DOT HS-801 227

DRINKING DRIVERS AND THEIR TRAFFIC RECORDS

Contract No. DOT-HS-010-2-452
September 1974
Final Report

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
WASHINGTON, D.C. 20590

Document is available to the public through
the National Technical Information Service,
Springfield, Virginia 22151

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS-801 227		

4. Title and Subtitle	5. Report Date
Drinking Drivers and Their Traffic Records I. The Effects of a Countermeasures Program in Reducing the Recidivism of Drunk Driving II. A Study of Drivers Involved in Fatal Accidents	September 1974
	6. Performing Organization Code
7. Author(s) J. Robert Newman, Susan Kirby, and Alexander W. McEachern	8. Performing Organization Report No. 1
9. Performing Organization Name and Address Social Science Research Institute University of Southern California Los Angeles, California 90007	10. Work Unit No. (TRAIS)
	11. Contract or Grant No. DOT-HS-010-2-452
12. Sponsoring Agency Name and Address National Highway Traffic Safety Administration U.S. Department of Transportation Washington, D.C. 20590	13. Type of Report and Period Covered Final Report July 1972-July 1974
	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This report describes two studies of comparing the driving behavior of drinking drivers with that of non-drinking drivers. Study I tested the efficacy of an intensive countermeasure treatment program designed to reduce the recidivism of drunk driving. The results indicated that overall the treatments were effective in the sense that those drunk drivers who received some treatment other than a court sentence had fewer post treatment alcohol related offenses and better overall driver quality when compared against appropriate control groups. The convicted drunk drivers had dramatically worse driving records both prior to and after the treatment programs when compared against a group who had never been convicted for drunk driving. The results also indicated that while the drunk drivers did not necessarily have more accidents than the non-drunk drivers, they did have [redacted] and were more often at fault. Study II investigated two groups of drivers killed in accidents. One group had been drinking prior to the accident as indicated by the presence of blood alcohol content (BAC group); the other group had not been drinking (non-BAC group). Analysis of the driving records of these two groups prior to the accident indicated distinct differences between the two groups with the BAC group having much poorer driving records than the non-BAC group. Members of the BAC group also were more often at fault but, unlike the results of Study I, were not involved in more serious accidents as measured by the number of injuries and deaths when compared with the non-BAC group.

17. Key Words	18. Distribution Statement
Drunk Driving Driver Behavior Traffic Records and Accidents	Document is available to the public through the National Technical Information Service, Springfield, Virginia 22151

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unlimited	Unlimited	48	

Form DOT F 1700.7 (8-72)

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

PART I

PART II

LIST OF TABLES - continued

SUMMARY

This is the final report of an investigation of the driving records of drinking drivers and nondrinking drivers. The report is divided into two parts presenting the results of two separate studies.

Part I presents the results of a study investigating the efficacy of several countermeasure treatment programs designed to reduce the recidivism of drunk driving. Six groups of convicted drunk drivers were assigned to six treatment programs. Two were assigned to Group Therapy; two to a Film and Lecture series; one to the Alcohol Rehabilitation Center (ARC); and one to Alcoholics Anonymous (AA). There were three control groups consisting of convicted drunk drivers that did not receive any treatment and a final group the members of which had never been convicted of drunk driving.

The complete driving history of each driver was analyzed both prior to and after the treatment period. The results, reported in terms of a driver quality index and an accident index, indicated the following: (1) The drunk drivers who had been assigned to a treatment group improved their driving behavior (i.e., had fewer post period alcohol related offenses and better driving records compared to appropriate control groups who received no such treatment), (2) The group that seemed to benefit the most (i.e., improved their driving behavior the greatest) was the group assigned to AA. The differences, however, while statistically significant, are quite small. The convicted drunk drivers had dramatically worse driving records when compared against a group that had no record of drunk driving. The accident index showed that the convicted drunk drivers were more likely to be at fault and have more serious accidents in terms of number of injuries and fatalities than the nondrunk driving group.

Part II compares the driving records of two groups of drivers who had been involved in fatal accidents: a group who had been drinking prior to the accident as indicated by evidence of blood alcohol content (BAC) and a group who had not been drinking prior to the accident (No BAC). The results show that the driving records of the two groups are distinctly different from one another with the BAC group having significantly poorer record of driving than the non-BAC group. These differences show up in all age groups from young to old. In terms of accidents, the BAC group was more apt to be at fault than the non-BAC, but unlike the results found in Part I the two groups were about the same with respect to the severity of the accident as measured by the number of injuries and fatalities. The two groups also differed in the type of fatal accident with the BAC group having a higher percentage of "off-the-road" type accident and the non-BAC group having a higher percentage of "multi-vehicle" accidents.

I. THE EFFECTS OF A COUNTERMEASURES PROGRAM IN REDUCING THE RECIDIVISM OF DRUNK DRIVING

Introduction

This is a report of a study of the driving records of a sample of people who had at least one drunk driving conviction in Los Angeles County during 1969 and 1970. It was a follow-on to an intensive study which had investigated the efficacy of several countermeasure programs designed to reduce the recidivism of drunk driving (Pollack, 1972). For the purposes of this report, this will be referred to as the initial study. One of the major conclusions of the initial study was that there essentially no differences between the various countermeasure treatment groups in comparison to control groups with respect to subsequent drunk driving arrests. This finding was based on approximately a one-year follow-up of the drivers records.

This study was designed to obtain information on the drinking drivers over a longer period of time both after the countermeasures program and prior to this program. Also, as a result of a suggestion from the initial study, the present study took a careful look at the accident records of the drinking drivers and nondrinking drivers in order to obtain more detailed information about the relationship between drunk driving and the type and severity of accidents.

The basic source of information was the California Department of Motor Vehicles "In-House Record" which contains the complete driving record of each California driver. Before describing the type of information obtained from this record and its use in this study, we will briefly describe the samples of drivers which were studied.

Description of the Samples

The Countermeasures Sample. This group of people had been arrested and convicted for drunk driving in the County of Los Angeles between 1968 and 1970 and were referred to the initial study program and assigned to one of six countermeasure treatment groups labeled 1 through 6 as follows:

1. Problem-Oriented Group Therapy. People assigned to this group attended eight two-hour problem centered therapy meetings. The primary focus was to aid each

individual in understanding himself in relation to his drinking and driving, which could lead to accident involvement. The therapist attempted to influence each individual to change his drinking and driving behavior.

2. Traditional Group Therapy. People assigned to this group attended approximately the same number of sessions as those in group 1. The sessions were conducted along traditional lines in which the participants were free to raise and explore problems and questions of concern to them. The therapist facilitated the group interaction but did not attempt to guide the session to specific problems such as the abuse of alcohol and driving while drinking.

3. Film-Lecture Discussion Meetings (four sessions). People assigned to this group attended four two-hour film and lecture discussion meetings in groups of 45 people. The films and lectures provided information on topics such as the effects of alcohol on driving behavior and accident probabilities.

4. Film-Lecture Discussion Meetings (One session only). People assigned to this group were shown all the films and had all the lectures presented to group 3, but all was done in one 90-minute session in groups of approximately 100 people.

5. Alcohol Rehabilitation Center (ARC). People assigned to this group were referred to the Los Angeles County Department of Health ARC for screening, diagnosis, and subsequent treatment. The usual treatment at ARC is the administration of the drug "antabuse." All participants also received a series of lectures on alcohol abuse.

6. Alcoholics Anonymous (AA). Arrangements were made with AA for the people assigned to this group to show evidence that the participants had attended AA meetings. Attendance was the sole criterion for saying that the participant had received "AA treatment."

A more detailed description of these treatment groups is given in the initial study (Pollack, 1972, pp. 31-33).

The Control Group Sample. In addition there was a control group (designated as group 7) referred by the courts and subjected to various types of tests but were not placed in any countermeasure group. Another control group designated as group 10 in this report served as a "Court Control." The

members of this group were convicted drunk drivers who were not referred to the initial study program but were included in order to obtain information on people who were not in any countermeasures group but received the conventional court sentence.

There were also two additional groups, generated from the initial countermeasures sample. One of these, group 8, consisted of convicted drunk drivers who were referred by the courts but for one reason or another did not cooperate and were returned to court for conventional sentencing. Members of this are similar to group 10, the court control group. The other group, group 9, also consisted of convicted drunk drivers who were referred by the court but for personal reasons or administrative convenience never received any countermeasure "treatment." In a sense, this group was similar to group 7 except members of this group were not given any of the tests adminstered to Group 7.

Additional Groups. Also included in the present analysis was a group of drivers who had never, prior to 1970, been arrested or convicted for drunk driving. This group can be considered as a random sample of typical drivers in Los Angeles County on which there is a DMV record which may or may not contain traffic offense data depending upon the driver's record. This group is designated as the DMV group.

Finally, there is a small group of convicted drunk drivers that had been exposed to an extensive countermeasures program conducted in conjunction with the Santa Monica Branch of the Los Angeles County Court System (Sackman, Didenko, Tang, and Thomas, 1972).[1] This group, which we will designate as the Santa Monica (SM group), was not part of the initial study, but, since it was convenient to do so, we obtained traffic record information on them. Thus, there are 12 groups, 11 of which had at least one conviction for drunk driving and of this 11, seven (including the SM group) had gone through some countermeasure program in the hope of reducing the probability of a repeat offense of drinking while driving. Four of these 11 did not receive such countermeasures treatment either by design or due to administrative convenience and can be considered control groups. One group can be considered a sample of "typical" Los Angeles County drivers who had not at the time of the initial study been arrested for drunk driving.

---

[1]This program was sponsored by the U.S. Department of Transportation.

Definition of the Risk Groups. The convicted drunk drivers that were referred to the initial study had filled out questionnaires about their driving and drinking behavior. On the basis of a "score" assigned to each person's answer to this questionnaire, it was possible to classify that person as a "Low Risk" or a "High Risk" with respect to the probability of repeating a drunk driving offense. (The details of this procedure and classification are given in the initial study final report (Pollack, 1972).[1]

Procedure for the Present Study

The present study used as its major source of information the California Department of Motor Vehicles Report DDL EDP form, the so called, "In-House Report."[2] This form contains the complete driving record of any California driver, including all traffic offenses and their disposition and summary information on all accidents. For each member of the groups described above this record was obtained from the Department of Motor Vehicles and a special coding sheet was prepared and all information considered relevant to this study was transcribed under codes suitable for computer data processing. With respect to accidents, fairly detailed information as to the type of accident, number of injuries and fatalities involved and driver fault were obtained. However, we were not able to obtain information with respect to property damage in accidents.[3]

All the results presented in the next section are based on the information obtained from the DMV record.

---

[1]Actually some of the convicted drunk drivers were assigned to a third "super high risk" category since their admitted drinking behavior was so extensive. There were only 42 such persons, however, and their data are not analyzed in this study.

[2]We are indebted to Raymand C. Peck and his staff of the California DMV for their cooperation in obtaining this information.

[3]It was intended in this study to obtain a sample of the actual accident reports filed by the police or the California Highway Patrol to obtain such property damage estimates and a sample of 223 such reports were actually selected. However, it was found that these reports do not contain such information in any detail. Apparently, information on traffic accident property damage is not readily accessible in public records.

Results

The results will be presented under three related topics that are descriptive of the traffic records of the various groups: (1) The number of subsequent, i.e., after the countermeasures program, drinking driving arrests and alcohol-related offenses (which includes reckless driving); (2) An overall analysis of driver quality, exclusive of accidents, which is a derived index; (3) The accident records and a derived accident index.

All the convicted drunk drivers were assigned to the various treatment and control groups in the latter half of 1969 and the early part of 1970. This study obtained the DMV records on these individuals covering a time period up to about mid-1973. Thus, by "subsequent" record we mean about a 2-1/2 year time period after the individuals had been assigned to the various groups.

The Drunk Driving Record

Table 1 presents the average number of subsequent drunk Driving (DD) offenses and Total Number of Alcohol Related Offenses (TAROF) as a function of the various groups. In addition to the number of drunk driving offenses, TAROF includes reckless driving, which in Los Angeles County is often the same as drunk driving and "other" alcohol offenses such as "open alcoholic container in the car," etc. Several things should be noted about Table 1.

(a) Treatment group 4 had a preponderance of low risk individuals assigned to it and contained only 13 High Risk persons. Also, it was not possible in the initial study to classify group 10 into High and Low Risk sub-groups. However, this group can be considered a Low Risk group. The evidence for this will be presented in the next section. Obviously, the DMV group is of Low (perhaps very Low) Risk.

(b) If we consider the number of Drunk Driving (DD) offenses then there is little of interest with respect to differences between the various groups. We would certainly expect the DMV group to have very few DD offenses and indeed this is the case. It is of interest to note that the Santa Monica group, which was exposed to an extensive countermeasures program does have a lower average than the various control groups and most of the treatment groups. Since this group was not part of

Table 1

AVERAGE NUMBER SUBSEQUENT DRUNK DRIVING OFFENSES AND TOTAL ALCOHOL-RELATED OFFENSES (TAROF)

			Risk	N	Av. # D.D.'s	Av. # TAROF
	Total Counter-Measures Grps 1-6		Lo	783	.20	.29
			Hi	376	.36	.46
Treatment Groups	Problem-Oriented Therapy	1.	Lo	47	.32	.36
			Hi	82	.41	.51
	Traditional Therapy	2.	Lo	18	.22	.44
			Hi	78	.32	.38
	Film & Lecture(4)	3.	Lo	36	.31	.53
			Hi	66	.45	.53
	Film & Lecture (1)	4.	Lo	547	.16	.26
			Hi[1]	13	.08	.23
	Alcoholics Anonymous	5.	Lo	88	.29	.36
			Hi	69	.29	.39
	Alcoholic Rehab. Center	6.	Lo	47	.13	.19
			Hi	68	.37	.51
Control Groups	Control No Trt.	7.	Lo	126	.15	.27
			Hi	87	.39	.64
	Control Ret. to Ct.	8.	Lo	131	.34	.45
			Hi	76	.35	.59
	Control No Trt.	9.	Lo	76	.20	.32
			Hi	47	.34	.53
	Control Ct. Sent.	10.	Lo	191	.23	.32
	DMV		Lo	292	.04	.07
	SM		Not Classified	55	.18	.22

[1]Since there were only 13 individuals in the high Risk group, the calculated statistics should be interpreted with caution.

the initial group, we did not apply statistical significance tests to the difference between this group and the others. However, with respect to subsequent drinking driving behavior and driver quality in general, this group did seem to be consistently better than the other groups.

(c) With respect to the Total Number of Alcohol Related Offenses (TAROF), there does appear to be some differences between the groups. In general, if we consider the High Risk sub-groups it would appear that if the convicted drunk drivers were exposed to some kind of countermeasures treatment then the average number of alcohol-related offenses is lower than the High Risk control groups. This is perhaps seen best in Figure 1 which depicts the average number of subsequent alcohol-related offenses for the combined High Risk treatment groups (1-6) and the combined High Risk control groups (7-9). These differences are statistically significant as measured by the conventional Z test for differences between means ($P < .001$). However, the actual differences, while consistent, are not very large, and we emphasize caution in their interpretation.

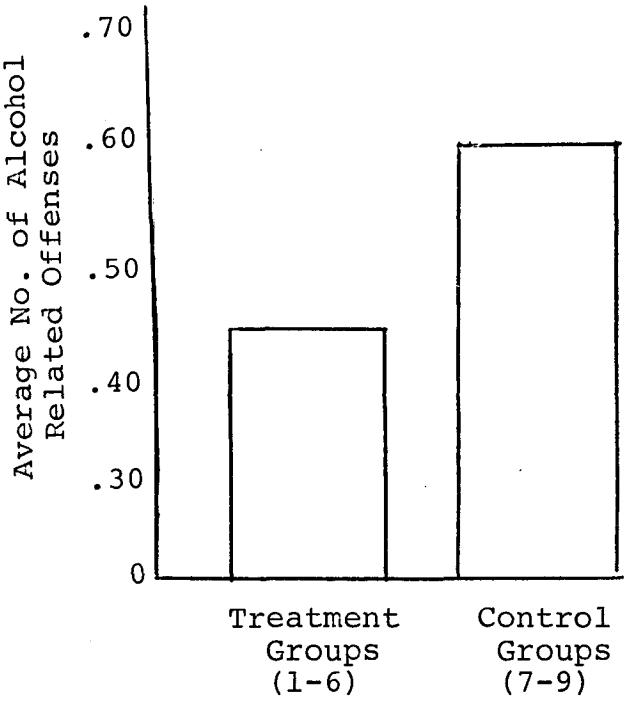

Figure 1. Average Number of Alcohol Related Offenses for Treatment and Control Group Classified as High Risk.

There is one finding presented in Table 1 that is interesting, and we have confidence that the conclusion is correct. Note the difference between the High Risk sub-group of the group assigned to Alcoholics Anonymous (AA) and the High Risk control groups. In every case, the AA high risk group has a better record than comparable control groups. These differences are statistically significant. This was a finding of the initial study, and it is confirmed here. Note that for both the number of DD's and and TAROF's there appears to be no difference between the high and low risk sub-groups for the group assigned to AA. This might suggest that the members of this group were all of low risk. However, this was not the case in the initial study, and we will show evidence for this again in the next section.

An Analysis of Overall Driver Quality

In analyzing these data we developed an index of driver "quality" which essentially was based on the number and severity of traffic offenses that each individual person in the sample had. Without going into details, this was essentially a weighted sum of all the person's traffic offenses both minor and major with the more serious offenses receiving higher weights. Minor violations consist of moving violations, mechanical violations, etc. Major violations consist of reckless driving, drunk driving, driving with suspended or revoked license, hit-and-run, etc. The higher the numerical value of this index the worse the driver quality. We calculated the index twice, once for the driver's record prior to the advent of the countermeasures program (i.e., prior to 1969 and once for the subsequent record after that person had left the countermeasures program). These two indices are called DRIQUALPRI and DRIQUALSUB, respectively. The interpretation of DRIQUALSUB presents no problem since it covers approximately the same period of all members of the sample (about two years). The interpretation of the DRIQUALPRI, however, does present a problem since it is obviously sensitive to the length of time a person has been driving and therefore very sensitive to the age of the person. Other things being equal the longer a person has been driving the higher the driver quality indices are apt to be. As of 1972 the age of all members of the sample (2,305 people) ranged from 21 to 72 years with a mean and median equal to 40 years. Obviously not everyone was driving for the same length of time. For this reason we converted the Driver Quality indices to rates by dividing each by the estimated number of years a person has been driving with a maximum of 14 years. This maximum was chosen since very few of the DMV records had recorded offenses going back more than 14 years. These are called PRIQUALRATE AND SUBQUALRATE, respectively.

Table 2 presents the results of this analysis in the same format as Table 1 but with the four driver quality indices for the major groups.

It should be remembered that for the numerical values presented in Table 2, the higher the value the worse is the driver quality. There are several things to note about Table 2:

Table 2

AVERAGE DRIVER QUALITY INDICES FOR THE MAJOR GROUPS

		Risk	N	Driver Quality Prior to Countermeasures (DRIQUALPRI)	Driver Quality After Countermeasures (DRIQUALSUB)	DRIVER QUALITY RATES (PRIQUALRATE)	DRIVER QUALITY RATES (SUBQUALRATE)
Total Countermeasures (Groups 1-6)		Lo	783	5.5	2.9	.54	1.50
		Hi	376	10.7	4.2	1.01	2.09
POT		Lo	47	4.7	3.4	.42	1.68
	1.	Hi	82	10.7	3.8	.97	1.91
Trad. T.		Lo	18	4.3	3.6	.61	1.81
	2.	Hi	78	9.9	4.4	.88	2.21
Film & Lecture (4)		Lo	36	5.9	4.4	.46	2.22
	3.	Hi	66	11.1	4.7	.95	2.35
Film & Lecture (1)		Lo	547	5.7	2.8	.58	1.39
	4.	Hi[1]	13	9.8	3.3	1.00	1.65
AA		Lo	88	4.7	3.5	.38	1.74
	5.	Hi	69	10.5	3.8	.94	1.91
ARC		Lo	47	5.3	2.8	.50	1.38
	6.	Hi	68	11.7	4.3	1.37	2.14
Control No Trt.	7.	Lo	126	5.2	2.9	.44	1.45
		Hi	87	12.1	5.0	1.22	2.49
Control Ret. to Ct.	8.	Lo	131	6.9	4.2	.90	2.10
		Hi	76	13.0	5.0	1.74	2.52
Control No Trt.	9.	Lo	76	6.7	3.4	.68	1.70
		Hi	47	11.0	5.2	1.54	2.59
Control Court Sentence	10.	Lo	191	6.5	3.3	.80	1.63
DMV		Lo	292	3.9	1.6	.53	.81
SM		NC	55	7.5	2.0	.63	1.03

[1]Since there were only 13 persons in this group, the calculated statistics should be interpreted with caution.

(a) Note that the driver quality indices all show that the High Risk group is of poorer driver quality than the Low Risk group. This is essentially a validation of the technique used to classify the groups in the initial study. That was based on the people in the sample filling out a questionnaire about their driving and drinking behavior. The driver quality indices depicted in Table 2 were developed from actual facts in the DMV record of the individual.

Note that obviously the DMV group is the best but what is more significant is that the Court Control group (#10) can definitely be considered a Low Risk group. This is not surprising since it is much more likely in the population of arrested drunk drivers for those drivers to be in the Low Risk category. (The odds are two-to-one that any individual chosen at random will be in the Low category.) It is proper, therefore, that this particular control group should only be compared against other Low Risk groups. Note also that the group assigned to AA definitely can be sub-divided into two sub-groups of Low and High Risk as far as the prior driving quality index is concerned. Also, the finding mentioned previously that the AA High Risk seemed to benefit most from this "treatment" is substantiated since the subsequent driver quality score is almost the same as for the Low Risk group even though the prior scores for these two sub-groups were quite different.

(b) If we look at the DRIQUALSUB scores, we see that all the countermeasures groups that are classified as High Risk appear on the average to be of better driver quality than the appropriate High Risk control groups. This is also true of the Santa Monica group which appears to be best of all with a DRIQUALSUB score of 2, lower and therefore better, than any other group of High or Low risk, with the obvious exception of the DMV group.

On the surface this looks very encouraging. However, again we emphasize caution in attributing these differences to the actual effects of the countermeasures programs. The reason for the caution is that when you look at the prior driver quality scores either DRIQUALPRI or its corresponding rate it can be seen that in most cases the groups that had been assigned to the various countermeasure programs (groups 1-6) had better prior driving records and therefore have

better (lower) prior driver quality scores than their control counterparts (groups 7-10). Thus, it is difficult to disentangle, the effects of the countermeasures programs with the prior records of the persons assigned to the various groups. This finding is the well known statistical regression problem --any "post score" is usually related to whatever the "prior score" was.

A way to handle this statistically is to use the analysis of covariance, which is an analysis of variance (ANOVA) on the post test scores after such scores have been adjusted for whatever influence the prior scores may have. Two such analyses were carried out. The first using DRIQUALSUB as the dependent variable with DRIQUALPRI as the covariate. The second used the driver quality rates, SUBQUALRATE AND PRIQUALRATE as the dependent variable and covariate, respectively. The results are given in Tables 3 and 4.

Tables 3 and 4 clearly indicate that there were strong regression effects, which were apparent from the descriptive averages given in Table 2. There still remains statistically significant differences between the drunk driving groups. However, these differences are not strong. Considering Table 4, of the total amount of variation in the SUBQUALRATE dependent variable as represented of the total sum-of-squares (TSS), excluding the regression effect, (7198.42) only 121.42 or about 2 percent can be accounted for by differences between the DD groups.

With this caveat in mind it is still of interest to compare the six High Risk treatment groups (1 through 6) and the three High Risk control groups (7-9). In every case the treatment groups were better as indicated in Table 2. We can see this more clearly in Table 5, which represents the difference between the pre and post text averages for the subsequent driver quality rate indices. Each entry represents the difference between the control group mean and the treatment group mean and the higher the value the "better" the treatment group is compared to the control group.

Table 6 presents a similar analysis but this time for the case that each mean has been adjusted for the influence of the covariate (the DRIQUALPRI score). Note that the differences presented in Table 6 are smaller than those presented in Table 5 which is another way of demonstrating that the covariate did influence a strong effect in this analysis.

The best groups, i.e., the ones that seem to respond best to treatment are the Problem Oriented Therapy (POT) and the Alcoholics Anonymous (AA) group, and the ARC group. The Initial study came to the conclusion that there were essentially no difference between the treatment groups and the control groups. The results reported here modifies this

Table 3

ANALYSES OF CO-VARIANCE SUMMARY TABLE WITH DRIQUALSUB AS THE DEPENDENT VARIABLE AND DRIQUALPRI AS A COVARIATE

Source	S.S.	df	M.S.	F	P
Regression	2,078.82	1	2,078.82	128.39	<.001
Between DD Groups	335.39	8	41.92	2.59	<.008
Between Risk Groups	3.59	1	3.59	--	NS
Interaction (DD x R)	115.99	8	14.50	--	NS
Error (within cells)	27,250.70	1,683	16.19		
Total	29,784.49	1,701			
TOTAL-Regression	27,705.67				

Table 4

ANALYSES OF CO-VARIANCE SUMMARY TABLE WITH SUBQUALRATE AS THE DEPENDENT VARIABLE AND PRIQUALRATE AS A COVARIATE

Source	S.S.	df	M.S.	F	P
Regression	301.23	1	301.23	72.04	<.001
Between DD Groups	121.42	8	15.18	3.63	<.001
Between Risk Groups	20.95	1	20.95	5.01	<.025
Interaction (DD x R)	24.86	8	3.11	--	NS
Error (within cells)	7,031.19	1,683	4.18		
Total	7,499.65	1,701			
TOTAL-Regression	7,198.42				

Table 5

DIFFERENCE BETWEEN AVERAGE SUBQUALRATE FOR FIVE HIGH RISK TREATMENT GROUPS AND THREE HIGH RISK CONTROL GROUPS[1,2]

GROUP		(1) POT	(2) Trad. T.	(3) Film & Lecture (4)	(5) AA	(6) ARC
	Mean	1.91	2.21	2.35	1.91	2.14
No Trt (7)	2.49	.58	.28	.14	.58	.35
Ret to Ct (8)	2.52	.60	.31	.17	.61	.38
No Trt (9)	2.59	.68	.38	.24	.68	.45

Table 6

DIFFERENCE BETWEEN ADJUSTED AVERAGE SUBQUALRATE FOR FIVE HIGH RISK TREATMENT GROUPS AND THREE HIGH RISK CONTROL GROUPS[1,2,3]

GROUP		(1) POT	(2) Trad. T.	(3) Film & Lecture (4)	(5) AA	(6) ARC
	Mean	1.86	2.19	2.31	1.87	1.94
No Trt (7)	2.35	.49	.16	.04	.48	.41
Ret to Ct (8)	2.18	.32	-.01	-.13	.31	.24
No Trt (9)	2.32	.46	.13	.01	.45	.38

[1]Each entry in the table is the difference between the control group mean and the treatment group mean.

[2]The results for group 4 are not presented since there were only 13 persons in this group.

[3]The means are adjusted for the influence of the covariate (PRIQUALRATE).

conclusion somewhat, i.e., certain treatment groups who were classified as high risk did improve their driving behavior as compared to appropriate control groups. Again we emphasize caution in interpretation of this finding, since the results, while reliable, may not be large enough to be of much practical significance. It should also be mentioned that we used a more sensitive dependent or criterion variable than did the initial study. Our results are based on driver quality indices which are more comprehensive than just counting the number of drunk driving offenses which was all that was done in the initial study. We will return to this point in the discussion section of this report.

The Accident Records and the Accident Indices

In this section we look at the accident records of all individuals, either convicted drunk drivers or non-convicted drivers, in the sample. Rather than just report on the number of accidents, however, we also developed an Accident Index which was derived as follows: Any accident can be characterized as having at least three dimensions or attributes which can be ranked in order of importance and be "weighted" as to how much importance should be given to each attribute. These are Injury, Fault, and Property Damage and can be listed in order of importance as follows:

Attribute	Rank	Importance Weight
Injury	1	65
Fault	2	25
Property Damage	3	10

The importance weights are arbitrary and can be changed, but most people would agree that they are in correct order of relative magnitude. From our data it is possible to obtain good information on injury and fault. For injury we have information on the number of fatalities and number of injuries for each accident. With respect to fault we have information as to whether the person was cited or not and in the opinion of the officer whether the driver was at fault. Also in this respect we have information as to the sobriety of the driver ranging from no evidence of alcohol or other drugs up to "completely drunk" and incapable of driving safely. Unfortunately, we do not have good information on property damage, although a rough estimate can be obtained from type of accident, assuming, for example, that a multi-car accident might have more damage than a single car accident. However, in

calculating the accident index for the purposes of this report, we left out the attribute of property damage.

Without going into details, the Accident Index was computed as a weighted sum of the number of accidents, with each accident being weighted by the severity of injury and degree of fault on the part of the driver, with the injury getting about three times the weight over fault. An Accident Index (ACCIND) of 0 means the driver had no accidents. Increasing values of the index means the driver has a more serious traffic accident record.[1]

Before presenting the results for the accident index, consider first Table 7, which presents the average number of subsequent accidents; i.e., after 1970 and average total number of accidents for the major groups of convicted drunk drivers and the DMV group, the members of which had never been convicted of drunk driving prior to 1970. The results of Table 7 are somewhat surprising. Although there are differences between the major group, they are very slight. It is of interest to note that the DMV group had on the average a surprising number of accidents both subsequent and total when compared to the various drunk driver groups.

A different picture emerges if we calculate the Accident Index (ACCIND) for all accidents for the major groups. This result is shown in Table 8. Now we see there are differences between the groups, and they are in the expected direction. It can be seen from Table 8 that the DMV group has the lowest (and therefore the best) average ACCIND. Also, with one exception (group 8), the drunk driver group classified as being of higher risk all have higher average ACCIND (and therefore poorer accident records) than the corresponding low risk groups. This information, coupled with that presented in Table 7, is evidence for the following: While drivers with no drunk driving record (i.e., the DMV group) do not necessarily have fewer accidents than drivers with some record of drunk driving, the latter clearly are involved in more serious accidents; i.e., they are more often at fault, and there are more injuries connected with the accidents.

---

[1]A possible criticism of the development of the accident index is that the fault component is based essentially on the judgment of the officer who arrives at the scene of the accident. It is assumed for the purposes of this analysis that these judgments, while not necessarily the same numerically for different officers who might arrive at the scene of an accident, they are at least consistent; i.e., there would be good agreement between the officers.

Table 7

AVERAGE NUMBER OF SUBSEQUENT ACCIDENTS AND TOTAL NUMBER OF ACCIDENTS FOR THE MAJOR GROUPS

Groups	Risk	N	No. of Subsequent Accidents	Total No. Accidents
Convicted Drunk Driver-Countermeasures (Groups 1-6)	Lo	783	.15	.71
	Hi	376	.10	.91
Convicted Drunk Drivers-Control Groups				
No Treatment (7)	Lo	126	.13	.15
	Hi	87	.09	.39
Ret. to Ct. (8)	Lo	131	.17	.34
	Hi	76	.12	.35
No Treatment (9)	Lo	76	.18	.20
	Hi	47	.21	.34
Court Control (10)	Lo	191	.13	.23
DMV Group		292	.15	.50

Table 8

AVERAGE ACCIDENT INDEX OVER ALL ACCIDENTS
FOR ALL MAJOR GROUPS

Groups	Risk	N	TOTAL ACCIND
Convicted Drunk Driver-Countermeasures (Group 1-6)	Lo	629	2.39
	Hi	294	3.35
Convicted Drunk Driver-Control Groups			
No Treatment (7)	Lo	99	2.70
	Hi	66	3.63
Return to Court (8)	Lo	117	2.85
	Hi	61	2.53
No Treatment (9)	Lo	66	2.83
	Hi	39	4.99
Court Control (10)	Lo	156	2.36
DMV Group		256	1.08

This finding is further substantiated if we partition the Accident Index (ACCIND) into its two major components: fault (FAULT) and injury (INJURY). The results of this are presented in Table 9.

Here again we see that in every case the drunk driving groups have higher (and therefore worse) average FAULT and INJURY values than the DMV group, and with one exception (group 8), the high risk drunk driving groups have higher values than their corresponding low risk groups.

The calculation of the Accident Index, of course, is very sensitive to the length of time over which the index is calculated. For this reason, we calculated the index over three 2-year periods: 1967-68, the 2 years prior to the countermeasures program; 1969-70, the 2 years during the program; and 1971-72, the 2 years after the program. The results of these indices called ACCIND68, ACCIND70, and ACCIND72, respectively, for the major groups are presented in Table 10.

Table 9

AVERAGE FAULT INDEX AND INJURY INDEX OVER ALL ACCIDENTS FOR THE MAJOR GROUPS

Groups	Risk	N	Fault	Injury
Convicted Drunk Driver-Contermeasures (Groups 1-6)	Lo	635	1.98	.53
	Hi	296	2.82	.59
Convicted Drunk Driver Control Groups				
No Treatment (7)	Lo	100	2.24	.50
	Hi	68	3.37	.54
Return to Court (8)	Lo	117	2.47	.39
	Hi	63	2.31	.38
No Treatment (9)	Lo	67	2.31	.64
	Hi	39	4.06	.92
Court Control (10)	Lo	157	2.11	.39
DMV Group		257	.93	.26

The results presented in Table 8 are interesting but require careful and cautious interpretation.

Consider first the Accident Index for the 2 years prior to the countermeasures program (ACCIND68). The familiar pattern is seen; there are consistent differences between major Low and High Risk groups, with the High Risk group always receiving higher values for the ACCIND. Group 9 receives a much higher value, 2.22, for its High Risk group than any other High Risk group. There is no apparent explanation for this.

The Accident Index calculated for the 2-year period while the countermeasures programs were going on (ACCIND70) is quite reasonable. The indices are all larger than for the preceding 2-year period. This is primarily due to (a) there were more accidents overall during this period and (b) for the combined countermeasures (groups 1-6) and for control groups (7-10), a large number of these people were involved in accidents while

Table 10

ACCIDENT INDEXES OVER THREE TWO-YEAR PERIODS
FOR MAJOR GROUPS

Group	Risk	N[1]	ACCIND68	N[1]	ACCIND70	N[1]	ACCIND72
Countermeasures 1-6 Groups combined	Lo	457	.48	508	1.35	439	.42
	Hi	204	.91	215	1.53	178	.30
7 Control	Lo	70	.77	74	1.32	61	.25
No Trt.	Hi	46	1.41	44	1.43	38	.51
8 Control Ret. to Ct.	Lo	83	.92	94	1.25	81	.67
Sentenced	Hi	45	1.00	46	.52	44	.51
9 Control	Lo	42	.74	48	1.23	39	.72
No Trt.	Hi	23	2.22	27	2.59	16	.00
10 Control Court Sentenced	Lo	123	.90	124	1.14	115	.45
DMV	Lo	203	.16	204	.37	212	.31

[1]The N's differ in the different time periods due to different amounts of missing or incomplete data in the records. Unless all information for the calculation was available for a particular case, the case was dropped for purposes of calculation.

they were driving under the influence of liquor and were arrested for this. As a matter of fact, this was often the arrest and subsequent conviction that resulted in these people being assigned to the initial study. Note, the DMV group is still low relative to all the others as should be expected.

Finally, the Accident Index calculated for the two years after the completion of the countermeasures program (ACCIND72) drops, which is to be expected, but the puzzling thing is that the DMV group does not drop back to a level it was prior to the countermeasures program, whereas all other groups fall

back to a level considerably below this. This is best seen by comparing the numbers in the last column of Table 4 (ACCIND72) with the column labeled (ACCIND68).

We have no immediate explanation for this phenomenon, but it is strong and perhaps is deserving of further study.

We present one final result, and this compared the ACCIND72, which represents the measure of accident behavior subsequent to the countermeasures program for the various treatment groups. This is presented in Table 11. Table 11

Table 11

ACCIDENT INDEX SUBSEQUENT TO THE COUNTERMEASURE PROGRAMS FOR ALL TREATMENT AND CONTROL GROUPS

		Risk	N	ACCIND72
Problem-Oriented Therapy	1.	Lo	21	.40
		Hi	36	.85
Traditional Therapy	2.	Lo	11	.00
		Hi	42	.51
Film & Lecture (4)	3.	Lo	22	.82
		Hi	29	.00
Film & Lecture (1)	4.	Lo	311	.41
		Hi	--	--
Alcoholics Anonymous	5.	Lo	44	.57
		Hi	32	.03
Alcoholic Rehab. Center	6.	Lo	30	.17
		Hi	33	.00
No Treatment	7.	Lo	61	.25
		Hi	38	.51
Return to Court	8.	Lo	81	.67
		Hi	44	.51
No Treatment	9.	Lo	39	.72
		Hi	16	.00
Court Control	10.	Lo	115	.45
DMV			212	.31

indicates that certain treatment groups actually had zero values for the Accident Index, which means that members of these groups had no accidents during this time period. If this happened only in the treatment groups, we might be encouraged. However, one of the High Risk Control groups (9) also has a zero, making interpretation difficult. These results could be easily due to sampling error, and we choose not to make any definite statements about the results represented in Table 11.

Discussion

Can we say that the countermeasure programs, designed in the initial study to reduce the probability that a convicted drunk driver will repeat his or her drinking driving behavior, had any success in this respect? There is an overall indication that this may be the case. The groups who were given some kind of treatment in general had fewer alcohol-related offenses than their control counterparts. Also, in terms of overall driver quality, these groups also did better than the control groups. This was most pronounced for those members of the sample that were classified as High Risk. These groups showed the best improvement. That this was not a statistical artifact was indicated by an analysis of covariance which partialed out the prior scores and still revealed statistically reliable differences between the major treatment and control groups.

Which treatment group was "best"? This is difficult to answer precisely, but if forced to make a choice, we should have to say the Alcoholics Anonymous group seemed to be most effective. The people assigned to the AA group did have fewer subsequent drunk driving arrests, and fewer total alcohol-related offenses (which includes reckless driving) than their control counterparts. This was most pronounced for those given a High Risk classification in the initial study. The overall effect was to make these High Risk people look more like Low Risk after the program than before the program. This statement is confirmed when we look at their overall driver quality index that was developed in this study. Also, these people also had fewer accidents after the program and had a better "score" on the post accident index (ACCIND) than the control groups.

Although we have no evidence for this, it may be that a good number of people assigned to the AA program may well have stuck with the program since AA does emphasize "that one has to keep working at not taking a drink." The other programs were "one-shot" affairs. It would be of interest to check on this if we could locate the convicted drunk drivers that were assigned to AA in the initial study.

Good Point

Also, while it is really not strictly proper to compare the Santa Monica group with the other groups since they were not part of the initial study, the evidence is fairly strong that this particular countermeasure program was quite effective. This group had, on all of the subsequent drunk driving quality indices, the best record of all the groups. This group also received very intensive treatment and was not strictly a "one-shot" affair.

Our results, thus, contradict to some extent the initial study, which generally concluded that the countermeasure treatment programs were not effective. There may be several reasons for this among which are:

(a) This study used all new data gathered over a longer period of time, both prior and subsequent to the countermeasure programs.

(b) We used additional control groups and more importantly demonstrated conclusively that one of the control groups used in the initial study can be classified only as Low Risk, and therefore it is proper only to compare this group against other Low Risk groups. This was not done in the initial study.

(c) This study did not, as the initial study did, rely on just counting the number of DD offenses or number of accidents as the major dependent variables in the analysis. Rather considerable effort was devoted to developing derived indices of driver quality and accident indices. The indices based on the information in the entire driving record of any individual are in our opinion a much more valid way of describing and interpreting just what a driver's traffic record may be telling you about the person's behavior and driving safety. We intend to continue to refine these indices and recommend that all traffic record studies use these or similar indices when interpreting the results of such studies.

II. A STUDY OF DRIVERS INVOLVED IN FATAL ACCIDENTS

In this study the driving records of a sample of people who were involved in a fatal accident; i.e., resulted in their death, were examined. The procedure was essentially the same as in Part I of this report with the basic source of information being the California DMV driving records of each member of the sample.

Description of the Sample

All members of the sample were selected from the records of the Los Angeles County Coroner's Office. The fatal accidents occurred between 1968 and 1972. Each member of the sample was the driver of the automobile, and an autopsy had been performed on the deceased driver. The total number selected was 867, and of this number 389 indicated no evidence of drinking before the accident, having blood alcohol levels of 0 percent, nor the presence of any drugs other than alcohol. The other 478 indicated some evidence of drinking before the accident, having blood alcohol levels ranging from .02 per cent to .33 percent with an average of .16 percent. However, there was no evidence of these drivers using any drug other than alcohol at the time of the accident.[1] Thus, the entire sample of drivers killed in automobile accidents can be divided into two distinct sub-samples or groups: those who had not been drinking prior to the accident and those who had.

Of the 867 members, 752 were male and 142 were female. The age at the time of death ranged from 16 to 87 years, with a mean age of 38 years. The average age at death was different for the two major groups with the drinking group having an average age at death of 35 years and the nondrinking group 40 years. This information is summarized in Table 12.

Results

The results will be presented under two major topics: (1) An analysis of the driving records exclusive of accidents

---

[1] It is often the case that autopsies of drivers killed in accidents indicate the presence of drugs other than alcohol or the presence of other drugs in addition to alcohol. Since we were interested in comparing drinking drivers with nondrinking drivers exclusively, only those deceased drivers with evidence of blood alcohol content were selected.

Table 12

AGE AT DEATH FOR SAMPLE OF DECEASED DRINKING DRIVERS AND NONDRINKING DRIVERS

	Entire Sample (N=867)	
	Mean	S.D.
Drinking Driver (N=478)	34.73	13.45
Nondrinking Driver (N=389)	39.76	19.56

of the deceased drivers including a measure of driver quality and (2) An analysis of accident records of the drivers. All the results are presented in the form of comparing the two major groups: Drivers who had not been drinking and drivers who had been drinking prior to the fatal accident. The results are presented in two ways: (1) For the entire sample, and (2) for those members of the sample who had only one accident, which, of course, resulted in the death of the driver.

The Driving Record

For each of the groups, the driving record was classified into the total number of minor violations, which included such things as number of moving violations, mechanical violations, etc., and the total number of major violations which includes number of drunk driving violations, hit and run, reckless driving violations, etc. The summary statistics of this analysis are shown in Table 13.

Table 13 indicates that on the average there are clear cut differences between the two groups with the deceased drinking driver having more major, minor, and alcohol-related violations than the deceased nondrinking drivers.

These differences are all statistically significant as tested by the Z test for differences between means which in all cases yielded significant P levels less than .001.

Table 13

MEAN AND STANDARD DEVIATIONS OF TRAFFIC VIOLATIONS FOR DRINKING AND NONDRINKING DRIVERS KILLED IN ACCIDENTS

	Minor Violations		Major Violations		Alcohol Violations	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Drinking Drivers (N=478)	3.03	3.54	.42	.98	.36	.96
Non-Drinking Drivers (N=389)	1.94	2.81	.13	.54	.13	.53

Analysis of Driving Quality

For each member of the sample we calculated an index of driver quality in the same fashion described in Part I. This, it will be remembered, is a weighted sum of all the person's traffic offenses both major and minor with the more serious offenses receiving higher weights. This index is called DRIQUAL, and the higher the numerical value of the DRIQUAL the worse the driver quality. Also, since every member of the sample had not been driving for the same length of time, we converted DRIQUAL to a rate by dividing it by the estimated number of years a person had been driving prior to his or her death with a maximum of 14 years. This is also the same procedure followed in Part I.

Table 14 presents summary statistics of the driver quality indices for the two major groups. Table 15 presents the same information for the two major groups for those members of the sample who had only one accident. The results in Tables 14 and 15 again indicate that there are distinct differences between the two groups with the drinking driver group having much poorer driver quality than the nondrinking drivers. Again, these differences are statistically significant.

Table 14

MEANS AND STANDARD DEVIATIONS OF THE DRIVER QUALITY INDICES FOR DRINKING AND NONDRINKING DRIVERS KILLED IN ACCIDENTS

	DRIQUAL		QUALRATE = $\frac{\text{DRIQUAL}}{\text{\#/Years Driving}}$	
	Mean	S.D.	Mean	S.D.
Drinking Drivers (N=478)	6.88	8.06	.72	.95
Non-Drinking Drivers (N=389)	3.72	5.84	.49	1.08

Table 15

MEANS AND STANDARD DEVIATION OF THE DRIVER QUALITY INDICES FOR THOSE DECEASED DRIVERS WHO HAD ONLY ONE ACCIDENT

	DRIQUAL		QUALRATE = $\frac{\text{DRIQUAL}}{\text{\#/Years Driving}}$	
	Mean	S.D.	Mean	S.D.
Drinking Drivers (N=348)	5.92	7.73	.61	.84
Nondrinking Drivers (N=312)	2.77	4.26	.35	.70

Driver Quality, Age, and the Major Groups

It is well known that age is related to driver quality with younger drivers having poorer driving records than the older drivers. This finding is supported by the results of this study. The correlation between age and the driver quality rate index is a moderate -.33. We studied this in more detail by defining five major age groups for the age-at-death deceased drivers as follows:

Group	Age in Years
1	Grp 1 $\leq$ 25
2	25 < grp 2 $\leq$ 31
3	31 < grp 3 $\leq$ 41
4	41 < grp 4 $\leq$ 51
5	51 < grp 5

(Definition of symbols $\leq$: less than or equal to age on the right; <: greater than age on the left.)

Figure 2 presents the summary statistics of the quality of driving rate (QUALRATE) for the five age groups, each of which is further broken down into the following groups: No blood alcohol present (0) and some blood alcohol present (1). Figure 3 shows similar results for those members of the same sample that had only one accident that was fatal. It should be noted that the higher the QUALRATE number, the worse the driver record.

Figures 2 and 3 reveal a familiar pattern--the younger drivers have the poorest driving records, and the quality of driving improves with age with the oldest age group having the best driver quality index score.

Figures 1 and 2 also show that the driving records of the two groups are distinctly different from one another, with the blood alcohol group (1) having significantly poorer record of driving (as measured by QUALRATE index) than the group with no blood alcohol (0). The evidence also indicates that this difference shows up in all age groups from young to old.

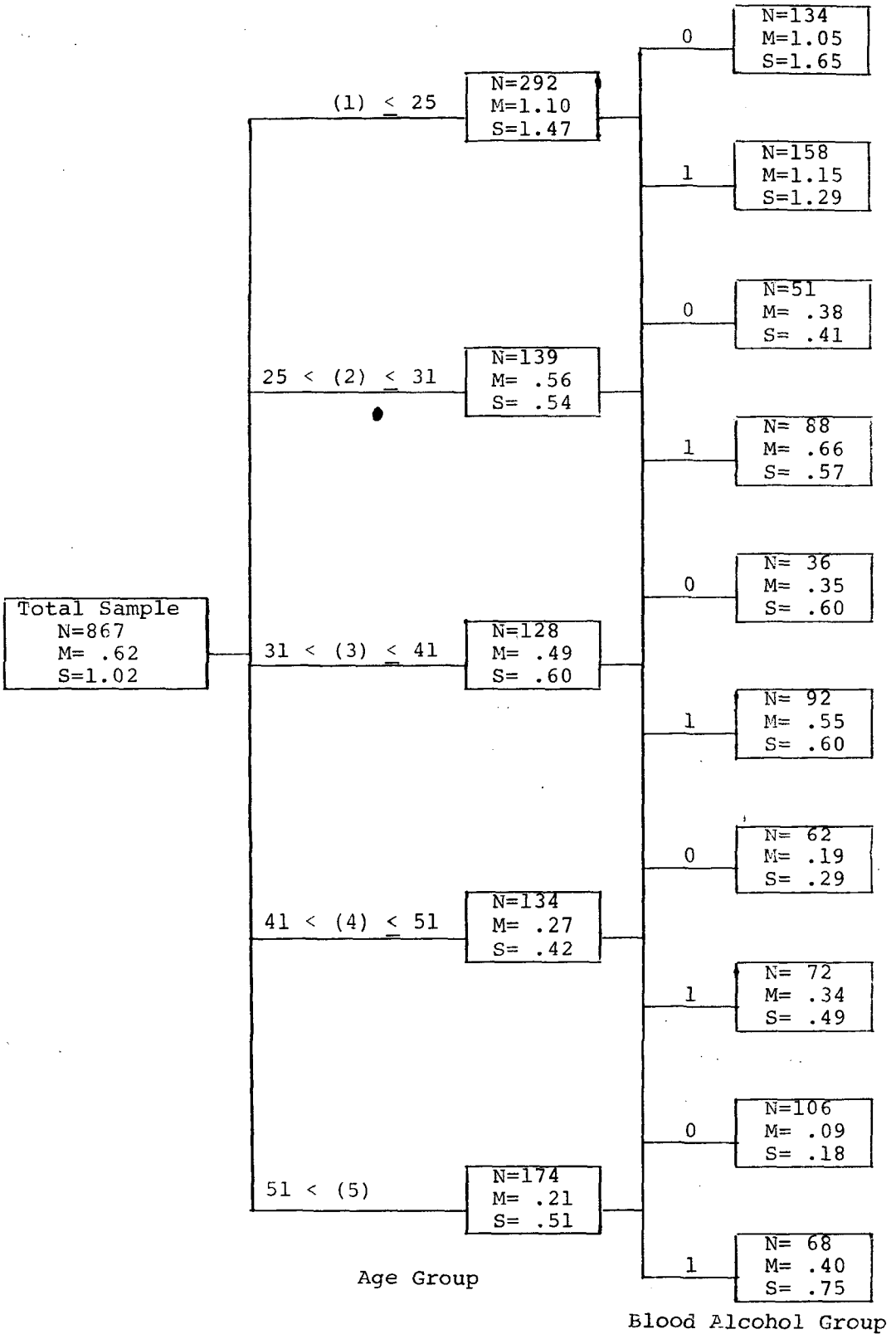

Figure 2. Mean (M) and Standard Deviation (S) of Driver Quality Rate Index Broken Down by Age Group and Blood Alcohol Groups (0=no blood alcohol; 1=some blood alcohol)

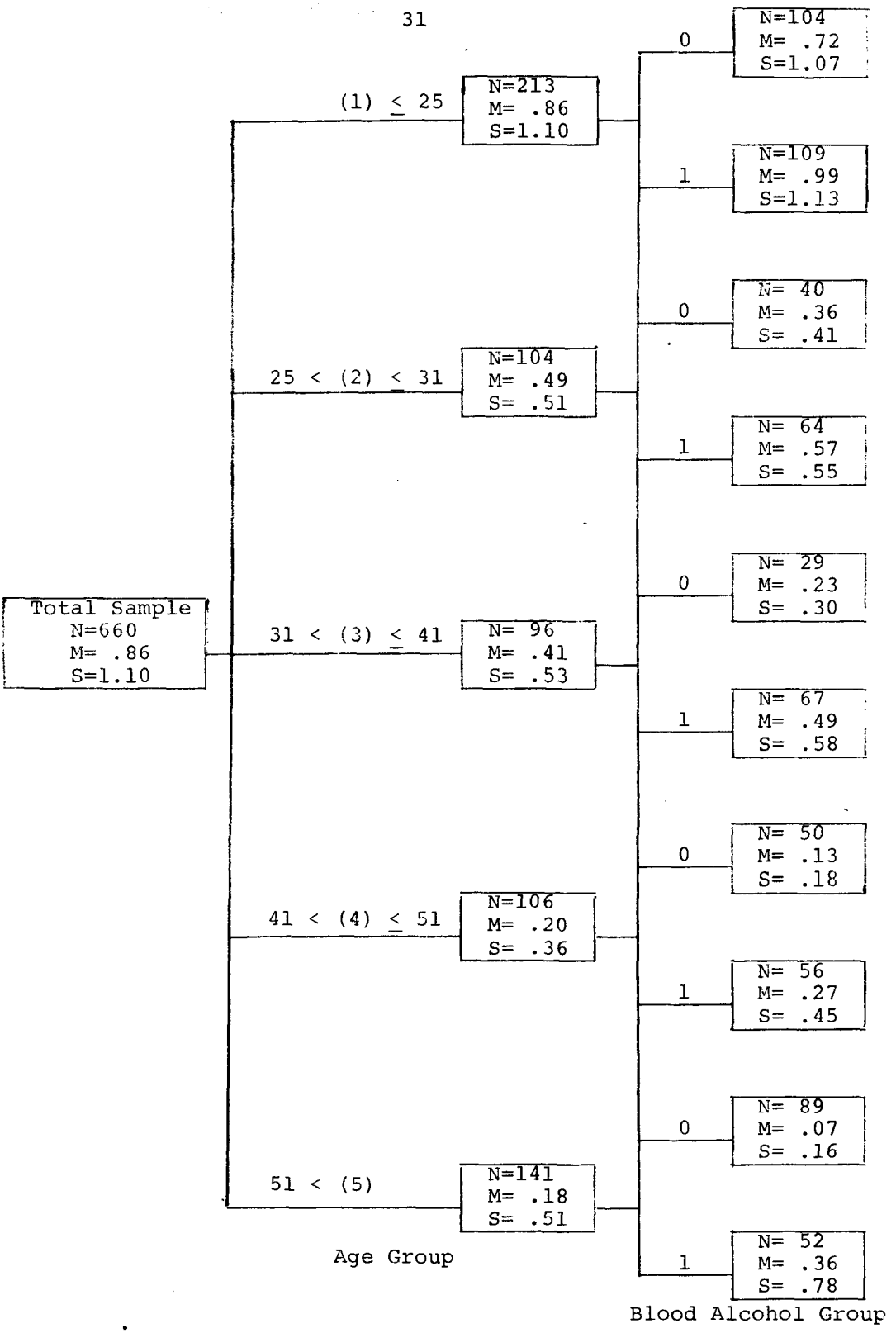

Figure 3. Mean (M) and Standard Deviation (S) of Driver Quality Rate Index Broken Down by Age Group and Blood Alcohol Group for Those Deceased Drivers Who Had Only One Accident (0=no blood alcohol; 1=some blood alcohol)

The Accident Records and Accident Indices

In this section, we compare the deceased nondrinking group and the deceased drinking group with respect to the number of accidents and an accident index, which was derived in the same fashion as described in Part I of this report. Essentially, the index is a weighted sum of two components--INJURY and FAULT--with Injury receiving a higher weight than Fault. As before, the results will be presented for all accidents and for that sub-set of the sample that had only one accident.

Table 16 presents summary statistics on the number of accidents for the two groups. Table 16 reveals that the drinking driver group had on the average significantly more accidents than the nondrinking group. If we subtract 1 from each of these averages for the accident resulting in the death of the driver, the averages are .37 and .25 for the two groups, respectively.

Table 16

MEANS AND STANDARD DEVIATIONS OF NUMBER OF ACCIDENTS FOR DRINKING AND NONDRINKING GROUPS

	Drinking Group	Nondrinking Group
Mean	1.37	1.25
Standard Deviation	.68	.55
N	478	389

Table 17 presents summary statistics on the derived accident index which is a measure of the severity of the accident which in turn is made up of two components: INJURY and FAULT. The Injury component, in turn, is a function of the number of fatalities and number of injuries. The Fault component is a function of the sobriety of the driver and whether the driver was cited or not by a police officer at the scene of the accident.

Table 17

MEANS AND STANDARD DEVIATIONS FOR THE ACCIDENT INDICES FOR DRINKING AND NONDRINKING DRIVERS KILLED IN ACCIDENTS

	INJURY		FAULT		ACCIND (Injury + Fault)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Drinking Driver	3.84 (N=338)	1.91	2.70 (N=222)	3.23	6.51 (N=212)	3.90
Nondrinking Driver	3.96 (N=302)	1.79	.82 (N=207)	1.82	4.93 (N=195)	2.67

Note: The N's differ since in many of the accident reports there were no data reported, and thus these accidents were eliminated from the calculation.

The interesting aspect of Table 17 is that while the two groups differ in the accident index, this difference is primarily due to the fault component with the drinking drivers having a much higher average on FAULT (2.70) than the nondrinking driver average on FAULT (.82). The groups do not differ significantly on the injury component of the index, with the two INJURY means being 3.84 and 3.96, respectively.

This also seems to be the case when each driver had only one accident as indicated in Table 18.[1]

[1]It might seem strange to calculate the accident index for those drivers who had only one accident which to them was fatal. However, the accident index also is a function of other fatalities and injuries that may have resulted from that one accident.

Table 18

MEANS AND STANDARD DEVIATIONS FOR THE ACCIDENT INDICES FOR THOSE DECEASED DRIVERS WHO HAD ONLY ONE ACCIDENT

	INJURY		FAULT		ACCIND (INJURY + FAULT)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Drinking Driver	3.73 (N=267)	1.99	1.99 (N=163)	1.35	5.64 (N=153)	3.21
Nondrinking Driver	3.84 (N=256)	1.80	.51 (N=173)	1.34	4.48 (N=161)	2.31

Note: The N's differ since in many of the accident reports there were no data reported, and thus these accidents were eliminated from the calculation.

Tables 17 and 18 indicate strongly that drinking drivers are much more responsible for the occurrence of accidents than nondrinking drivers; a familiar finding. However, the accidents they are involved in are not any more severe (as measured by the number of injuries and fatalities) than those drivers who had not been drinking. This is best seen in Table 18 which presents results for those deceased drivers who had only one accident.

Amount of Blood Alcohol (BAC)

Does the Amount of alcohol in the blood (BAC) influence the accident indices? The answer is yes, but not dramatically. The correlation between BAC and the total accident index is only .23, with INJURY practically zero (-.06) and with FAULT a modest .33. We looked at this in more detail by forming several groups with increasing amounts of BAC as follows:

Group	BAC (%)
0	0
1	$0 < 1 \leq .05$
2	$.05 < 2 \leq .10$
3	$.10 < 3 \leq .15$
4	$.15 < 4 \leq .20$
5	$.20 < 5 \leq .25$
6	$.25 < 6$

Table 19 presents summary statistics for the accident indices as a function of the BAC groups. Table 20 presents the same information for those deceased drivers who had only one accident. Tables 19 and 20 indicate that the severity of injury does not increase with increasing amounts of BAC, but there is a tendency for the Fault values to increase as a function of increasing BAC, although the relationship is not clear cut.

Table 19

MEANS AND STANDARD DEVIATIONS FOR THE ACCIDENT INDICES FOR DRINKING AND NONDRINKING DRIVERS KILLED IN ACCIDENTS AS A FUNCTION OF AMOUNT OF BLOOD ALCOHOL

		INJURY		FAULT		ACCIND	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
	0	3.96	1.79	.82	1.82	4.93	2.67
	1	3.92	1.42	1.69	2.80	6.02	2.96
Blood	2	4.01	1.87	1.89	2.98	5.73	3.70
Alcohol	3	3.99	2.04	2.68	2.91	6.66	3.69
Group	4	3.72	1.98	3.11	3.51	6.71	4.30
	5	3.81	2.16	3.25	3.64	7.12	4.53
	6	3.26	1.23	3.02	3.08	6.21	3.35

Table 20

MEANS AND STANDARD DEVIATIONS FOR THE ACCIDENT INDICES FOR DRINKING AND NONDRINKING DRIVERS KILLED IN THEIR ONLY ACCIDENT AS A FUNCTION OF AMOUNT OF BLOOD ALCOHOL

		INJURY		FAULT		ACCIND	
		Mean	S.D.	Mean	S.D.	Mean	S.D.
	0	3.84	1.80	.51	1.35	4.48	2.31
	1	4.00	1.54	1.14	1.86	5.71	2.21
Blood	2	3.91	1.92	1.34	2.25	5.02	3.24
Alcohol	3	3.94	2.08	2.52	2.88	6.53	3.92
Group	4	3.48	2.03	1.68	1.71	4.69	2.07
	5	3.70	2.39	2.10	2.32	5.79	3.49
	6	2.98	.91	2.83	2.82	5.80	3.10

Type of Accident

What kinds of accidents were the deceased drivers involved in? The DMV records classify the accidents as follows: (1) multi-vehicle; i.e., more than one vehicle involved; (2) fixed object; e.g., hitting a tree or a wall; (3) off-the-road; and (4) "other." For those accidents where such information was available (673 accidents in this sample), Table 20 presents the type of accident as a function of the major groups.

Table 21 indicates that there are small but statistically significant ($X^2 = 12.49$, $p < .01$) differences in the type of accident and the major groups. It is of interest to note that most of the accidents involve multi-vehicles (61%), and there is a higher percentage of such accidents for nondrinking drivers (67%) than for drinking drivers (56%). Also, drinking drivers have a higher percentage of "off-the-road-accidents" (24%) than nondrinking drivers (14%).

Table 21

TYPE OF ACCIDENT FOR DRINKING AND NONDRINKING DRIVERS KILLED IN ACCIDENTS

	Frequency Col. Pct. Tot. Pct.	Nondrinking Drivers	Drinking Drivers	Row Total
Type of Accident	Multi-Vehicle	208 67.5 30.9	205 56.2 30.5	413 61.4
	Fixed Object	44 14.3 6.5	56 15.3 8.3	100 14.5
	Off-the Road	43 14.0 6.4	88 24.1 13.1	131 19.5
	Other	13 4.2 1.9	16 4.4 2.4	29 4.3
		308 45.8	365 54.2	673 100.00

Multivariate Classification Analysis

The results presented in the previous section indicate that several variables connected with the driving record of the drivers killed in accidents seem to discriminate between nondrinking and drinking drivers. In this section we present the results of using multiple regression analysis (MRA), which considers the variables in combination. For the case at hand, the dependent variable is a binary one in which the nondrinking group is coded 0 and the drinking group is coded 1. For this special case, what MRA does is to indicate how well the variables can discriminate between the two groups. We used a stepwise mutliple regression procedure which steps the variables into the MRA in order of importance for prediction and/or for making maximal discrimination between the two groups. Tables 22 and 23 present the results for a stepwise mutliple regression analysis for the most crucial

Table 22

SUMMARY OF STEPWISE MULTIPLE REGRESSION ANALYSIS USING MAJOR TRAFFIC RECORD VARIABLES FOR THE ENTIRE SAMPLE OF DECEASED DRIVERS

Step #	Variable	F	Multiple R	R^2 *
1	Fault	50.99	.336	.113
2	Age at Death	29.89	.360	.129
3	Total # of Major Offenses	22.05	.377	.142
4	Total # of Minor Offenses	17.17	.383	.147
5	Injury	14.11	.388	.151

*R^2 = Proportion of Predicted Variance.

traffic record and accident record variables. Table 22 is for the entire sample, and Table 23 is for that portion of the sample that had only one accident.

There are several things to note about Tables 22 and 23:

(1) All the variables stepped into the equation were highly significant from a statistical point of view. All the F ratios can occur with very low probability ($p < .001$). However, the final multiple correlation coefficients while moderately high (.39 and .44 for Tables 22 and 23, respectively) account for at most 19 percent of the variance as indicated by the R^2.

(2) The regression equation is dominated by the Fault component of the accident index, which accounts for 11 percent and 13 percent of the total variance in the two samples. As might be expected from our previous analysis, the Injury component is the least important.

Table 23

SUMMARY OF STEPWISE MULTIPLE REGRESSION ANALYSIS USING TRAFFIC RECORD VARIABLES FOR DECEASED DRIVERS HAVING ONLY ONE ACCIDENT

Step #	Variable	F	Multiple R	R^{2*}
1	Fault	45.09	.356	.127
2	Total # of Minor Offenses	29.81	.402	.162
3	Total # of Major Offenses	22.13	.421	.177
4	Age at Death	18.03	.436	.190
5	Injury	14.47	.437	.191

*R^2 = Proportion of Predicted Variance.

(3) The order of importance of the variables is different for the two samples, after you consider the first most important (Fault) and the least important (Injury). For the entire sample having one or more accidents, the order of importance is age at death, total number of major offenses, and total number of minor offenses (cf. Table 22). But for the deceased driver having only one accident, this order is exactly reversed (cf. Table 23). This is an interesting finding which perhaps should be investigated further. However, since the total amount of variance accounted for (after the strong Fault variable) is rather small, we hesitate to make much of it.

Discussion

The results of this study clearly indicates that drivers who had been drinking prior to becoming involved in a fatal accident are qualitatively different in their driving behavior than drivers who had not been drinking prior to their involvement in a fatal accident. The former group has a history of more minor violations, more major violations, and more alcohol-related violations than the latter group. Using the quality of driving index, developed for this analysis, the deceased drinking driver had much poorer overall driving quality than the nondrinking deceased driver. These differences show up very early in the age of the driver and persist with increasing age. The youngest driver (age at death $\leq$ 25 years) has the worst driving quality; the quality improves with increasing age; and is best for the oldest age group (age at death > 51 years). However, in every age group the deceased drinking driver had a poorer driver quality record than the nondrinking deceased driver. Incidently, the deceased driver with some evidence of BAC was younger at time of death (mean age = 35 years) than the deceased driver with no evidence of BAC (mean age = 40 years).

When we analyze the traffic accident record, the differences between the two groups are also quite pronounced, with the deceased drinking group having had more accidents in the past than their nondrinking counterparts. Using the accident indices developed for this analysis, the results also show that the deceased drinking driver did not differ in the Injury component of the overall index, but did differ dramatically in the Fault component, with the deceased drinking driver having much higher Fault values than their nondrinking counterparts. This can be compared with the results of Part I of this report in which convicted drunk drivers always had worse accident index values on both the Injury and Fault components of the index. Apparently, if one is involved in an accident severe enough to result in the death of the driver, the overall results of injury is about the same whether or not the driver had been drinking.

The amount of blood alcohol level is also related to Fault, but not to Injury. In general, the higher the BAC level the higher the likelihood the driver is at fault.

An interesting finding of this study is the type of accident the deceased driver was involved in. In general, deceased drinking drivers are more apt to be involved in "off-the-road" accidents, whereas deceased nondrinking drivers are more apt to be involved in "multi-vehicle" accidents. Both groups have about the same probability of being involved in "hitting-a-solid-object" type of accident.

The results of this study are in contradiction with those reported in the initial study, which concluded, "The drinking driver involved in a fatal crash should not be regarded as a distinctly different type from the nondrinking driver in the fatal crash population." (Pollack, 1972, p. 65). This conclusion was based on the application of a factor analysis procedure on two groups of drivers who had been killed in accidents: those with some evidence of BAC and those with no evidence of BAC. Each group were described by some forty different variables, and it was noted that the pattern of factor loadings were quite similar for the two groups; i.e., the variables that loaded appreciably on the six factors extracted were about the same for the two groups.

Our results indicate that the two groups involved in fatal accidents, the drinking group and the nondrinking group, do differ on several characteristics of traffic records including accidents.

Perhaps the primary reason for the differences of our results from those of the initial study is that we made extensive use of derived indices such as the driver quality and the accident index. In our opinion, these are more sensitive measures of driver behavior and, therefore, are more apt to reveal differences between the groups if such differences really exist, which we think do as indicated in Parts I and II of this report. We strongly recommend that such measures be used in further studies of driving behavior and traffic records.

REFERENCES

Pollack, S., Drinking Driver and Traffic Safety Project. Public Systems Research Institute, University of Southern California, U.S. DOT FH-11-7099, Final Report, May 1972.

Sachman, H.; Didenko, O.; Tang, T.; and Thomas, M. Results of the Santa Monica Prototype Program to Assist and Re-Educate Drinking Drivers. Public Systems Research Institute, Technical Report, Volume III, January 1972 (DOT-HS-010-1-010).