of the prior record, discussed in the Methods section, can be observed. For example, Figure A3 indicates that the conviction rate increases prior to the action date to a point, at 0-6 months prior, of 153 convictions per 100 drivers. Since people are sent a 7-point letter when they accumulate 7 points on their driver record, it is clear that every driver must have had one conviction in this time period in order to receive the letter. This then does not truly reflect a good estimate of the average amount of difficulty these drivers are experiencing. Hence, the sharp drop to 30 convictions per hundred drivers in the 0-6 subsequent time period is not a true measure of improvement. This artificiality in the prior time periods decreases as the time interval prior to the action date increases, but exists to some degree in all the prior time periods presented. The least affected time period would be the 25-36 month prior period

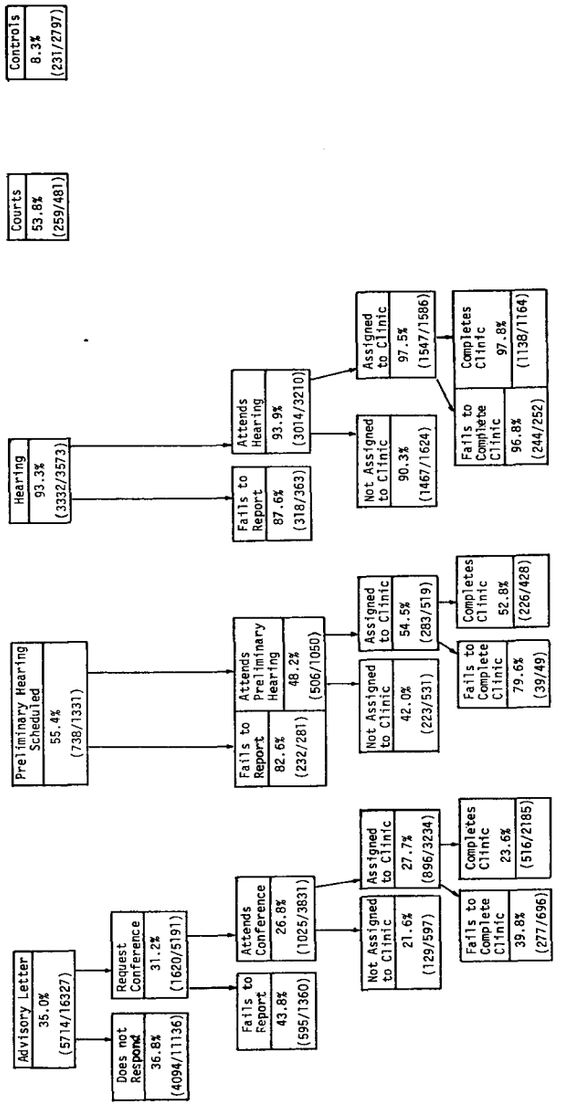

Figure 6. Percentage (number) of drivers with a suspension or revocation within the total five year period.

and for this reason this year was selected to determine comparability of prior records between the study groups.

When comparisons are based on a full year's experience, the average number of convictions was computed by averaging the conviction rate per hundred drivers for the two six-month intervals composing the year.

Results of Chi-square tests did not indicate significant differences between the average number of convictions in this third year period prior to the clinic experience for the groups of drivers who failed to complete the clinic and the corresponding groups who completed the clinic experience. Comparisons were therefore made of the average subsequent convictions for the Failed to Complete Clinic Group and the Completed Clinic Group assigned to the clinic as a result of a conference, preliminary hearing or hearing. In each of the three comparisons, the Completed Clinic Group had an average of fewer convictions than the corresponding Failed to Complete Clinic Group (see Table 1). The comparisons within the conference and preliminary hearing groups produced significant results ($p < .05$ and $p < .20$, respectively). Significant results are indicated by an asterisk (*) if the value is significant at the .05 level, a cross (†) if the value is significant at the .10 level, and delta (Δ) if the value is significant at the .20 level. Table 1 also presents the percentage of drivers in each study group that remained conviction free for the year following the improvement measure. It can be observed that each of the three Completed Clinic Groups had a higher percentage of drivers conviction free than the corresponding Failed to Complete Clinic Group. This variable is therefore consistent with the average number of convictions in favoring the clinic graduates. The only significant difference was within the Conference comparison ($p < .05$).

Conviction comparisons within age/sex and age/race groups.

There is considerable evidence that females are a different type of driver than males and that older drivers are different than younger. In addition, there is some evidence that females and older drivers may respond differently to correction methods than males and younger drivers (Kaestner, Warmoth, and Syring, 1967; McBride and Peck, 1970). For these reasons, in comparisons to evaluate the clinic, tests for differences between the Failed to Complete Clinic Groups and the Completed Clinic Groups within the three main types of individual interview were made within age and sex groups. Appendix B presents a representative set of graphs of the conviction rate per hundred drivers for each six-month interval in the study period for age/sex

Table 1. Four criterion variables utilized in comparing first year subsequent records of study groups failing to complete the clinic and those completing the clinic.

Variable	Attended Conference		Attended Preliminary Hearing		Attended Hearing	
	Failed to complete clinic (n=695)	Completed clinic (n=2185)	Failed to complete clinic (n=49)	Completed clinic (n=427)	Failed to complete clinic (n=251)	Completed clinic (n=1164)
Convictions						
Mean number of subsequent convictions per hundred drivers[1]	28.8 ← * → 24.2		32.7 ← Δ → 23.4		29.3	25.2
Percentage of drivers conviction free	59.6 ← * → 65.2		59.2	66.7	62.5	64.6
Crashes						
Mean number of subsequent crashes per hundred drivers[1]	12.2	11.8	8.2	10.5	12.5 ← Δ → 9.8	
Percentage of drivers crash free	79.3	79.7	83.7	80.8	78.5 ← Δ → 83.1	

* $p < .05$
† $p < .10$
Δ $p < .20$

[1]Computed by averaging the conviction (or crash) rate per hundred drivers for the two six-month intervals comprising the year.

Note: The symbols denoting significance indicate differences between the numbers indicated by the arrows.

groups and for age/race groups within the six study groups utilized to evaluate the clinic experience.

Table 2 presents the average number of convictions in the first year subsequent to the improvement measure for the age/sex groups within the six comparison groups. Table 3 presents the corresponding data for the age/race groups. Chi-square tests were performed; again, significant results are indicated by an asterisk (*) if the value is significant at the .05 level, a cross (†) if significant at the .10 level, and delta (Δ) if significant at the .20 level. Although few differences were significant, these tables do indicate that the overall differences are not a result of the age and sex or age and race compositions of the comparison groups. Trends seem to favor the clinic experience.

Crashes as criterion variable.

Figures A15, A16, A18, A19, A21, A22 present the crash rate per hundred drivers for each of the ten six-month intervals for each of the study groups utilized in these comparisons.

Again, there was no significant difference between the prior third year records of the three Failed to Complete Clinic Groups and the corresponding Completed Clinic Groups (i.e., assigned through a conference, preliminary hearing, or hearing). Hence, comparisons between the groups were performed using the average number of crashes in the subsequent year. These averages are presented back in Table 1. There was no statistical difference between the Failed to Complete Group and Completed Clinic Group where attendance resulted from a conference or a preliminary hearing. Following a hearing, the Completed Clinic Group fared significantly better ($p < .20$) than the Failed to Complete Group. The percentage of drivers in each study group which drove crash free in the subsequent year is also presented in Table 1. Again it should be pointed out that the drivers who failed to complete the clinic subsequent to a preliminary hearing usually had their licenses suspended or revoked and hence lack of exposure in the subsequent time period may be a factor for these 49 drivers.

Crash comparisons within age/sex and age/race groups.

The average number of crashes for age/sex classifications within each of the six study groups is presented in Table 4; the corresponding averages for the age/race classifications are presented in Table 5. The very few significant results are indicated.

Table 2. Average number of convictions (per hundred drivers)[1] in the first year subsequent to the improvement measure, by age and sex, for drivers who failed to complete the driver improvement clinic and for drivers who completed the clinic.

AGE	SEX	Attended Conference		Attended Preliminary Hearing		Attended Hearing	
		Failed To Complete Clinic	Completed Clinic	Failed To Complete Clinic	Completed Clinic	Failed To Complete Clinic	Completed Clinic
Less Than 25	Male	34.0 (359)	34.8 (771)	31.5 (27)	28.6 (140)	32.7 (110)	28.8 (517)
	Female	10.0 (15)	10.2 (64)	0 (2) + † +	7.5 (20)	0 (8) + * +	6.9 (36)
	Total	33.0 (374)	32.9 (835)	29.3 (29)	25.9 (160)	30.5 (118)	27.4 (553)
Greater Than Or Equal To 25	Male	25.2 (292) + * +	20.0 (1189)	37.5 (20)	24.1 (237)	27.0 (126)	23.8 (589)
	Female	10.3 (29)	10.6 (161)	——	5.0 (30)	50.0 (7) + Δ +	9.1 (22)
	Total	23.8 (321) + * +	18.9 (1350)	37.5 (20) + Δ +	21.9 (267)	28.2 (133)	23.2 (611)
TOTAL		28.8 (695) + * +	24.2 (2185)	32.7 (49) + Δ +	23.4 (427)	29.3 (251)	25.2 (1164)

* $p < .05$
\+ $p < .10$
Δ $p < .20$

[1]Computed by averaging the conviction rate per hundred drivers for the two six-month intervals comprising the year.

Table 3. Average number of convictions (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who failed to complete the driver improvement clinic and for drivers who completed the clinic.

AGE	RACE	Attended Conference: Failed To Complete Clinic	Attended Conference: Completed Clinic	Attended Preliminary Hearing: Failed To Complete Clinic	Attended Preliminary Hearing: Completed Clinic	Attended Hearing: Failed To Complete Clinic	Attended Hearing: Completed Clinic
Less Than 25	White	32.3 (293)	30.3 (664)	22.7 (22)	26.1 (138)	32.6 (95)	26.6 (491)
	Non-white	35.8 (81)	42.7 (171)	50.0 (7)	25.0 (22)	21.7 (23)	33.9 (62)
	Total	33.0 (374)	32.9 (835)	29.3 (29)	25.9 (160)	30.5 (118)	27.4 (553)
Greater Than Or Equal To 25	White	18.4 (196)	15.8 (837)	38.5 (13) ← Δ →	19.9 (224)	30.2 (91) ← Δ →	21.7 (465)
	Non-white	32.4 (125) ← † →	23.9 (513)	35.7 (7)	32.6 (43)	23.8 (42)	28.1 (146)
	Total	23.8 (321) ← * →	18.9 (1350)	37.5 (20) ← Δ →	21.9 (267)	28.2 (133)	23.2 (611)
TOTAL		28.8 (695) ← * →	24.2 (2185)	32.7 (49) ← Δ →	23.4 (427)	29.3 (251)	25.2 (1164)

Table 4. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and sex, for drivers who failed to complete the driver improvement clinic and for drivers who completed the clinic.

AGE	SEX	Attended Conference: Failed To Complete Clinic	Attended Conference: Completed Clinic	Attended Preliminary Hearing: Failed To Complete Clinic	Attended Preliminary Hearing: Completed Clinic	Attended Hearing: Failed To Complete Clinic	Attended Hearing: Completed Clinic
Less Than 25	Male	13.1 (359)	14.9 (771)	11.1 (27)	12.9 (140)	15.5 (110)	12.2 (517)
	Female	10.0 (15)	1.5 (64)	0 (2) ← † →	10.0 (20)	6.3 (8)	0 (36)
	Total	13.0 (374)	14.0 (835)	10.3 (29)	12.5 (160)	14.8 (118)	11.4 (553)
Greater Than Or Equal To 25	Male	11.6 (292)	10.7 (1189)	5.0 (20) ← Δ →	10.1 (237)	11.1 (126)	8.2 (589)
	Female	8.6 (29)	8.7 (161)	——	3.3 (30)	0 (7) ← * →	11.4 (22)
	Total	11.4 (321)	10.4 (1350)	5.0 (20)	9.4 (267)	10.5 (133)	8.3 (611)
TOTAL		12.2 (695)	11.8 (2185)	8.2 (49)	10.5 (427)	12.5 (251) ← Δ →	9.8 (1164)

Table 5. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who failed to complete the driver improvement clinic and for drivers who completed the clinic.

AGE	RACE	Attended Conference		Attended Preliminary Hearing		Attended Hearing	
		Failed To Complete Clinic	Completed Clinic	Failed To Complete Clinic	Completed Clinic	Failed To Complete Clinic	Completed Clinic
Less Than 25	White	12.3 (293)	12.9 (664)	13.6 (22)	12.3 (138)	13.7 (95)	10.5 (491)
	Non-white	15.4 (81)	18.4 (171)	0 (7)	13.6 (22)	19.6 (23)	18.5 (62)
	Total	13.0 (374)	14.0 (835)	10.3 (29)	12.5 (160)	14.8 (118)	11.4 (553)
Greater Than Or Equal To 25	White	9.2 (196)	8.4 (837)	3.8 (13)	8.3 (224)	9.3 (91)	7.7 (465)
	Non-white	14.8 (125)	13.8 (513)	7.1 (7)	6.6 (43)	13.1 (42)	10.3 (146)
	Total	11.4 (321)	10.4 (1350)	5.0 (20)	9.4 (267)	10.5 (133)	8.3 (611)
TOTAL		12.2 (695)	11.8 (2185)	8.2 (49)	10.5 (427)	12.5 (251)	9.8 (1164)

Evaluation of a Combination of Driver Improvement Measures

As indicated in Figure 1, there are many driver improvement routes a delinquent driver can take. In order to evaluate the effect of a meeting with a hearing officer followed by the clinic experience, the group of drivers who failed to report to the meeting was compared to the corresponding group who not only attended the meeting but completed the clinic. Again self-selection is a big factor in that the type of driver who chooses not to attend the meeting is most certainly different in some ways than those who attend the meeting and go on to complete the clinic. Other uncontrolled factors such as exposure in the form of suspensions and revocations in subsequent time periods must be kept in mind when interpreting results.

Convictions as criterion variable.

Comparison of Failed to Respond to Advisory Letter Group with Completed Conference and Clinic Group.

Figure A1 presents the conviction rate for each of the six-month intervals for the Failed to Respond to Advisory Letter Group. The corresponding figure for the Completed Conference and Clinic Group is A4. Comparison of the average number of convictions in the third year prior to the action revealed that the two groups were not comparable. The Failed to Respond to Advisory Letter Group accumulated an average of 26 convictions per hundred drivers in this year whereas the Completed Conference and Clinic Group accumulated an average of only 21.3 convictions per hundred drivers ($p < .05$). From the two graphs it can be seen that this difference results from the 31-36 month prior time interval; the 25-30 month prior time interval for the two groups is almost identical (26.3 per hundred drivers and 26.7 per hundred drivers). Figure A4 and Table 6 reveal that the Completed Conference and Clinic Group had an average number of convictions in the subsequent year (24.2 per hundred drivers) which was significantly less than the average for the Failed to Respond to Advisory Letter Group (26.1 convictions per hundred drivers).

The Failed to Respond to Advisory Letter Group, therefore, changed very little from the prior time period to the subsequent time period (from 26 convictions per hundred drivers to 26.1 convictions per hundred drivers); whereas, the subsequent average

Table 6. Four criterion variables utilized in comparing first year subsequent records of study groups failing to respond or failing to report to meeting with hearing officer and groups attending meeting and completing clinic.

	Variable	Failed to respond to advisory letter (n=1133)	Failed to report to conference (n=1359)	Completed conference and clinic (n=2185)	Failed to report to preliminary hearing (n=280)	Completed preliminary hearing and clinic (n=427)	Failed to report to hearing (n=363)	Completed hearing and clinic (n=1164)
Convictions	Mean number of subsequent convictions per hundred drivers	26.1*	30.8*	24.2	14.9 → * → 23.4		27.5	25.2
	Percentage of drivers conviction free	64.6	60.3*	65.2	80.0 → * → 66.7		68.6 → Δ → 64.6	
Crashes	Mean number of subsequent crashes per hundred drivers	10.1*	11.1	11.8	1.8 → * → 10.5		8.8	9.8
	Percentage of drivers crash free	82.4*	81.3	79.7	96.8 → * → 80.8		85.4	83.1

Note: The symbols denoting significance in columns 1 and 2 indicate differences between these numbers and those of column 3.

number of convictions for the Completed Conference and Clinic Group was greater than the average in the third year prior (increase from 21.3 to 24.2 per hundred drivers). Table 6 demonstrates that both groups had about the same percentage of drivers conviction free during the subsequent year.

Comparison of Failed to Report to Conference Group with Completed Conference and Clinic Group.

The Completed Conference and Clinic Group had a significantly lower average number of convictions in the subsequent year (24.2 per hundred drivers) than the Failed to Report to Conference Group (30.8 per hundred drivers; $p < .05$, see Table 6). However, the prior records of the two groups were not comparable. The Failed to Report to Conference Group (Figure A2) had a third year prior average of 26.0 convictions per hundred drivers which was significantly higher ($p < .05$) than the corresponding average of 21.3 convictions per hundred drivers for the Completed Conference and Clinic Group (Figure A4). Again the 31-36 month interval appears to be responsible for this difference.

Therefore, although the subsequent record for the Completed Conference and Clinic Group was better, the two groups were not significantly different in regard to amount of change from the third year prior to the first year subsequent (increase of 4.9 convictions per hundred drivers, Failed to Report to Conference Group; increase of 2.9 convictions per hundred drivers, Completed Conference and Clinic Group). However, the Completed Conference and Clinic Group had a significantly greater percentage of drivers (65.2 percent) who drove conviction free for the year than the Failed to Report to Conference Group (60.3 percent; see Table 6).

Comparison of Failed to Report to Preliminary Hearing Group with Completed Preliminary Hearing and Clinic Group.

There was a statistical difference between the prior conviction record of the Failed to Report to Preliminary Hearing Group (Figure A5), 12.1 per hundred drivers, and the Completed Preliminary Hearing and Clinic Group (Figure A7), 17.3 per hundred drivers. The Failed to Report to Preliminary Hearing Group had significantly fewer convictions in the year following the preliminary hearing ($p < .05$) and a significantly greater percentage (80 percent) of drivers who drove conviction free during the subsequent year than those drivers who completed the preliminary hearing and the clinic

(67 percent; Table 6). Of course it should be pointed out that drivers who fail to report to the preliminary hearing routinely have their licenses suspended or revoked; therefore it is not surprising that the Failed to Report to Preliminary Hearing Group had a greater percentage of conviction free drivers in this time period (even though as is obvious from the data, some percentage of these suspended drivers are driving).

Comparison of Failed to Report to Hearing Group with Completed Hearing and Clinic Group.

The prior conviction records of these two groups were not statistically different (Figures A8 and A10). Likewise, the subsequent conviction records for the two groups were not significantly different; however, the difference in percentage of drivers driving conviction free in the subsequent year was significant ($p < .20$; see Table 6).

Conviction comparisons within age/sex and age/race groups.

Table 7 presents the average number of convictions in the first year subsequent to the improvement measure for the age/sex groups within the eight comparison groups utilized in these analyses. Table 8 presents the same variable for age/race groups. Significant comparisons are indicated on the tables.

Crashes as criterion variable.

Table 6 indicates that when comparing subsequent crash records using both the average number of crashes and the percentage of crash free drivers, the Failed to Respond or Report Groups fared better than the Completed Meeting and Clinic Groups, although not all differences were significant.

The average number of crashes by age/sex groupings are presented in Table 9 and by age/race groupings are presented in Table 10.

Evaluation of Driver Improvement Clinic Curricula

In 1967, two curricula were in use in the clinics. One was the "traditional" curriculum which emphasized change in the drivers' attitudes and ways the driver could improve his negligent driving behavior.

Table 7. Average number of convictions (per hundred drivers) in the first year subsequent to the improvement measure, by age and sex, for drivers who failed to report to the meeting with a hearing officer and for drivers who completed the clinic after meeting with a hearing officer.

AGE	SEX	Failed To Respond To 7-Point Letter	Failed To Report To Conference	Completed Conference and Clinic	Failed To Report To Preliminary Hearing	Completed Preliminary Hearing and Clinic	Failed To Report To Hearing	Completed Hearing and Clinic
Less Than 25	Male	30.7 * (4815)	35.6 (673)	34.8 (771)	15.8 + * + (117)	28.6 (140)	45.7 + * + (140)	28.8 (517)
	Female	13.4 (328)	11.5 (39)	10.2 (64)	14.3 (14)	7.5 (20)	20.0 (10)	6.9 (36)
	Total	29.6 † (5143)	34.3 (712)	32.9 (835)	15.6 + * + (131)	25.9 (160)	44.0 + * + (150)	27.4 (553)
Greater Than Or Equal To 25	Male	24.0 * (5461)	27.8 * (607)	20.0 (1189)	15.3 + * + (137)	24.1 (237)	16.3 + * + (205)	23.8 (589)
	Female	13.5 (524)	15.0 (40)	10.6 (161)	0 + † + (10)	5.0 (30)	6.3 (8)	9.1 (22)
	Total	23.1 * (5985)	27.0 * (647)	18.9 (1350)	14.3 + * + (147)	21.9 (267)	16.0 + * + (213)	23.2 (611)
TOTAL		26.1 * (11128)	30.8 * (1359)	24.2 (2185)	14.9 + * + (278)	23.4 (427)	27.5 (363)	25.2 (1164)

Table 8. Average number of convictions (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who failed to report to the meeting with a hearing officer and for drivers who completed the clinic after meeting with the hearing officer.

AGE	RACE	Failed To Respond To 7-Point Letter	Failed To Report To Conference	Completed Conference and Clinic	Failed To Report To Preliminary Hearing	Completed Preliminary Hearing and Clinic	Failed To Report To Hearing	Completed Hearing and Clinic
Less Than 25	White	27.8 Δ (4071)	32.4 (502)	30.3 (664)	16.5 ← † → (94)	26.1 (138)	47.1 ← * → (122)	26.6 (491)
	Non-white	36.4 Δ (1072)	38.8 (210)	42.7 (171)	13.5 (37)	25.0 (22)	30.4 ← † → (28)	33.9 (62)
	Total	29.6 † (5143)	34.3 (712)	32.9 (835)	15.6 ← * → (131)	25.9 (160)	44.0 ← * → (150)	27.4 (553)
Greater Than Or Equal To 25	White	21.1 * (4000)	23.8 * (367)	15.8 (837)	12.3 ← * → (114)	19.9 (224)	15.8 (158)	21.7 (465)
	Non-white	27.1 † (1985)	31.3 * (280)	23.9 (513)	21.2 (33)	32.6 (43)	16.4 ← * → (55)	28.1 (146)
	Total	23.1 * (5985)	27.0 * (647)	18.9 (1350)	14.3 ← * → (147)	21.9 (267)	16.0 ← * → (213)	23.2 (611)
TOTAL		26.1 * (11128)	30.8 * (1359)	24.2 (2185)	14.9 ← * → (278)	23.4 (427)	27.5 (363)	25.2 (1164)

Table 9. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and sex, for drivers who failed to report to the meeting with a hearing officer and for drivers who completed the clinic after meeting with a hearing officer.

AGE	SEX	Failed To Respond To 7-Point Letter	Failed To Report To Conference	Completed Conference and Clinic	Failed To Report To Preliminary Hearing	Completed Preliminary Hearing and Clinic	Failed To Report To Hearing	Completed Hearing and Clinic
Less Than 25	Male	10.9 * (4815)	11.7 * (673)	14.9 (771)	1.3 ← * → (117)	12.9 (140)	15.0 (140)	12.2 (517)
	Female	7.5 * (328)	1.3 (39)	3.1 (64)	0 ← † → (14)	10.0 (20)	5.0 (10)	0 (36)
	Total	10.7 * (5143)	11.2 * (712)	14.0 (835)	1.1 ← * → (131)	12.5 (160)	14.3 (150)	11.4 (553)
Greater Than Or Equal To 25	Male	9.7 Δ (5461)	11.2 (607)	10.7 (1189)	2.6 ← * → (137)	10.1 (237)	5.1 ← * → (205)	8.2 (589)
	Female	7.3 (524)	8.7 (40)	8.7 (161)	0 ← Δ → (10)	3.3 (30)	0 ← * → (8)	11.4 (22)
	Total	9.5 (5985)	11.1 (647)	10.4 (1350)	2.4 ← * → (147)	9.4 (267)	4.9 ← * → (213)	8.3 (611)
TOTAL		10.1 * (11128)	11.1 (1359)	11.8 (2185)	1.8 ← * → (278)	10.5 (427)	8.8 (363)	9.8 (1164)

Table 10. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who failed to report to the meeting with a hearing officer and for drivers who completed the clinic after meeting with a hearing officer.

AGE	RACE	Failed To Respond To 7-Point Letter	Failed To Report To Conference	Completed Conference and Clinic	Failed To Report To Preliminary Hearing	Completed Preliminary Hearing and Clinic	Failed To Report To Hearing	Completed Hearing and Clinic
Less Than 25	White	9.8 * (4071)	9.7 * (502)	12.9 (664)	0.5 + * + (94)	12.3 (138)	15.2 + Δ + (122)	10.5 (491)
	Non-white	14.0 + (1072)	14.8 (210)	18.4 (171)	2.7 + * + (37)	13.6 (22)	10.7 + Δ + (28)	18.5 (62)
	Total	10.7 * (5143)	11.2 * (712)	14.0 (835)	1.1 + * + (131)	12.5 (160)	14.3 (150)	11.4 (553)
Greater Than Or Equal To 25	White	8.1 (4000)	7.5 (367)	8.4 (837)	2.2 + * + (114)	8.3 (224)	4.4 + * + (158)	7.7 (465)
	Non-white	12.4 (1985)	15.7 (280)	13.8 (513)	3.0 + * + (33)	15.1 (43)	6.4 + Δ + (55)	10.3 (146)
	Total	9.5 (5985)	11.1 (647)	10.4 (1350)	2.4 + * + (147)	9.4 (267)	4.9 + * + (213)	8.3 (611)
TOTAL		10.1 * (11128)	11.1 (1359)	11.8 (2185)	1.8 + * + (278)	10.5 (427)	8.8 (363)	9.8 (1164)

The other curriculum was the Defensive Driving Course (DDC) designed by the National Safety Council to inform drivers of ways to drive defensively regardless of fault.

Data were available on 1882 drivers who were enrolled in the traditional curriculum in 1967 and on 1717 drivers enrolled in the Defensive Driving Curriculum that year. The curriculum each driver received was dependent upon his location in the state. Thus there should be no systematic biases as to which drivers received which curriculum. Some clinic instructors had begun using the DDC whereas others had not. Comparisons were made between the two curricula within the groups assigned to the clinic as a result of a conference, preliminary hearing, or hearing.

Convictions as criterion variable.

The three Chi-square tests comparing the two curricula groups' prior third year conviction records did not produce significant results. As indicated in Table 11, there was also little difference in the subsequent records of the persons receiving each of the two curricula; however, of the drivers assigned through a hearing, the traditional curriculum, when judged on average subsequent convictions, was significantly better ($p < .10$) than the defensive driving curriculum (23.1 per hundred drivers and 28.1 per hundred drivers, respectively).

Conviction comparisons within age/sex and age/race groups.

Table 12 contains the average number of convictions in the first year subsequent to the date assigned to the clinic for age/sex groups. It can be observed that neither curriculum is consistently superior. There appears to be a trend for males to respond more favorably to the traditional curriculum, although only one of the tests produced significant results. The young males who were assigned to the clinic as a result of a hearing responded significantly better to the traditional curriculum ($p < .05$). The females assigned through a preliminary hearing or a hearing, on the other hand, responded more favorably to the Defensive Driving Curriculum. Four tests produced significant results. Both young and older females being assigned as a result of a preliminary hearing responded significantly more favorably to the Defensive Driving Curriculum ($p < .05$, and $p < .20$, respectively). In addition, the younger and older females being assigned as a result of a hearing fared significantly better after receiving the Defensive Driving Curriculum ($p < .20$, and $p < .05$, respectively).

Table 11. Four criterion variables utilized in comparing first year subsequent records of study group receiving the traditional curriculum and those receiving the DDC curriculum.

	Variable	Conference		Preliminary Hearing		Hearing	
		Traditional (n=1025)	DDC (n=1076)	Traditional (n=214)	DDC (n=183)	Traditional (n=643)	DDC (n=458)
Convictions	Mean number of subsequent convictions per hundred drivers	23.7	24.6	23.1	23.5	23.1 ← + →	28.1
	Percentage of drivers conviction free	66.1	64.2	67.8	66.1	65.6	63.8
Crashes	Mean number of subsequent crashes per hundred drivers	11.0 ← Δ →	12.6	10.5	10.4	7.8 ← * →	12.1
	Percentage of drivers crash free	80.3	79.1	81.3	80.9	86.0 ← * →	80.1

Table 12. Average number of convictions (per hundred drivers) in the first year subsequent to the improvement measure, by age and sex, for drivers who received the traditional curriculum and for drivers who received the defensive driving curriculum at the clinic.

AGE	SEX	Completed Conference and Clinic		Completed Preliminary Hearing and Clinic		Completed Hearing and Clinic	
		Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum
Less Than 25	Male	33.1 (393)	36.2 (344)	26.5 (81)	35.2 (44)	23.3 ← * → (283)	35.3 (204)
	Female	7.7 (26)	11.1 (36)	15.0 ← * → (10)	0 (10)	10.5 ← Δ → (19)	3.1 (16)
	Total	31.5 (419)	33.8 (380)	25.3 (91)	28.7 (54)	22.5 ← * → (302)	33.0 (220)
Greater Than Or Equal To 25	Male	19.2 (543)	20.8 (600)	22.8 (112)	24.1 (114)	24.1 (326)	24.2 (231)
	Female	9.5 (63)	11.5 (96)	9.1 ← Δ → (11)	0 (15)	13.3 ← * → (15)	0 (7)
	Total	18.2 (606)	19.5 (696)	21.5 (123)	21.3 (129)	23.6 (341)	23.5 (238)
TOTAL		23.7 (1025)	24.6 (1076)	23.1 (214)	23.5 (183)	23.1 ← + → (643)	28.1 (458)

Table 13 contains the average number of convictions in the first year subsequent to the date assigned to the clinic for age/race groups. There do not appear to be any trends of differences between the races. There was only one significant result produced when comparing average convictions. Of the young whites who were assigned through a hearing, those enrolled in the traditional curriculum fared more favorably ($p < .05$).

Crashes as criterion variable.

Although the differences between the two curricula in the crash variables are not great, the means and percentages do favor the traditional curricula (see Table 11). This is surprising since the DDC is especially designed for crash avoidance. The biggest difference is observed within the hearing group. It should be pointed out that the drivers within the hearing group who received the traditional curriculum had significantly fewer crashes in the third year prior (7.7 per hundred drivers compared to 10.2 for the DDC group, $p < .10$) and hence selection factors may be responsible for the significant differences in the subsequent crash record.

In Table 14, males appear to be accounting for most of the significant results. Since there are more males than females, overall results favoring the traditional curriculum are reflecting the differences observed for males. Table 15 contains mean number of subsequent crashes for age/race groups. There appear to be no consistent trends.

IV. DISCUSSION AND SUMMARY

Before discussing the results of this study, the reader should be reminded of the various possible biases present in the data. First, since randomized control groups were not utilized, selection factors are inevitably present. What effect these factors have on the number of citations and crashes accumulated by the various study groups is unknown. Second, as is always the case, an artificiality existed in the increased number of convictions prior to the improvement measure. Drivers are selected into the improvement programs on the basis of an accumulation of convictions. Therefore, within the six-month period just prior to the program, each driver would have received at least one conviction (the final one responsible for bringing him to the Department's attention for improvement). This artificiality exists to some extent in all prior time periods, but decreases as the length of time prior to the improvement measure increases. For this reason, the third year prior was selected to determine comparability of groups

Table 13. Average number of convictions (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who received the traditional curriculum and for drivers who received the defensive driving curriculum at the clinic.

AGE	RACE	Completed Conference and Clinic		Completed Preliminary Hearing and Clinic		Completed Hearing and Clinic	
		Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum
Less Than 25	White	29.1 (326)	30.9 (307)	25.0 (78)	28.7 (47)	21.2 (278)	32.8 (186)
	Non-white	39.8 (93)	45.9 (73)	26.9 (13)	28.6 (7)	37.5 (24)	33.8 (34)
	Total	31.5 (419)	33.8 (380)	25.3 (91)	28.7 (54)	22.5 (302)	33.0 (220)
Greater Than Or Equal To 25	White	15.3 (344)	16.3 (457)	19.3 (101)	19.1 (110)	23.3 (266)	20.2 (176)
	Non-white	22.1 (262)	25.7 (239)	31.8 (22)	34.2 (19)	24.7 (75)	33.1 (62)
	Total	18.2 (606)	19.5 (696)	21.5 (123)	21.3 (129)	23.6 (341)	23.5 (238)
TOTAL		23.7 (1025)	24.6 (1076)	23.1 (214)	23.5 (183)	23.1 (643)	28.1 (458)

Table 14. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and sex, for drivers who received the traditional curriculum and for drivers who received the defensive driving curriculum at the clinic.

AGE	SEX	Completed Conference and Clinic		Completed Preliminary Hearing and Clinic		Completed Hearing and Clinic	
		Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum
Less Than 25	Male	13.5 (393)	16.3 (344)	12.3 (81)	15.9 (44)	9.5 (283)	15.4 (204)
	Female	3.8 (26)	2.8 (36)	10.0 (10)	10.0 (10)	0 (19)	0 (16)
	Total	12.9 (419)	15.0 (380)	12.1 (91)	14.8 (54)	8.9 (302)	14.3 (220)
Greater Than Or Equal To 25	Male	9.9 (543)	11.7 (600)	9.8 (112)	9.2 (114)	6.9 (326)	9.5 (231)
	Female	7.9 (63)	9.4 (96)	4.5 (11)	3.3 (15)	3.3 (15)	28.6 (7)
	Total	9.7 (606)	11.4 (696)	9.3 (123)	8.5 (129)	6.7 (341)	10.1 (238)
TOTAL		11.0 (1025)	12.6 (1076)	10.5 (214)	10.4 (183)	7.8 (643)	12.1 (458)

Table 15. Average number of crashes (per hundred drivers) in the first year subsequent to the improvement measure, by age and race, for drivers who received the traditional curriculum and for drivers who received the defensive driving curriculum at the clinic.

AGE	RACE	Completed Conference and Clinic		Completed Preliminary Hearing and Clinic		Completed Hearing and Clinic	
		Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum	Traditional Curriculum	Defensive Driving Curriculum
Less Than 25	White	12.1 (326)	13.4 (307)	11.5 (78)	14.9 (47)	8.1 (278)	13.7 (186)
	Non-white	15.6 (93)	21.9 (73)	15.4 (13)	14.3 (7)	18.8 (24)	17.6 (34)
	Total	12.9 (419)	15.0 (380)	12.1 (91)	14.8 (54)	8.9 (302)	14.3 (220)
Greater Than Or Equal To 25	White	6.5 (344)	10.0 (457)	8.4 (101)	6.8 (110)	7.0 (266)	8.5 (176)
	Non-white	13.7 (262)	14.0 (239)	13.6 (22)	18.4 (19)	6.0 (75)	14.5 (62)
	Total	9.7 (606)	11.4 (696)	9.3 (123)	8.5 (129)	6.7 (341)	10.1 (238)
TOTAL		11.0 (1025)	12.6 (1076)	10.5 (214)	10.4 (183)	7.8 (643)	12.1 (458)

before comparisons of subsequent records were performed. The shortcoming of this decision was that it is possible that some drivers were not driving and perhaps not even licensed to drive in North Carolina during this third year prior. Whether exposure varied between study groups is unknown. Third, many drivers had a suspension or revocation within the five year study period. Although the percentage of such drivers was presented for each study group, these drivers were not removed from the sample for reasons discussed earlier. The lack of exposure caused by suspensions or revocations may have had an effect on some of the significant findings reported.

Keeping these factors in mind, the main results will be discussed. Based on convictions, trends favor the clinic experience, although differences were not dramatic. The only comparison for which both variables (mean number of subsequent convictions and percentage of drivers conviction free for the subsequent year) significantly favored the clinic was the Failed to Complete Clinic Group vs the Completed Clinic Group assigned to the clinic as a result of a conference. Of those drivers assigned to a clinic as a result of a preliminary hearing, the clinic graduates had a significantly lower mean number of subsequent convictions and a higher, but not significantly higher, percentage of drivers conviction free in the subsequent year than the drivers who failed to complete the clinic. Of the drivers assigned to a clinic as a result of a hearing, the clinic graduates had a lower mean number of subsequent convictions and a higher percentage of drivers conviction free in the subsequent year than the non-graduates, but neither difference was significant. With regard to crashes, the clinic fared favorably in the hearing group; there was little difference within the conference group; and, although not significant, the clinic graduates within the preliminary hearing group did not respond as well as the non-graduates. However, when it is recalled that drivers failing to complete the clinic after attending a preliminary hearing usually have their license suspended, it is surprising that the Failed to Complete Clinic Group had as many convictions and crashes as it did. This finding is consistent with the results of Coppin and Van Oldenbeek that suspended and revoked drivers do drive.

When making conviction comparisons within age/sex and age/race groups, clinic participants do not show superior performance in every case. No clear-cut trends are obvious; however, it does appear that most of the significant differences favoring the clinic appear within the greater than 25 age group.

The next set of comparisons was between the Failed to Respond to Advisory Letter Group and the Failed to Report to the Individual Meeting with a Hearing Officer Groups with the Completed Clinic Groups. These

comparisons are plagued with many biasing factors. The Completed Conference and Clinic Group did not perform consistently better than the Failed to Respond to Advisory Letter Group or the Failed to Report to Conference Group. Although the Completed Conference and Clinic Group had a significantly lower mean number of convictions, it had about the same percentage of drivers conviction free and a significantly higher mean number of crashes and lower percentage of drivers crash free than the Failed to Respond to Advisory Letter Group. Many selection factors may be involved in these comparisons. The drivers in the Failed to Respond to Advisory Letter Group may be more conscientious and take it upon themselves to improve their driving performance, whereas drivers in the Completed Conference and Clinic Group may be less apt to use their own initiative and instead let DMV try to correct their performance. The data in this study do not provide a basis for differentiating among all these possibilities. However, from the comparisons within age/sex groups, the younger males appear to be the group that responds better on its own than from the driver improvement experience. The older males and both of the female groups appear to respond better to the improvement measures than on their own.

The next finding that the Failed to Report to Preliminary Hearing Group had a significantly greater percentage of drivers conviction free and crash free as well as a significantly lower mean number of citations and crashes compared to the Completed Preliminary Hearing and Clinic Group most likely may result from differences in the proportion of drivers whose licenses are suspended or revoked. About 83 percent of the Failed to Report to Preliminary Hearing Group had a suspension or revocation during the study period compared to 53 percent of the Completed Preliminary Hearing and Clinic Group. Hence, the results seem to indicate that suspension and revocation may be more effective (although certainly not completely successful) in reducing convictions and crashes than the combination of the preliminary hearing and clinic experience. However, the price of the inconvenience and hardship of suspension and revocation to the drivers is a considerable drawback to use of suspensions and revocations.

The final set of comparisons, between the traditional and DDC curricula reveal little differences. There is a slight trend for the males to respond more favorably to the traditional curriculum. With the exception of the females attending as a result of a conference, the females tend to respond more favorably to the DDC. This tendency is interesting in view of previous research on warning letters where the level of threat was varied (McBride and Peck, 1970). Females were found to respond more favorably than males to the lower threat approach. The two driver improvement clinic curriculum types could be roughly categorized in terms of level of threat in that the traditional curri-

curriculum is considered to view the driver as a violator who is in need of improvement. In contrast, the DDC curriculum is considered by the instructors to be less threatening in that it takes the approach that anyone can find himself in a potentially dangerous situation, but there are ways to respond that will reduce the probability of a crash. If the two curriculum types can be seen as varying in their level of threat, then the finding that females respond somewhat better to the DDC curriculum while males show a better response to the traditional curriculum is in keeping with the findings for warning letters. However, only a few of the differences were significant, and it may be that the benefits observed for the clinic experience stem primarily from attending a "Driver Improvement Clinic" and not from the particular curriculum taught.

What practical implications can be drawn from these data are up to the administrators. Based on citations, the clinic experience appears worthwhile although not overwhelmingly so for every group of drivers. None of the study groups has a subsequent record as good as the control group consisting of a systematic sample of drivers from the driver file.

The impact of the program cannot of course be judged solely on citation and collision data. The mere existence of the improvement system may be having a positive effect on drivers. The clinic is a positive approach to correction which is available to the hearing officers in lieu of suspension or revocation. The main recommendation of the authors are that more study be given to those aspects of the clinic experience that seem to be most beneficial to various groups of drivers. Revisions in the program to include the more successful aspects and to aim different aspects of the program at different groups of drivers may be in order. Such revisions should be evaluated under controlled conditions including random assignment of drivers to treatment in order to optimize the possibility of detecting an effect.

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APPENDIX A

Figures Presenting Conviction and Crash Rates per One Hundred Drivers for Each Six-Month Interval of the Study Period for Main Study Groups

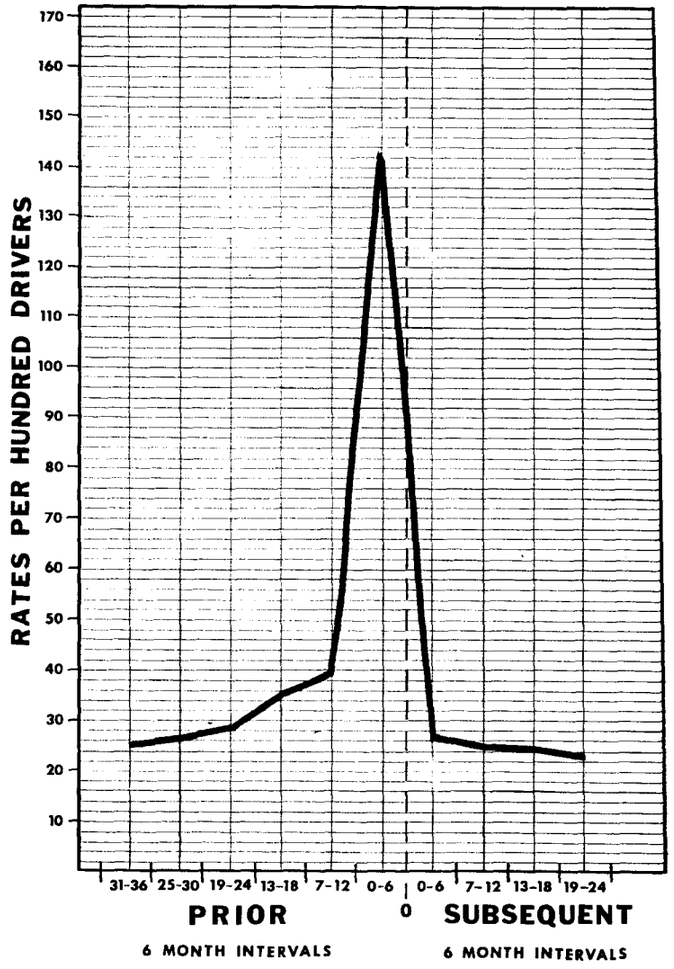

Figure A1. Conviction rate per one hundred drivers for each six-month interval for Failed to Respond to Advisory Letter Group (n = 11136).

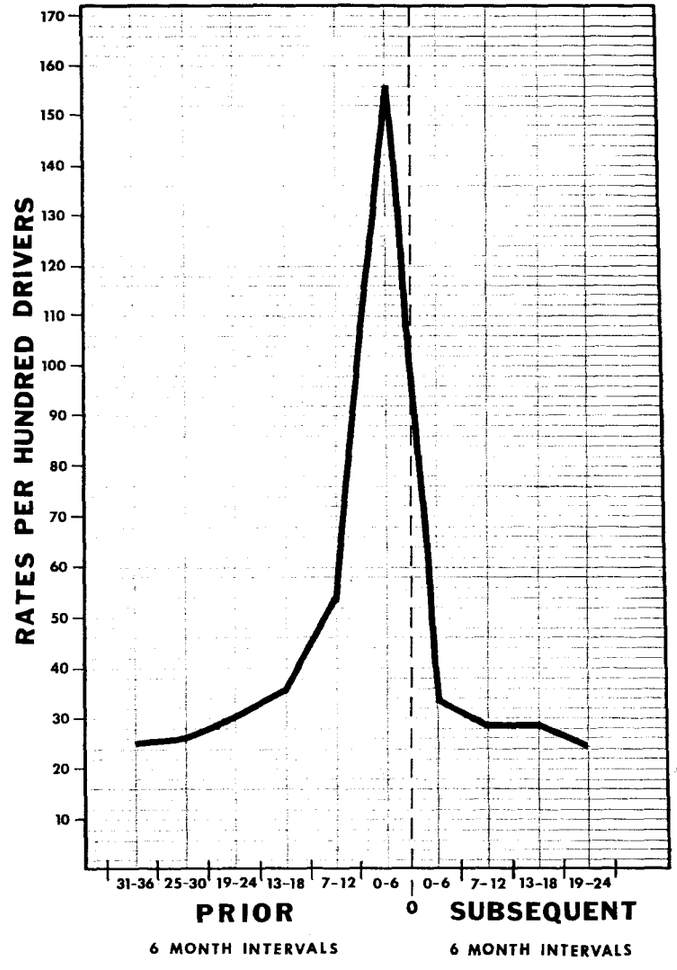

Figure A2. Conviction rate per one hundred drivers for each six- month interval for Failed to Report to Conference Group (n = 1360).

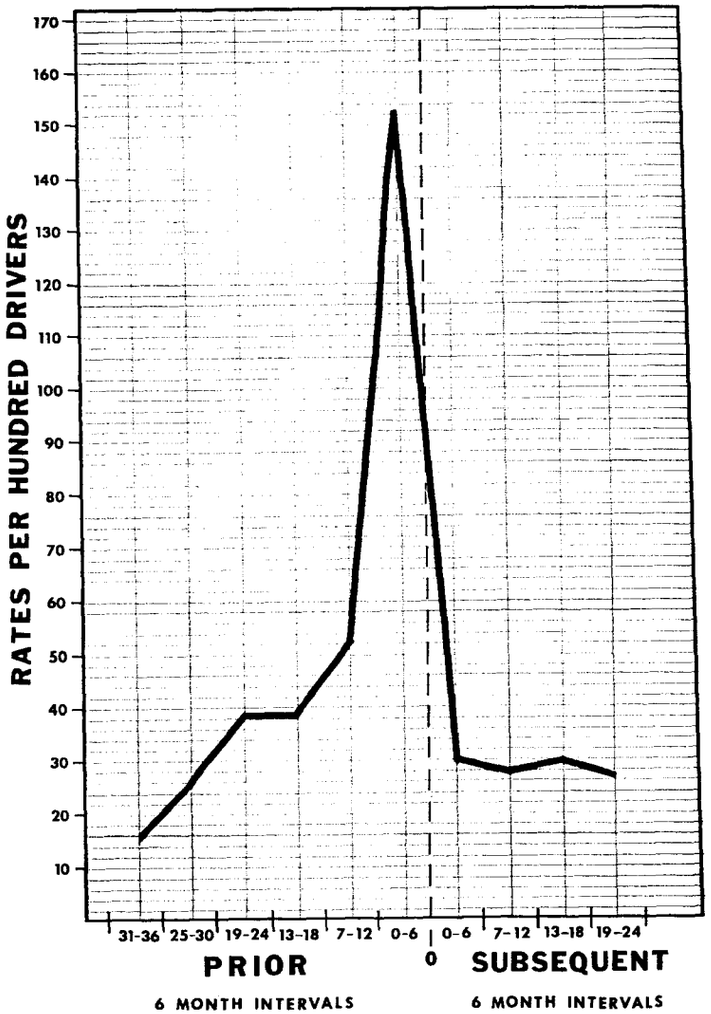

Figure A3. Conviction rate per one hundred drivers for each six-month interval for Attended Conference, Failed to Complete Clinic Group (n = 696).

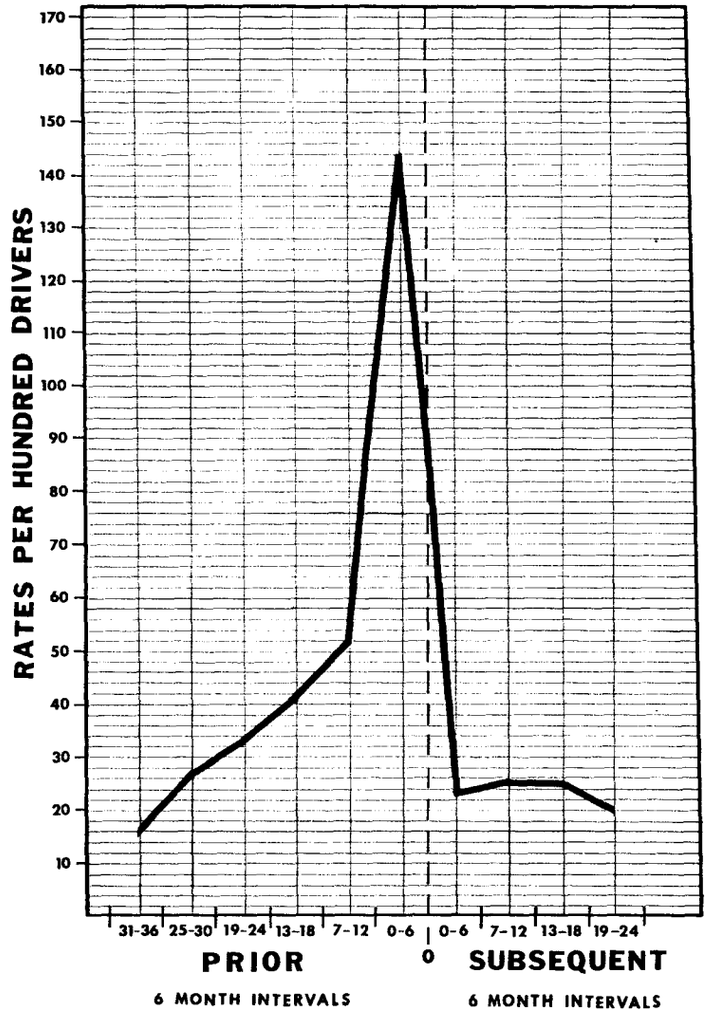

Figure A4. Conviction rate per one hundred drivers for each six-month interval for Completed Conference and Clinic Group (n = 2185).

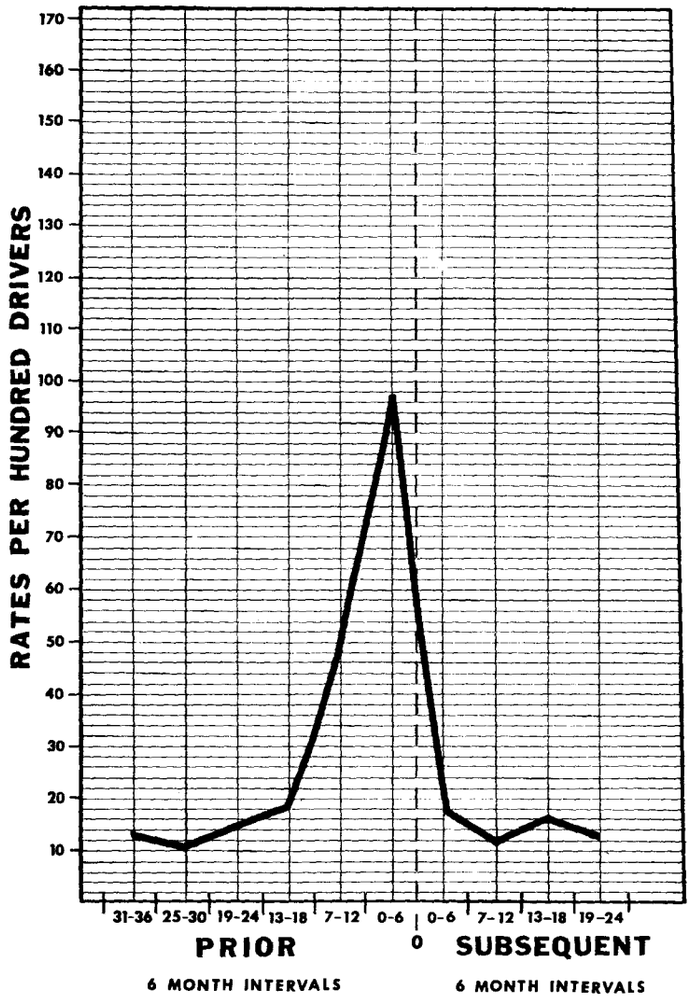

Figure A5. Conviction rate per one hundred drivers for each six-month interval for Failed to Report to Preliminary Hearing Group (n = 281).

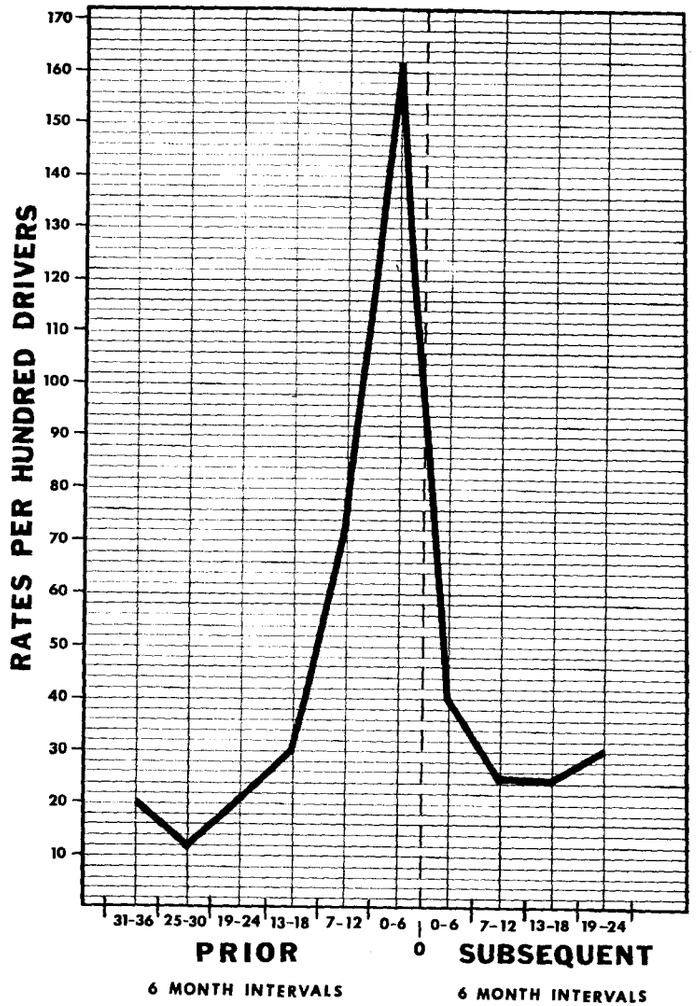

Figure A6. Conviction rate per one hundred drivers for each six-month interval for Attended Preliminary Hearing, Failed to Complete Clinic Group (n = 49).

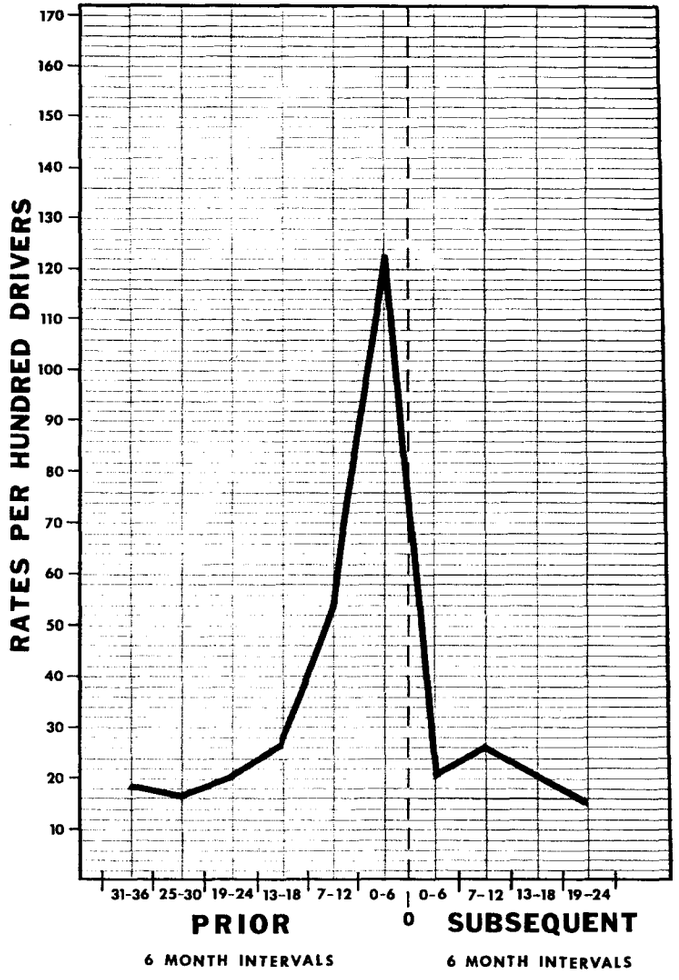

Figure A7. Conviction rate per one hundred drivers for each six-month interval for Completed Preliminary Hearing and Clinic Group (n = 428).

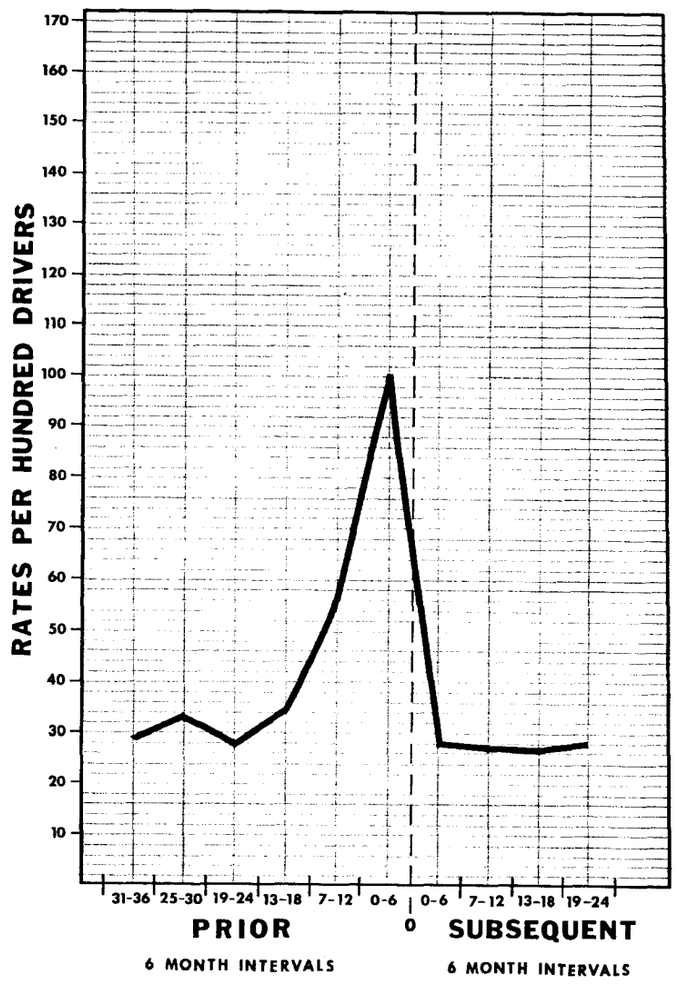

Figure A8. Conviction rate per one hundred drivers for each six-month interval for Failed to Report to Hearing Group (n = 363).

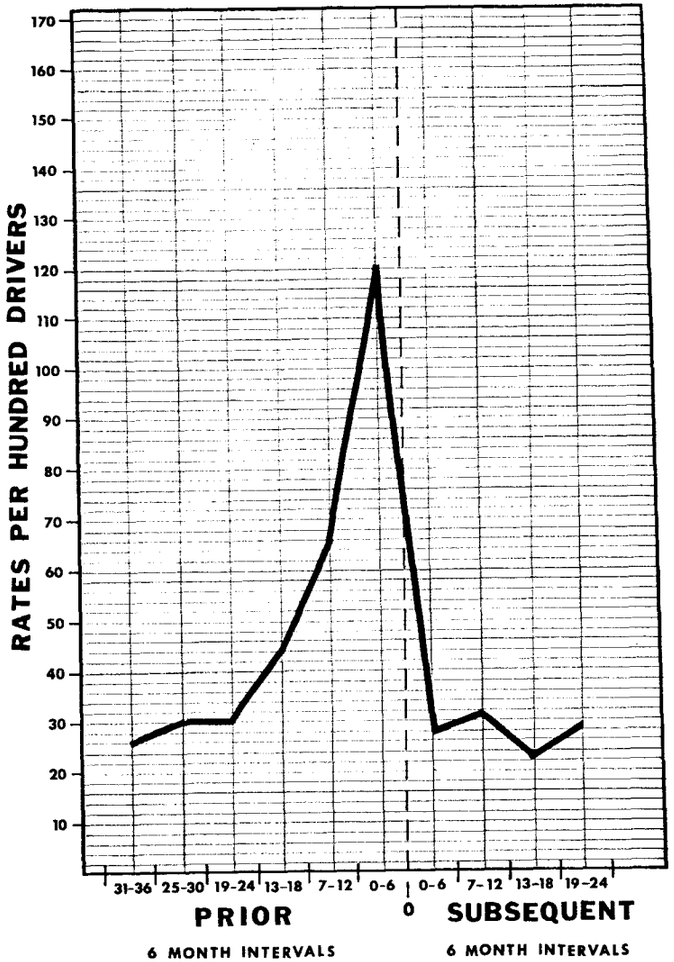

Figure A9. Conviction rate per one hundred drivers for each six-month interval for Attended Hearing, Failed to Complete Clinic Group (n = 252).

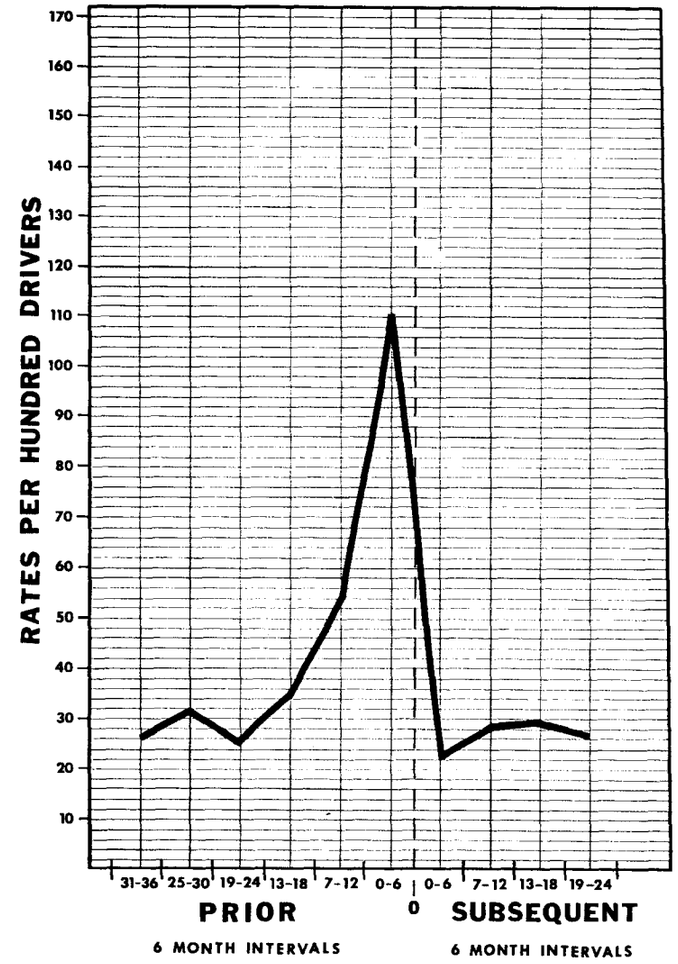

Figure A10. Conviction rate per one hundred drivers for each six-month interval for Completed Hearing and Clinic Group (n = 1164).

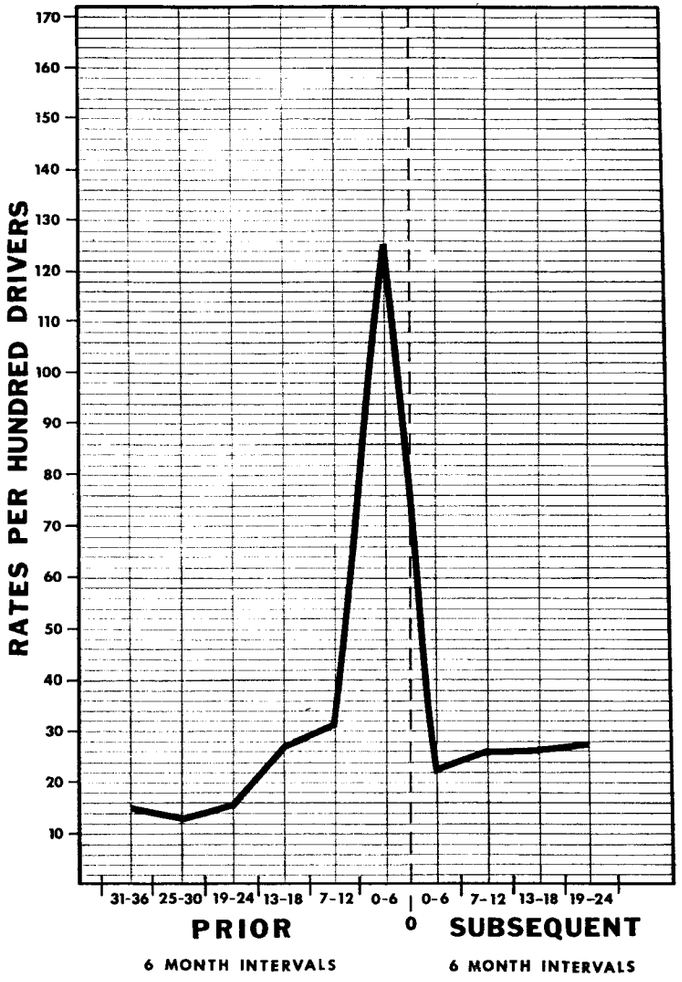

Figure A11. Conviction rate per one hundred drivers for each six-month interval for Attended Clinic Through Courts Group (n = 481).

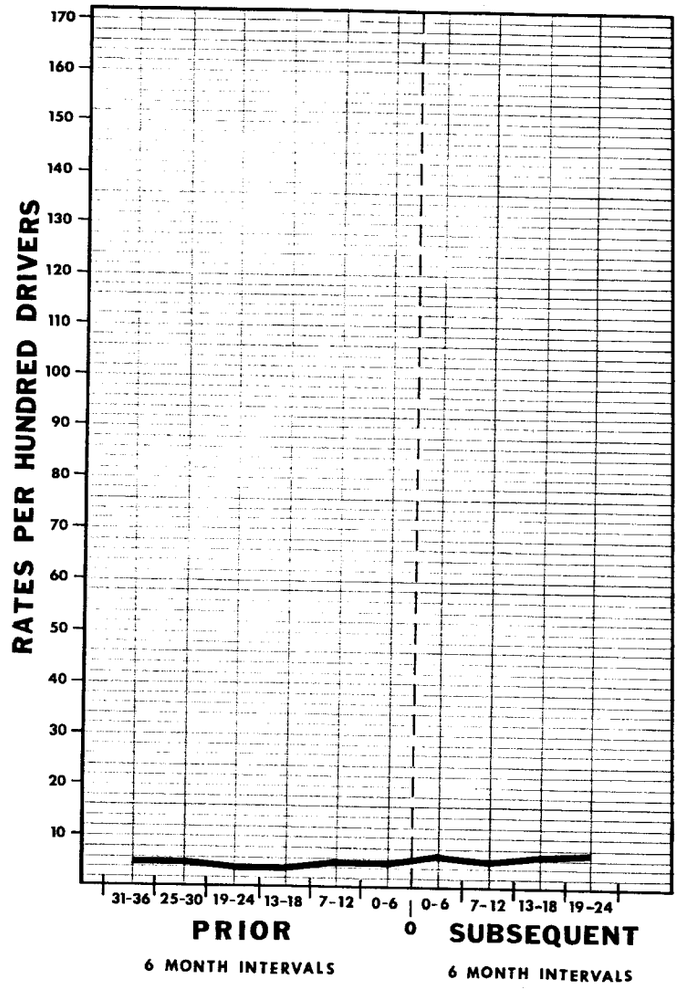

Figure A12. Conviction rate per one hundred drivers for each six-month interval for Control Group (n = 2797).

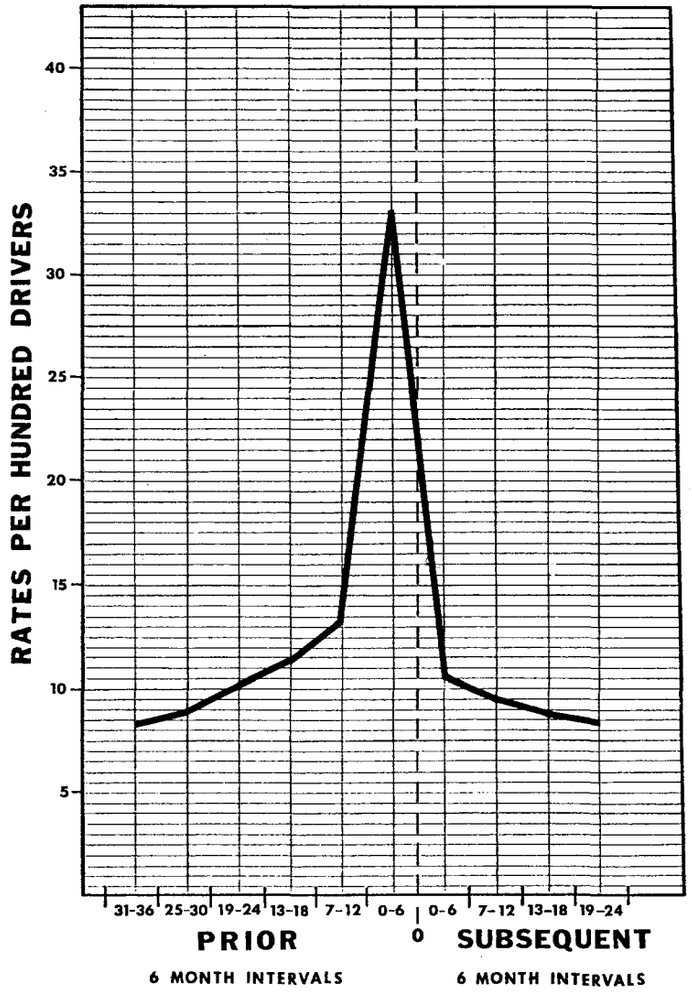

Figure A13. Crash rate per one hundred drivers for each six-month interval for Failed to Respond to Advisory Letter Group (n = 11136).

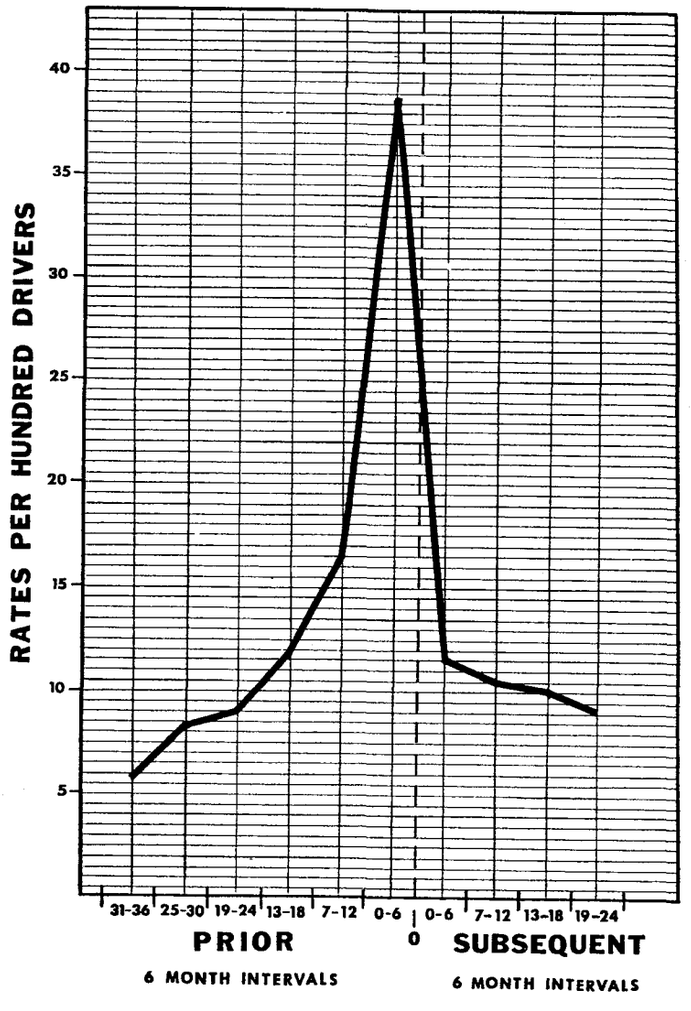

Figure A14. Crash rate per one hundred drivers for each six-month interval for Failed to Report to Conference Group (n = 1360).

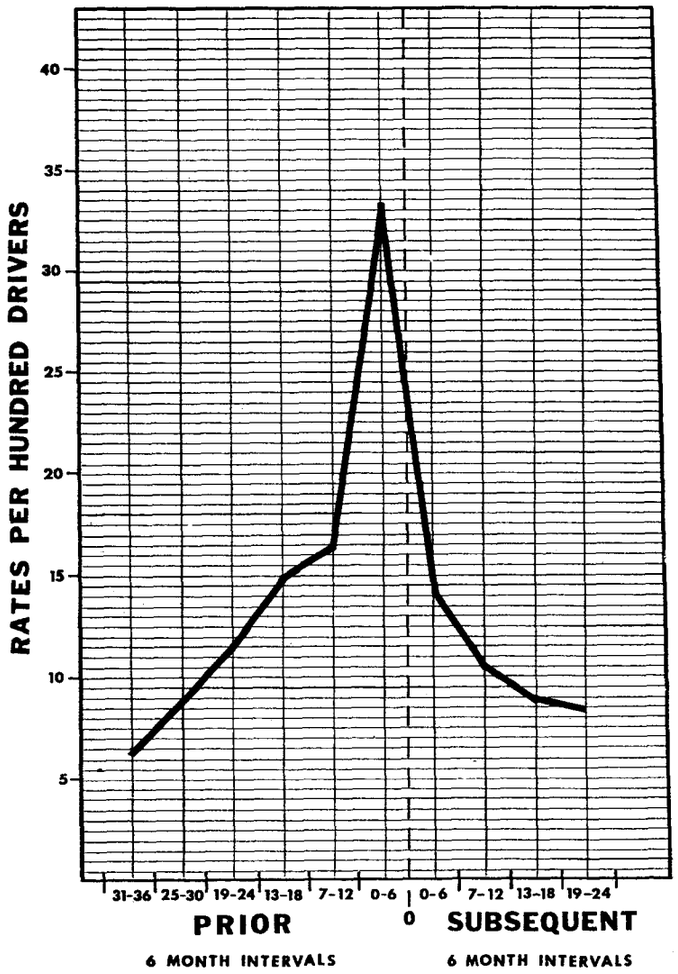

Figure A15. Crash rate per one hundred drivers for each six-month interval for Attended Conference, Failed to Complete Clinic Group (n = 696).

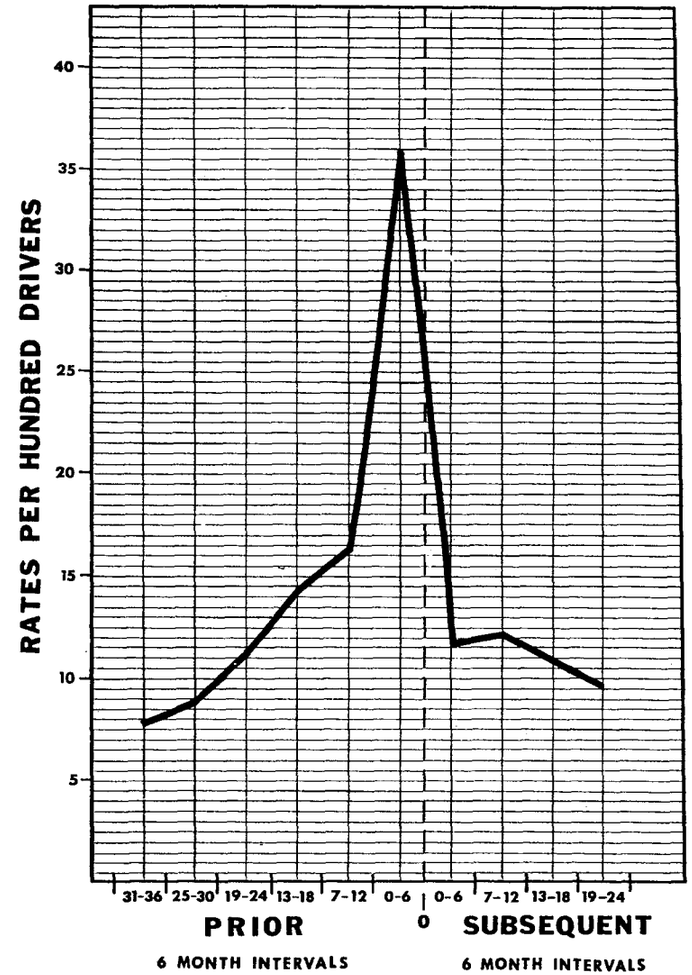

Figure A16. Crash rate per one hundred drivers for each six-month interval for Completed Conference and Clinic Group (n = 2185).

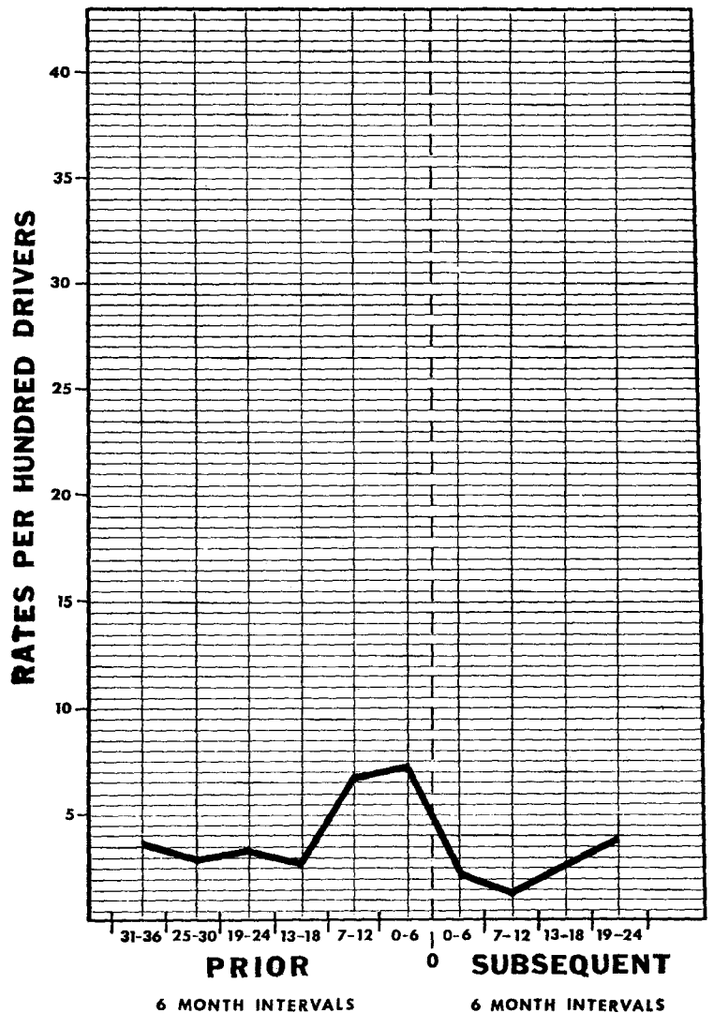

Figure A17. Crash rate per one hundred drivers for each six-month interval for Failed to Report to Preliminary Hearing Group (n = 281).

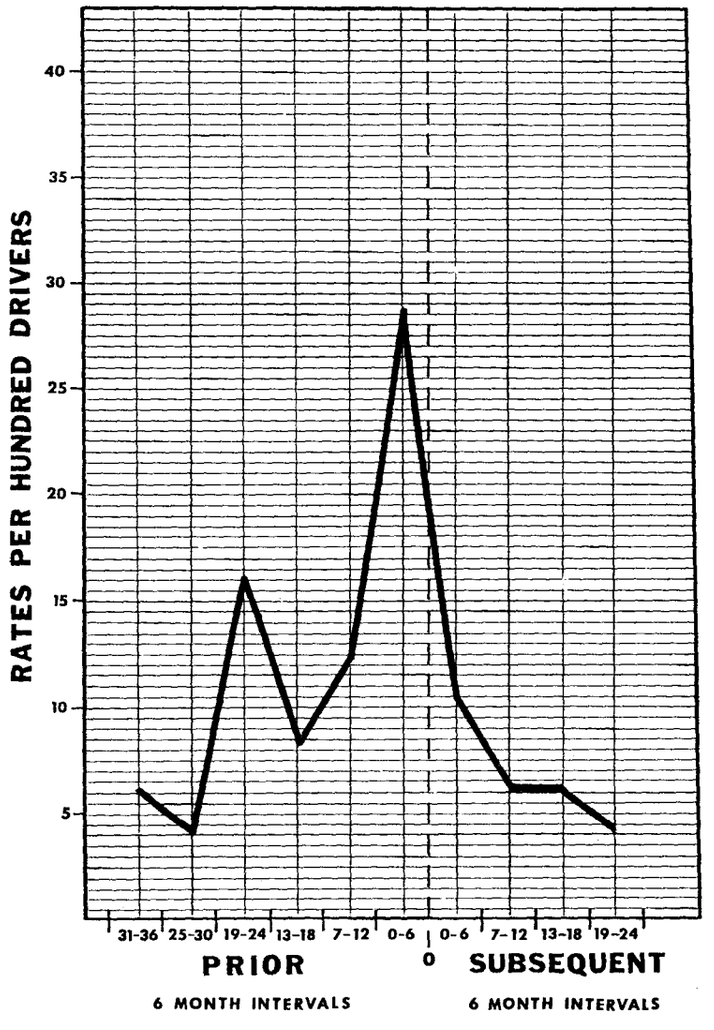

Figure A18. Crash rate per one hundred drivers for each six-month interval for Attended Preliminary Hearing, Failed to Complete Clinic Group (n = 49).

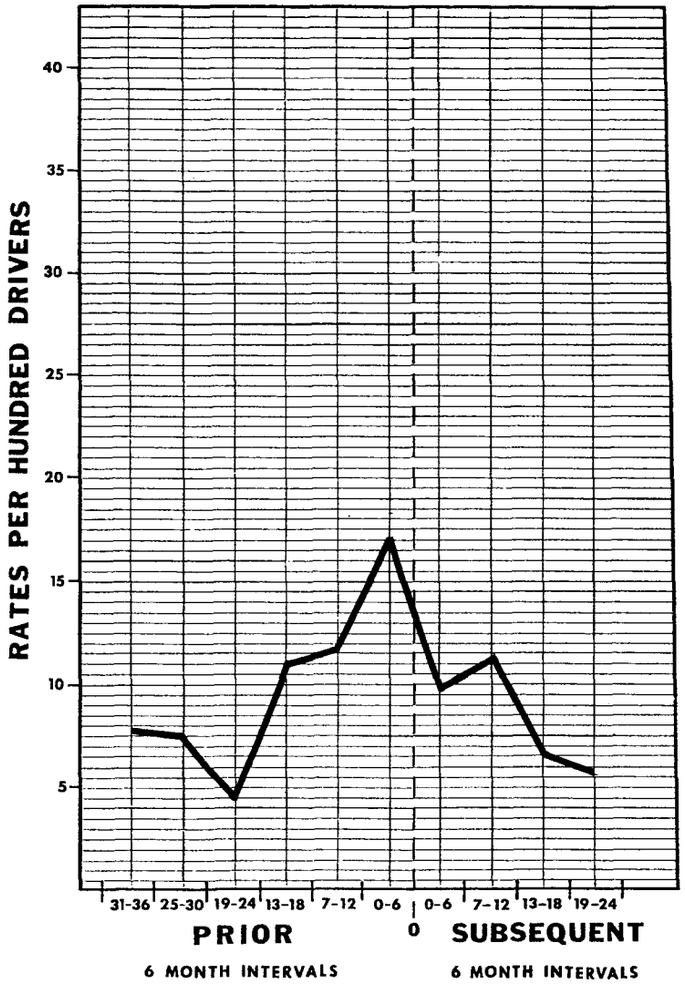

Figure A19. Crash rate per one hundred drivers for each six-month interval for Completed Preliminary Hearing and Clinic Group (n = 428).

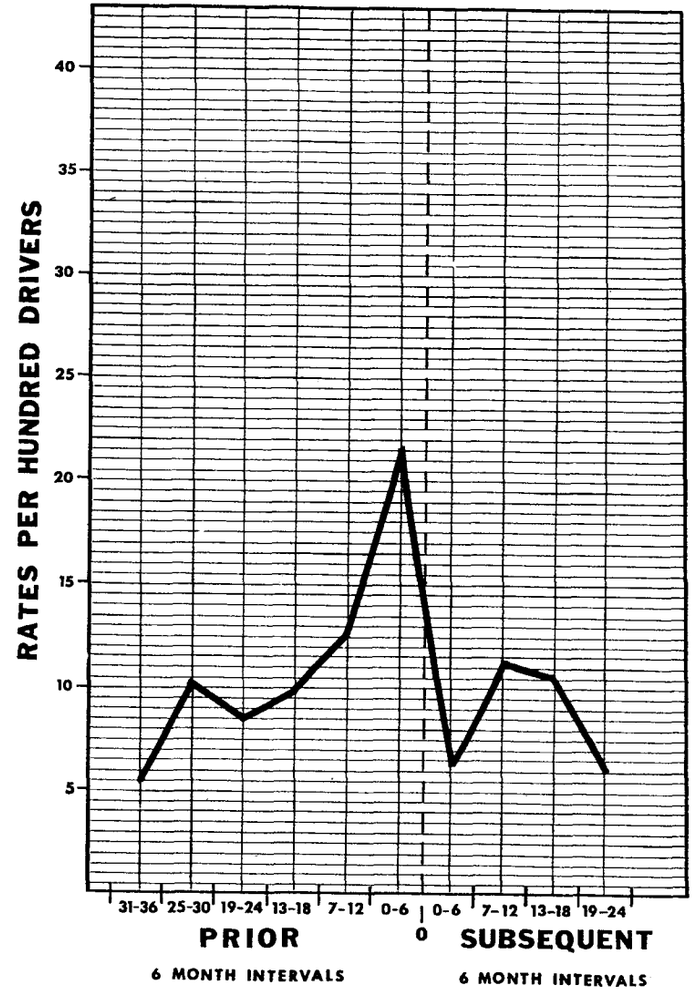

Figure A20. Crash rate per one hundred drivers for each six-month interval for Failed to Report to Hearing Group (n = 363).

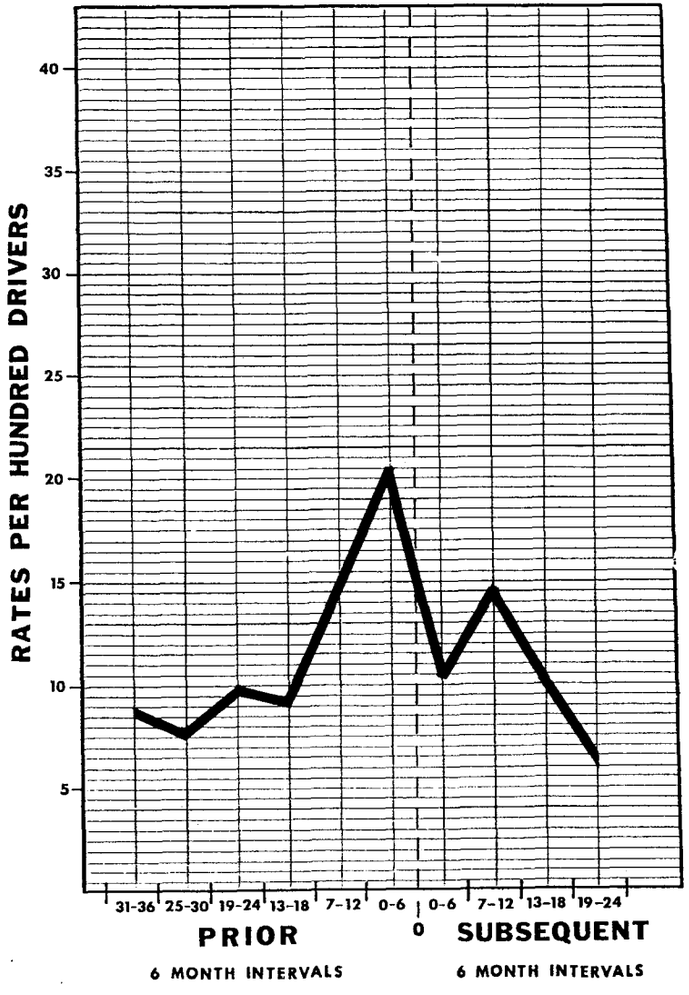

Figure A21. Crash rate per one hundred drivers for each six-month interval for Attended Hearing, Failed to Complete Clinic (n = 252).

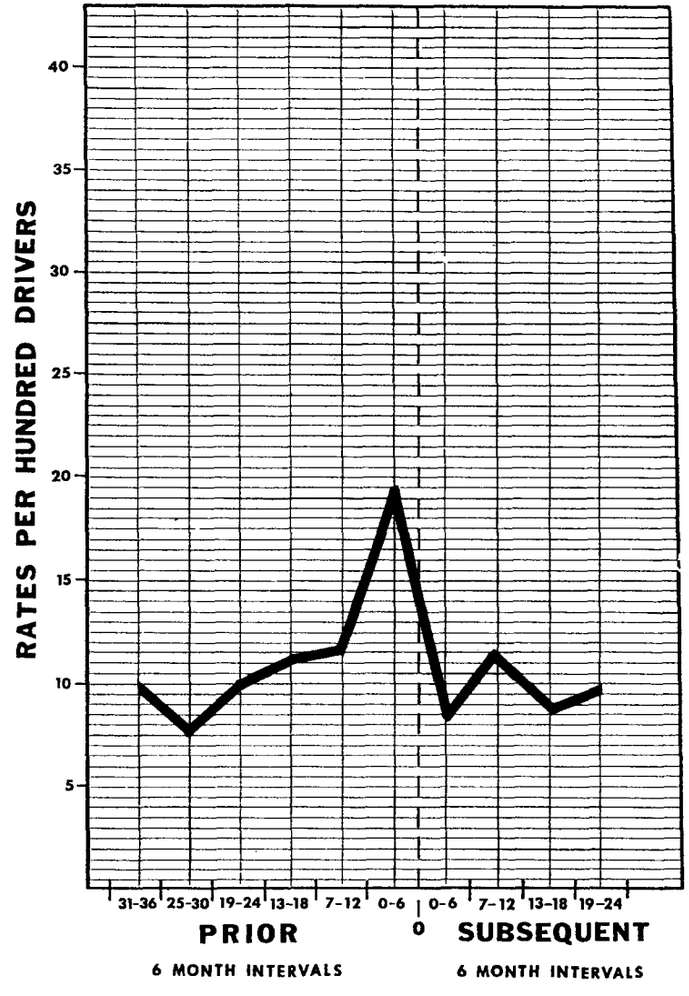

Figure A22. Crash rate per one hundred drivers for each six-month interval for Completed Hearing and Clinic Group (n = 1164).

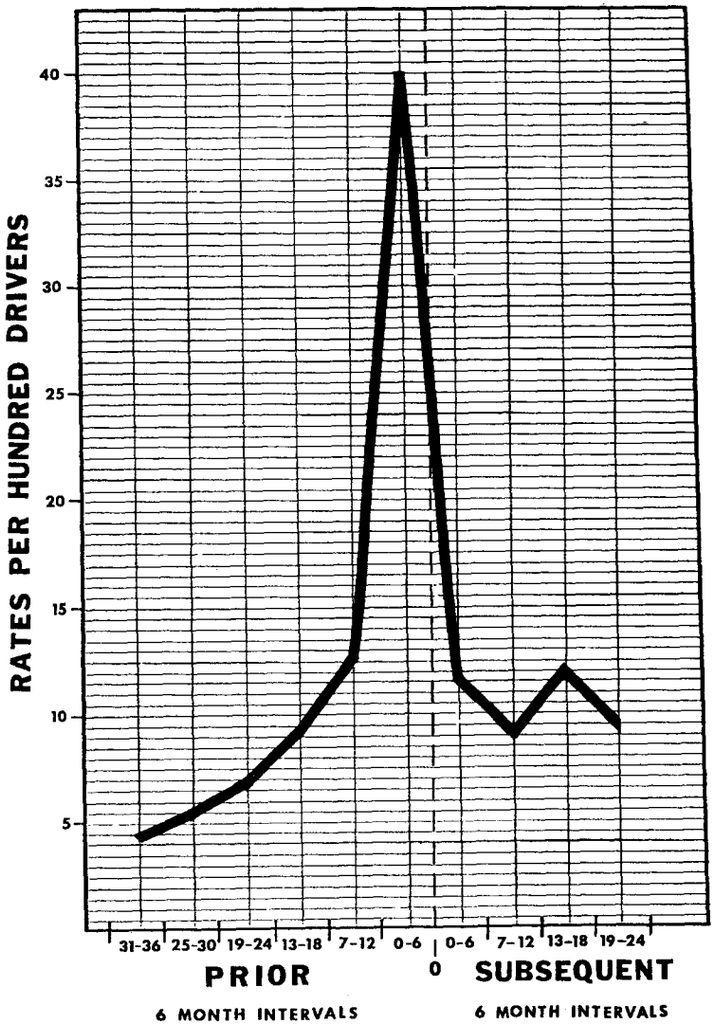

Figure A23. Crash rate per one hundred drivers for each six-month interval for Attended Clinic Through Courts Group (n = 481).

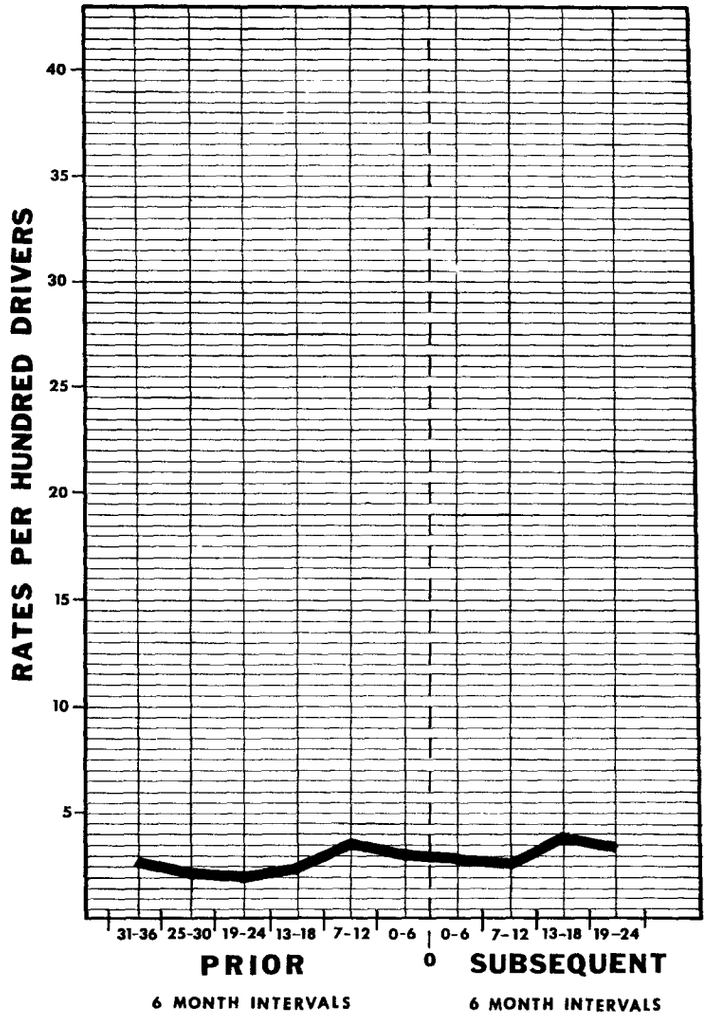

Figure A24. Crash rate per one hundred drivers for each six-month interval for Control Group (n = 2797).

APPENDIX B

Selected Figures Presenting Conviction Rates per One Hundred Drivers for Each Six-Month Interval of the Study Period by Age/Race and Age/Sex Groups

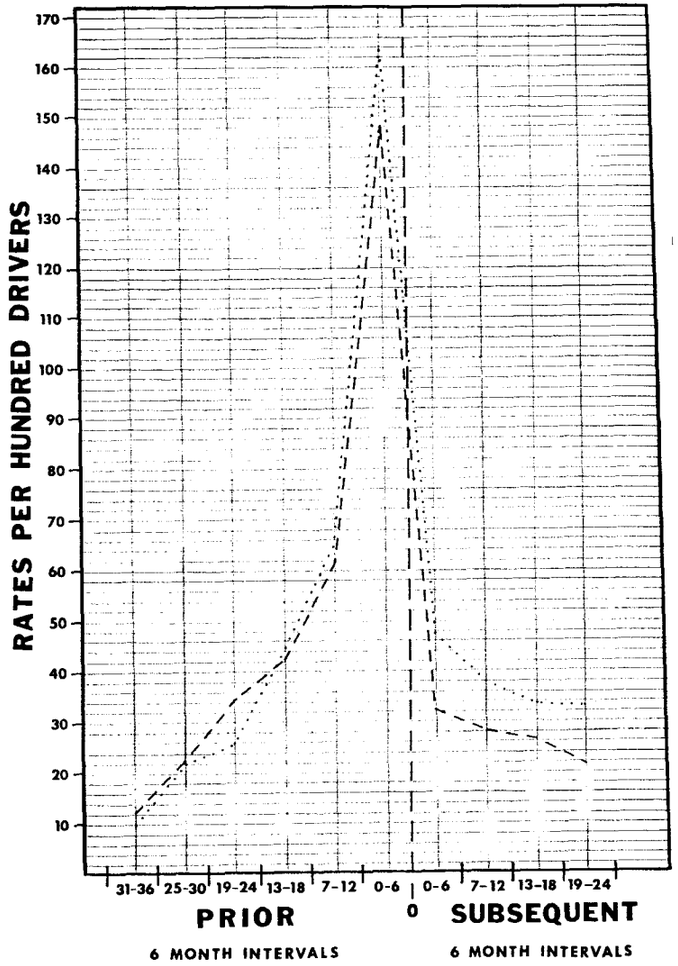

Figure B1. Conviction rate per one hundred drivers for each six-month interval for drivers under age 25, in Completed Conference and Clinic Group by race (white, n = 664; nonwhite, n = 171).

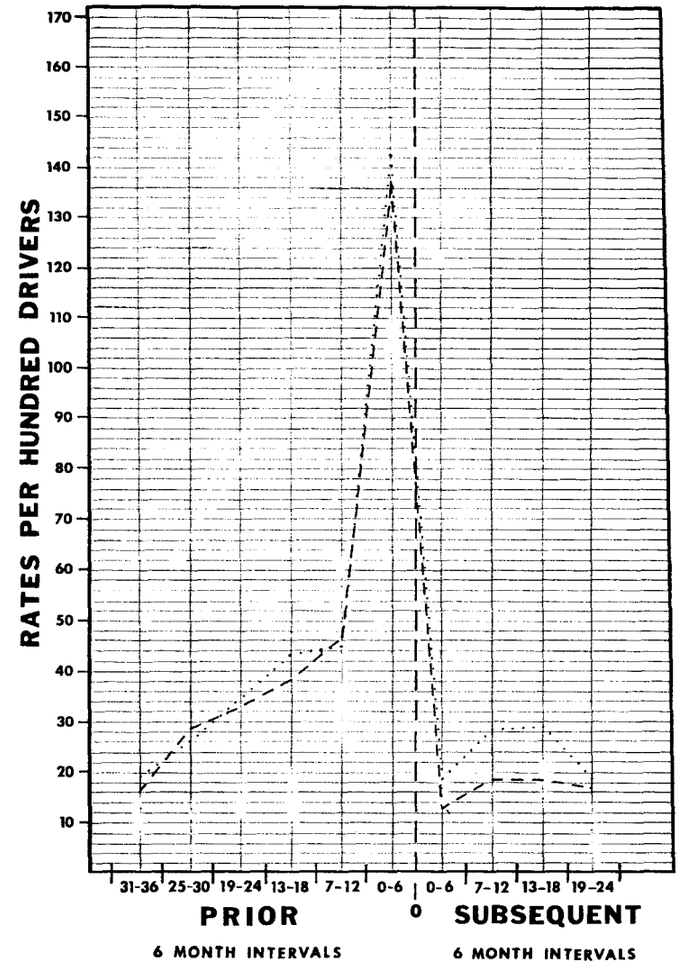

Figure B2. Conviction rate per one hundred drivers for each six-month interval for drivers 25 years old and over in Completed Conference and Clinic Group by race (white, n = 837; nonwhite, n = 513).

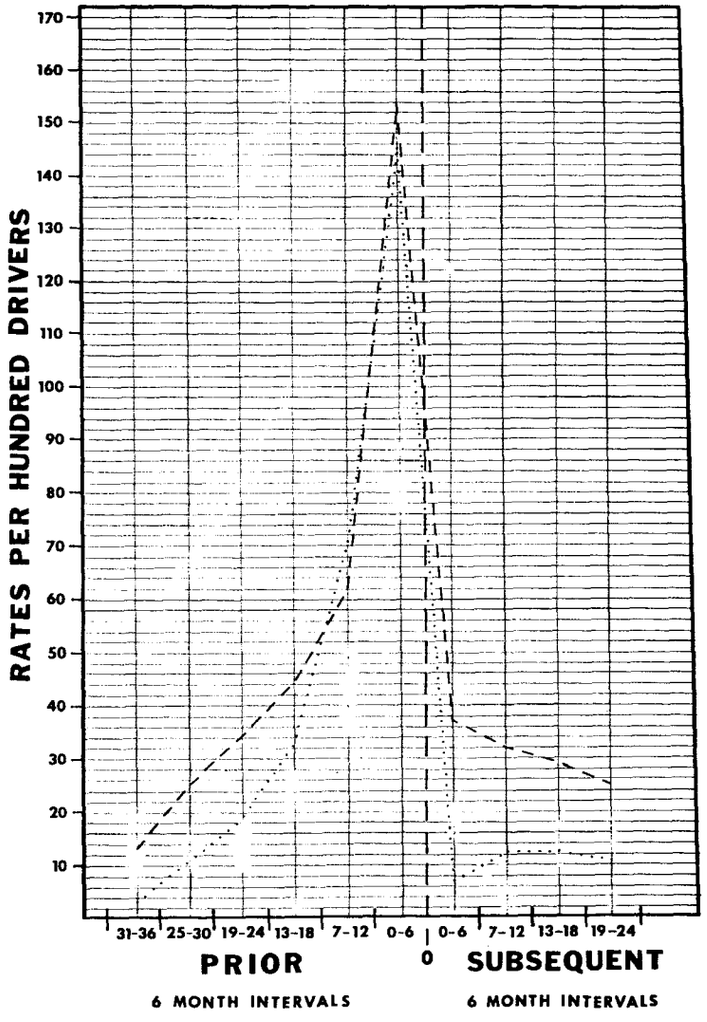

Figure B3. Conviction rate per one hundred drivers for each six-month interval for drivers under age 25 in Completed Conference and Clinic Group by sex (male, n = 771; female, n = 64).

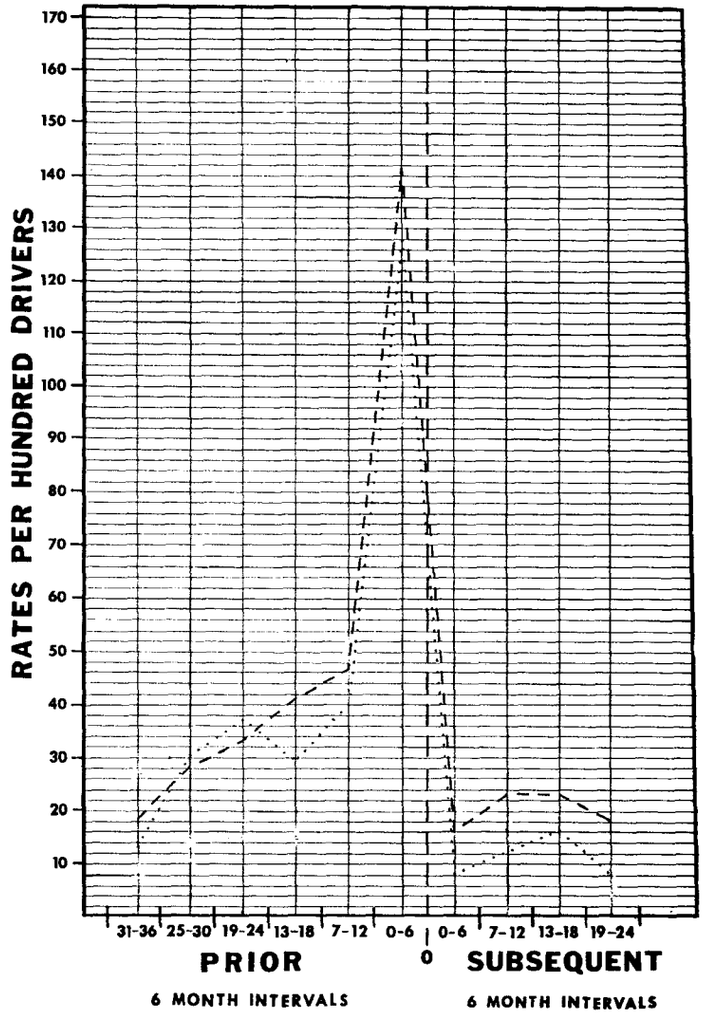

Figure B4. Conviction rate per one hundred drivers for each six-month interval for drivers 25 years old and over in Completed Conference and Clinic Group by sex (male, n = 1189; female, n = 161).