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ALCOHOL ABUSE AND TRAFFIC SAFETY: A STUDY OF FATALITIES, DWI OFFENDERS, ALCOHOLICS, AND COURT-RELATED TREATMENT APPROACHES

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16. Abstract

Methodology and conclusions on the role of the abusive use of alcohol in traffic safety were developed through three related projects. Project I is a case-history investigation of 616 traffic fatalities from metropolitan Wayne County, Michigan (15 July 1967-31 August 1969), to (a)identify drinking involvement of these fatalities; (b)investigate, compare, and analyze accidents in which alcohol was involved; (c)characterize a population of drinking traffic fatalities from demographic, driving, criminal, and social agency information. Project II investigates 1517 persons admitted to Hurley Hospital (Flint, Mich.) diagnosed alcoholic or referred to the hospital's alcoholic group therapy program from 15 June 1956 to 30 June 1967. The study focuses on driving performance of 1247 alcoholics from 1961 to 1967, to (a)describe groups of alcoholic drivers who contribute disproportionately to traffic deaths, injuries, or property damage, and (b)identify characteristics which best predict which of these drivers are likely to be involved in future traffic crashes. Project III describes and analyzes published reports of 10 alcoholism treatment programs in the U.S. over the past 20 years, to (a)provide a framework for program planners considering use of court-related treatment for alcoholics; and (b)analyze results of court-induced alcoholism treatment. In addition, the first two project populations were compared with one random sample of Michigan drivers and another of drivers convicted of DUIL or DWI in Detroit from July 1967 to June 1969; all four were compared on selected demographic variables and on a 6.5-year driving history.

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PREFACE

This report summarizes the research conducted during the period from July 1967 through May 1970 by the Highway Safety Research Institute for the National Highway Safety Bureau, Department of Transportation, under Contract FH-11-6555 and FH-11-7129. The basic purposes have been to delineate more fully the role that the abusive use of alcohol plays in highway crashes, to identify those characteristics that are descriptive and predictive of deviant driving, and to investigate court-related treatment approaches for alcoholics.

The National Highway Safety Bureau Contract Manager has been Robert B. Voas, Ph.D., of the Research Institute.

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The cooperation of many organizations has been indispensable in making this research possible. Their contributions are gratefully acknowledged.

The Office of the Medical Examiner of Wayne County has played an integral part in the Wayne County Traffic Fatality Study by supplying pathological and toxicological findings on the Wayne County traffic fatalities. The excellent work of this organization and its staff is appreciated, particularly that of John F. Burton, M.D., Chief Medical Examiner, and Herbert R. Wetherell, Ph.D., Toxicologist.

The study of alcoholics at Hurley Hospital was originally started at the Mental Health Research Institute, The University of Michigan, under the direction of Margaret L. Clay, Ph.D., Associate Research Psychologist. We are indebted to her and other MHRI staff members, including Harold T. Salive who handled the initial programming effort, for the inception of the study and for the groundwork on which our subsequent efforts were based. (A historical perspective of this study by Dr. Clay appears in Appendix H.) Throughout its evolution, this study has been made possible by the ongoing cooperation of the following persons at Hurley Hospital: Milton Sacks, Director; Clayton Stroup, M.D., Medical Director; and William Keaton, Senior Alcoholism Therapist.

The following organizations and their staff played a vital role in supplying necessary records and research data:

Michigan Department of State: The Honorable James M. Hare, Secretary; and George O. Stevens, Driver and Vehicle Administrator.

Michigan Department of State Police: Colonel Fredrick E. Davids, Director; and Lieutenant George F. Strong, Assistant Commanding Officer, Records and Identification Section.

Greater Detroit Council on Alcoholism: Mrs. Phyllis Tuttle, Executive Director. Catholic Social Services of Wayne County: Mrs. Glenn Gorman, Assistant Director. Family Services of Metropolitan Detroit: Mrs. Laura Askey, Casework Director. Mayor's Committee on Skid Row Problems: Richard Dakesian, Executive Director. Salvation Army Alcoholism Treatment Center: James Wheeler, Director of Treatment Center. Wayne County Department of Social Services: Paul G. Conlan, Director.

Ypsilanti State Hospital: Alexander Dukay, M.D., Administrator. Brighton Hospital: John Bethea, M.D., Medical Director. Mercywood Hospital: Richard D. Watkins, M.D., Medical Director. Towne Hospital: Charles G. Killins, M.D., Administrator. North Woodward Hospital: Albert H. Keltch, Administrator.

Wayne County Circuit Court: Jerry Meisner, Chief Probation Officer. Detroit Recorder's Court: James S. Henahan, Chief Probation Officer. Recorder's Court Traffic Division: Frank B. Dunne, Probation Supervisor.

Detroit Police Department, Accident Prevention Bureau: Lieutenant James Martin.

Many members of the HSRI staff made valuable contributions in the preparation and processing of research data. Our thanks go to all of these persons for their diligence and attention to the many details connected with these vital tasks. Sonja Sollie Merrill deserves special mention for her many contributions, as do Thomas E. Lawson and other members of the Computer Services staff.

The participation of all these persons and organizations is sincerely appreciated.

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INTRODUCTION

This report presents the methodology and conclusions of research conducted by the Highway Safety Research Institute (HSRI) on the role of the abusive use of alcohol as it pertains to traffic safety. Essentially the research effort consisted of three related projects: (1) The Wayne County Traffic Fatality Study; (2) Driving Performance of an Alcoholic Population; (3) Description and Analysis of Ten Court-Related Treatment Programs for the Alcoholic. In addition, the driving populations in the first two projects were compared with a random sample of Michigan drivers and also with a random sample of drivers convicted of Driving Under the Influence of Liquor (DUIL) or Driving While Impaired (DWI) offenses.

Project One, the Wayne County Traffic Fatality Study, is a case-history investigation of 616 traffic fatalities who died in the metropolitan area of Wayne County, Michigan, during the period from 15 July 1967 to 31 August 1969; Detroit is the largest city in this area. The 616 subjects include 309 drivers, 140 passengers, and 167 pedestrians 16 years of age and older whose bodies were brought to and examined at the Wayne County morgue. In practice, this includes nearly all traffic fatalities; the exceptions are those persons who survived in a local hospital for such an extended period that the attending physician was qualified to sign the death certificate. For the most part, the cases included for detailed study involve persons who died within 24 hours of their crash; certain information is also presented for a few cases in which the victim survived longer than 24 hours. The objectives of the study are to: (1) identify the actual drinking involvement of Wayne County fatalities at death; (2) investigate accident conditions, and compare and analyze those accidents in which alcohol was involved; and (3) characterize a population of drinking traffic fatalities by demographic, driving, criminal, and social agency, case-record information.

Project Two, the Driving Performance of an Alcoholic Population study, is an investigation of 1,517 alcoholics admitted to Hurley Hospital, Flint, Michigan, between 15 June 1956 and 30 June 1967. All persons were either diagnosed alcoholic by a physician or referred by one to the hospital's alcoholic group therapy program. The focus of the study is on the driving performance of 1,247 alcoholics who were operating a motor vehicle between 1961 and 1967. The objectives of the study are to describe those critical groups of alcoholic drivers who contribute disproportionately to traffic deaths, injuries, or property damage and to identify the characteristics which best predict which drivers, within an alcoholic population, are likely to become involved in future traffic accidents.

A comparison was made among four driving populations: the two populations described above and two additional groups of drivers. These included a random sample of 1,071 persons holding Michigan driver's licenses in June 1967; these persons are identified in the report as the Michigan Driver Profile (MDP) sample. The second sample was a group of 169 drivers arrested and convicted for Driving Under the Influence of Liquor, or Driving While Impaired; they were termed the DUIL sample. These drivers were arrested in the City of Detroit for the above offenses between July 1967 and June 1969, the same time period as that during which the subjects in the Wayne County Fatality Study were involved in their accidents. All four populations were compared on selected demographic variables as well as on driving history information taken from the Michigan Department of State driving record during a six-and-one-half-year period.

In the final section on court-related treatment programs for the alcoholic, 10 programs conducted in the United States over the past 20 years are described and analyzed. Published accounts of the programs were reviewed for subject selection, referral procedures, sentencing and probation provisions, type of treatment, evaluation techniques, and results. The objectives of this review are to: (1) provide a framework for program planners considering the use of court-related treatment for the alcoholic; and (2) analyze results of treatment for alcoholics where initial motivation was court-induced.

The report is organized and presented according to these projects.

SUMMARY OF FINDINGS

The primary research findings are summarized below by individual project. Comparative data on each of the four populations are also included.

WAYNE COUNTY TRAFFIC FATALITY STUDY

Demographic

1. Data from this study and similar research indicate that alcohol is a characteristic feature in many fatal accidents. Forty-five percent of the total population of 616 fatalities had blood alcohol levels of 0.10% or above; 36% had BALs of 0.15% or above; and 14% had BALs of 0.25% or above.
2. Driver fatalities showed the greatest alcohol involvement: 55% of 309 drivers were legally impaired (0.10% or higher), 43% were legally intoxicated (0.15% or higher), and 14% had BALs of 0.25% or higher.
3. Driver fatalities aged 16-25 years were somewhat over-represented in accidents compared to their number holding Michigan driver's licenses. Thirty-six percent of the fatalities were in this age group compared to 22% of all persons holding Michigan driver's licenses.
4. Fifty percent of the driver fatalities between the ages of 16-19 years had been drinking prior to their crash, although they were below the legal drinking age (21 years) for Michigan.
5. The heaviest drinking involvement among driver fatalities was between the ages of 26 and 45 years. Seventy-seven percent had BALs 0.10% or higher, 67% had BALs of 0.15% or higher, and 27% had BALs of 0.25% or higher.
6. The majority of the pedestrians involved in fatal crashes were 56 years or older, and 35% were 66 years or older. Drinking involvement was least

for this older age group, with 66% having negative BALs at death.

7. In the fatally injured drivers, passengers, and pedestrians, the age group of 36- to 45-year olds contained the largest percentage with BALs of 0.25% or higher; among the same samples persons 66 years or older had the highest percentage of negative BALs--other than a small group of 5 pedestrians aged 16-19 years, none of whom had positive BALs at the time of death.
8. Only 10% of the drivers involved in fatal crashes were female. Females accounted for 46% of the passenger fatalities and 30% of the pedestrian fatalities. Seventeen percent of these female passengers and 20% of these female pedestrians had BALs 0.10% and higher; 45% of the female driver fatalities had equally high BALs.
9. Eighty-three percent of the fatalities were either married or single and 7% were widowed. Although divorced or separated persons accounted for only 10% of the total, as a group they showed the heaviest drinking involvement.
10. Seventy-eight percent of the accident fatalities were white and 22% were black. More whites had negative BALs than did blacks, although of fatalities who had been drinking a greater percentage of blacks had low BALs between 0.01-0.09% than did whites.
11. Blue-collar workers constituted the largest occupational class among the fatalities; they accounted for 43% of the total. White-collar workers were the next largest group with 18%. There was a dependent relationship between BAL and occupational class for the three working classes. Blue-collar workers were over-represented

among those with BALs 0.15% or greater, while white-collar workers and professionals were under-represented at this BAL.

Toxicology

12. Barbiturates were present in the blood of 16 fatalities; 11 of these also had alcohol present. Two persons were known to be epileptic, one was a known drug addict, and one was a registered nurse. Five cases had cyanide in their blood and four fatalities had carbon monoxide in their blood. Fire at the scene of the crash and electrocution probably accounted for two cases of carbon monoxide and at least one case of cyanide.

Pathology

13. Liver biopsies revealed that 14 of the 509 persons checked (or 3% of the population) were cirrhotic. All but one were aged 26 years or older; all but five were drinking prior to their crash; and half had BALs 0.15% or higher.

14. The most common primary cause of death for drivers and passengers was head injury, which was somewhat more prevalent among rear seat passengers (55%) than among front seat passengers (35%).

Morgue Witness Statements

15. Information about where the deceased was coming from at the time of the crash was known for 124 fatalities. Where this information was available from witnesses at the morgue, 26% of the fatalities were reported to be coming from work or school and half had BALs of 0.10% or higher. Twenty percent were reported to be visiting friends or relatives, and 20% were reported to be on errands or appointments. Ten fatalities were reported coming from a bar or drinking establishment. All but one of these 10 fatalities had BALs of 0.10% or higher.

16. An inquiry concerning frequency of drinking was asked of witnesses who came to identify the deceased at the morgue. Two of the 11 fatalities

thought to be alcoholics had negative BALs. One hundred and thirty-eight of 213 reported to be moderate drinkers had BALs 0.10% or above, and 115 of these had BALs 0.15% or higher. Twenty-eight "occasional drinkers" had BALs of 0.15% or above. Seventy-eight of the 197 reported to be non-drinkers actually had been drinking.

Accident Information

The police accident report provides extensive information concerning time, physical environment, and dynamic factors pertaining to the crash.

17. The greatest number of driver fatality crashes occurred between midnight and 6 A.M. and only 14% of these 120 drivers had not been drinking. Seventy-eight percent had BALs 0.10% or higher.
18. The greatest number of the pedestrians' fatal crashes occurred between 6 P.M. and midnight; but pedestrian alcohol involvement was most extensive between midnight and 6 A.M.
19. The number of fatalities rose significantly over the week-end period, as did drinking involvement. There was a mean of 1.5 driver fatalities per hour during the week, and 2.3 per hour during the week-end. Only 24% of the drivers killed on the week-end had negative BALs compared to 43% of those killed during the week.
20. On a single factor basis, the physical environment appeared safe for driving. Generally, the roads were straight (79%), divided with 2 to 4 lanes (90%), the weather was clear (83%), and the road surface was dry (76%).
21. Thirty-seven percent of the drivers had out-of-control crashes; this was the most common type of crash. Head-on collisions showed the heaviest drinking involvement; 76% of these drivers had BALs of 0.10% or higher. A two-vehicle crash usually resulted in only one driver death.

22. Drinking drivers appear to suffer more severe injuries, or are less able to recover from those they sustain than do non-drinking drivers. In 59 of 67 two-vehicle crashes where one driver survived, the dead driver had been drinking while the police report noted the surviving driver had not been drinking.
23. The highest percentage of drivers were traveling at speeds between 40-60 MPH prior to their crash. High speeds were associated with young drivers and high BALs. Ninety-two percent of those traveling above 80 MPH had BALs 0.10% or higher. Thirty-two percent of the drivers under age 25 were traveling at 60 MPH or above, while 12% of the drivers aged 26 and older were traveling at that speed.
24. Fifty-three percent of the driver fatalities were reported by police to have committed a driving violation prior to their accident. Of that group, 78% had been drinking as compared to 52% of the drivers for whom no violations were checked. The most common violation was speeding.
25. An analysis of pedestrian activity shows that 38% were crossing at non-intersection areas. Of this group, 56% had BALs 0.10% and higher, while only 28% of the pedestrians crossing at intersections had BALs 0.10% and higher.
26. Thirty-seven percent of the drivers who suffered fatal crashes and who were alone at the time of their crash had negative BALs. Twenty-two percent of the drivers with passengers had negative BALs. Forty percent of the drivers under 25 years of age had passengers compared to 15% of the remaining drivers.

Driver and Criminal Record Information

27. Ninety percent of the driver fatalities had a Michigan Department of State driving record. At the time of the crash, 77% had a valid license,

7% had an expired license, and 4% were driving on revoked or suspended licenses. Fifty percent of the latter group had a BAL of 0.10% or higher.

28. Convictions and accidents listed on the driver and criminal records for driver fatalities were compared to BAL at death. The number of driving violations in six and one-half years was significantly associated with BAL. Persons with no violations were under-represented in the group which had BALs 0.10% or greater, while drivers with four or more violations were over-represented at these blood alcohol levels.
29. The number of crashes prior to the fatal crash did not show a dependent relationship to BAL at death. A satisfactory explanation of this observation has not been found within this data set. We suggest, however, that it may be related to the fact that crashes are inherently rare events; for example, two-thirds of the sample had no prior crashes recorded on their driving record. The frequently observed under-reporting of crashes would mask the detection of a dependent relationship between high BAL and previous crashes.
30. Twenty-eight driver fatalities had reckless driving convictions over a six-and-one-half-year period, and all but five died with a BAL 0.10% or higher; 18 had a BAL 0.15% or higher.
31. There is a dependent relationship between prior DUIL convictions and BAL. Eleven of the 12 persons with such convictions had BALs 0.10% or higher. All 12 of these drivers were males between 25 and 55 years of age. Nineteen percent of the divorced drivers had a DUIL offense as compared to 4% of the married and 3% of the single drivers.
32. Criminal convictions were also significantly associated with BAL. Thirteen percent of the fatalities had criminal convictions: 61 of the 83 had BALs 0.10% or higher.

33. Twenty-nine fatalities had convictions for drunkenness offenses not associated with driving, such as drunk and disorderly conduct or drunk in a public place. All but seven had BALs 0.10% or higher. The divorced fatalities were again over-represented. Twenty percent of the divorced group had drunkenness convictions not associated with driving compared to 2%-5% of other marital status groups.

<u>DUIL Sample Compared to Fatalities</u>

A random sample of 169 persons convicted of a DUIL or DWI offense (Driving Under the Influence of Liquor or Driving While Impaired) was collected from the City of Detroit court records. They were compared to the 134 Detroit driver fatalities split into two groups: those with a BAL less than 0.15%, and those with a BAL greater than 0.15%. This blood alcohol level was used because all persons in the DUIL sample who took the Breathalyzer test registered at or above the 0.15% level.

34. High BAL (0.15%+) fatalities were somewhat younger than the DUIL sample; their respective mean ages were 36 and 44 years. High BAL fatalities were similar to the DUIL sample in the mean number of prior driving violation convictions (5.3 and 5.4, respectively) while Low BAL fatalities had a mean number of 3.7 convictions.

35. The DUIL sample had a higher mean number of prior accidents than either group of fatalities. Their mean for six and one-half years was 1.12 compared to 0.51 for Low BAL fatalities and 0.43 for High BAL fatalities.

36. High BAL fatalities and the DUIL sample had a similar mean number of prior DUIL/DWI convictions. Their means were 0.13 and 0.15, compared to 0.3 convictions for the Low BAL fatalities. The High BAL fatalities and the DUIL sample were similar on reckless driving convictions with respective means of 0.19 and 0.15, compared to a 0.10 mean

for Low BAL fatalities. The DUIL sample had the lowest mean number of speeding convictions with 1.2, while the High BAL fatalities had the highest mean number with 5.3. It can be theorized that persons in the DUIL sample speeded to such an extent that they were convicted of more serious offenses such as reckless driving.

Agency Case Record Findings

37. Agency case records were searched for 502 fatalities. Ninety-four records were found on 72 fatalities or members of their immediate family. Using information available from the case record, 11 persons were identified as alcoholics, 10 as problem drinkers, and 8 as possible excessive users of beverage alcohol. In the case records for the remaining 43 persons (or 59% of those with records) there was no indication of excessive drinking.

38. Of those persons with no agency or criminal records there was a high percentage (45%) with negative BALs and a low percentage (32%) with BALs 0.15% or higher. Persons with an agency record and no criminal record showed a somewhat higher alcohol involvement, while persons with a criminal record showed the heaviest drinking involvement; this suggests that criminal records demonstrate the closest association with high BAL.

39. Although the number was small, reckless driving offenses appear to be related to alcoholism identification on the case record. Twelve persons with an agency record had reckless driving convictions, and seven of these persons were identified as alcoholics or problem drinkers.

40. One hundred forty-three fatalities or 23% of the population evidenced one or more of the following problem drinker criteria: BAL of 0.25% or higher, conviction for a drinking-related offense, cirrhosis of the liver, diagnosis of alcoholism or problem drinking on a social or medical agency

record, or report of alcoholism by the witness who identified the body of the fatality at the morgue.

DRIVING PERFORMANCE OF AN ALCOHOLIC POPULATION

41. The crash rate (1961-67) for this alcoholic population of drivers (0.65) is about twice as high as the crash rate for the same age group (26-75 years) in the Michigan Driver Profile (0.36).
42. The higher crash rates for alcoholic drivers are associated both with younger age (less than 46 years) and with a high rate of driving convictions unrelated to crashes.
43. The group with a high crash rate also had a high rate of DUIL convictions.
44. Twenty-five percent of the alcoholic drivers (N = 1,247) had no crashes or driving convictions in the six-and-one-half-year period of the study.
45. Analysis of the sequence of events in the alcoholics' life pattern (limited to those events contained in the data set defined in the main text of this report) reveals that events of the same type tend to follow each other. In particular, the most likely event to follow a traffic event is another traffic event. Furthermore, among the various types of events for which data are available, traffic convictions or crashes are followed by the shortest time intervals before the next such traffic event.
46. From 1961-67, among this driving alcoholic sample, 100 persons were found to be unlicensed.
47. With respect to the number of crashes, there is a statistically significant difference (at the 0.061 level) in the distribution of male and female alcoholics. Furthermore, the 1,108 males have a crash rate of 0.67 compared to 0.47 for the 139 females.
48. The number of hospital admissions citing a diagnosis of alcoholism is statistically independent of the

number of driving convictions. This suggests that alcoholics who are convicted of many traffic offenses either are not being recognized as alcoholics while they are accruing these offenses, or they are being recognized but are being referred to treatment sources other than those at the hospital.

49. Those alcoholics who withdrew from the hospital's alcoholic group therapy prior to the third day of the program had the highest rates of crashes and driving convictions.
50. Those alcoholics who completed one group therapy series consistently had the lowest crash and driving conviction rates, when compared with those who did not complete the series, or those who completed the series, but returned for more therapy.
51. The hypothesis that there is a direct correlation between a high rate of driving convictions and behavioral deviancy (in terms of criminal convictions, drunkenness convictions not associated with driving and mental illness diagnoses) was substantiated.
52. Behavioral instability (as reflected in family problems, or in the three marital statuses of single, separated, or divorced) was associated with a high crash rate.
53. The death rate of the alcoholic sample is higher than the overall 1965 U. S. experience in all age categories, except in the 56-65 year age group.

COMPARISON OF FOUR POPULATIONS

Four driving populations were compared in terms of selected demographic and driving history variables. Comparisons were made to provide more information on similarities and differences among various driving groups. The four populations were (1) the Wayne County fatalities (divided into two groups: low BALs ranging from negative up to and including 0.14%, and high BALs above 0.15%), (2) the Hurley Hospital alcoholic drivers, (3) a random sample of Michigan drivers, referred to as the

Michigan Driver Profile (MDP), and (4) a random sample of persons convicted of DUIL or DWI in Detroit, Michigan. Driving variables used for comparison were all based on a six-and-one-half-year analysis of driving records from the Michigan Department of State.

54. When age was compared, the Hurley alcoholics and the DUIL sample had nearly the same distribution peaking between 36-55 years. Driver fatalities were seen to peak at a much younger age (20-25 years), although among those with BALs of 0.15% or higher the peak was between 26-35 years. The MDP distribution is a bell-shaped curve across all ages.
55. The MDP contained 33% females while the other three populations contained only 2%-11% females.
56. All four populations (with the fatalities subdivided into two BAL groups) were compared on driving variables and then ranked according to their mean incidence for each type of event. On moving violation convictions the MDP had the lowest mean, followed in order by the alcoholics, the Low BAL fatalities, the High BAL fatalities and the DUIL sample.
57. The mean number of crashes for alcoholics and High BAL fatalities was similar, and in both cases was higher than the mean for the MDP and the Low BAL fatalities. The DUIL sample had the highest mean with a crash rate nearly twice that of the High BAL fatalities.
58. The Low BAL fatalities and the MDP had the same low mean number of DUIL offenses. They were followed with increasingly higher means respectively by the High BAL fatalities, the DUIL sample, and the alcoholics.
59. The ranking on mean number of reckless convictions indicated a similar pattern to that of crashes, with the High BAL fatalities having the highest mean and the DUIL sample and the alcoholics having respectively lower means.

COURT-RELATED TREATMENT APPROACHES

Ten published accounts of court-related alcoholic treatment programs conducted in the United States over the past twenty years were reviewed.

60. Evaluation techniques had been employed in 7 of the 10 programs. The results consistently indicate that court-related treatment can be successful for at least half of the clients seen. The somewhat coercive approach was not a detriment to the treatment outcome, and the courts provided a readily available case-finding source. Personnel in both the evaluated and non-evaluated programs expressed a very positive reaction to the court-related treatment approach.
61. The tentative conclusion is that enforced therapy can be a constructive deterrent to future deviant behavior by motivating the alcoholic to seek help in changing his pattern of response to crisis and his life situation.

1. WAYNE COUNTY TRAFFIC FATALITY STUDY (PROJECT I)

1.1 INTRODUCTION

The Wayne County Traffic Fatality Study, a joint project of the Office of the Medical Examiner of Wayne County and The University of Michigan's Highway Safety Research Institute (HSRI), is a case-history investigation of traffic fatalities occurring in Wayne County during the period from 15 July 1967 - 31 August 1969. The subjects in this study were drivers, passengers, and pedestrians 16 years of age and older whose bodies were brought to and examined at the Wayne County morgue. This included nearly all traffic fatalities in the County; the exceptions were those persons who survived in a local hospital for such an extended period that the attending physician was qualified to sign the death certificate. Most of the cases included in this detailed study involved persons who died within 24 hours of their crash; certain information is also presented for a few cases in which the victim survived longer than 24 hours.

Six hundred and sixteen (616) fatalities are analyzed in this report. Section 1.2 deals with the data sources and data collection procedures, Section 1.3 presents information about the data analysis, and the results are given in Section 1.4.

1.2 DATA SOURCES

Data about each of the fatalities was sought from several different sources. These sources and the method of data collection are discussed in this section.

1.2.1 THE OFFICE OF THE MEDICAL EXAMINER OF WAYNE COUNTY.

The case material for this study originated upon the victim's entry into the morgue, as mentioned in the Introduction. There, at the discretion of the Medical Examiner, either a full autopsy or certain selected pathological and toxicological tests were performed. Detailed data about these tests are given in Appendix A.

A summary report of each case was then prepared and submitted to HSRI. Samples of these reports, which include an autopsy and which do not include such a procedure, are exhibited in Appendix B.

Each report contains brief information about the subject, the accident, the conditions leading to death, toxicological data (particularly alcohol concentration in the various body fluids), and an indication of whether cirrhosis was present.

The pathologist's score sheet was also submitted to HSRI. This is a checklist used by the pathologist during the course of his examination for cirrhosis. A sample score sheet is also included in Appendix B.

Although this study was continuous for a period of 25 and a half months, from 15 July 1967 to 31 August 1969, the Office of the Medical Examiner was not under contract to carry out the data collection during 4 of these months. Therefore, to achieve the desired study continuity there was a retroactive collection of data for the 107 cases who expired between 1 November 1968 and 28 February 1969 and who would have been in the study had a contract been in effect. Because of the retroactive nature of this collection, there were some omissions in the data that were available on these 107 fatalities. First, a pathological examination was not made so there is no information on liver abnormalities or cirrhosis for these subjects. Second, toxicological data on the presence of alcohol in the body of a traffic fatality was collected solely from a spinal specimen, rather than in addition to a blood specimen, as it had been during contract work. However, this did not present any serious problem. A regression model predicting blood alcohol from spinal alcohol was developed from 344 cases in which both data elements were present. The model is described in Appendix C, and from it the blood alcohol level was predicted for these 107 cases. Because of the excellent correlation between the two alcohol concentrations, this model may also prove useful to other researchers.

1.2.2 THE POLICE ACCIDENT REPORT. More extensive information about the accidents than could be obtained from the summary in the Medical Examiner's report was desired. Therefore, official police accident reports were collected. When the police accident investigation is completed, fatal accident reports on cases which occurred in Wayne County but outside Detroit are sent to the Wayne County morgue. Detroit fatal accident reports are filed at Detroit Police Headquarters. Copies of reports from both these sources were obtained for all accidents.

The data called for on the reports are indicated by the sample report forms shown in Appendix D. These data are frequently supplemented by written reports prepared by the investigating officers. However, since post-accident, on-the-scene investigations were not a part of this study the recorded data generally can be neither confirmed nor denied. An exception is that the alcohol involvement data can be checked against the later morgue findings for fatally injured drivers and pedestrians.

1.2.3 DRIVING AND CRIMINAL RECORDS. Michigan Department of State driving records and Michigan State Police criminal records were collected for as many fatalities as possible. These records provide one way of identifying the existence of drinking or drinking-driving problems in cases where such convictions appear. The driving records also provide a means of comparing traffic fatalities, including known problem drinkers, with a sample population of drivers, a population of hospitalized alcoholics, and a population of persons convicted of Driving Under the Influence of Liquor (DUIL). Two hundred and seventy-six driving records on the 309 driver fatalities were located; and 83 fatalities from among the 616 had records of criminal convictions. A description and samples of driving and criminal records can be found in Appendix E.

1.2.4 AGENCY RECORDS. In addition to the reports and records previously explained, case records from social agencies, medical facilities, and court probation departments were collected.

This was done to: (1) seek an assessment of drinking problems from sources other than driver and criminal records, or alcohol concentration at the time of death, and (2) ascertain whether or not a case-record search is a viable method of identifying problem-drinking drivers prior to an accident. Other studies have found that only one half of a crash-involved, problem-drinking population will also have any drinking-related convictions (Selzer and Ehrlich, 1969).* Therefore, it is desirable that methods be found that can assist in the identification of problem drinkers aside from relying on previous convictions for drinking or drunk-driving. Reports were also reviewed to obtain background material which might help characterize the problem drinker.

*For complete reference see Bibliography.

Organizations contacted for case-record collection all had jurisdiction over part or all of Wayne County. All deaths occurred in the county, and it also was the county of residence for 94% of the fatalities.

Organizations that gave their assistance in this project are: the Wayne County Department of Social Services; Probation Department of Wayne County Circuit Court; Detroit Recorder's Court of Metropolitan Detroit; Catholic Social Services of Wayne County; Greater Detroit Council on Alcoholism; Mayor's Rehabilitation Committee on Skid Row Problems; Mercywood Hospital; Ypsilanti State Hospital; Towne Hospital; Brighton Hospital; North Woodward Hospital; and the Salvation Army. A brief description of each agency can be found in Appendix F.

1.3 DATA ANALYSIS

Information and records collected on the fatalities were processed in two different ways. Most of the data were coded directly from the various records and prepared for machine analysis. Other information was reviewed individually and conclusions were then formulated, coded, and incorporated into the total data set on each person. This latter method was utilized when the diversity in the records precluded standardized reporting.

1.3.1 MORGUE REPORTS AND POLICE ACCIDENT REPORTS. All information on the Wayne County Morgue Report and the police accident report was coded directly, except for the schematic diagram on the latter. Information coded included demographic data on the individual, dates and time of crash, time of death, physical conditions leading to death, pathological and toxicological findings, and all accident variables contained on the official accident form; supplementary descriptive data forming a part of the official report was not coded for computer analysis.

1.3.2 DRIVING AND CRIMINAL RECORDS. Driving and criminal records were also coded. The driving record code is the same as the one developed by the Michigan Department of State for their computerization process. A similar code was developed for all criminal offenses. In addition to a code for the type of offense or accident, the dates and place of occurrence were coded as well as the type of conviction and disposition. Disposition includes such things as suspension or revocation of license, fines, probation, and incarceration.

1.3.3 AGENCY RECORDS. Certain information was coded from records collected at the social, medical, and court agencies. Coded information included whether a record was located and if so, whether there was an indication of a drinking problem and what area of life it affected. Other information found in the case records was deleted from the coding procedure because the data were too diverse or nonuniform to organize by standardized codes.

The coded information from all records was combined under the individual case number.

1.4 RESULTS

The results and findings of the foregoing data collection and analysis are presented in this section. They have been grouped into the following categories for presentation purposes:

1. Demographic Information and Blood Alcohol Levels
2. Morgue Report Information
3. Accident Information
4. Driver and Criminal Record Information for Fatalities and the DUIL Sample
5. Case Record Findings

Many frequency tables appear throughout the report; they are often presented as bivariate tables; that is, they compare two variables. One of these variables often is the blood alcohol level (BAL) of the fatality. For 107 fatalities the blood level is the one which was predicted from spinal alcohol, as indicated in Appendix C. The reader should also note that on tables labeled BAL = 0.15%+, the cases included all had BALs of 0.15% or higher. Where a table shows two columns labeled 0.10%+ and 0.15%+, the first column presents the number of persons with a BAL of 0.10% or higher and includes those with a BAL of 0.15% or higher; the second column shows only the persons with a BAL of 0.15% or above. Unless otherwise indicated, all significance levels noted in the text have been derived using the Chi square statistical test for dependency. Frequency tables not shown in the text can be found in Appendix G.

1.4.1 DEMOGRAPHIC INFORMATION AND BLOOD ALCOHOL LEVELS. This section describes demographic information for the total fatality population. A comparison of this information was made with BAL data to determine if there were any correlations between the drinking habits of fatalities and the demographic variables.

The various demographic variables used were:

1. age
2. sex
3. marital status
4. race
5. social class

This information is also shown for each road status group (drivers, passengers, and pedestrians), and it is compared to the drinking status of each group.

1.4.1.1 Total Population, Road Status Groups, and BAL. Six hundred and sixteen fatalities from Wayne County were included for analysis in this study. BAL at the time of death was known for all 616. Two hundred and thirty-three (38%) were not drinking at the time of their accident, and 383 (62%) were drinking to some extent. Table 1-1 shows the distribution of the fatalities according to BAL categories. Although not shown below, there were 21 fatalities with BALs between 0.35% - 0.46%; 6 were drivers.

TABLE 1-1. DISTRIBUTION OF BAL FOR THE TOTAL FATALITY POPULATION

		Blood Alcohol Level Category					
Population	Total	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%
All Fatalities	616(100%)	233(38%)	68(11%)	36(6%)	55(9%)	137(22%)	87(14%)

If BALs are regrouped so that negative to 0.09% levels are combined in a low BAL group, and 0.10% and higher levels constitute a high BAL group, the distribution is as follows:

a. Low BAL (negative to 0.09%): 337, or 55% of all fatalities.

b. High BAL (0.10% or more): 279, or 45% of all fatalities.

The distribution of BAL changes when the population is subdivided by each of the road status groups: drivers, passengers, and pedestrians.

Drivers constituted 50% (309 persons) of the total fatality population. Of these 309 drivers, 170 (55%) had BALs over the legally impaired driving limit, which is 0.10%. One hundred and thirty-three drivers (43%) were above the legally intoxicated level of 0.15%. Of all road status groups, drivers had the smallest percentage of members with negative BALs; there were 105 persons, or 34%.

One hundred and forty passengers died in crashes; this accounts for 23% of all fatalities. In contrast to the drinking at death of the drivers, the majority of passenger fatalities had not been drinking or had BALs under 0.10% (102, or 73%). Only 27% (38) had a BAL above 0.10% and only 5% were above 0.25%, as compared to 14% of the drivers and 21% of the pedestrians who had a BAL above 0.25%.

Twenty-seven percent (167) of the fatalities were pedestrians. The majority (58%, or 96) of the 167 pedestrians had BALs lower than 0.10%, and 68 of the 96 had not been drinking. Of those who had a high BAL, only 7 (4%) were in the 0.10-0.14% range, while another 64 (38% of all pedestrians) had a BAL 0.15% or above.

Table 1-2 presents the distribution of BAL for each of the road status groups and Fig. 1.1 plots this distribution.

1.4.1.2 Driver Fatalities by BAL and Age. The 309 driver fatalities were divided into six age groups: 16-25, 26-35, 36-45, 46-55, 56-65, and 66 or more years of age (see Table 1-3). Young

TABLE 1-2. DISTRIBUTION OF BAL BY ROAD STATUS GROUPS

Road Status Groups	Total Number	Blood Alcohol Level: Not Drinking	Drinking	0.10%+	0.15%+
Total Population	616	233 (38%)	383 (62%)	279 (45%)	224 (36%)
Drivers	309	105 (34%)	204 (66%)	170 (55%)	134 (43%)
Passengers	140	60 (43%)	80 (57%)	38 (27%)	26 (19%)
Pedestrians	167	68 (41%)	99 (59%)	71 (43%)	64 (38%)

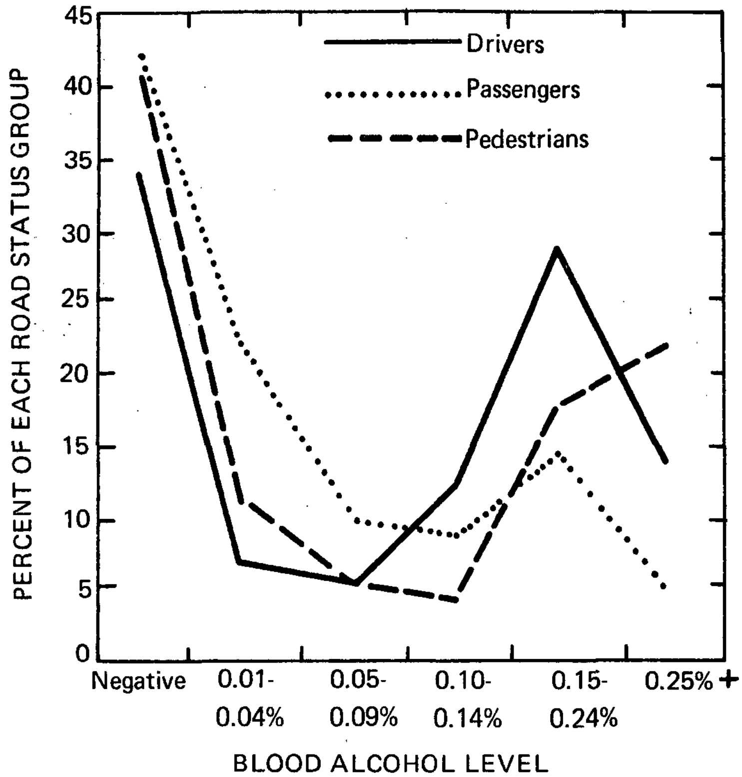

Figure 1.1. Comparison of blood alcohol levels between road status groups.

drivers (16-25) were further subdivided into two groups: 16-19 years, and 20-25 years. This was done because significant differences in alcohol involvement appeared between those two young driver populations.

TABLE 1-3. DRIVER FATALITIES, AGE, AND BAL

Age (Years)	Percent of Michigan Driver Population	Driver Fatalities	Drinking	0.10%+	0.15%+
16-19	7%	34 (11%)	17 (50%)	10 (29%)	6 (18%)
20-25	15%	76 (25%)	57 (75%)	48 (63%)	32 (42%)
26-35	19%	57 (19%)	47 (82%)	46 (81%)	39 (68%)
36-45	21%	44 (14%)	35 (80%)	32 (73%)	29 (66%)
46-55	17%	45 (15%)	30 (67%)	23 (51%)	17 (38%)
56-65	13%	32 (10%)	14 (44%)	10 (31%)	10 (31%)
66+	7%	20 (6%)	4 (20%)	1 (5%)	1 (5%)
TOTAL	100%	308* (100%)	204 (66%)	170 (55%)	134 (43%)

*Age missing for one driver

When BAL comparisons were made for each of the age groups they were also compared to a random sample of Michigan drivers.

The age group 16-25 years accounted for 36% (110) of the driver fatalities, but according to 1967 statistics (Little, 1968) this age group represented only 21% of Michigan's total driving population.

When further subdivided, ages 16-19 years totaled 11% of all the Wayne County fatalities but only 7% of the driving population.

In the age group 20-25 years there was an even greater discrepancy. That age group accounted for 25% of the fatalities but only 15% of the Michigan drivers.

When the other fatality age groups were compared to the "at large" driving population the percentages between the two populations were quite similar, except for the ages 36-45 years. This age group constituted only 14% of the fatality population but 21% of the driving population.

BALs were then compared between fatality age groups. Although 205 (66%) of the driver fatalities were drinking to some extent, certain age groups differed considerably from each other in the amount of alcohol consumed.

Of the 110 drivers between 16 years and 25 years of age, 74 (67%) had been drinking. Fifty-eight (53%) had a BAL of 0.10% or higher. Thirty-eight (35%) had a BAL of 0.15% or higher.

The extent of the drinking involvement in the 34 very young drivers was quite different, however. Seventeen (50%) of the 16- to 19-year-olds had been drinking. Ten (30%) reached BALs 0.10% or above, and six (18%) had BALs 0.15% or above. Fifty-seven (75%) of the drivers between 20 years and 25 years of age had been drinking. Forty-eight (63%) had BALs 0.10% or higher, while 32 (42%) had BALs 0.15% or above.

The amount of drinking involvement increased between the ages of 26-35 years and 36-45 years. Since the percentages were quite similar for the two age groups, they were combined. One hundred and one (33%) drivers were between 26 years and 45 years of age. Eighty-two (81%) had been drinking, 78 (77%) had BALs 0.10% or above. Another 27 (27%) had BALs 0.25% or above. The age group having the largest percentage of extremely heavy drinkers (BAL $\geq$ 0.25%) was the group of 36- to 45-year-olds.

From age 46 on, the number of driver fatalities who had been drinking, as well as the amount they had been drinking, decreased appreciably until after age 66, only 20% of the drivers had been drinking and only one driver had a BAL above 0.09% at the time of his fatal accident.

Summary of driver age and BAL comparisons. Drivers age 16-19 years were somewhat over-represented in the fatality population as compared to their actual percentage within the Michigan driver population. Half of that age group had been drinking at the time of their fatal accident although they were below Michigan's legal drinking age of 21 years.

The age group between 20 and 25 years constituted the single largest group of driver fatalities. Three-quarters of this group had been drinking.

However, the heaviest drinking occurred among drivers aged 26 to 45 years. Twenty-seven percent of that combined population had BALs 0.25% or above. Sixty-seven percent had BALs 0.15% or above.

Drivers over age 45 were somewhat under-represented in the fatality population as compared to their percentage in the Michigan driver population.

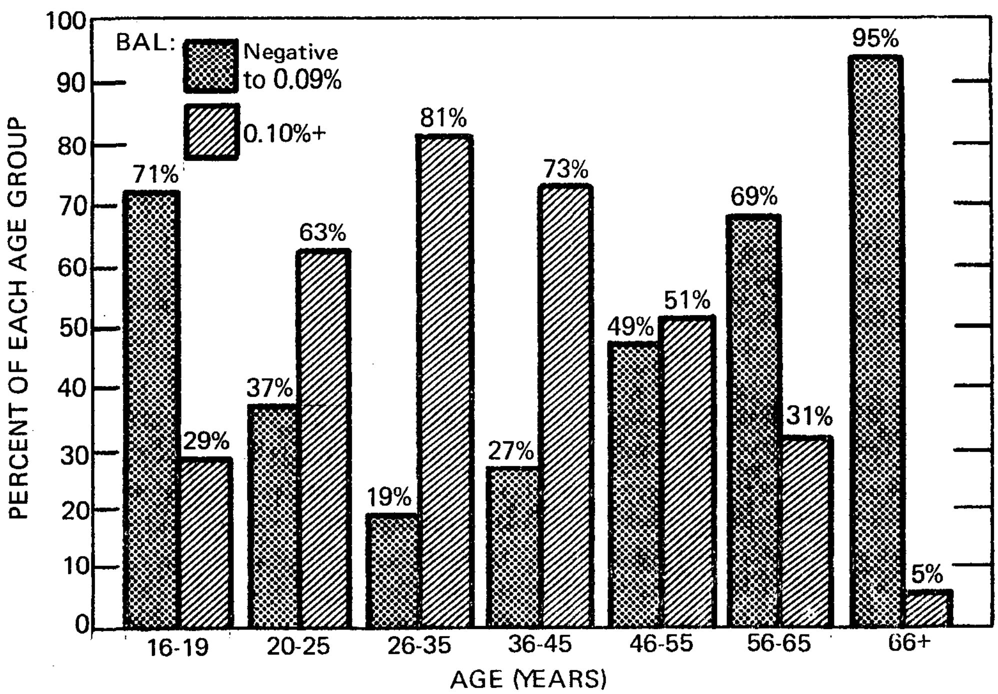

Figure 1.2. Driver age and BAL.

Correspondingly, the amount of alcohol involvement within the fatal population also decreased with age, until, after age 66, at which point 80% of the driver fatalities had not been drinking.

1.4.1.3 Passenger Age and Blood Alcohol Level. The largest single age group of passenger fatalities is the 16- to 19-year group, which contained 32 persons or 23% of the total. If combined with passengers in the age group of 20 to 25 years, young persons accounted for 44% (61) of the total passenger fatality population.

Table 1-4 shows BALs for each of the passenger age groups. Age was not given for three persons.

TABLE 1-4. PASSENGER AGE AND BAL

Age (Years)	Passenger Fatalities	Drinking	0.10%+	0.15%+
16-19	32 (23%)	17 (53%)	3 (9%)	3 (9%)
20-25	29 (21%)	24 (83%)	11 (38%)	7 (24%)
26-35	21 (15%)	14 (67%)	9 (43%)	5 (24%)
36-45	15 (11%)	11 (73%)	10 (67%)	7 (47%)
46-55	13 (9%)	5 (38%)	3 (23%)	2 (15%)
56-65	16 (11%)	6 (38%)	2 (13%)	2 (13%)
66+	11 (8%)	3 (27%)	0 (0%)	0 (0%)
Missing Data	3 (2%)	0 -	0 -	0 -
TOTAL	140 (100%)	80 (57%)	38 (27%)	26 (19%)

The percentage of persons drinking was much lower for the 16to19-year-olds than for those aged 20-25. However, 17 (53%) of the 16- to 19-year-olds had been drinking. Three (9%) had BALs 0.15% or above. Twenty-four (83%) of the passengers between 20 and 25 years of age had been drinking to some extent, and eleven (38%) had BALs 0.10% or above.

The 36- to 45-year-olds had the greatest percentage of those drinking heavily ($\geq$0.15%), while eight (73%) of the 66-and-older age group had not been drinking at all.

1.4.1.4 Pedestrian Age and BAL. In Table 1-5 the 167 pedestrian fatalities were divided into the same age groups as the drivers and passengers.

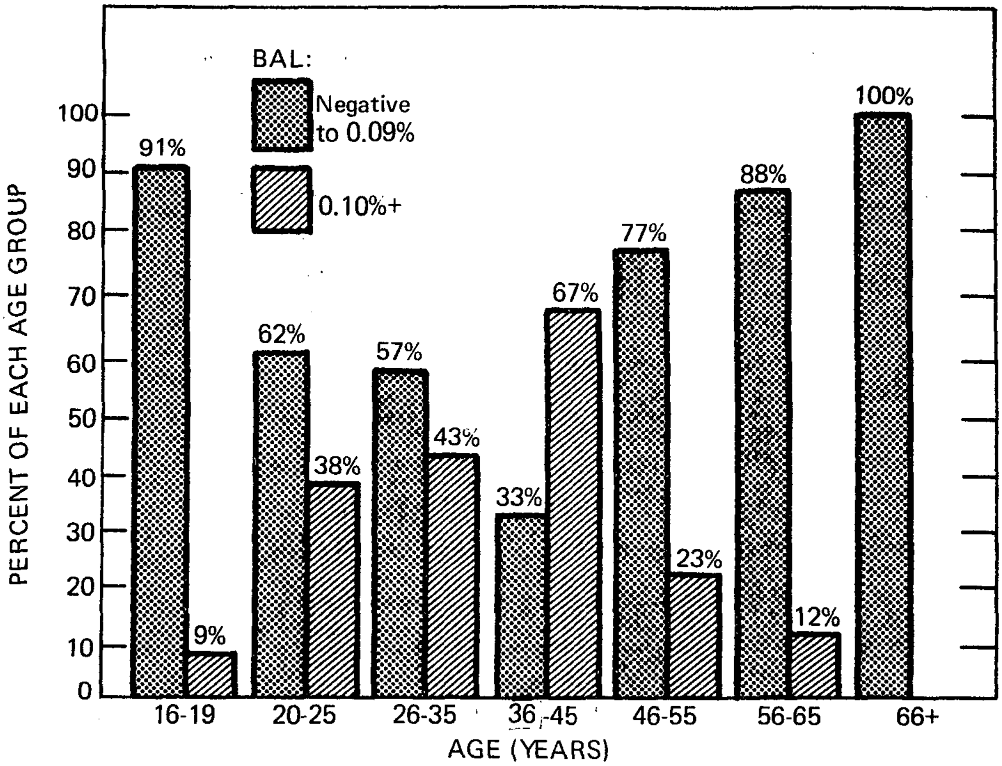

Figure 1.3. Passenger age and BAL.

TABLE 1-5. PEDESTRIAN AGE AND BAL

Age (Years)	Pedestrian Fatalities	Drinking	0.10%+	0.15%+
16-19	5 (3%)	0 (0%)	0 (0%)	0 (0%)
20-25	8 (5%)	7 (88%)	5 (63%)	5 (63%)
26-35	13 (8%)	8 (62%)	3 (23%)	3 (23%)
36-45	28 (17%)	22 (79%)	17 (61%)	15 (54%)
46-55	27 (16%)	21 (78%)	20 (74%)	19 (70%)
56-65	27 (16%)	21 (78%)	12 (44%)	11 (41%)
66+	59 (35%)	20 (34%)	11 (19%)	8 (14%)
TOTAL	167 (100%)	99 (59%)	68 (41%)	61 (37%)

Only 26 (14%) of the pedestrian fatalities were between the ages of 16 and 35. The several age groups ranging from 36 to 65 years had either 27 or 28 pedestrians each. The largest single age group of pedestrian fatalities was the 66-years-and-older group, which constituted 35% (59) of the pedestrian fatality population.

Between 20 years of age and 65, there was extensive drinking involvement, as can be seen in the table above. Anywhere from 62%-88% of the pedestrian fatalities in each of the age groups had been drinking.

Further subdivision revealed that between ages 36 and 45 there was a peak of extremely heavy drinking that is shown in Figure 1.5. Fifteen (46%) out of 28 pedestrians in this age group had BALs $\geq$ 0.25%.

Although persons aged 66 and older constituted the largest single age group of pedestrian fatalities, 39 out of 59 (66%) had not been drinking.

At the opposite end of the age scale, ages 16-19 years constituted the smallest number of pedestrian fatalities (five) and none had been drinking.

The majority of pedestrian fatalities were 56 years or older, but drinking involvement--the number of drinkers and the amount consumed--was more extensive among the middle-aged pedestrians (36-55 years).

Summary of comparison between road status groups, age, and BAL. The age group containing the largest percentage of fatalities differed among the three road status groups. Young persons aged 16-25 years represented 36% of the driver fatalities and 44% of the passenger fatalities. However, the oldest group, aged 66 and above, represented the largest percentage (35%) of the pedestrian fatality population.

Fifty percent of the driver fatalities between the ages of 16 and 19 years had been drinking at the time of their crash, although they were below Michigan's legal drinking age.

The heaviest drinking involvement for driver fatalities was among persons aged 26 to 45 years. Sixty-seven percent had BALs of 0.15% or higher, and 27% had BALs of 0.25% or higher.

For drivers and passengers, the smallest amount of drinking involvement was in the age group of 66-year olds or older. This age group for pedestrians also showed very minor drinking involvement, although none of the five pedestrians aged 16-19 years had been drinking.

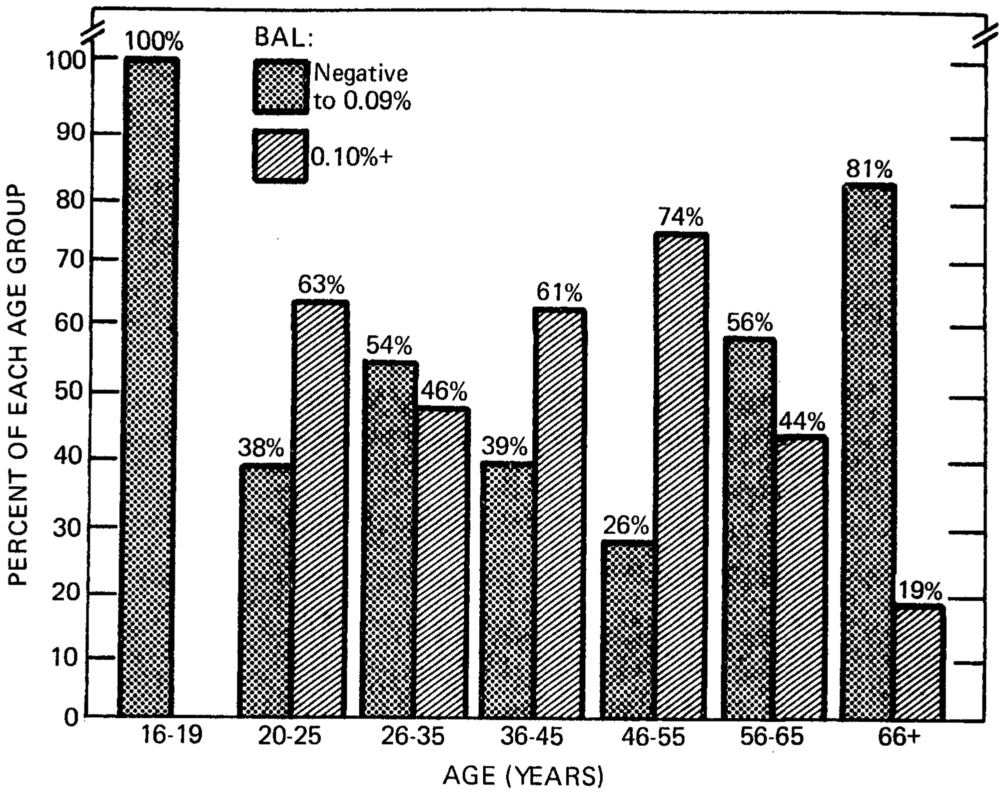

Figure 1.4. Pedestrian age and BAL.

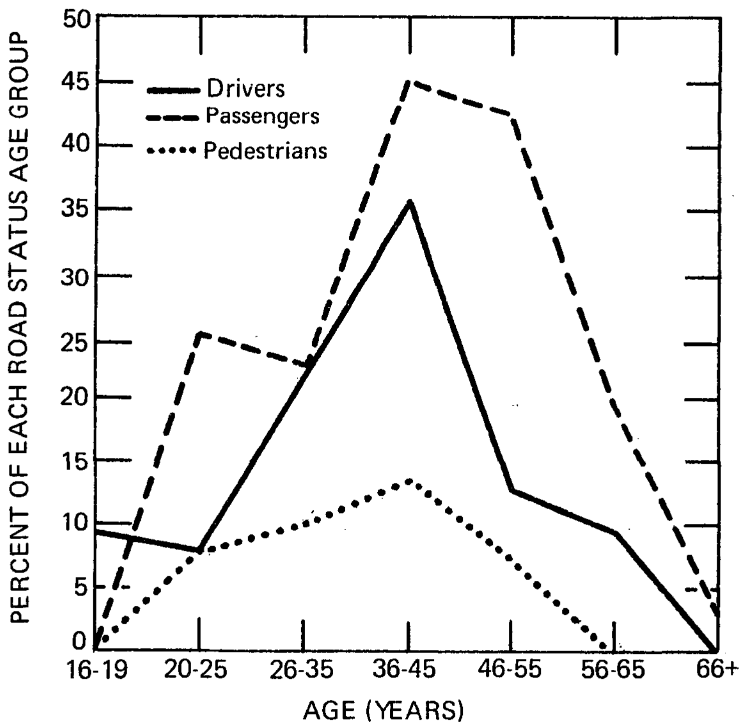

Figure 1.5. Distribution across age for drivers, passengers, and pedestrians with BAL 0.25% or higher.

1.4.1.5 Sex and Blood Alcohol Level. Of the total population, 470 persons (76%) were male, and 146 (24%) were female. Within this total population, 34% of the males had negative BALs and 52% had BALs 0.10% or above. The ratio changes for females who had 51% with negative BALs and 24% with BALs 0.10% or above.

Only 10% of the drivers were female (31) compared to 46% of the passengers and 30% of the pedestrians. Although, as a group, females had a lower percentage than males with BALs 0.10% or greater (24%:52%) this low percentage is primarily accounted for by the female passengers and pedestrians. Only 17% and 20% of their respective groups had BALs 0.10% or above, but 45% (14) of the female drivers had BALs 0.10% or higher.

1.4.1.6 Marital Status and Blood Alcohol Level. Six categories of marital status were coded for the fatalities. Table 1-6 shows the drinking involvement in each group; figures for divorced and separated persons are presented together. The two largest groups were "married" (45%) and "single" (38%). Divorced and separated persons constituted 6% and 4% of the total, respectively, while 7% of the persons were widowed.

TABLE 1-6. MARITAL STATUS AND BAL

Marital Status	Total Number	Percent Drinking	BAL 0.10%+	BAL 0.15%+
Married	277	64%	48%	39%
Single	233	62%	42%	34%
Divorced or Separated	57	75%	58%	47%
Widowed	41	37%	27%	20%
Missing Data	8	37%	25%	25%
TOTAL	616	62%	45%	36%

The group with the greatest alcohol involvement, both in percentage drinking and percentage drinking at high BALs, was divorced and separated persons.

The drinking involvement of single persons was slightly less than that of married persons.

Age was perhaps a factor in the low drinking involvement of widowed persons, with only 15 out of 41 (37%) drinking to any extent. The percentage of widowed persons also differed between road status groups. They constituted only 2% of the drivers but 17% of the pedestrians.

1.4.1.7 Race and Blood Alcohol Level. Racial differences defined by color (black or white) were the only distinctions which could be made for the fatalities. Four hundred and eighty persons (78%) were white, and 136 (22%) were black. A higher percentage of whites had negative BALs (41%:28%) although this was somewhat balanced by a lower percentage of whites in the 0.01%-0.09% BAL category (15%:22%). Other BAL differences between the two races did not appear to be great. (see Table 1-7).

TABLE 1-7. RACE AND BAL

	Blood Alcohol Level				
Race	Neg.	0.01-0.09%	0.10-0.14%	0.15-0.24%	0.25%+
White (Total:480)	41%	15%	9%	22%	13%
Black (Total:136)	28%	22%	9%	23%	18%

1.4.1.8 Social Class and BAL. The largest socio-economic group of fatalities contained blue collar/unskilled/semi-skilled workers (43%). The next largest group was white collar/skilled/technicians, who accounted for 18% of the total fatalities. The other groups each accounted for less than 10% of the population. These groups were: professional and semi-professional (5%), retired and disabled persons (9%), housewives (7%), students or Armed Forces personnel (7%), and unemployed persons (6%).

The Chi square test was used to test for significant relationships between social class and alcohol involvement. The comparison was limited to employed persons, therefore excluding any bias which might result from young or old age (students, retired), sex (housewives), and unemployed (many of whom also were women who were probably classified as unemployed because they were housewives). Table 1-8 shows the frequency of blood alcohol level for three groups: "blue collar" includes unskilled and semi-skilled workers; "white collar" includes skilled work which requires an apprenticeship as well as traditionally defined white collar work; "professional" includes semi-professional and managerial jobs. Actual job coding was done using Hollingshead's scale of occupations (Hollingshead and Redlich 1958).

TABLE 1-8. SOCIAL CLASS AND BAL FOR ALL FATALITIES

Social Class	Total	Blood Alcohol Level: Neg.-0.04%	0.05-0.14%	0.15%+
Blue Collar	262	93 (36%)	43 (16%)	126 (48%)
White Collar	112	50 (45%)	19 (17%)	43 (38%)
Professional	29	16 (55%)	7 (24%)	6 (21%)
TOTAL	403*	159	69	175

*The fatalities not shown on this table can be found in Appendix G.

The hypothesis that social class and blood alcohol level are significantly related was accepted at the 0.05 level of significance.

Blue-collar workers (with the largest sample size) were overrepresented in the heaviest drinking category (BAL $\geq$ 0.15%). Professionals who had been drinking heavily (BAL $\geq$ 0.15%) were underrepresented as were white-collar workers.

Summary of demographic information. The total fatality population analyzed was 616 cases: 309 were drivers; 140 were passengers; and 167 were pedestrians.

Sixty-two percent had been drinking to some extent and 36% had BALs 0.15% or higher. When BAL was checked for each road status group, 55% of the driver population, 27% of the passengers, and 43% of the pedestrians had BALs $\geq$ 0.10%.

For each road status group, persons aged 20-25 years had the most extensive drinking involvement, although persons aged 36-45 years consistently had the highest percentage of extremely heavy drinkers (BALs $\geq$ 0.25%). The very old fatalities had seldom been drinking.

The majority of the fatalities were male and the extent of their drinking involvement was much greater than that of females.

Married people were the largest marital group within the fatalities, but divorced and separated persons accounted for the highest percentage of those drinking.

The majority of the fatalities were white. There were essentially no differences between drinking involvement of the white and black populations.

Blue-collar workers constituted the largest social class in the fatality sample. Heavy drinking involvement was most extensive for this same group.

1.4.2 MORGUE REPORT INFORMATION. In addition to determining the blood and spinal alcohol levels of all of the fatalities, the Wayne County morgue furnished the following information:

1. Toxicological findings
2. Pathological findings: cirrhosis or liver abnormalities
3. Primary cause of death: type of injury causing death
4. Information about the deceased's activities prior to the accident

1.4.2.1 Toxicological Findings. The following presents toxicological results from the two years of Wayne County data, which was based on 616 fatalities, 309 of whom were drivers. Testing was done for six drugs or substances including: barbiturates, cyanide, carbon monoxide, salicylate, sugar, and acetone. No testing was done for the presence of narcotics, marihuana, or the amphetamines.

Results are summarized as follows:

A. Blood Barbiturate (see Table 1-9):
   1. Present in 16 cases: 6 drivers, 4 passengers, and 6 pedestrians
   2. 11 out of 16 combined barbiturates with alcohol
   3. 2 persons were epileptic (one previously hospitalized for barbiturate overdose)
   4. 1 person was a known drug addict

5. 1 person had a previous conviction for possession of marihuana

6. 1 person was a registered nurse

B. Blood Cyanide (see Table 1-10):

1. Present in 5 cases: 3 drivers, 1 passenger, and 1 pedestrian

2. 2 persons had negative blood alcohol levels; both of these were involved in crash fires which may account for the presence of cyanide

3. The remaining three persons had BALs from 0.13% - 0.39%

C. Blood Carbon Monoxide (see Table 1-11):

1. Present in 4 cases: 3 drivers and 1 passenger

2. One driver was electrocuted (BAL = 0.16%) and another driver was involved in a crash fire (BAL = neg.), both of which would account for carbon monoxide

D. Salicylate (see Table 1-12):

1. Present in 13 cases: 5 drivers, 5 passengers, and 3 pedestrians

2. Six of the 13 had negative BALs

3. Three were above 0.15% BAL

E. Blood Sugar and Acetone (see Table 1-13):

One case with both present. BAL was 0.25%. Sugar and Acetone are usually found in diabetics

TABLE 1-9. BLOOD BARBITURATE RESULTS BY CASE (N = 16 CASES)

Road Status Group	Blood Barbiturate (mg/100ml)	BAL (%)	Other Information
Drivers	(trace)	0.23	
	0.5	(neg.)	
	(trace)	0.25	
	(trace)	0.20	
	(trace)	0.11	
	2.4	(neg.)	(epileptic previously hospitalized for barbiturate overdose)
Passengers	0.5	0.01	
	4.1	(neg.)	(registered nurse)
	(trace)	0.06	
	0.5	0.01	
Pedestrians	0.4	0.32	
	0.9	(neg.)	(drug addict)
	1.1	0.20	
	0.6	0.12	(1955 conviction for possession of marihuana)
	0.75	0.26	(grand mal epileptic)
	1.3	(neg.)	

TABLE 1-10. BLOOD CYANIDE RESULTS BY CASE AMONG ALL ROAD STATUS GROUPS (N = 5 Cases)

Blood Cyanide	BAL (%)	Other Information
trace	(neg.)	driver (crash fire)
trace	0.13	driver
trace	0.19	driver
trace	0.39	pedestrian
140 mcg/100ml	(neg.)	passenger

TABLE 1-11. BLOOD CARBON MONOXIDE RESULTS BY CASE AMONG ALL ROAD STATUS GROUPS (N = 4 Cases)

Blood Carbon Monoxide	BAL (%)	Other Information
9%	(neg.)	passenger
10%	0.16	driver (electrocuted)
14%	(neg.)	driver (crash fire)
16%	(neg.)	driver

TABLE 1-12. SALICYLATE RESULTS BY CASE AMONG ALL ROAD STATUS GROUPS (N = 13 Cases)

Salicylate Results	BAL
positive urine:	5 with neg. BAL
	3 with 0.01% BAL
	1 with 0.15% BAL
	1 with 0.24% BAL
	1 with 0.33% BAL
moderate urine:	1 with 0.06% BAL
18 mg/100ml urine:	1 with neg. BAL

TABLE 1-13. BLOOD SUGAR AND ACETONE RESULTS BY CASE AMONG ALL ROAD STATUS GROUPS (N = 1 Case)

Substance	Amount	BAL
Blood Sugar	152 mg/100ml	0.25% BAL
Acetone	trace	0.25% BAL

1.4.2.2 Pathological Findings. Table 1-14 summarizes the pathological findings. Thirteen persons 25 years of age or older were cirrhotic. Seven had BALs less than 0.10% and six had BALs 0.10% or higher. The table also compares cirrhosis with the presence of fatty changes in the liver. Three of the 13 cirrhotics did not show fatty changes, although by definition there were other liver abnormalities. Of the 349 persons 25 years old or older whose liver was examined, 156 had BALs 0.10% or higher. Fifty percent of this group showed fatty changes while 50% showed no change. This compares to 39% of the 189 persons with BALs less than 0.10% who had fatty changes in the liver.

TABLE 1-14. FATTY LIVER AND CIRRHOSIS FOR PERSONS 25 YEARS OR OLDER*

	BAL ≤0.09%			BAL≥0.10%		
Liver Findings	No Cirrhosis	Cirrhosis	Total	No Cirrhosis	Cirrhosis	Total
No Fatty Changes	114	2	116	77	1	78
Fatty Changes	68	5	73	73	5	78
Total	182	7	189	150	6	156

*Table excludes 83 persons for whom no liver biopsy was made

In addition to the 13 cirrhotics shown on Table 1-14, there was one cirrhotic male who was 21 years of age and who died with a BAL of 0.26%. The BAL of all 14 cirrhotics is shown below.

BAL:	Negative	0.01-0.04%	0.10-0.14%	0.15-0.24%	0.25%+
Number of Cirrhotics: (N = 14)	5	2	1	5	1

1.4.2.3 Cause of Death for Drivers and Passengers. One hundred and twenty-two (39%) driver deaths were primarily caused by head injuries, the largest type being either skull fracture or crushed skull (28%).

The next largest category comprised internal, multiple, and crushing injuries, which caused 70 of the 88 deaths listed as "Other"; another 68 (22%) deaths were caused by thoracic injuries, notably crushed chest.

Table 1-15 shows the injury type for drivers and passengers (front and rear seat).

TABLE 1-15. PRIMARY INJURY CAUSING DEATH IN 309 DRIVERS AND 140 PASSENGERS

Injury Type	Drivers	Front Passengers	Rear Passengers
Head	122 (39%)	39 (35%)	15 (55%)
Neck	20 (6%)	9 (8%)	1 (4%)
Thorax	68 (22%)	26 (23%)	2 (7%)
Abdomen	7 (2%)	4 (3%)	0 (0%)
Other	88 (28%)	34 (30%)	8 (30%)
Missing Data	4 (1%)	1 (<1%)	1 (4%)
TOTAL	309 (100%)	113 (100%)	27 (100%)

1.4.2.4 Information from Morgue Witnesses. Certain general questions were usually asked of witnesses who came to the morgue to identify the bodies of traffic fatalities. The questions most often asked were: Where was the deceased coming from at the time of the accident? Had he been sick recently? Taking any medication? Depressed or made suicide attempts? Had any accidents recently? Did the deceased drink?

Information from the answers to these questions was coded. However, the available data were often sketchy and incomplete because the identifying witness often did not know the deceased very well or had not seen him recently. In other cases one can be quite sure that the witnesses were less than candid, especially on the drinking question. This was perhaps due to a fear that insurance companies or prosecuting attorneys would use drinking information to the detriment of the deceased's family.

Even though this information is incomplete and perhaps not entirely factual, it does suggest the kind of activities preceding fatal crashes, and is therefore presented in Table 1-16.

Among those cases where information was known, the place the deceased was coming from most often was work or school. The next most common places were from visiting friends or relatives and running an errand or coming from an appointment. Ninety percent of the persons reported to be coming from a bar or drinking

TABLE 1-16. LOCATION OF DECEASED PRIOR TO ACCIDENT BY BAL

Prior Location of Deceased	Blood Alcohol Level Neg.	0.01-0.09%	0.10%+	Percent with 0.10%+
Bar or Drinking Estab. (Total:10)	0	1	9	90%
Visiting Friends or Relatives (Total:25)	8	4	13	50%
Work/School (Total:32)	9	7	16	50%
Home (Total:7)	4	2	1	14%
Errand/Appoint. (Total:24)	17	4	3	13%
Entertainment/ Recreation (Total:16)	4	5	7	44%
On the Job (Total:10)	6	1	3	43%
No Information (Total:492)	185	80	227	46%

establishment reached a BAL of 0.10% or higher, although this was only 8% of the known sample. The two other groups with 50% of the fatalities having high BALs had been visiting friends or coming from work. This gives limited support to the idea that persons drinking on the way home from work often reach levels unsafe for driving.

The only other question asked of morgue witnesses for which there was a significant number of answers involved the deceased's drinking frequency. As mentioned in the beginning of this section, the responses are not thought to be entirely truthful; however, it is expected that they are biased in favor of less drinking rather than more drinking. Answers as compared to the actual tested BAL are presented in Table 1-17.

TABLE 1-17. DRINKING FREQUENCY RESPONSES AND TESTED BAL

Drinking Frequency	Total	Blood Alcohol Level Neg.	0.01-0.09%	0.10-0.14%	0.15%+
Alcoholic	11	2	2	0	7
Heavy Drinker	29	4	4	5	16
Moderate Drinker	213	45	30	23	115
Occasional Drinker	65	22	6	9	28
Non-Drinker	197	119	45	11	22
Drinks-Frequency Not Given	39	4	8	6	21
Missing Data	62	37	9	1	15
TOTAL	616	233	104	55	224

An interesting finding from Table 1-17 is that 2 of the 11 alcoholics were not drinking at the time of their accidents. Many of the persons called moderate drinkers were in fact at levels of 0.15% or higher. The highest correlation betewen witness response and actual BAL was for non-drinkers. Sixty percent of these persons (119/197) actually were not drinking.

Results from other information found in the morgue files include the following. BALs were evenly distributed across all levels for the 19 persons who had recently been ill. Thirteen persons had a disability which may have contributed to their accidents. This includes such things as partial blindness or pedestrians whose walk was slowed because they used canes. Sixteen persons had physical ailments which are often associated with or aggravated by drinking. This includes gastritis, ulcers, nervous stomach, and hypertension. Eleven of the 16 persons who had complained of such ailments prior to their death had BALs 0.10% or higher, and 9 had BALs of 0.15% or higher. This may suggest that physicians treating patients with the above type of complaints should carefully check the drinking habits of these persons. Five persons were noted by witnesses to have been hospitalized mental patients.

Summary of morgue information. Testing was done for six drugs or substances including barbiturates, cyanide, carbon monoxide, salicylate, sugar, and acetone. No testing was done for the presence of narcotics, marihuana, or the amphetamines.

Liver biopsies were performed on 509 of the 616 deceased accident victims. Thirteen persons above age 25 were cirrhotic. Seven had BALs <0.10% and six had BALs ≥ 0.10%. Three of the cirrhotics did not show fatty changes. Fifty percent of the total population with BALs ≥ 0.10% showed fatty changes in the liver. Thirty-nine percent with BALs < 0.10% had fatty changes in the liver.

Head injury was the primary cause of death for 39% of the drivers. The next largest category comprised internal, multiple, or crushing injuries.

Information was given on the activities of the deceased prior to the fatal crash. According to morgue identification witnesses, 26% had been coming from work or school, 20% had been visiting friends or relatives, and 20% had been on errands or appointments. Of the 10 fatalities coming from a bar or drinking establishment, all but one had BALs ≥ 0.10%. Fifty percent of those coming from work or school also had BALs ≥ 0.10%.

Drinking habits of the deceased was the other question asked of morgue witnesses. Two of the 11 deceased thought to be alcoholics had negative BALs. One hundred and thirty-eight of 213 reported to be moderate drinkers had BALs ≥ 0.10% and 115 had 0.15% and above. Twenty-eight "occasional drinkers" had BALs ≥0.15%. Seventy-eight of 197 said to be non-drinkers actually were drinking and 33 were above 0.15%.

Other information about the deceased included the following: Nineteen people had recently been ill and 13 had physical disabilities which may have contributed to their accidents. Sixteen had physical ailments often associated with drinking habits and 11 of these had BALs ≥ 0.10%.

1.4.3 ACCIDENT INFORMATION. This section gives information on the accident characteristics of the fatalities. These data are presented primarily for drivers and pedestrians. They have been taken from the accident report filled out by the investigating police officer and include the following type of data:

1. Time: hour, day, and month of accident.
2. Physical environment: locality, type of road, weather.
3. Dynamic factors pertaining to the crash: driver and pedestrian activity, type of collision, number of vehicles, speed at accident, alcohol involvement of surviving drivers, violations prior to crash.
4. Other: physical condition of the driver, vehicle condition, driver license status, number of passengers in the driver fatality's car, and car ownership.

1.4.3.1 Time of Accident.

Driver fatalities. The greatest number of driver fatalities occurred between midnight and 6 a.m. One hundred and twenty driver fatality crashes took place during this period; this is 38% of all the driver fatalities. Further division of this six-hour period reveals that 88 (23%) crashes occurred between midnight and 3 a.m.; 32 (10%) were between 3 a.m. and 6 a.m.

Of the 120 crashes between midnight and 6 a.m., 94 or 78% of the drivers had BALs of 0.10% or higher. Only 17 or 14% had not been drinking. No other time periods have that great a percentage of heavy drinkers.

Between 6 a.m. and 6 p.m. there were 96 fatalities or 31% of all drivers. Thirty-seven (39%) had been drinking to some extent and 25 (26% of 96 fatalities) had BALs of 0.10% or higher. Fifty-nine (61%) had not been drinking.

Between 6 p.m. and midnight there were 93 fatalities or 30% of all driver crashes. Sixty-four (69%) had been drinking and of those, 51 (55%) had BALs of 0.10% or higher. Twenty-nine had not been drinking. Fig. 1.6 shows the driver fatalities with negative BAL and BAL 0.10% or higher for each of the six-hour time periods.

Pedestrian fatalities. The highest percentage of accidents fatal to pedestrians occurred between 6 p.m. and midnight, with this time period accounting for 74 or 53% of the total. Thirty-eight (51%) had BALs 0.10% or higher, while 25 (34%) had not been drinking.

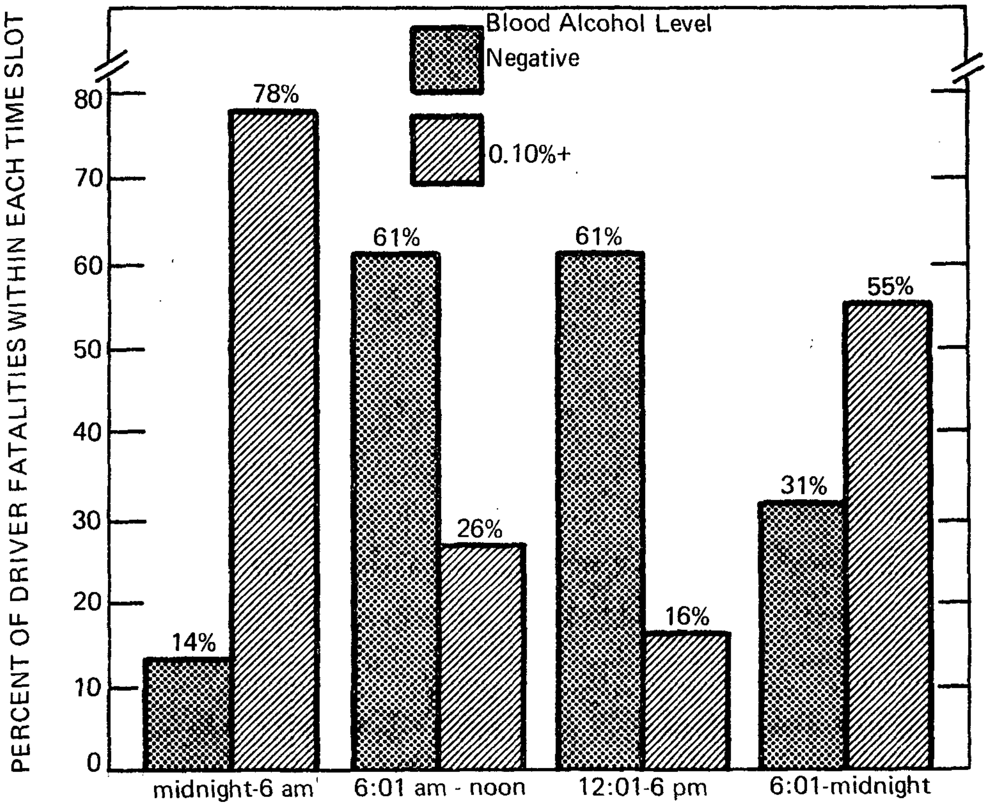

Figure 1.6. Driver crashes and drinking involvement for six-hour time periods.

Thirty-two (23%) pedestrian accidents took place between midnight and 6 a.m. However, of these, 24 or 75% had BALs 0.10% or higher, 4 had BALs 0.01%-0.09% and 4 had not been drinking. Although this time period does not contain the highest percentage of pedestrian accidents, it does show the highest percentage of drinking pedestrians for the three time periods.

Sixty-one (44%) pedestrian accidents occurred between 6 a.m. and 6 p.m. Nine (15%) had BALs of 0.10% or higher and 39 (64%) had not been drinking.

Table 1-18 shows the alcohol involvement for each of the three road status groups during the three time periods. Passengers have been included.

Summary of driver and pedestrian accidents by time of crash. Although there are relatively few cars on the road between midnight and 6 a.m., the highest percentage of driver fatality crashes

TABLE 1-18. TIME OF CRASH AND BAL FOR EACH ROAD STATUS GROUP*

	A. Midnight to 6 am, 6-Hour Total	BAL Negative	BAL 0.10%+
Drivers	120	17 (14%)	94 (78%)
Passengers	60	13 (22%)	24 (40%)
Pedestrians	32	4 (13%)	24 (75%)

	B. 6 am to 6 pm, 12-Hour Total	BAL Negative	BAL 0.10%+
Drivers	96	59 (61%)	24 (26%)
Passengers	34	22 (65%)	3 (9%)
Pedestrians	61	39 (64%)	9 (15%)

	C. 6 pm to Midnight, 6-Hour Total	BAL Negative	BAL 0.10%+
Drivers	92	29 (31%)	51 (55%)
Passengers	46	25 (54%)	11 (24%)
Pedestrians	74	25 (34%)	38 (51%)

*Percentages are based on totals within each time period by road status.

occurred at this time. Drinking involvement was also most extensive for crashes which took place during this time period.

During the period from 6 a.m. to 6 p.m. the majority of driver fatalities had not been drinking (61%), while between 6 p.m. and midnight the number drinking increased to 69%, with 55% having BALs of 0.10% or higher.

The majority of pedestrian accidents occurred between 6 p.m. and midnight, with this period accounting for 53% of the pedestrians who died. This time period is six hours earlier than the peak period for driver crashes. However, heavy drinking involvement for pedestrians was greatest during the same period that it was heaviest for drivers, that is, between the hours of midnight and 6 a.m.

Day of accident (week-day and week-end) for drivers. Information concerning the day of the week was analyzed for driver fatalities. Each day was considered a 24-hour unit beginning at 12:01 a.m. and ending at 12 midnight. Week-end time differed from this 24-hour breakdown. This change was made so that week-end time would correspond with the end of the work week and the beginning of the week-end leisure time period. The week-end was considered to begin on Friday at 6 p.m. and end on Monday at 6 a.m., a 60-hour period. The work week began on Monday at 6 a.m. and ended on Friday at 6 p.m., a 108-hour period.

Table 1-19 shows the total number of driver fatalities per week day. They are subdivided into those who had not been drinking and those who had BALs 0.10% or higher. Those driver fatalities not shown on the table would, of course, have had BALs from 0.01-0.09%. Monday and Friday are shown with the hours considered a part of the week-end deleted.

TABLE 1-19. WEEK-DAY ACCIDENTS AND BAL FOR DRIVER FATALITIES

		BAL	
Week Days	Total Number	Negative	0.10%+
Monday (after 6 am)	26	16 (62%)	8 (31%)
Tuesday	38	19 (50%)	17 (45%)
Wednesday	43	15 (35%)	22 (51%)
Thursday	33	13 (39%)	15 (45%)
Friday (before 6 pm)	27	9 (33%)	13 (48%)
TOTAL	167	72 (43%)	75 (45%)

Between Monday morning at 6 a.m. and Friday night at 6 p.m. there were 167 driver fatality crashes, or 54% of the total. Seventy-five drivers (45%) had BALs 0.10% or higher. Seventy-two (43%) had not been drinking. Monday is the day with the least amount of drinking, although the percent drinking would increase somewhat if the early Monday morning week-end crashes had been included.

One hundred and forty drivers crashed in week-end accidents (see Table 1-20). This is 45% of all the driver fatalities though only 36% of the hours in a week. One hundred and seven (76%) had been drinking and 94 (67%) had BALs 0.10% or higher. Only 33 (24%) had not been drinking during the week-end period.

TABLE 1-20. WEEK-END ACCIDENTS AND BAL FOR DRIVER FATALITIES

Week-End	Total Number	BAL Negative	BAL 0.10%+
Friday (6 pm - Midnight)	23	6 (26%)	15 (65%)
Saturday	58	11 (19%)	41 (71%)
Sunday	46	13 (28%)	28 (61%)
Monday (12:01 - 6 am)	13	3 (23%)	10 (77%)
TOTAL	140	33 (24%)	94 (67%)

Nearly half (23 of 50) of the Friday fatalities occurred between 6 p.m. and midnight, and thus are counted as part of the week-end. Fifteen (65%) had BALs of 0.10% or higher.

The highest number of driver fatality crashes for any day occurred on Saturday, which had 58 such crashes. Of that number, 41 drivers had BALs 0.10% or greater. This number includes Friday night drinkers, since 21 occurred between midnight on Friday night and 6 a.m. Saturday morning. Another 15 of the Saturday drivers with BALs 0.10% or higher crashed between 6 p.m. and 12 midnight. Only 11 (19%) of all Saturday fatalities had not been drinking at the time of their crash.

Many of the Sunday driver fatalities were actually the Saturday night drinkers. Although not shown on the table above, 27 (59% of 46) Sunday fatalities occurred between Saturday midnight and 6 a.m. Sunday morning. Of these 27, nineteen had BALs 0.10% or higher. Between Sunday midnight and 6 a.m. Monday morning, there were 13 fatalities. Ten had a BAL of 0.10% or higher.

Table 1-21 shows the mean number of driver fatalities per hour by the drivers' drinking involvement during the week-days and the week-ends.

TABLE 1-21. MEAN NUMBER OF DRIVER FATALITIES BY WEEK-DAY AND WEEK-END

Day of Accident	Number, per hr.	Nondrinking, per hr.	Drinking, per hr.	BAL > 0.10%
WEEK-DAY				
108 hours: 167 fatalities	1.54	0.66	0.88	0.69
WEEK-END				
60 hours: 140 fatalities	2.33	0.55	1.78	1.56

Summary. There was an increase in the number of, and drinking involvement in, week-end accident fatalities. Forty-five percent of the drivers crashed on the week-end compared to 54% during the week, although the former only accounted for 36% of the hours in a week. During the week-end, 76% of the fatalities had been drinking compared to 57% during the week. The percentage of those drinking heavily (BAL $\geq$ 0.10%) also increased on the week-end. Forty-five percent of the week-day fatalities had been drinking heavily, as compared to 67% on the week-end. The difference in week-end and week-day drinking was statistically significant at the 0.05 level of significance.

Month of crash for driver fatalities. July, 1967 and August, 1969 were excluded from the analysis of month of crash in order to make a complete two-year period. Between August 1, 1967 and July 30, 1969, there were 298 driver deaths. The mean number of driver deaths per month was 12.4; the mean number of fatalities for drivers, passengers, and pedestrians together was 25 per month.

There was a significant relationship between month of accident and age. In the warm months, April through August, the number of driver fatalities between the ages of 16-25 was over-represented, while drivers 26 years and older were over-represented during the colder months. (Chi square significance level = 0.02)

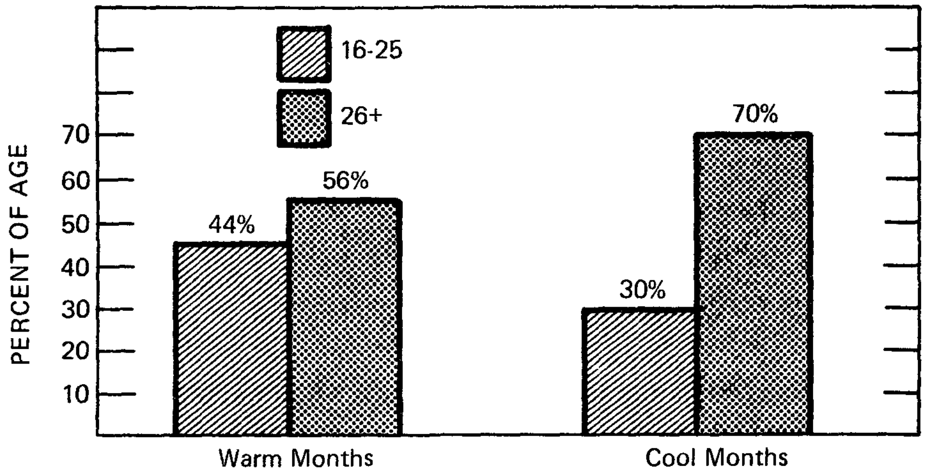

Figure 1.7. Age and month of accidents.

1.4.3.2 Physical Environment. This section describes the physical environment of the driver fatality crashes. Environment includes the following:

1. Locality: industrial, business, residential, and non-developed.
2. Type of road: divided, one-way, unpaved, number of lanes, straight and curved roads.
3. Weather: clear, rain, or snow
4. Road surface: dry, wet, snow, or ice covered.

Locality. The locality of driver fatality crashes was known for 269 drivers. Table 1-22 presents a list from the accident report with the number of drivers in each locality.

TABLE 1-22. DRIVER FATALITIES BY LOCALITY

Locality		Drivers
	Manufacturing, Industrial	27 (9%)
	Shopping, Business	107 (35%)
Residential	Apartments	12 (4%)
	School or Playground	8 (2%)
	Family Homes	40 (13%)
Open Areas	Farms, Fields	20 (6%)
	Not Developed	55 (18%)
	Missing Data	40 (13%)
	TOTAL	269 (100%)

Type of road. The police accident report included information on the type of road and number of lanes at the scene of the accident. The following divisions were used, with the number of lanes (1-4) recorded for each.

1. Divided, limited-access road.
2. Divided, cross street.
3. One-way.
4. Unpaved, any width.

This information was completed by the police for 96 (31%) of the 309 driver fatalities. Table 1-23 summarizes this information.

Ninety-two reported crashes were on divided roads. Sixty-four (67%) were on divided limited-access roads. Twenty-eight (29%) were divided with cross street access.

Of the 92 driver crashes on divided roads, only 5 were on roads with one lane in each direction. The remainder (83 or 90%) were on two- to four-lane (in one direction) roadways.

Sixty (65% of the 92) driver fatality crashes occurred on roads with three to four lanes in each direction. Only one accident occurred on a one-way street, and three were on unpaved roads.

TABLE 1-23. NUMBER OF DRIVER FATALITIES FOR TYPE OF ROAD AND NUMBER OF LANES

Type of Road	Total Fatalities	Number of Lanes in One Direction 1	2	3	4	MD*
Divided Limited-Access	64 (67%)	3	15	28	15	3
Divided Cross Street Access	28 (29%)	2	8	9	8	1
One-Way	1 (1%)	1	--	--	--	--
Unpaved	3 (3%)	--	--	--	--	3
OVERALL	96 (100%)	6	23	37	23	7

*MD = Missing Data

The blood alcohol concentrations were determined for each driver by the type of divided road. Thirty-five (55%) of the 64 driver fatalities which occurred on divided, limited-access roads had BALs ≥0.10%. Twenty-three (36%) had not been drinking. Of the 28 driver fatality crashes which occurred on cross street access roads, 16 drivers (57%) had BALs ≥ 0.10% and 9 (32%) had not been drinking. Thus, BAL was proportionally the same for what would generally be highway/freeway or city driving.

Straight versus curved roads. Two hundred and forty-four (79%) of the driver fatalities were driving on straight roads. Of this total, 128 (52%) had BALs 0.10% or higher, 99 (41%) had BALs 0.15% or higher. Eighty-eight (36%) had a negative BAL.

Forty-seven (15%) died on curved roads. Thirty-two of these (68%) had BALs 0.10% or higher, and 29 (62%) had BALs 0.15% or higher. Ten (21%) had not been drinking. Data were missing for 18 cases.

Weather and driver fatalities. Two hundred and fifty-eight (83%) driver fatalities were involved in their fatal crash during clear weather. Twenty-six (8%) of the accidents were during rainy weather and 11 (4%) took place in snow or freezing rain. Data were missing for 14 cases.

Road surface. Two hundred and thirty-five (76%) driver fatality crashes occurred on a dry road surface. Forty-eight (16%) involved a wet road surface and 10 (3%) were snow covered. Data were unknown for 16 cases.

Of the 48 crashes involving a wet road surface, 11 were head-on and 23 were out-of-control crashes. The three crashes on snow-covered roads were all head-on collisions.

Summary. For the majority of driver fatalities, the environment, on a single-factor basis, appeared to be ideal for driving. Generally, the roads were straight, divided, two- to four-lanes, the weather was clear, and the road surface was dry (see Table 1-24).

TABLE 1-24. PERCENT OF DRIVER FATALITIES BY ROAD CONDITION

Environment	Known Driver Fatalities on Single-Factor Basis
Divided road, 2-4 lanes:	90%
Straight roads:	79%
Clear weather:	83%
Dry road surface:	76%

1.4.3.3 Dynamic Factors Pertaining to the Crash. This section provides information on the following variables:

A. Accident interpretation of driver crashes.

1. Activity of the driver: passing, going straight ahead, turning, slowing, starting, or stopping
2. Type of collision: rear-end, head-on, right-angle, side-swipe, out-of-control, number of vehicles involved, locality of occurrence, number of driver deaths per crash
3. Drinking status of surviving and dead drivers
4. Speed of vehicle and type of road
5. Driving violations noted on the accident report

B. Accident interpretation for pedestrians.

1. Activity of the pedestrian: crossing at intersection, crossing at non-intersection, not in road, standing in road, other in road
2. Time of pedestrian accidents

Driver activity and BAL. Table 1-25 shows driver activity and BAL for each activity. Two hundred and sixty-nine drivers or 89% of the known total were traveling straight ahead when they crashed.

TABLE 1-25. DRIVER ACTIVITY AND BAL

Activity	Total Number	Blood Alcohol Level: Negative	Blood Alcohol Level: > 0.10%
Going straight	269	87 (32%)	150 (56%)
Overtaking vehicle	11	3 (27%)	7 (64%)
Making right turn	4	1 (25%)	3 (75%)
Making left turn	9	6 (67%)	2 (22%)
Slowing, stopping, or starting	8	4 (50%)	4 (50%)
Missing data	8	4 (50%)	4 (50%)
TOTAL	309	105 (34%)	170 (55%)

Description of collision type and BAL. The most common collision type for drivers was the out-of-control accident (see Table 1-26), which accounted for 37% of the known total. Alcohol involvement at levels of 0.10% or higher was greatest for head-on collisions (76%), although out-of-control and rear-end collisions also had heavy drinking (63% and 61%, respectively).

TABLE 1-26. COLLISION TYPE AND BAL FOR DRIVER FATALITIES

Type	Total	BAL: Negative	BAL: 0.10%+
Rear-end	36 (12%)	12 (33%)	22 (61%)
Head-on	51 (17%)	6 (12%)	39 (76%)
Right angle	91 (29%)	45 (49%)	31 (34%)
Side-swipe	15 (5%)	9 (60%)	6 (40%)
Out-of-control	114 (37%)	31 (27%)	72 (63%)
Missing data	2 --		
TOTAL	309 (100%)	103 (34%)	170 (55%)

Number of vehicles for each driver death. The number of vehicles involved in a crash where a driver died is shown in Table 1-27. It should be noted that this table is presented on driver deaths and on number of crashes. Two-vehicle accidents are the only type where more than one driver died. Three-, four-, and five-vehicle crashes each had one driver death per accident.

TABLE 1-27. NUMBER OF VEHICLES AND CRASHES FOR EACH DRIVER DEATH

Number of Vehicles	Number of Crashes: 1 driver death	Number of Crashes: 2 driver deaths	Number of Driver Fatalities	BAL: Negative	BAL: 0.10%+
One	108		108	28 (26%)	70 (65%)
Two	159	7	173	60 (35%)	90 (52%)
Three	15		15	9 (60%)	6 (40%)
Four	7		7	3 (43%)	3 (43%)
Five	1		1	1 (100%)	0
TOTAL*	297 Crashes		304 driver fatalities		

*Missing data on 5 driver fatalities

Of the 173 drivers who died in two-vehicle crashes, 159 crashes resulted in one driver death. The remaining 14 drivers died in 7 two-vehicle crashes. Thus, 304 drivers were killed in 297 crashes. Number of vehicles was missing on the accident report for the remaining five driver deaths.

Table 1-28 shows the BALs of the 14 drivers who died in the seven 2-vehicle multiple-death crashes.

Both drivers had negative BALs in one crash. Both were positive in three crashes; both drivers were below 0.10% in one crash, and both drivers were between 0.10% and 0.15% in one crash. In the three other crashes, the one driver was negative or very low (0.01%), while the other crash-involved drivers were at BALs of 0.13%, 0.19%, and 0.24%.

Inferences based on this small sample necessarily must be guarded, but the trend is clear: drinking drivers are apparently responsible for those crashes in which both drivers died but only one had been impaired by alcohol.

TABLE 1-28. BAL FOR DRIVERS IN SEVEN 2-VEHICLE MULTI-DEATH CRASHES

BAL for Driver 1	BAL for Driver 2
0.14%	0.12%
Negative	Negative
Negative	0.13%
0.08%	0.04%
0.18%	0.26%
0.01%	0.24%
Negative	0.19%

BAL of surviving and dead drivers. The distribution of the 309 driver fatalities by blood alcohol concentration has been given previously. These data are highly reliable since they are derived from toxicological analyses performed at the morgue. They are incomplete in that alcohol concentration is not available from this source for surviving drivers in multiple-vehicle crashes.

An indication of alcohol involvement for both drivers in two-vehicle crashes, however, can be obtained by combining the morgue-derived data with that from the Official Accident Report for the surviving drivers. Of the 159 two-vehicle crashes in which one driver died, police data were available on the surviving driver in 111 crashes. Table 1-29 shows the distribution of these 111 crashes by alcohol concentration of the surviving and dead drivers, categorized by a simple positive-negative indication of BAL.

TABLE 1-29. BAL OF SURVIVING AND DEAD DRIVERS INVOLVED IN TWO-VEHICLE CRASHES

		Dead Drivers' BAL		Total
		Negative	Positive	Crashes
Surviving Drivers' BAL:	Negative	29	59	88
	Positive	8	15	23
TOTAL CRASHES		37	74	111

Both the surviving and dead drivers had negative BALs in 29 crashes; both were positive in 15 crashes. The surviving driver was positive and the dead driver negative in 8 crashes, while the reverse was true in 59 crashes. This is an interesting result, particularly with respect to the 67 crashes in which one driver had been drinking and the other had not. One might adopt the a priori assumption, conditioned on the occurrence of the crash situation described, that the proportion of non-drinking fatalities would approximate that of the drinking fatalities. Yet, in this sample, 88% of the dead drivers had been drinking in those crashes in which only one driver had been drinking and died. The available data and the analysis to date, unfortunately, do not suggest an explanation. We might speculate that one or a combination of the following might hold:

1. The drivers who had negative BALs may have been driving newer, safer vehicles, thus increasing their crash survivability.
2. The drivers who had negative BALs may have been wearing safety belts, thus increasing their crash survivability.
3. The drivers who had negative BALs may have been able to initiate last-minute maneuvers that minimized their crash involvement without a corresponding decrease in the crash severity for the drivers who had positive BALs.
4. The drivers who had positive BALs may have been in a generally less hardy physical condition, thus being less able to survive the trauma induced during the crash.
5. The alcohol, per se, in the drivers who had positive BALs may have made subsequent emergency medical procedures less effective.
6. There may be a rather gross under-reporting of the alcohol involvement of the surviving drivers. The under-reporting of alcohol involvement for dead drivers is reported in Section 1.4.3.4, but to our knowledge there have not been adequate studies on this point for surviving drivers. Given the general confusion surrounding severe crashes in urban areas and the concern for injured persons, we would strongly expect that under-reporting of alcohol

involvement for surviving drivers would explain at least a part of the observed phenomenon. Subsequent investigators may wish to examine this point more fully along with the other possible explanations that have been listed.

The data support the general notion that drinking drivers tend to injure themselves more seriously than others. However, the surviving driver had been drinking and the dead driver had not in 8 of the 67 crashes. Furthermore, of the 59 dead drinking drivers, 48 were definitely impaired (with BALs above 0.10%) at the time of the crash. The probability that these persons were responsible for the crash is high (Borkenstein,1964). If this is true, then the 48 surviving drivers innocently suffered the economic loss and pain concurrent with the crash.

Number of vehicles and driver age. The data suggest a trend when driver age is compared to number of vehicles involved in the crash. The very young drivers (ages 16-19 years) and those above age 56 were more apt than other age groups to be involved in two-car crashes rather than single-vehicle crashes. Table 1-30 shows percentages of each driver age involved in one- and two-car crashes. Crashes involving three or more vehicles are not shown.

TABLE 1-30. FREQUENCY OF ONE- AND TWO-VEHICLE FATAL ACCIDENTS BY DRIVER AGE

Driver Age (Years)	1-Vehicle Accident	2-Vehicle Accident
16-19	26%	74%
20-25	38%	51%
26-35	28%	56%
36-45	39%	57%
46-55	47%	63%
56-65	31%	63%
66+	30%	60%

Number of vehicles and collision types. Data on number of vehicles was combined with collision type (see Table 1-31). One hundred and one of the 114 out-of-control crashes (60 to the right and 54 to the left) were single-vehicle crashes. From

Table 1-26, 63% of the out-of-control driver fatalities had BALs 0.10% or higher. Eighty-three of the 173 two-vehicle crashes were right-angle. As noted previously, 14 drivers of these 173 were killed in 7 two-vehicle crashes. Five of these crashes were head-on, one was out-of-control, and one crash was a side-swipe following a drag race.

TABLE 1-31. NUMBER OF VEHICLES AND TYPE OF COLLISION FOR DRIVER FATALITIES

Number of Vehicles	Total	Rear-end	Head-on	Right-angle	Side-Swipe	Out-of-Control	MD*
One	108	0	5	1	0	101	1
Two	173	26	42	83	11	10	1
Three	15	6	3	3	3	0	0
Four	7	1	1	1	1	3	0
Five	1	1	0	0	0	0	0
Missing Data	5	2	0	3	0	0	0
TOTAL	309	36	51	91	15	114	2

*MD = Missing data

Type of collision and locality. Type of collision was compared to the locality in which it took place.

Fifty-three percent of the 36 rear-end collisions took place in shopping/business areas and only 8% were in open areas. Twenty-eight percent of the 51 head-on collisions were in shopping areas and another 29% were in open areas. Forty-eight percent of the right-angle collisions were in business areas, and 19% in residential areas.

Twenty-seven percent of the 15 side-swipe accidents were in residential areas, another 27% were in open areas, and 33% were in shopping/business areas.

Out-of-control accidents (both to the right and left) were under-represented in business areas (21%) and residential areas (22%), and over-represented in open areas (33%).

Speed at time of accident. Estimated speed was filled out on the accident report filed by the police for 223 of the 309 drivers. Table 1-32 shows speed and BAL of drivers at those recorded speeds.

TABLE 1-32. SPEED AT TIME OF DRIVER'S FATAL CRASH

			BAL	
MPH	Number of Drivers	Percent of All Crashes	Negative	0.10%+
0-20	31	14%	18 (58%)	7 (23%)
20-40	73	33%	27 (37%)	35 (48%)
40-60	77	35%	19 (25%)	51 (66%)
60-80	30	14%	7 (23%)	20 (67%)
80-100+	12	4%	0 (0%)	11 (92%)
TOTAL	223	100%	71 (32% of Total)	124 (56% of Total)

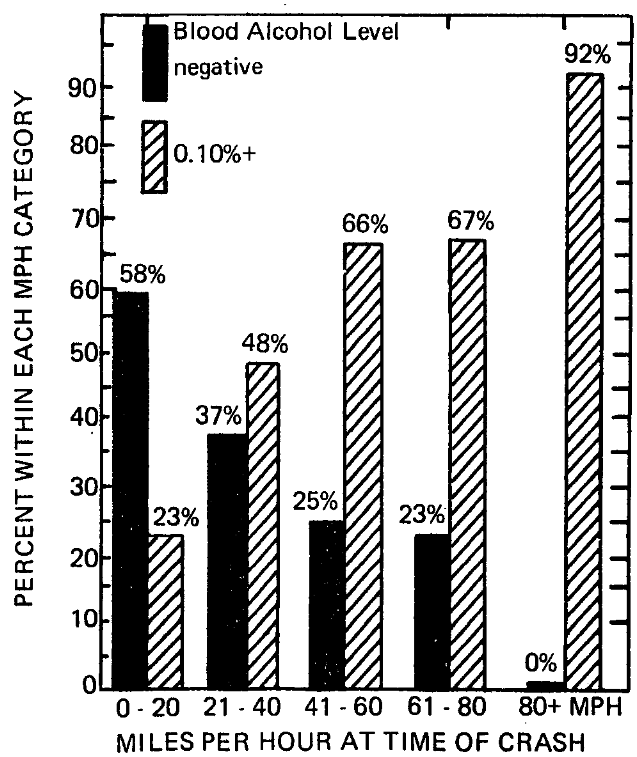

Figure 1.8. Driver speed and blood alcohol level at time of crash.

The highest percentage of drivers (35%) were traveling between 40 and 60 MPH. This is not too surprising considering the fact that 36 of those drivers were traveling on two- to four-lane roads. Another 42 (18%) of all the driver fatalities were traveling at speeds of 60 MPH or above.

There was a dependent relationship (at the 0.01 significance level) between BAL and speed. As driver speed increased so did the percentage of drivers with high (≥ 0.10%) BAL. Eleven (92%) of the drivers traveling at speeds greater than 80 MPH had BAL ≥ 0.10%. Only seven (23%) of those traveling up to 20 MPH had high BALs.

Age also shows a dependent relationship to speed (significance level less than 0.02). (See Table 1-33.)

TABLE 1-33. NUMBER OF DRIVERS BY AGE VS. SPEED AT CRASH

Speed	16-25 Years	26 Years or Older
Under 60 MPH	53 (68%)	120 (88%)
60 MPH or Over	25 (32%)	17 (12%)
TOTAL	78 (100%)	145 (100%)

Thirty-two percent of the drivers aged 16-25 were traveling at speeds of 60 MPH or higher, whereas only 12% of the drivers over 25 years of age were traveling that fast. When the older drivers are further subdivided, only three of the 73 drivers above age 45 were traveling at speeds greater than 60 MPH. Drivers above age 55 tended to drive at slower speeds. Forty-one drivers were above age 55 and 29 (71%) were traveling under 40 MPH. Ten (24%) were traveling 20 MPH or less.

Violations recorded at the accident scene. The police accident report includes a section for recording any driving violations that occurred just prior to the crash. One hundred and sixty-three driver fatalities (53%) had moving driving violations recorded. There was a dependent relationship between such violations and BAL (significance level less than 0.02).

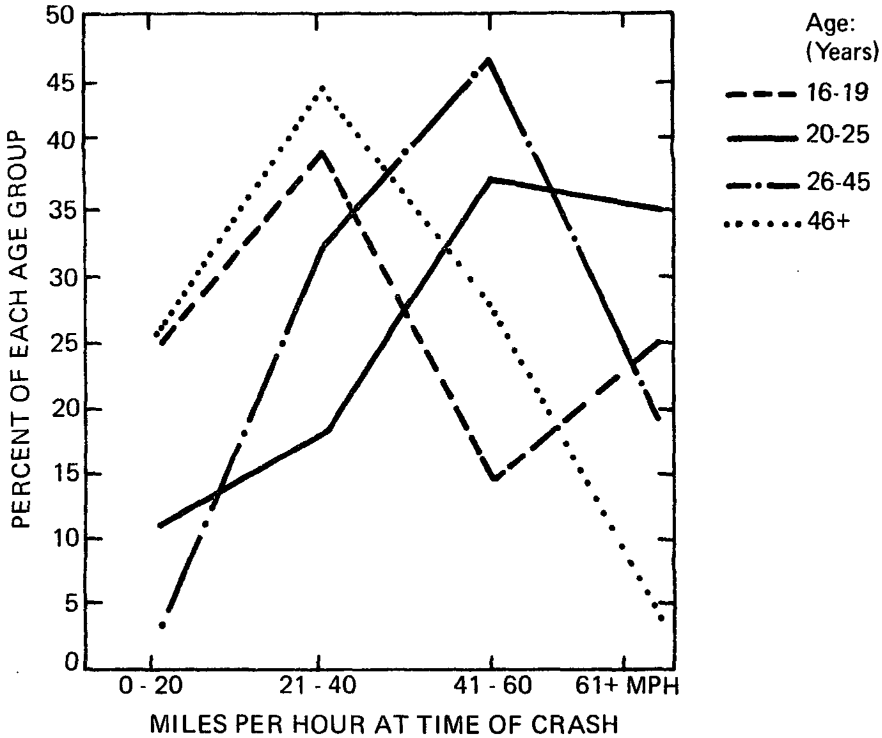

Figure 1.9. Driver age and speed at time of crash.

Of the 163 persons who had driving violations, 128 (79%) had been drinking. One hundred and eleven (68%) had BALs $\geq$ 0.10% and of those, 90 (55%) had BALs $\geq$ 0.15%. Of the 146 persons for whom no violations were recorded, 52% had been drinking and 41% had a BAL of 0.10% or higher. Below is a breakdown of the violation categories on the accident report and the number and percentages of drivers with each kind of violation by BAL.

"Speeding" and "Other Violations" (undefined) were the two categories most often checked by the police accident investigator. The violation categories which had the heaviest drinking involvement also included "Speeding" (81% $\geq$ 0.10% and 67% $\geq$ 0.15%) and "More Than 1 Violation" (79% $\geq$ 0.10% and 71% $\geq$ 0.15%).

TABLE 1-34. VIOLATIONS RECORDED AT THE ACCIDENT SCENE

Violation Category	Number of Drivers (N=163)	Blood Alcohol Level: Negative	0.10%+	0.15%+
Speeding	48 (16%)	5 (10%)	39 (81%)	32 (67%)
Fail to yield or stop	23 (7%)	9 (39%)	10 (43%)	7 (30%)
Drove left of center	17 (6%)	2 (12%)	12 (71%)	9 (53%)
More than 1 violation: non-specific	28 (9%)	4 (14%)	22 (79%)	20 (71%)
Other violations	47 (15%)	15 (32%)	28 (60%)	22 (47%)
Drivers with violations	163 (53% of 309)	35 (22%)	111 (68%)	90 (55%)
Drivers with no violations	146 (47% of 309)	70 (48%)	59 (41%)	44 (30%)
TOTAL	309			

Pedestrian activity and BAL. The accident report describes pedestrian activity in eight ways:

1. Crossing or entering road at an intersection
2. Crossing or entering road at a non-intersection
3. Walking in road with traffic
4. Walking in road against traffic
5. Standing in road
6. Working on, or pushing vehicle
7. Other, in road
8. Not in road

Table 1-35 shows the number and percentage of pedestrians within each category. Those categories with low frequency have been combined with "other, in road."

TABLE 1-35. PEDESTRIAN ACTIVITY AND BAL

Activity	Number of Pedestrians	Blood Alcohol Level: Negative	Blood Alcohol Level: 0.10%+
Crossing at a non-intersection	64 (38%)[a]	16 (25%)[b]	36 (56%)[b]
Crossing at an intersection	54 (32%)	32 (59%)	15 (28%)
Not in road	19 (11%)	7 (37%)	8 (42%)
Standing in road	14 (9%)	5 (36%)	6 (43%)
Other, in road	16 (10%)	1 (6%)[b]	6 (38%)[b]
TOTAL	167 (100%)[a]	61 (37%)[a]	71 (43%)[a]

[a]Percent of all (167) pedestrians

[b]Percent of pedestrians within activity category

Table 1-35 shows that the largest percentage of pedestrians were not crossing at a properly designated intersection. Intersection crossings were the next most common activity.

BAL appeared in reverse order for these two activities. Twenty-five percent of those crossing at a non-intersection had a negative BAL and 56% had a BAL of 0.10% or higher. Conversely, 59% of those crossing at an intersection had a negative BAL, and 28% had a BAL of 0.10% or higher. These data suggest that drinking pedestrians are more likely to be darting out in front of moving vehicles in places where drivers would not be expecting them, while sober pedestrians are more often killed at intersections. Figure 1.10 shows the BAL of pedestrians crossing at these two types of areas.

Activity and time. Fifty-four pedestrians died while crossing streets at the intersection. Twenty-eight (52%) of those accidents occurred in the daytime between 6 a.m. and 6 p.m. Only 19 (30%) of the 64 who were not crossing at intersections were killed during the daytime. Forty-five (70%) of the 64 were killed between 6 p.m. and 6 a.m.

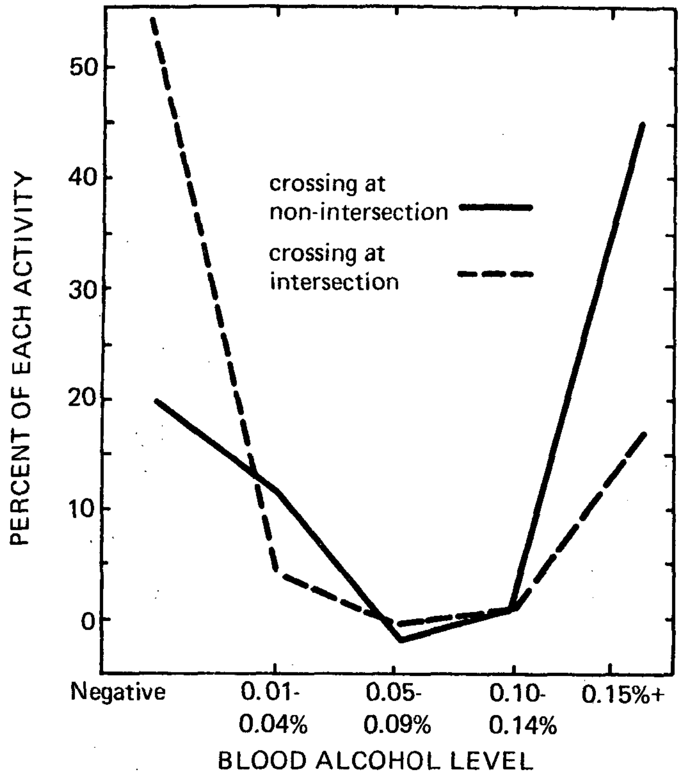

Figure 1.10. Pedestrian activity and blood alcohol level.

Summary of crash information. Most drivers were going straight ahead at the time of their crash. Thirty-seven percent of the crashes were out-of-control crashes; this was the most common collision type. However, head-on collisions had the heaviest drinking involvement, with 76% of such drivers having a BAL greater than 0.10%.

Of the 297 crashes where number of vehicles involved was known, all but seven were single-driver death crashes. These seven crashes each involved two vehicles and resulted in two driver deaths per crash. Except for three of these crashes, the BALs of the 14 drivers were similar--that is, both were low or both were high.

The data also suggest that drinking drivers tend to injure themselves more seriously than others when alcohol involvement of dead and surviving drivers is compared. Eliminating those crashes where the dead and surviving drivers were either both not drinking or both drinking, we find that in 59 of the remaining 67 crashes the dead driver had been drinking while the surviving driver was noted by the police as not having been drinking.

The highest percentage (35%) of drivers were traveling between 40-60 MPH at the time of their crash. High speeds were associated with young drivers and with high BAL. Of crashes where the driver who died was traveling 80 MPH and above, 92% had BALs of 0.10% or higher.

Slightly more than half of the driver fatalities were noted by the accident investigator as committing a violation immediately prior to their accident. Seventy-eight percent of these drivers had been drinking compared to 52% of the drivers who were not noted as committing a violation. The most common violation noted was speeding.

An analysis of pedestrian activity showed that 38% of the pedestrians were crossing at non-intersections as compared to 32% who were crossing at an intersection. More than half (56%) of those crossing at non-intersections had BALs 0.10% or higher, and 70% of this group were killed between 6 p.m. and 6 a.m. On the other hand, only 28% of the pedestrians crossing at an intersection had BALs 0.10% or higher, and 52% of these pedestrians were killed between 6 a.m. and 6 p.m.

1.4.3.4 Other Descriptors. Other accident report information concerning driver fatalities included the following:

1. Physical condition of the driver
2. Police estimation of drinking and actual BAL
3. Vehicle condition
4. The driver's license status: valid license, expired, revoked or suspended, or no driving record
5. Number of passengers in vehicle of driver fatality
6. Vehicle ownership

Physical condition of driver. Two hundred and twenty-six (73%) accident reports had some notation on the physical condition of the driver who died. Ninety-seven (43%) were reported to be in normal condition. Of these, 32% had negative BALs, 11% had BALs between 0.01%-0.09%, and 57% had BALs 0.10% or higher.

Three drivers were checked as asleep, one of them had a BAL between 0.05%-0.09%, two persons had BALs between 0.15%-0.24%.

Three drivers were noted as ill; two had negative BALs and one driver had a BAL between 0.01%-0.04%.

Ten drivers were marked "other impairment". Four of these had a negative BAL and the remaining six had levels above 0.05%.

The remaining 113 drivers for whom a notation was made were checked as "unknown".

Police estimation of drinking. The police accident report includes a section on the estimated extent of the driver or pedestrian's drinking involvement prior to the accident.

A total of 219 driver fatality accident reports contained this estimated drinking information. Table 1-36 shows the police estimation of drinking compared to the actual tested BAL.

TABLE 1-36. ESTIMATED DRINKING INVOLVEMENT AND ACTUAL BAL FOR DRIVER FATALITIES (N = 309)

Police Estimates	Total	Actual Blood Alcohol Level: Negative	Actual Blood Alcohol Level: Positive
Had been drinking	40	6 (15%)	34 (85%)
Had not been drinking	72	38 (53%)	34 (47%)
Not known if drinking	107	33 (31%)	74 (69%)
Missing data	90	28 (31%)	62 (69%)

Of the reports marked "had been drinking" the police were incorrect in only 15% of the cases. The discrepancy was greater for those checked "had not been drinking." The police were incorrect in 47% of those cases. In addition, 35% of those drivers had been drinking to levels of 0.10% or greater and 8% were above 0.25%. Where the police checked "not known if drinking," 69% actually were drinking, 63% had BALs $\geq$ 0.10% and 13% were above 0.25%.

Police reports were more accurate concerning drinking involvement of pedestrians. Seventy-seven pedestrian accident reports gave drinking information, shown on Table 1-37.

TABLE 1-37. ESTIMATED DRINKING INVOLVEMENT AND ACTUAL BAL FOR PEDESTRIAN FATALITIES (N = 167)

Police Estimates	Total	Actual Blood Alcohol Level: Negative	Positive
Had been drinking	17	0 (0%)	17 (100%)
Had not been drinking	41	31 (76%)	10 (24%)
Not known if drinking	19	9 (47%)	10 (53%)
Missing data	90	28 (31%)	62 (69%)

Of those checked as "had been drinking", the police were entirely correct. Of those marked "had not been drinking," they were wrong in 24% of the cases. However, only two (5%) of those had BALs 0.10% or above. Those two, in fact, had BALs above 0.25%. Fifty-three percent of the cases in the "not known if drinking" category actually had been drinking and 42% had BALs 0.10% or above.

These examples are in no sense an indictment of police investigation practices, for there are several obvious events that could have prevented a correct assessment by investigating units:

1. The seriously injured or dead persons may have been removed from the crash scene to a hospital by the time the police arrived.
2. The injured may have been unconscious when the police arrived.
3. The police have a first duty to care for the injured rather than try to assess the details of alcohol involvement.

Other crash-related duties also divert attention from this detail.

Nonetheless, one obvious and vital conclusion must be drawn from these results: Operating and research personnel will be grossly misled if they attempt to deduce the extent of alcohol involvement from existing accident data that is not supplemented by chemical test data. Whether this conclusion extends to less serious personal injury and property damage crashes cannot be determined from the data in this study.

Vehicle condition. Two hundred and forty-seven (80%) accident reports gave information about vehicle condition. No defect was noted for 134 (54%) vehicles. Vehicle condition was checked as not known by the police for 110 (45%) cases. One head-on crash vehicle had a defect in the moving systems (brakes, steering, or tires), while two other vehicles had other defects not described.

License status and restrictions. A total of 237 (77%) drivers had valid licenses at the time of the fatal accident; 29 were chauffeur's licenses. Twenty-three (7%) fatalities were driving on expired licenses (5 on chauffeur's licenses) while another 12 (4%) were driving with revoked or suspended licenses (one was a chauffeur's license). Table 1-38 gives license status and BAL.

TABLE 1-38. LICENSE STATUS AT TIME OF ACCIDENT AND BAL FOR DRIVER FATALITIES

License Status	Number	Percent of Total (N=309)	BAL: Negative to 0.09%	BAL: 0.10%+
Valid	237	77%	106	131
Expired	23	7%	13	10
Expiration date missing	3	<1%	0	3
Revoked/Suspended	12	4%	6	6
No Michigan License or has violations in Michigan	2	<1%	1	1
No driving record	32	10%	13	19
TOTAL	309	100%	139	170

Table 1-38 shows that the 12 drivers who had revoked or suspended licenses at the time of their crash were equally divided between the low and high BAL groups. The same was true of the two persons who had no driver's license but had a driving record due to previous driving violations. No driving record was found for 10% of the driver fatalities. More than half of these drivers were in the high BAL group.

Number of passengers in vehicle of driver fatality. Two hundred and thirty drivers (74%) were alone in their cars at the time of the fatal crash. One hundred and twenty-two (53%) had BALs $\geq$ 0.10%, and 85 (37%) had not been drinking. Table 1-39 shows the number of drivers driving alone or with front or rear seat passengers. These are not exclusive as some drivers had passengers in both the front and rear.

TABLE 1-39. DRIVER FATALITIES: ALONE OR WITH PASSENGERS

Persons in Car	Total Number	Not Drinking (Neg.)	Drinking ($\geq$0.01%)
Driver Alone	230	85 (37%)	145 (63%)
Driver with Front Seat Passengers	74	16 (22%)	58 (78%)
Driver with Rear Seat Passengers	26	5 (19%)	21 (81%)

Driver fatalities who were alone at the time of their crash had a higher percentage of negative BALs than drivers with either front or rear seat passengers (37% compared to 22% and 19%).

Of the 74 drivers with front seat passengers, 44 drivers were 16-25 years of age. Thus, 40% of the drivers 16-25 years old had front seat passengers (44/110), compared to 15% of the drivers 26 years or older (30/199).

Vehicle ownership and age for driver fatalities. Sixty-nine percent (213) of the driver fatalities were driving their own cars at the time of their crash. Ten percent (32) were driving a car other than the family car, while 8% (25) had the family car. Of these last 25 persons, 19 were between the ages of 16-25 years (76% of 25). The remainder of the drivers had business cars (6% or 18) or ownership information was missing on the accident report.

In addition to the young persons driving family cars mentioned above, other age/vehicle owner relationships were as expected, with middle-aged persons primarily driving their own or business cars and 66% of the persons driving someone else's car being under the age of 25.

Summary. According to the accident report, the majority of drivers were apparently in "normal" physical condition at the time of the crash. Vehicle condition was marked "no defect" for 54%, while that information was marked "unknown" for another 45% of the vehicles. Seventy-seven percent of the drivers had valid licenses at the time of the fatal accident, 11% had either expired, revoked, or suspended licenses, and 10% had no driving record. Those drivers who did not have valid licenses were about equally divided between high and low BAL groups (36 and 33 exclusive of missing expiration data records). Sixty-nine percent of the driver fatalities owned their own car, although 66% of the drivers who crashed in another person's vehicle were under 25 years of age. Drivers under 25 years of age more often had front seat passengers than older drivers, and a greater percentage of driver fatalities who were alone in their car had negative BALs than did driver fatalities with passengers.

1.4.4 DRIVER AND CRIMINAL RECORD INFORMATION FOR FATALITIES AND A SAMPLE OF PERSONS CONVICTED OF DUIL

1.4.4.1 Driving Violations, Accidents, and BAL. Notable differences appeared when comparisons were made between the driver fatalities' BALs and their number of previous driving violations and accidents. For these variables (number of driving violations and number of accidents) the frequency count was limited to six and one-half years of driver record length; also it was confined to driver fatalities who had driving records. For these analyses it was found that the number of driving violations was significantly associated with BAL, whereas the number of accidents was not significantly associated with BAL. Table 1-40 presents the observed and "expected" (based on the marginal distributions) frequencies for the number of driving violations compared to BAL for the 276 drivers for whom driving records were available.

TABLE 1-40. PREVIOUS DRIVING VIOLATIONS AND BAL FOR 276 DRIVER FATALITIES

Number of Violations	Observed Frequency BAL Neg.-0.09%	Observed Frequency BAL 0.10%+	Expected Frequency BAL Neg.-0.09%	Expected Frequency BAL 0.10%+
0	42	28	31	39
1	23	19	19	23
2	12	19	14	17
3	11	15	12	14
4+	36	71	48	59

Driving violations were found to be significantly associated with BAL (significance level = 0.006). The specific cells with under-representation and over-representation can be readily seen. There were too few drivers with zero violations and BAL of 0.10% or higher--28 were observed compared to an expected 39 drivers. The other cells contributing importantly to the Chi square statistic are those with four or more violations. Seventy-one drivers had four or more violations and BAL of 0.10% or higher compared to an expected 59 drivers.

The same relationship was not apparent when the number of previous accidents was compared to BAL. The number of accidents prior to the fatal crash was not significantly associated with BAL at death (significance level = 0.45). Table 1-41 presents the frequency of accidents for driver fatalities who had driving records for the six-and-one-half-year period as shown by BAL less than, and greater than, 0.10%.

TABLE 1-41. ACCIDENTS AND BAL FOR 276 DRIVER FATALITIES

Number of Accidents	Total	BAL Neg.-0.09%	BAL 0.10%+
0	177 (64%)	83	94
1+	99 (36%)	41	58
TOTAL	276 (100%)	124	152

Perhaps this lack of a significant relationship between previous accidents and BAL can be explained by the fact that driving violations generally are an overt act of law-breaking as contrasted to accident involvement. Accidents for which a person was not responsible would be noted on the driving record and it may be this fact which has affected the relationship of accidents and BAL at death.

1.4.4.2 Reckless Driving Convictions. Of the driver fatalities who had driving records, 28 had convictions for reckless driving during the six and one-half years analyzed (see Table 1-42). All but five died with BALs greater than 0.10%, and 18 of these 28 had BALs greater than 0.15%.

TABLE 1-42. RECKLESS DRIVING CONVICTIONS AND BAL FOR 276 DRIVERS

Reckless Driving Convictions	Total	BAL Neg.	0.01-0.09%	0.10-0.14%	0.15%+
None	248	87	32	25	104
One or more	28	5	0	5	18

All the drivers with two or more reckless driving convictions (five persons) had BALs 0.10% or higher.

Although the number of persons with this type of conviction is small, one might speculate that there is a group of reckless drivers who perhaps in the past have not combined alcohol with their reckless driving, and there are other drivers for whom alcohol either causes or exacerbates their reckless driving.

Another possible explanation is that the reckless driving convictions for the 23 persons with high BALs were reduced from a DUIL charge. This practice, known particularly to occur prior to widespread use of the Breathalyzer, would have masked prior indication of problem drinking.

1.4.4.3 DUIL Convictions and BAL. DUIL or Impaired Driving convictions were also compared with BAL for all driver fatalities who had a driver's license or who had no license but did have a record of moving violations.

The following hypothesis was made: There is a significant relationship between high BAL and one or more convictions for DUIL or Impaired Driving. Table 1-43 shows the frequency of DUIL convictions compared to BAL.

TABLE 1-43. DUIL CONVICTIONS AND BAL

Number of DUIL Convictions	Total	BAL Neg.-0.09%	BAL 0.10%+
No DUIL Convictions	264	123	141
One or More DUIL Convictions	12	1	11
TOTAL	276	124	152

Results of the Chi square test indicate that there was a significant relationship between DUIL convictions and BAL at death (significance level = 0.02). One or more DUIL convictions were under-represented at the negative-to-0.09% level (expected frequency = 5.4) and over-represented at the 0.10% or higher level (expected frequency = 6.6).

In addition, all the DUIL offenders were male (none among the 27 females) between 25 and 55 years of age. Race had little effect (5% of 221 whites and 4% of 55 blacks had a DUIL) although there were differences in marital status: 4% of the married drivers had a DUIL, as did 3% of the single drivers, but 19% of the divorced drivers had a DUIL offense.

1.4.4.4 Criminal Convictions and BAL. The fact that a fatality had criminal convictions was significantly associated with BAL. Eighty-three persons or 13% of the fatality population had criminal records (this figure does not include persons with criminal records where the sole entry was fingerprinting for a job application). Initially, two tables were run using the Chi square test. The first table compared persons with 0, 1, 2, 3, and 4 or more violations with BAL. However, in all cases, persons with 1 through 4 or more violations were over-represented in the BAL cells pertaining to the 0.10% or higher levels (level of significance = 0.0001). Therefore, the violations were combined and tested using the two divisions of either not having a criminal conviction or having any number of criminal convictions (see Table 1-44).

TABLE 1-44. CRIMINAL CONVICTIONS AND BAL (N = 616)

Conviction Status	Total	BAL Neg.	BAL 0.01-0.09%	BAL 0.10%+
No criminal convictions	533 (87%)	220	95	218
Had criminal convictions	83 (13%)	13	9	61

Again, the relationship between criminal convictions and BAL was extremely strong (significance level = 0.0001). Persons with criminal convictions were very heavily over-represented in the BAL cell for 0.10% and higher levels, slightly under-represented in the 0.01%-0.09% BAL cell, and heavily under-represented in the negative BAL cell. The converse was true for persons with no criminal convictions, although over-representation and under-representation were not as pronounced as they were for the other group.

1.4.4.5 Non-Driving Drunkenness Convictions. Non-driving drunkenness offenses were relatively rare occurrences for the group of fatalities. These offenses include such things as Drunk and Disorderly, or Drunk in a Public Place, and are found on the criminal record. Such offenses are not deleted from the criminal record after a number of years as are driving offenses, therefore their frequency was computed for a time period which included the total criminal record length, rather than the six-and-one-half-year period used for driving record analyses. Table 1-45 shows the frequency of such offenses for the total population of 616 persons.

Only 29 persons had been convicted of such offenses. Thirteen were drivers, 11 were pedestrians, and the remainder were passengers. All but seven persons had BALs greater than 0.10%, including a female with 70 such offenses.

TABLE 1-45. NON-DRIVING DRUNKENNESS CONVICTIONS AND BAL

Number of Offenses	Total	BAL Neg.	BAL 0.01-0.09%	BAL 0.10%+
0	587	229	101	257
1	16	2	3	11
2	9	2	0	7
3-12	3	0	0	3
70	1	0	0	1
TOTAL	616	233	104	279

A Chi square test was run to see if there was a significant relationship between BAL and the fact that one either had or did not have such a conviction. For this statistical test, data were combined as shown in Table 1-46. The relationship between non-driving drunkenness offenses and BAL was found to be very strong (significant to the 0.002 level) with the greatest contribution to the Chi square statistic coming from the over-representation of persons having a conviction and a BAL greater than 0.10%. The second largest contributor to the Chi square statistic was the under-representation in the number of persons with convictions in the negative BAL cell.

TABLE 1-46. NUMBER OF NON-DRIVING DRUNKENNESS CONVICTIONS AND BAL

Conviction Status	Total	BAL Neg.	BAL 0.01-0.09%	BAL 0.10%+
No Conviction	587	229	101	257
Had Conviction	29	4	3	22

As with persons who had DUIL convictions, the divorced group was over-represented. From 2% to 5% of the other marital status groups had drunkenness convictions compared to 20% of the divorced persons (7 out of 35). These persons differed from the DUIL offenders in that there were 2 females (1% of 146 females) including the woman with 70 such offenses.

In summary: non-driving drunkenness offenses were reported for 29 persons in the fatality population. Although somewhat rare events, their appearance was nonetheless significantly associated with high BAL at death.

1.4.4.6 Sample of Persons Convicted for Driving Under the Influence of Liquor Compared to the Fatality Sample. A random sample of persons convicted for Driving Under the Influence of Liquor (DUIL) or Driving While Impaired (DWI) was collected in order to make comparisons with the Wayne County fatalities and the Hurley Hospital Alcoholics.

Sampling methodology. The sample was drawn from Detroit Recorder's Court. This court handles persons who have committed either misdemeanors or felonies in the City of Detroit. Detroit is the major urban area of Wayne County; also it supplied one half of the Wayne County fatalities. The sample was drawn from the court log book of persons arrested for Drunk Motor Law (DML) which includes both DUIL and Impaired Driving offenses. The dates selected for the sampling were the same as those used in the collection of the Wayne County fatalities: July 1967 through June 1969. A table of random numbers was used to select 4 dates for each of the 24 months of the sampling period. After the selection of dates had been carried out by this procedure, the court log book was opened for the date in question and the names of the first, third, and fifth DML arrestees were selected for the sample. If there were not five such DML offenders for that day, only the first and third persons were selected, and similarly, if there were less than three, only the first was taken. After the name and court filing number of each arrestee had been drawn, the individual file was pulled and the driver's license number was recorded. Using this number, the Department of State Driver Record was requested in order to compare the driving histories of these offenders with those of the driver fatalities and the alcoholic drivers. Information adequate for a driver record request was obtained for 229 persons. However, when the driver records were returned we found that 26% of the sample had no convictions listed for either DUIL or Impaired Driving for the six-and-one-half-year period selected for the analysis. Insofar as could be determined from a brief review of the individual records, most of this subgroup of 60 persons, or 26% of the sample, had the DML offense for which they were arrested reduced to a lesser charge after their court appearance. Thus, the group selected for the final analysis consisted of the 169 persons who were actually convicted of either DUIL or DWI. The driver record period used in the analysis was from January 1963 through June 1969. This six-and-one-half-year period begins and ends two years later than the driving analysis period for the comparison populations. This was necessary since the DUIL sample was collected later than the other samples. Except for serious offenses, the Department of State deletes offenses on individual records after a certain number of years. Therefore, to compare a full six and one-half years of driving exposure it was necessary to select this later period for the DUIL sample.

A second important point is that although the DUIL sample was collected because of conviction for DUIL or Driving While Impaired during the sampling period, this conviction was not counted in the analysis of the driving record. Thus, the table on drunk driving shows that 149 persons had zero drunk-driving offenses: this means that 149 persons had zero drunk-driving offenses, other than that offense which brought them into the study. This procedure was also followed for the Wayne County fatalities. The accident in which they died was not counted in the number of accidents which appeared on their driving record.

It was most reasonable to compare the sample of persons convicted of DUIL or Impaired Driving (hereafter called the DUIL sample) with the driver fatalities whose accidents occurred within the Detroit City limits (this constitutes approximately half of all fatal crashes occurring in Wayne County). The Detroit fatalities were further sub-divided into two groups; those with a BAL less than 0.15% and those with a BAL of 0.15% or higher. This latter group of fatalities is especially important since of the DUIL sample, all who submitted to the breathalyzer test showed a BAL of 0.15% or higher, excluding the 32% of the sample who refused this test and whose BAL was therefore unknown. The group of fatalities with BALs 0.15% or higher is also important because one could postulate that this is the subgroup of fatalities who would show the greatest similarity to a sample of problem-drinking drivers. Even though it is clearly evident that alcohol is implicated in a large number of fatal crashes, it would be erroneous to assume that all crashes were related to alcohol or that all driver fatalities would show similarities to the DUIL sample.

Table 1-47 shows descriptors which are comparable between the two samples, the persons convicted of DUIL/DWI and the subgroup of Wayne County fatalities who crashed in Detroit.

TABLE 1-47. DESCRIPTORS OF DUIL SAMPLE AND DETROIT FATALITY SAMPLE

Descriptors	DUIL Sample	Detroit Fatalities (1/2 of Wayne County Fatalities)
Sample	Driver with Driving Record	Driver with Driving Record
Sample Size	169 persons	134 persons
Occurrence	Arrested and convicted for DUIL or DWI	Died in auto crash
Site	Detroit, Wayne County, Michigan	Detroit, Wayne County, Michigan
Time	Arrested between July 1967-June 1969	Crashed between July 1967-July 1969
Period of Driver Record Analysis	January 1963-June 1969	January 1961-June 1967
BAL	Breathalyzer reading 0.15% or higher or refused Breathalyzer (32%)	Group I "High" BAL= 0.15% or higher Group II "Low" BAL= Neg.-0.14%

Results. All groups were predominantly male. Only 2% of the DUIL sample were female (4); 8% of the Detroit high-BAL fatalities (5), and 9% of the Detroit low-BAL fatalities (6) were female.

Other information on these groups is best presented showing means. Tables 1-48 through 1-51 give means for age and certain important driving history variables followed by a brief description of each.

TABLE 1-48. MEAN AGE OF DETROIT FATALITIES AND DUIL SAMPLE

Sample	Mean Age	Number of Persons
Detroit Low BAL	43 years	70
Detroit High BAL	36 years	64
DUIL Sample	44 years	169

Detroit fatalities with high BALs were somewhat younger than their DUIL counterparts, with mean ages of 36 years compared to 44 years, respectively.

TABLE 1-49. MEAN NUMBER OF DRIVING VIOLATION CONVICTIONS FOR DETROIT FATALITIES AND DUIL SAMPLE

Sample	Mean Number of Driving Violation Convictions	Number of Persons
Detroit Low BAL	3.73	70
Detroit High BAL	5.35	64
DUIL Sample	5.47	169

Detroit fatalities with high BALs had a mean number of driving violation convictions very similar to that of the DUIL sample. Both groups had a higher mean than the fatalities with low BALs. The mean of 5.47 for the DUIL group does not include the conviction for which they were sampled. If it were counted, this mean would be 6.48.

TABLE 1-50. MEAN NUMBER OF ACCIDENTS FOR DETROIT FATALITIES AND DUIL SAMPLE

Sample	Mean Number of Accidents	Number of Persons
Detroit Low BAL	0.51*	70
Detroit High BAL	0.43*	64
DUIL Sample	1.12	169

*Mean does not include fatal crash

A larger percentage of drivers under 25 years of age are in the Detroit low-BAL group (23%) than in the Detroit high-BAL group (16%). The general association between young drivers and a high number of crashes may partially explain the slightly higher accident mean for the low-BAL group.

Although mean number of accidents for the DUIL sample is considerably higher than for either of the Detroit groups, it should be noted that if the fatal crash had been counted in the means, they would increase to 1.51 and 1.43 for the two Detroit groups; these figures are just slightly higher than for the DUIL sample.

The high mean number of accidents for the DUIL group lends further credence to the assertion that accidents and problem-drinking drivers are strongly associated.

TABLE 1-51. MEAN NUMBER OF SPECIFIC CONVICTIONS FOR DETROIT FATALITIES AND DUIL SAMPLE

Sample	Mean Number of Specific Conviction Types		
	DUIL/DWI	Speeding	Reckless Driving
Detroit Low BAL	0.03	3.73	0.10
Detroit High BAL	0.13	5.33	0.19
DUIL Sample	0.15*	1.28	0.15

*Mean DUIL/DWI does not include the DUIL offense for which the sample was chosen. It, of course, would increase to 1.15 if it were counted.

Several important facts emerge from this table. First, a high number of DUIL/DWI offenses are associated with both the heavy-drinking fatalities and the DUIL group, but not with those fatalities with negative to 0.14% BALs. This finding lends additional support to the assumption that the DUIL offenders and heavy-drinking fatalities may, in fact, be the same or similar subsets of the driving population and that countermeasures directed toward DUIL offenders may reach persons likely to drink, drive, and then die in crashes.

The second important fact is that although the speeding conviction mean is lowest for the DUIL sample, this may be because these persons speed to such an extent that they are convicted of more serious offenses such as reckless driving.

Summary of driver and criminal record information. Ninety percent of the driver fatalities had a Michigan Department of State driving record. At the time of the crash, 77% had a valid license, 7% had an expired license, and 4% were driving on revoked or suspended licenses. Fifty percent of the latter group had BAL 0.10% or higher.

Convictions and accidents listed on the driver and criminal records of driver fatalities were compared to BAL at death. The number of driving violations in six and one-half years was significantly associated with BAL. Persons with no violations were under-represented in the 0.10% or greater BAL group, while drivers with 4 or more violations were over-represented at these blood alcohol levels.

The number of accidents previous to the fatal crash did not show a dependent relationship to BAL at death. A satisfactory explanation of this observation has not been found within this data set. We suggest, however, that it may be related to the fact that crashes are inherently rare events; for example, two-thirds of the sample had no prior crashes recorded on their driving record. The frequently observed under-reporting of crashes would also mask the detection of a dependent relationship between high BAL and previous crashes.

Twenty-eight driver fatalities had reckless driving convictions over a six-and-one-half year period, and all but 5 died with BAL $\geq$ 0.10% and 18 had BAL 0.15% and above.

There is a dependent relationship between prior DUIL convictions and BAL. Eleven of the 12 persons with such convictions had BAL 0.10% or higher. Nineteen percent of the divorced drivers had a DUIL offense as compared to 4% of the married and 3% of the single drivers. In addition, all 12 were males between 25 and 55 years of age.

Criminal convictions were also significantly associated with BAL. Thirteen percent of the fatalities had criminal convictions: 61 of the 83 had BAL 0.10% or higher.

Twenty-nine fatalities had convictions for non-driving drunk offenses, such as drunk and disorderly or drunk in a public place. All but seven had BAL 0.10% or higher. The divorced fatalities were again over-represented. Twenty percent of the divorced group had non-driving drunk convictions, compared to 2%-5% of other marital status groups.

A random sample of 169 persons convicted of a DUIL or DWI offense (Driving Under the Influence of Liquor or Driving While Impaired) was collected from the City of Detroit court records. They were compared to the 134 Detroit driver fatalities split into two groups; those with BAL less than and greater than 0.15%. This blood alcohol level was chosen since all persons in the DUIL sample who took the breathalyzer test registered at or above that level.

High BAL (0.15%+) fatalities were somewhat younger than the DUIL sample; their respective mean ages were 36 and 44 years. High BAL fatalities were similar to the DUIL sample in the mean number of prior driving violation convictions (5.3 and 5.4) while low BAL fatalities had a mean number of 3.7 convictions.

The DUIL sample had a higher mean number of prior accidents than either group of fatalities. Their mean for six and one-half years was 1.12 compared to 0.51 for low BAL fatalities and 0.43 for high BAL fatalities.

High BAL fatalities and the DUIL sample had a similar mean number of prior DUIL/DWI convictions. Their means were 0.13 and 0.15 compared to 0.03 for the low BAL fatalities. The high BAL fatalities and the DUIL sample were similar on reckless driving convictions with 0.19 and 0.15, compared to 0.10 for low BAL fatalities. The DUIL sample had the lowest mean number of speeding convictions with 1.2, while the high BAL fatalities had the highest mean number with 5.3. It can be theorized that persons in the DUIL sample speeded to such an extent that they were convicted of more serious offenses such as reckless driving.

1.4.5 CASE RECORD FINDINGS

1.4.5.1 Methodology.

Number of traffic fatality names searched. Five hundred and two names were searched at those social, court, and medical agencies where permission to do a record check was obtained. This does not include all traffic fatalities in the study but it does include all those fatalities who expired between July 1967, the start of the study, and March 1969. The elimination of the final 114 persons who became a part of the fatality study after March 1969 was done because time constraints did not permit their inclusion before the case search had to be completed. The only exception to the searching of 502 names was the Department of Social Services where only 177 names were used.

Number of records found. Ninety-four records were found on 72 fatalities or members of their immediate family. The breakdown on number of records by agency is as follows: Department of Social Services, 28; Recorder's Court, 16; Circuit Court, 20; Family Service, 14; Catholic Social Services, 2; Greater Detroit Council on Alcoholics, 6; Mayor's Rehabilitation, 2; Mercywood, 1; Ypsilanti State Hospital, 4; Towne Hospital, 1. No records were found at Brighton Hospital, North Woodward Hospital, and the Salvation Army. In the latter case, this may have been partly due to the very limited information which was kept on file for the persons served. A description of each agency can be found in Appendix F.

1.4.5.2 Analytic Procedure. When the case records were reviewed at the various agencies, very extensive notes were taken, including all information which might be potentially pertinent. However, because the information came from such diverse sources (hospitals, probation departments, alcoholism clinics, and counseling agencies) the data found on each of the different types of records were rarely comparable. Therefore, much information which was potentially relevant to understanding more about aspects of the individual's life which might affect drinking behavior had to be excluded from any quantitative analysis. This included such things as educational background, family life situation, including evidence of a number of divorces or loss of a parent while a minor, and many other types of data which might have been relevant had they been available on a larger number of cases. As it was, social service records often emphasized financial status, the counseling agencies concentrated on family background, and the probation departments on past criminal behavior. Where individuals were seen at several agencies, they often presented many different faces to the various interviewers: If they were applying for foster care, they seemed to have ideal family life situations; a second agency record might reveal severe marital problems, and a third would be a review of criminal behavior. Not only was there a problem in analysis due to differences in revealed character and omission of pertinent information, but records also covered a multitude of time periods in an individual's life. Examples are the criminal record of a fatality which covered his activities both as a boy, and 40 years later in life; and family counseling records for an immature teen-age couple compared to old age assistance records for the same couple.

Because of these difficulties, records were analyzed primarily to answer two major questions: Is there evidence of alcoholism or problem drinking in the record and, if so, what area of life was it noted to affect? To do this, an alcoholism score was given:

"1": a positive diagnosis of alcoholism. This score was used where the report writer stated that the individual was an alcoholic and he had clearly lost control of his drinking.

"2": evidence of problem drinking which affected a particular area of life. This was used when a report stated such things as "his excessive drinking is the cause of all his run-ins with the police." Such reports did not state that the person had lost all control over drinking.

"3": evidence of possible excessive drinking affecting some area of life. Evidence of problem drinking was less complete or more tenuous than for persons scored with "2". Examples of the kinds of comments which indicated a score of "3" were: probation terms where the offender was told not to drink and to stay out of bars, two arrests for drunkenness offenses combined with a very marginal skid-row existence, or drinking as a minor followed by a larceny and police arrest.

"4": no evidence on the record of the existence of a drinking problem. This is not to say that these persons did not have a drinking problem, but only that there was no evidence of it.

After the alcoholism scoring was completed, the area of life the problem drinking affected, if it was present, was identified. These areas were categorized as follows: (1) affects driving, i.e., has had driving offenses; (2) affects criminal behavior, i.e., has had criminal offenses; (3) affects employment; (4) affects family or marital life; (5) brings out violent or destructive behavior; (6) is related to mental or emotional problems; (7) is related to a hospitalization; (8) is related to suicide attempts; or (9) has affected health.

1.4.5.3 Results of Case Record Search. The results derived from asking certain questions about the data available from the case records are presented below.

Does a case record search of the type described earlier provide many records?

Ninety-four records were found on 72 fatalities or a member of their immediate family. Of these, 14 persons had 2 records and 4 had 3 records. The total of 72 persons includes 14% of the total number of persons searched (502).

What agencies have had the greatest number of contacts with the fatalities?

The Department of Social Services had the highest percentage of contacts with 15%, or 28 of the records for the 177 subjects searched. Next most common were the court probation departments with 36 records (7%) on 502 subjects. Family Service followed with 3% (14 of 502), and the other agencies had less than 1% (6 or fewer records).

It is important to note that the 28 records found in the Department of Social Services files cover only the first 177 fatalities. Their filing system does not permit rapid search, and it was necessary to discontinue examination of their files for the remaining subjects in favor of broadening the search to include the other agencies listed. It was believed that the alcoholism referral and treatment agencies would provide more reliable and definitive data regarding prior abusive use of alcohol. This proved to be true, but it is also clear that the Department of Social Services' files are a relatively fertile source, in a quantitative sense, about contacts with the subjects' families.

Accordingly, in the results that follow, the total number of contacts with the Department of Social Services are under-reported with respect to the number that would have been obtained had all names been searched. The trends and percentages, however, are believed to hold for the following reasons:

1. The 177 subjects represent nearly a third of the population that was examined at the other social agencies. This is a large enough sample for us to have confidence that the distribution of the remaining two-thirds would not have been significantly different.
2. The BAL distribution of the persons for whom the 28 records were found matched, within a few percentage points, that of the persons found in other social agency files.

Were many people identified as being alcoholic from the records that were found?

Eleven persons were identified as alcoholic -- 15% of 72 had a score of 1. Ten persons had indications of problem drinking -- 14% of 72 had a score of 2. Eight persons may have been excessive users of beverage alcohol -- 11% of 72 had a score of 3. The remainder (43 of 72, or 59%) had no indication of excessive drinking in their case records and therefore had a score of 4.

If the record gave an indication that the subject was either an alcoholic, a problem drinker, or an excessive user of beverage alcohol, what problem areas were related to this alcohol use?

Alcohol-related driving offenses	7 persons
Alcohol-related criminal offenses	17 persons
Family life	6 persons
Violent or destructive behavior	5 persons
Mental or emotional problems	3 persons
Hospitalization related to alcohol	2 persons
General health	2 persons
Employment	1 person
Suicide	1 person

Totals do not add to the 29 persons described since drinking behavior often affected more than one area. Offenses are those known by the report writer rather than those listed on the driving or criminal record.

Does an alcohol designation on a case record predict blood alcohol concentration?

The Chi square test for significance was applied to see if there is a dependent relationship between blood alcohol concentration and indications of drinking behavior on the case record. (See Table 1-52.) Results were not significant at the 0.05 level of significance, therefore the hypothesis of a dependent relationship between BAL and alcohol indication on the case record was not supported.

TABLE 1-52. BAL AND INDICATIONS OF DRINKING BEHAVIOR ON AGENCY CASE RECORD

BAL	Total	Indicated Alcoholic (1) Problem Drinker (2) Possible Excessive (3)	No Indication of Excessive Drinking (4)
Neg.-0.09%	26	6	20
0.10-0.14%	11	9	2
0.15-0.24%	21	9	12
0.25%+	14	5	9
TOTAL	72	29	43

Is BAL associated with having or not having any particular type of record?

BAL was compared to factors other than alcohol indication on the case record. (However, driving records were not used because they are not necessarily a result of either medical or social problems or deviant criminal behavior.) Subjects were divided into four groups: those with no records, those with an agency record exclusive of a state police criminal record, those with an agency case record and a state criminal and those without an agency record but having a criminal record. BALS of these groups are compared in Table 1-53. The rationale for this comparison has been given previously.

The second and third groups (those with an agency record only, and those with an agency record and a criminal record) make up the 72 persons described earlier. In addition, there were 83 persons with a criminal record. Sixty of these persons had no agency record, while 23 had an agency record.

TABLE 1-53. BAL AND PRESENCE OF AGENCY AND/OR CRIMINAL RECORDS

BAL	No Record	Agency Case Record Only	Agency Record and Criminal Record	Criminal Record Only*
Negative	172 (45%)	11 (22%)	4 (17%)	9 (15%)
0.01-0.04%	39 (10%)	8 (16%)	0 (0%)	5 (8%)
0.05-0.09%	18 (4%)	1 (2%)	2 (9%)	2 (3%)
0.10-0.14%	30 (8%)	8 (16%)	3 (13%)	6 (10%)
0.15%+	121 (32%)	21 (43%)	14 (61%)	38 (63%)
TOTAL	380 (100%)	49 (100%)	23 (100%)	60 (100%)

*Ten of the 60 persons with criminal records were additional to the 502 searched at agencies. Therefore, the above total is 512.

The distribution of BAL for these four groups indicates three trends. The group with no agency or criminal records have the highest percentage of persons with negative BALs (45%) and the lowest percentage with BALs of 0.15% or higher (32%).

The group with the next highest negative BAL is the one that has agency case records only. Twenty-two percent of this group had a negative BAL and 43% had a BAL 0.15% or greater. The two groups having criminal records, either with or without an agency record, appear to be quite similar to each other. These groups have negative BALs of 17% and 15%, respectively, and BALs of 0.15% or higher for 61% and 63% of each of the respective groups.

This would seem to indicate that alcohol involvement at time of death is least for those persons with no records (380, or 76% of the 502); greater for fatalities with an agency record and no criminal record; and greatest for fatalities with a criminal record, whether or not they also had an agency record.

How many persons with case records also had driving records?

For 19 persons, the case record was the only source of information. These persons had no driving or criminal record. Four of the 19 were identified on the case record as alcoholics, 1 a problem drinker, 2 were possible excessive users; and 12 gave no indication of excessive use of alcohol.

Supplementary to the case record, 30 persons had a driving record, 4 had a criminal record but no driving record, and 19 had both a criminal and driving record. Thus of the 72 fatalities with an agency case record, 53 had either a driving or a criminal record, or they had both.

Can any relationship be established between case record drinking problems and drunkenness offenses listed on the criminal and driving records?

The number of persons with offenses related to drinking was too low to establish any definite relationship.

Two of the 72 persons had a DUIL offense--neither gave any indication of problem drinking on their case record.

Eight persons had been convicted of an offense related to drinking. Three of these persons gave no indication of problem drinking on their case records. Of the remainder, one was a possible excessive user, three were problem drinkers, and one was identified as being alcoholic.

Does a case-record alcohol indication show any relationship with number of moving violations on the driving record?

Persons with case records and driving or criminal records were placed in one of two groups according to whether there was any or no indication of excessive drinking on the case record. They were then distributed by the number of convictions for moving violations during the six-and-one-half-year period. The distribution is presented in Table 1-54. The hypothesis tested was that there would

TABLE 1-54. MOVING VIOLATION CONVICTIONS AND INDICATION OF ALCOHOLISM FROM AGENCY CASE RECORD

Moving Violation Convictions	Some Excessive Alcohol Use (1-3)	No Indication of Excessive Use (4)	Total
0-1	5	11	16
2-4	8	10	18
5-9	6	6	12
12 or more	3	4	7
TOTAL	22	31	53

be a dependent relationship between number of moving violations and problem drinking or excessive drinking, as indicated on the case record. Using the Chi square test for significance, this hypothesis was not supported at the 0.05 level of significance.

Does a case-record alcohol indication predict number of accidents?

The number of persons having an accident during the six-and-one-half-year period was too low to test any hypothesis related to the above question. However, for informational purposes, the distribution of case-record alcohol indication versus the number of accidents is presented in Table 1-55.

TABLE 1-55. ACCIDENTS AND INDICATION OF ALCOHOLISM FROM AGENCY CASE RECORDS

Number of Accidents	Alcoholic (1)	Problem Drinker (2)	Possible Excess (3)	No Indication (4)	Total
1	0	2	1	6	9
2	0	1	1	3	5
3	0	0	0	1	1
4	1	0	0	0	1

Are any other serious driving offenses related to case record indications of problem drinking or alcoholism?

Although it cannot be statistically tested due to small sample size, reckless or felonious driving offenses seem to have a close relationship with an alcoholism identification on the case records.

Twelve persons had one or more reckless or felonious driving convictions. Seven of these were alcoholics or problem drinkers. One person was a possible excessive user and four were not noted to use alcohol excessively.

Was there any additional information on the case records which might be relevant to accident causation or helpful in making a characterization of the persons involved in fatal accidents?

Seven persons had severe enough mental problems to result in a psychiatric hospitalization. Four had been diagnosed as schizophrenic, one diagnosed as having a personality disorder and two were unspecified in their diagnosis. Two of these mental patients (both schizophrenic) were also diagnosed as alcoholics on their case records and one other mental patient was identified on the case record as being a problem drinker.

One female schizophrenic, though not alcoholic, was addicted to barbiturates and had made several suicide attempts. One male was addicted to narcotics and was also an alcoholic. Both of these drug addicts died as pedestrians with negative blood alcohol concentrations, but the male had 0.09mg./ml. of barbiturate in his blood specimen. He was one of 16 persons with a barbiturate trace in his blood stream among the fatality sample tested.

One alcoholic who died with a very high BAL was noted to be suicidal. He died as a passenger fatality.

Two persons died the day after their wives either remarried or told their husbands they were planning to remarry. This supports Selzer's findings (Selzer and Ehrlich 1969) that fatal accidents are often preceded by crisis situations. Both these men also died with very high BALs (0.22% and 0.40%).

Summary of data related to identification of problem drinking or alcoholism based on all sources. Throughout the analysis of the data on the fatalities there have appeared certain indicators of problem drinking. For the purposes of this study, they were defined to be the following: BAL of 0.25% or higher, conviction for driving under the influence of liquor (DUIL), conviction for a drunkenness offense not related to driving, cirrhosis of the liver, diagnosis of alcoholism or excessive drinking on a social or medical agency record, or a report of alcoholism by the witness who identified the fatality at the morgue. One hundred forty-three fatalities, or 23% of the population had one or more of these problem drinking indicators. Drunkenness offenses not related to driving were usually found in conjunction with other signs of problem drinking; 82% of the 17 cases with this type of conviction also had at least one other indicator. However, fatalities with other indicators most often were found to have only one problem drinking criterion: 82% of the 87 individuals with BAL higher than 0.25% had no other indicators; 78% of the 18 individuals with a DUIL conviction had no other indicators (DUIL convictions listed on the driver record during any time period); 55% of the 11 individuals reported to be alcoholic by the morgue witness had no other indicators; and 64% of the 14 cirrhotics had no other indicators (it should be noted that alcoholism is not the only cause of cirrhosis, however 75% of cirrhotics develop the disease from alcoholism (Harrison 1966). Altogether, 127 of the 143 fatalities, or 89% of those defined to be problem drinkers by the above criteria had only one criterion present. However, as noted above, the evidence of problem drinking was present for a quarter of the population, and had the blood alcohol level been defined lower, this percentage would have increased greatly.

2. DRIVING PERFORMANCE OF AN ALCOHOLIC POPULATION (PROJECT II)

2.1 INTRODUCTION

2.1.1 BACKGROUND. This investigation focuses upon the existence of alcoholism as a contributing and pertinent factor in the occurrence of highway crashes. Research on the alcohol-related traffic safety problem indicates that alcohol involvement, as reflected in levels of blood alcohol in excess of that found in social drinking, is a characteristic feature of fatal crashes*.

One of the goals of HSRI's research is to explore ways to reduce the number and severity of traffic crashes associated with alcohol consumption. We need to identify and characterize those groups of alcoholics who are involved in crashes so that appropriate and effective intervention will be possible. In order to achieve this goal the Highway Safety Research Institute, in cooperation with the Mental Health Research Institute (MHRI), has utilized data on a hospitalized alcoholic population collected in 1965-68. This research has developed from an initial investigation, under MHRI's coordination, of alcoholics hospitalized in Hurley Hospital, Flint, Michigan**. Nearly 2400 Hurley patients with drinking problems who had at least one admission (not necessarily alcohol-related) to the hospital between June 15, 1956 and June 30, 1967 were selected for study. Beginning with the alcoholic group therapy program's inception in 1956, Hurley's senior therapist has kept a record of all patients referred to the alcoholic group therapy program. In addition, he recorded the names of those patients who were medically diagnosed as alcoholic, and those patients (which we subsequently excluded from this study) who were reported by the medical and ancillary staffs as presenting drinking

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*See Section 1 of this report.

**A more detailed historical background of this study of hospitalized alcoholics as well as a description of the treatment resources of Hurley Hospital in Flint, Michigan, will be found in Appendix H.

problems. Information was then collected on these patients; it included: medical and group therapy records; traffic conviction and accident records provided by the Michigan Department of State; criminal conviction records from the Michigan Department of State Police; and Health Department death certificates where applicable.

2.1.2 OBJECTIVES. This study has two objectives: it attempts to characterize those critical groups of alcoholic drivers that contribute disproportionately to the death, personal injury, and property damage occurring on our highways. Characterization involves describing these drivers in terms of pertinent demographic factors, medical state, group therapy,reactions, deviancy, driving convictions, crashes, and criminal convictions. This study also attempts to select, through multivariate analysis, those characteristics which best identify the alcoholic drivers who are likely to be involved in future traffic accidents or driving convictions. Hopefully this will contribute to early identification and rehabilitation of these critical groups.

2.1.3 DEFINITIONS. In the context of this research, we have used the following terms which require clarification:

(1) Alcoholic. The Hurley Hospital Group Therapy Program in practice agrees with Cross, and defines an "alcoholic" as a compulsive drinker who has lost control over the quantity or frequency of his drinking, and whose condition cannot be expected to improve unless he completely abstains from the use of alcoholic beverages (Cross 1968).

(2) Alcoholism. In addition, this hospital alcoholism program accepts the definition of alcoholism proposed by Keller (1968):

> Alcoholism is a chronic disease manifested by repeated implicative drinking so as to cause injury to the drinker's health or to his social or economic functioning.

(3) The Alcoholic Driver. The alcoholic driver is any person who suffers from alcoholism and operates a vehicle, whether licensed or unlicensed. This study focuses on a sample of these drivers in Michigan.

2.2 DISCUSSION

2.2.1 METHODOLOGY

2.2.1.1 Operational Definitions

The alcoholic population. For the purposes of this study, we have defined the alcoholic population as those individuals who were admitted to Hurley Hospital between June 15, 1956 and June 30, 1967, who had been diagnosed as alcoholic by one of the hospital's staff physicians, and/or who were referred by one of these physicians to the alcoholism group therapy program. Thus, we excluded from our discussion part of the broad spectrum of problem drinkers and focused on those who were diagnosed alcoholic. At one end of the continuum, a problem drinker could be an alcoholic. At the other end of the continuum, he could be someone who must limit his intake of alcohol because of health reasons, for example he could be someone with a stomach ulcer. But for the purposes of this study, we decided to evaluate only those individuals for whom information had been gathered and who were, as stated above, actually diagnosed as alcoholics or individuals who were referred by a physician to the alcoholic group therapy program.

Drivers and non-drivers. We have identified as "drivers" those persons who have either

1. a valid driver's license, or
2. no valid driver's license, but driving convictions and/or crashes.

"Non-drivers" are defined as persons having neither (1) nor (2) above.

2.2.1.2 Source of Data. A comprehensive data file on 2,400 patients with drinking problems who had been hospitalized in Hurley Hospital was collected. To refine the picture of the alcoholic problem driver, it was necessary to obtain information pertinent to both the drinking disorder and the concurrent driving and violation history. Therefore, we utilized data from the following sources:

1. Hospital records: medical and group therapy data.
2. Department of State Driving Records.

3. Department of State Police Criminal Records.
4. Death Certificates, as applicable.

2.2.1.3 Procedures for Data Collection. The hospital records were collected, condensed, and prepared by utilizing an on-site team of coders, nurses, and aides skilled in hospital procedures who transcribed medical records and group therapy information into the format required for collection and subsequent machine analysis. This information was then mailed to Ann Arbor for collation and analysis. Requests were made to the Michigan State Police for criminal records. These records were checked for matching names and birthdays. In a similar fashion, the driving records were collected and organized for machine manipulation. Finally, a team of coders was sent to the Genesee County Department of Health and copies of death certificates were made for the deceased among this population.

2.2.1.4 Content of Data. The data are composed of the following information gathered from the medical, driving, criminal, and death certificate records of hospitalized problem drinkers:

1. The Medical records included medically charted information about physician's diagnosis, chief complaint, medical impressions, medications, group therapy prescribed, dates of admission, discharge, special characteristics of illness, patient's personal history and life style, job history, marital history, drinking history, and other comments.
2. Group therapy records contained evaluation of the patient's general progress during the period of hospitalization. In addition, ratings from "good" to "poor" were assigned by the therapist for the patient's attendance, response, level of participation, and attitude.
3. Driving records included a record of driving convictions, financial responsibility records, accidents, and associated dates. These records also contained case identity information such as name, license number, address, birth date, and

license expiration date. In addition, any suspensions or revocations were recorded.

4. Criminal records maintained by the Michigan State Police provide the name, aliases, sex, race, offenses, charge, date, and disposition of each person who had a criminal offense and conviction. Also included are sentences to penal institutions.
5. Death Certificates contained information which included the patient's address, place of death, date of death, date of birth, marital status, occupation, and medical certification of the cause and conditions leading to the death.

Examples of these records can be found in Appendices E and N. A list of factors coded from these records can be found in Appendix J.

2.2.2 SAMPLE DESCRIPTION. This study attempts to identify the various types of alcoholic drivers who contribute disproportionately to the deaths, injuries, and property damage occurring on our highways. Identification and characterization of individuals in these critical groups is an important first step toward the development of appropriate countermeasures which can be effectively applied prior to crash involvement.

2.2.2.1 Description of Sample Reduction. Although information on nearly 2,400 persons hospitalized between June 1956 and June 1967 was originally gathered, the sample was reduced to 1,517 for purposes of this analysis. There were several reasons for this reduction. We eliminated those people for whom we had insufficient medical or driving information. This lack of information was particularly characteristic of the majority of those who died before 1961. Consequently, we excluded from our analysis pre-1961 drivers and focused our investigation on the population that was operating vehicles between January 1, 1961 and June 30, 1967. Also, we excluded those problem drinkers who were not specifically medically diagnosed as alcoholic and/or referred to alcoholic group therapy by a physician. This excluded such categories as wives who attended group therapy because their husbands were alcoholics, or the patients who through hearsay were thought to have a problem with alcohol. Therefore, in accordance with the purpose of this study, our investigation was limited to those who were actually diagnosed alcoholics.

2.2.2.2 A <u>Hospitalized Alcoholic Population.</u> This population included 270 non-drivers and 1,247 drivers.

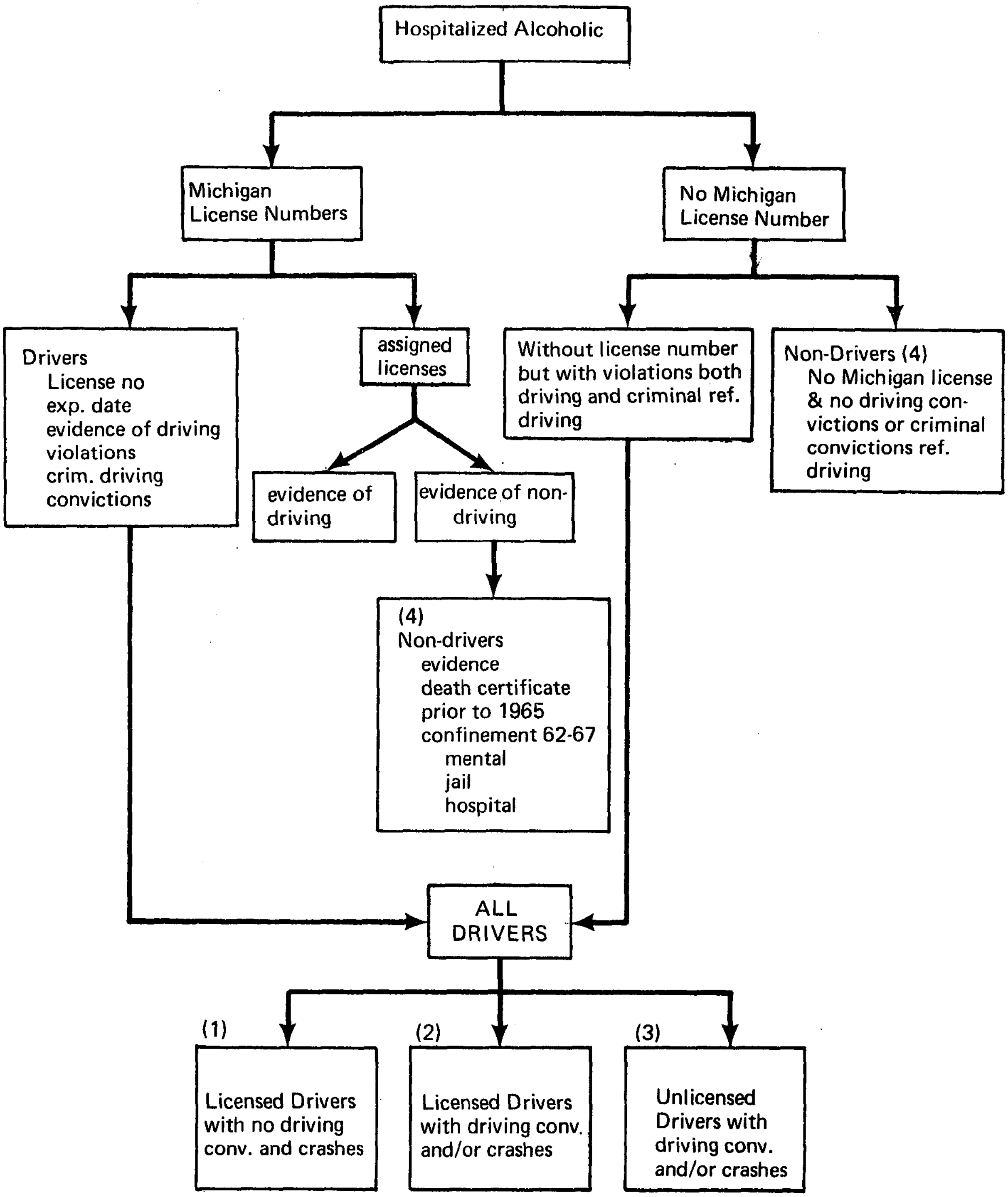
<u>Alcoholic drivers, 1961-67.</u> This was the sample focused upon for the major portion of our analysis. It consisted of a population of hospitalized alcoholics who had been operating a vehicle between January 1, 1961 and June 30, 1967. The mean age of these 1,247 drivers was slightly over 49 years. Eighty-three percent of the sample was between 35 and 65 years of age. They were predominately male, Protestant and white; 62.5% were blue-collar, skilled, or semi-skilled employees. The balance was divided among approximately equal categories. At the time of the data collection (1965-1968) most were residents of Flint, Michigan, and over half were married.

<u>Non-drivers.</u> Similarly, the 270 non-drivers were hospitalized alcoholics for whom we have complete records. Thus, 18% of the total sample (1,517) were non-drivers. These non-drivers tended to be either older patients or further along in the alcoholism syndrome, and they tend to have a higher hospital admission rate.

<u>Other subgroups.</u> The 1,247 drivers were then divided into three subgroups. Our initial driving performance analysis was based on the following subgroups:

1. Licensed drivers with no driving convictions and/or crashes. (N = 313)
2. Licensed drivers with one or more driving convictions and/or crashes. (N = 834)
3. Unlicensed drivers with one or more driving convictions and/or crashes. (N = 100)

<u>Identification of driving involvement.</u> The presence of a driver's license number, <u>per se</u>, is not sufficient evidence to establish whether one drives or does not. For when a person operates a vehicle in Michigan without a license, and is involved in a traffic violation, a license number is generated to him. Therefore, the task of identifying "drivers" in the population was undertaken with care. We evaluated the driving record of those alcoholics who had a driver's license to see if that license was generated or assigned. This evaluation procedure can be seen in Fig. 2.1.



Evidence used to determine driving involvement

License Number
Evidence of Driving Violation
Traffic Convictions
Number of Alcohol Related Driving Offenses
Other Evidence of Driving, e.g., Occupation - Truck Driver

Expiration Date
Criminal Driving Convictions
Financial Responsibility Record (accidents and DUIL)
Out of State Conviction NDR Evidence

Figure 2.1. Identification of driving involvement (N=1517 total hospitalized alcoholic sample).

If the alcoholic patient had a Michigan driver's license number, we then evaluated whether this license was assigned by checking for the existence of expiration date, as well as for evidence of driving record convictions or a driving conviction found on the criminal record. If this evidence existed, the patient was categorized as a driver, and if neither this evidence nor any evidence of driving was found in his medical record or National Driver Record, he was grouped with the non-drivers. Similarly, we checked the record of those without a Michigan driver's license number to see how they should be grouped. If there was evidence of driving conviction or crash found either on the driving record or the criminal record, the individual was placed with the drivers, but if no evidence existed to the contrary, and most particularly if a driver's license expiration was lacking, he was placed in the non-driving category. Subsequently, we evaluated all of the drivers and grouped them into the previously listed three categories (i.e., licensed alcoholic drivers with no driving convictions or crashes, licensed alcoholic drivers with driving convictions and/or crashes, and unlicensed alcoholic drivers with driving convictions and/or crashes).

Sample limitations. This hospitalized alcoholic population may not be representative of all alcoholics nor of all alcoholic drivers. Hospital admission procedures seemed to restrict alcoholic admission when the census was high, and to encourage admission when it was low. Consequently, when the census was high, only those cases with severe medical problems were admitted; thus, the sample was biased by excluding those alcoholics whose medical condition could have been treated on an out-patient basis. During the period covered by this study, the hospital census was, for the most part, high, except during the summer and around the time of major holidays.

In addition, this hospitalized alcoholic population seems to be non-random on several points of personal patient history. It is predominantly middle-aged, white, male, and Protestant. The population seems to lack a proportionate number of young alcoholics. One reason for the disproportionately low number of identified young alcoholics may be that physical deterioration is essential both for alcoholism diagnosis and for subsequent admission as a hospital in-patient.

In evaluating the group therapy program's effectiveness as an intercedent between alcoholism and highway crashes, it is necessary to point out that the program's objective is not the control of problematic driving; it seeks to help the alcoholic abstain from drinking alcohol. In our evaluation of the program's effectiveness as a crash deterrent we have introduced what are essentially our own objectives. Consequently, our evaluation, on this basis, is not by itself a fair judgment of the program's success or failure.

Another problematic item involves the specific driving violations: driving under the influence of liquor, reckless and felonious driving, and driver's license offenses (such as fraudulent license application or operating a vehicle without a license).* It was found that these violations are not dis-associated from crashes. In this sample, 17% of the specific convictions came as a result of the crash situation. We therefore have restricted our use of these specific variables as independent predictors of crashes, but they have been utilized as descriptive characteristics. Thus, we have utilized the total number of driving convictions not associated with crashes in our attempt to discover those variables most associated with the crash situation.

Prior to 1960 diagnoses of neurosis and mental illness for the Hurley alcoholics were found infrequently. Although this condition may have existed prior to 1960, the medical records do not contain the information.

Finally, because medical records are not primarily research tools, but are a shorthand documentation used by the physicians, the usefulness of these records in reflecting characteristics found in patient life style, work history, marital problems, etc., is questionable. Although physicians often record sidelights about the patient's social situation not directly related to the condition being treated, they may not ask medically irrelevant social questions of each patient and they may not record the answers often needed for research purposes. Thus, we lack both answers and the knowledge of whether the questions were ever posed. Therefore, from the several hundred variables available, we have screened the following.

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*Turn to Appendix J for a complete list of driver's license offenses.

2.2.3 DESCRIPTION OF RELEVANT VARIABLES. In accordance with our objective, the variables utilized in this study were screened for sufficient frequency and meaningfulness. They then were grouped into the following categories.

Demographic:	Age, Sex, Race, Marital Status, Religion, Occupation, Residence
Medical and Group Therapy:	Admission Rate, Number of Alcoholism Admissions, Number of Trauma Admissions, Age at Last Group Therapy Referral, Days of Group Therapy, Mean Group Therapy Score
Deviancy:	Number of Neurosis/Mental Admissions, Attempted Suicide, Patient at State Hospital, Incarceration, Family Problems, Drunk Convictions Not Related to Driving, Other Criminal Convictions
Driving Performance:	DUIL Convictions, Reckless and Felonious Convictions, Speeding Convictions, Driver's License Convictions, Other Driving Convictions, Total Driving Convictions, Total Driving Convictions Not Associated with Crashes, Crashes

2.2.3.1 <u>The Demographic Variables</u>. Essentially, this category of variables provided for the characterization of each individual alcoholic. When the data were collected, age was computed as of 1967. Sex was coded from the medical record. Race was taken from the medical record and confirmed by the criminal record if one existed. Marital status seemed to change over time for much of the population. Therefore, if a person reported, on any admission, that he was separated or divorced, he was screened into that category, and not later returned to the sample. Similarly, those who were widowed, married, and single were successively screened without replacement to the sample, until independent groups of patients were categorized by marital status. Occupation scales were based on a modification of Hollingshead's Two-Factor Index of Social Position (Hollingshead and Redlich 1958). Since educational status was unavailable, patients were grouped according to occupation ratings alone. This procedure of ranking by occupational position without the corrective influence of educational attainment is contrary to Hollingshead's recommendation. The following groupings were utilized: (1) higher executives, proprietors, and major professionals; (2) minor professionals and foremen; (3) skilled manual employees; (4) semi-skilled and unskilled employees; (5) part-time or unemployed; (6) retired; and (7) missing data. Patient residence was also used to categorize individuals and individuals were then grouped according to the location of their residence: (1) within Flint, Michigan; (2) outside of Flint, but inside Michigan; or (3) outside of Michigan.

2.2.3.2 Medical and Group Therapy Variables. This category includes admissions for diagnoses of alcoholism, trauma, or general medical conditions. Moreover, a variable which reflects the rate of total hospital admissions was computed in order to compare the admission rate of those individuals who recently came to Flint with those people who have been known to the hospital for years. This admission rate for all causes was computed by subtracting the year of first admission from the year of last admission, and adding one; this figure was then divided into the total number of admissions. Thus, an individual with one admission would have a rate of one admission per year.

There are also variables which reflect group therapy performance. These include the number of hours completed in group therapy, age for the last group therapy program attended, and a score which reflects the therapist's evaluation of the patient's attendance, attitude, and acceptance of the recovery program.

2.2.3.3 Deviancy Variables. In this study deviancy refers to a category of indices which measure social, familial, and emotional difficulties or problems. These difficulties, for the most part, reflect the individuals' general life style.

1. Social variables of deviance are those reflecting criminal incarceration, i.e., where the individual was ever sentenced to prison by a court and actually served time, frequencies of criminal convictions, and criminal drinking convictions.
2. Familial variables of deviance were recorded from physician reports on severe family problems with associated stress.

3. Emotional variables of deviance are those that indicate attempted or successful suicide, mental hospital confinement, rate of trauma admission, and rates of neurotic or emotional illness diagnoses.

2.2.3.4 Driving Performance Variables. This category of variables contains information about frequency and type of driving convictions and crashes. The driving record code was similar to the one developed by the Michigan Department of State for their computerized records. However, this study's driving performance category differs in one major respect; it contains a variable which reflects the frequency of driving convictions not associated with crashes. This variable was constructed in order to obtain a variable which was not associated with the crash situation. For only when a variable is not affected by a dependent variable does it stand a chance of being a useful, meaningful descriptor in the multivariate analysis that was used to identify subgroups of problem alcoholic drivers.

2.2.4 ANALYTIC PROCEDURES

2.2.4.1 Analytic Conception. One purpose of this study was to determine whether there is some combination of behavioral and constitutional factors that partially describes the make-up of an alcoholic person. We proceeded on the assumption that there was such a combination and we have called this descriptive combination of factors the individual's Personal Inventory. A second assumption was that the factors associated with an individual's Personal Inventory are patterned, i.e., some of the factors associated with his Inventory are reinforced or developed into recognizable integrated patterns of characteristics and behaviors. One such behavior is the individual's driving behavior which is reflected in crashes and driving convictions. Therefore, because an individual's driving behavior is part of his integrated Personal Inventory configuration, we hypothesized that when certain configurations of attributes and behaviors exist, they are associated with high rates of crashes and driving convictions, i.e., certain configurations involving deviant driving behavior tend to exist. Since sets of both attributes and behaviors are related to the individual's patterned Personal Inventory, we hypothesized that we can discover some of the combined characteristics which are most reflective of alcoholic problem-driving behavior.

2.2.4.2 Description of Procedures.

Driving performance by selected characteristics. Because of the many possible relationships within data samples containing large amounts of coded information, it was considered desirable to utilize several methods of analysis. The objectives of our first approach were to identify groups of alcoholic problem drivers and to describe the identifying characteristics most closely associated with them.

The first approach compared logical subdivisions of the population to see which group was most closely associated with higher numbers of crashes and driving convictions. We compared such constitutional groups as "male", "female", and such behavioral groups as those with "no admissions with a diagnosis of trauma", "one or more admissions with a diagnosis of trauma". The Chi square test was used to check significance between the groups.

This study of the individuals with specific characteristics associated with high numbers of crashes or convictions was based on the qualification that the characteristics selected for statistical analysis must be rationally associated with either the constitutional or behavioral descriptions of the individual. In this way we hoped to limit some of the characteristics that are significant on a chance basis alone.

Multivariate analysis. The second analytical approach used the Automatic Interaction Detector (AID) algorithm (Sonquist and Morgan, 1964), to uncover the critical factors associated with driving performance as it is seen in crash and driving conviction rates. This approach utilized independent variables selected for their characterizing qualities. All these variables were used together, and then separated into these groups: (1) demographic, (2) medical and group therapy, (3) deviancy, and (4) driving convictions. Each variable in the selected group was examined according to the AID algorithm. When the variable that best accounts for the variation in the dependent variable (e.g., crash rate) was found, it was then used to divide the population into a high rate group and a low rate group. In other words, at each step the AID picked out the two groups whose means are the farthest apart. Each of these subgroups was subsequently and sequentially split until the explained variation was no longer significant or group size was too small to be reliable. Through this repetitive process a (AID) tree was developed which shows the variables that are statistically most closely associated with the dependent variable (crashes or driving convictions). Thus, the AID algorithm made it possible for us to examine a large amount of data and discover both the variables that are the best predictors of problem driving, and the precise groupings on those variables that predict problem and non-problem driving.

We described the significant splits of each AID analysis, and discussed what the splits and the final groups suggest in terms of (1) those variables that most strongly tend to uncover problematic driving performance, and (2) the characteristics which are associated with the problem-driving groups themselves. This allowed us to describe problem-driving alcoholics in two ways. We could describe the effect of each variable on the total group and we could also examine carefully each sub-population that made a major contribution to driving behavior.

We originally planned to develop and test an analytic model which would be useful in specifically identifying the <u>high risk</u> alcoholic in a hospitalized alcoholic population. We planned to dichotomize the sample, building the model with half of the sample, and testing it with the other half. But, after removing the unreliable cases, the number of remaining cases was insufficient to allow the application of the AID analysis. We reached this conclusion after dividing the remaining data in half and obtaining approximately 600 cases in each group. Had it been employed, the AID algorithm would then have proceeded to divide this group along predictive lines. After three such splits, we would have only had about 75 cases in each resulting group. Thus, we would not have been able to determine more than a small number of factors with any degree of reliability. We, therefore, applied the AID algorithm to the entire sample of alcoholic drivers rather than just the high risk drivers.

Evaluation of group therapy as a deterrent to alcoholic driver involvement in crashes. The objective of this section of the analysis was to compare the driving performance and other descriptive characteristics of the alcoholic drivers who attended group therapy against drivers who were diagnosed alcoholic by a physician at the hospital but who did not attend therapy. Our approach was to compare these groups in terms of the following variables: (1) total crash rate; (2) total driving conviction rate; (3) updated crash rate; (4) updated driving conviction rate; and (5) descriptive characteristic available.

As part of this analysis, we examined the age of the persons who attended group therapy. This was done to enable us to determine the number of driving convictions and crashes each patient accrued before the last group therapy program attended. The choice of age at admission to last therapy program was made because this age presumably reflects the point at which the program's maximum impact would be felt. That is, at this point it would be most likely to have an effect on bringing alcoholic drinking behavior under control, particularly for those alcoholics who were repeating the program.

Analysis of life patterns of alcoholics. The objective of this analysis was to investigate whether certain groups of alcoholics have predictable and well defined life patterns. Our investigation analyzed both the sequence of events and the time intervals between events. We hoped to discover whether there was a patterned sequence of events, and whether the temporal clustering of these events was associated with crashes and driving convictions.

The hospitalized alcoholic driving population compared to the Michigan Driver Profile. The task of this portion of our analysis was to compare the means and distributions of driving convictions and crashes found in the alcoholic driving sample with those found in a normal sample of Michigan drivers. The purpose of this analysis was to evaluate the degree of variance from the norm exhibited by the alcoholic driving population.

A description of three alcoholic drivers with high rates of driving convictions and crashes. The purpose of this descriptive analysis was to provide a picture of the chronological development of three high risk alcoholic drivers. In addition, we have suggested points of intervention in terms of the identification and rehabilitation of these alcoholics.

2.2.4.3 Rationale for Data Source. For the purpose of making this inquiry manageable, we investigated the data set and decided to utilize information which we believed would characterize alcoholic drivers. The decision was made to utilize only that information which was presently available in medical or state records. This meant that we would not have to go outside of the presently existing records to find predictors of problem driving by alcoholics. In fact, we completely examined every item on the driving and medical records. After this information was coded into variables, we eliminated those variables with little or no data content. If someone, such as a social service worker, were responsible for recording the life style histories of alcoholics, future research attempts could build a much better predictive model of alcoholic problem driving with very little expenditure of effort.

2.3 FINDINGS

This section contains a description of the findings from our analysis of the data. For presentation, the findings have been arranged into the following categories: (1) subgroups based on selected characteristics; (2) multivariate analyses; (3) evaluation of group therapy as a deterrent to alcoholic involvement in crashes; (4) analysis of life patterns of alcoholics; (5) the hospitalized alcoholic driving population compared to the Michigan Driver Profile; (6) a description of three alcoholic drivers with high rates of driving convictions and crashes.

2.3.1 SUBGROUPS BASED ON SELECTED CHARACTERISTICS

2.3.1.1 Introduction. In the context of this study, driving performance has been defined and measured by two separate criteria: (1) number of crashes, and (2) number of driving convictions. Our purpose in this study was to identify those characteristics or descriptors (demographic, medical, deviancy) which are associated with problem driving performance, i.e., with high rates of crashes or driving convictions.

In order to identify those characteristics, our analytical procedure grouped the alcoholic drivers both by number of crashes and number of driving convictions. By ordering subgroups in this fashion, it was possible to identify driver characteristics associated with a high rate of crashes (two or more) or driving convictions (four or more) and to determine whether these characteristics differ from those of drivers who have a lower rate of crashes or driving convictions.

Each of the subgroups categories (crashes and convictions) were analyzed separately. Figure 2.2 illustrates this approach. Furthermore, each of the crash and conviction subgroups were examined in terms of the following relevant characteristics or descriptors:*

Demographic:

Sex, Age, Race, Occupation, Marital Status

Medical:

Number of Alcoholism Admissions, Number of Trauma Admissions, Admission Rate for All Causes

Deviancy:

Number of Neurosis/Mental Illness Admissions, Suicide, State Hospital Patients, Incarceration, Family Problems, Drunkenness Convictions Not Related to Driving, Other Criminal Convictions

The data in this section are presented in the form of contingency tables. The "expected" number was derived from the marginal distributions and is, in each case, presented in parentheses. The classical Chi square test of significance is used to test the hypothesis that the observed data are independent of the classification variables in question. A high value for the statistic implies that the observed data are not independent (and therefore dependent) on the classification variables. The significance level, Chi square value, and degrees of freedom are recorded for each table.

2.3.1.2 <u>Analysis of Crash Subgroups: Demographic descriptors relating to crashes, race, age, and occupation are significant at the 0.01 level.</u> (Tables 2-1 through 2-3)

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*Refer to Sections 2.2.3.1-2.2.3.3

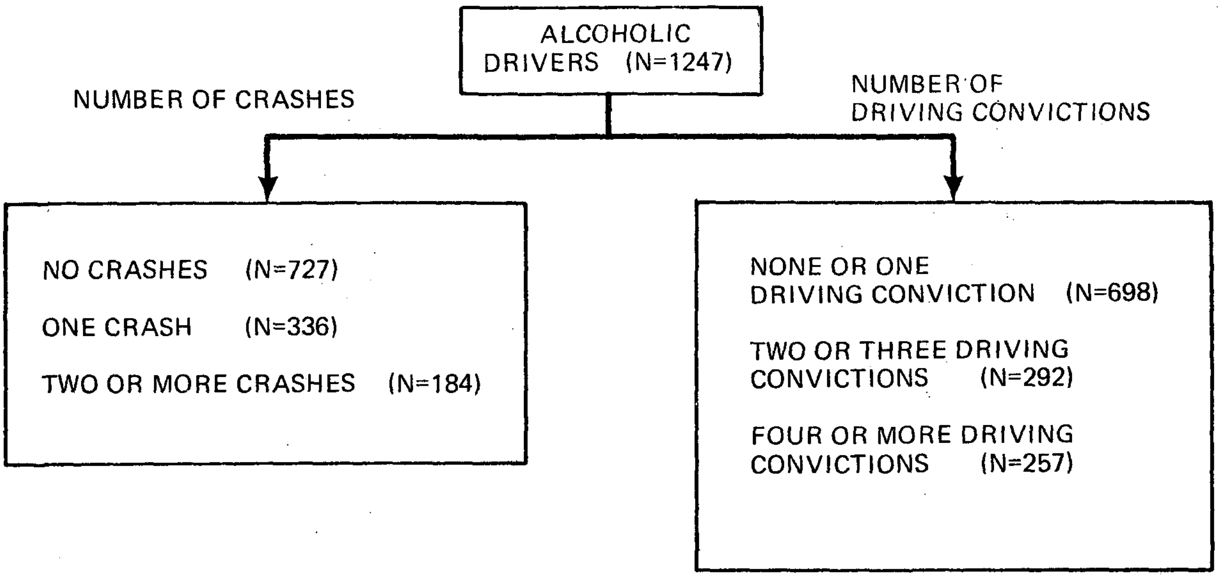

Figure 2.2. Procedure for analysis of subgroups.

Blacks were greatly over-represented in the two-or-more-crashes category (see Table 2-1). Of particular interest, however, is the observation that when race is broken down by age groups it is not significantly related to crashes at the 0.05 level. In other words, the relationship between race and crashes may simply be due to the fact that each is an effect of a third factor, age.

Two age groups, 20-25 years and 75 years and older, were omitted from a Chi square analysis because of lack of sufficient cases in each of the cells. Of the remaining groups, the two younger age groups (26-35 years and 36-45 years) contributed most significantly to the single-crash and the two-or-more-crashes categories, while the groups 46 years and older were more typically represented in the zero-crash category (see Table 2-2).

Of the occupational categories, semi-skilled and unskilled, part-time and unemployed workers, as well as retirees were over-represented in the zero-crash category; thus they appear to contribute least to crash rates. In contrast, skilled manual employees are over-represented in both the single-crash and the two-or-more-crashes categories, thus appearing more crash-prone. (See Table 2-3.)

TABLE 2-1. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY RACE

Number of Crashes	White	Black
0	659[a] (648)[b]	68 (79)
1	299 (299)	37 (37)
2+	153 (164)	31 (20)

Chi Square value: 8.493

d.f. : 2

Significance level: 0.0143

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[a]Observed

[b]Expected

[c]Degree of freedom

TABLE 2-2. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY AGE

Number of Crashes	Age Groups (Years)				
	26-35	36-45	46-55	56-65	66-75
0	54 (77)	176 (204)	266 (251)	181 (151)	43 (37)
1	48 (36)	109 (95)	103 (117)	59 (70)	15 (17)
2+	30 (20)	65 (52)	63 (64)	19 (38)	6 (10)

Chi Square value: 48.483

d.f.: 8

Significance level: <0.0001

It is an interesting feature of this analysis of demographic descriptors that no statistically significant difference (at the 0.05 significance level) was found in the distribution of male and female alcoholics with respect to number of crashes. (See Table 2-4.) We would expect a greater difference between the sexes because of the tendency of women to drive under less hazardous conditions than men, i.e., women generally have lower "exposure proneness."

Of the medical descriptors relating to crashes, trauma admissions and admission rate for all causes are significant at the 0.01 level and the 0.05 level, respectively (Tables 2-5, 2-6).

Those people with one or more trauma admissions are described by a higher number of crashes (single-crash and two-or-more-crashes categories) than those people with no admissions for trauma who typify the zero-crash category.

The data also demonstrate (Table 2-6) that the more frequent the hospital admissions for all causes, the higher the number of crashes. Those people with more than one hospital admission every three years are over-represented in the two-or-more-crashes category, in contrast to those people with fewer than one hospital admission every three years who typify the zero-crash category.

Of the deviancy descriptors relating to crashes, only two--family problems and drunkenness convictions not related to driving--are significant at the 0.05 and 0.01 level, respectively (Tables 2-7, 2-8). People having family problems contribute significantly to the single- and two-or-more-crashes categories, while those individuals without family problems typify the zero-crash category.

Table 2-8 demonstrates the relationship between drunkenness convictions not related to driving and number of crashes. It appears that the more drunkenness convictions (two or more), the more likely an individual will be involved in one or more crashes. Conversely, the fewer the drunkenness convictions (zero or one), the more likely an individual will be under-represented in categories for one or more crashes.

TABLE 2-3. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY OCCUPATION*

Number of Crashes	Occupational Groups				
	1	2	3	4	5 and 6
0	59 (58)	46 (50)	343 (372)	127 (108)	141 (129)
1	30 (27)	23 (23)	188 (172)	36 (50)	54 (60)
2+	10 (15)	16 (13)	107 (95)	22 (27)	27 (33)

Chi Square value: 19.491

d.f.: 8

Significance level: 0.0124

*Refer to Appendix J for occupational codes

TABLE 2-4. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY SEX

Number of Crashes	Male	Female
0	633 (646)	94 (81)
1	307 (299)	29 (38)
2+	168 (164)	16 (21)

Chi Square value: 5.597

d.f.: 2

Significance level: 0.0609

TABLE 2-5. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY TRAUMA ADMISSIONS

Number of Crashes	Number of Admissions: 0	Number of Admissions: 1+
0	500 (465)	227 (262)
1	193 (215)	143 (121)
2+	105 (118)	79 (66)

Chi Square value: 17.311

d.f.: 2

Significance level: 0.0002

TABLE 2-6. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY ADMISSION RATE FOR ALL CAUSES

Number of Crashes	$\leq$1 admission every three years	$\geq$1 admission every three years
0	232 (218)	495 (510)
1	101 (101)	235 (236)
2+	40 (55)	144 (129)

Chi Square value: 7.253

d.f.: 2

Significance level: 0.0266

TABLE 2-7. CRASH FREQUENCY FOR HURLEY ALCOHOLICS BY FAMILY PROBLEMS

Number of Crashes	Yes	No
0	162 (182)	565 (545)
1	97 (84)	239 (252)
2+	53 (46)	131 (138)

Chi Square value: 6.960

d.f.: 2

Significance level: 0.0308

TABLE 2-8. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY DRUNKENNESS CONVICTIONS NOT RELATED TO DRIVING

	Number of Convictions		
Number of Crashes	0,1	2,3	4+
0	530 (507)	87 (98)	110 (122)
1	231 (234)	48 (45)	57 (57)
2+	108 (128)	33 (25)	43 (31)

Chi Square value: 14.341

d.f.: 4

Significance level: 0.0063

2.3.1.3 Demographic, Medical, and Behavioral Attributes Associated with High Rates of Driving Convictions, 1961-67. The objective of this portion of the analysis was to identify those attributes which are associated with problematic driving performance as represented by the number of driving convictions during the period 1961-67. The number of driving convictions is strongly related to the number of crashes (0.01 level of significance). The number of driving convictions issued for reasons other than crashes is also strongly related to number of crashes (significant at the 0.01 level). Because of these high correlations, and because we wanted to find a way to identify high-crash drivers before their crashes occur, we evaluated the relation of individual driver attributes to high rates of driving convictions. Tables 2-9 to 2-13 demonstrate that all of the specific driving convictions which we included in the total driving conviction rate--i.e., DUIL, reckless and felonious driving, speeding, driver's license offenses, and other driving convictions--are also strongly related to crashes (at the 0.01 level). In general, the higher the driving conviction rate, then the higher the crash rate.

TABLE 2-9. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY TOTAL DRIVING CONVICTIONS

Number of Crashes	Number of Driving Convictions					
	0	1	2	3	4	5+
0	313[a] (219)[b]	204 (188)	96 (106)	48 (65)	36 (58)	30 (92)
1	56 (101)	94 (87)	57 (49)	38 (30)	39 (27)	52 (42)
2+	6 (55)	25 (48)	28 (27)	25 (16)	25 (15)	75 (23)

Chi Square value: 311.397

d.f.: 10

Significance level: <0.0001

[a]Observed

[b]Expected

TABLE 2-10. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY DRIVING CONVICTIONS NOT ASSOCIATED WITH CRASHES

Number of Crashes	Number of Non-Crash Convictions 0	1	2	3	4	5+
0	314 (262)	202 (186)	97 (107)	49 (64)	36 (47)	29 (62)
1	105 (121)	78 (86)	51 (49)	36 (29)	24 (22)	42 (29)
2+	30 (66)	39 (47)	35 (27)	24 (16)	20 (12)	36 (16)

Chi Square value: 106.047

d.f.: 10

Significance level: <0.0001

TABLE 2-11. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY DUIL

Number of Crashes	Number of DUIL Convictions 0	1+
0	597 (556)	130 (171)
1	250 (257)	86 (79)
2+	106 (141)	78 (43)

Chi Square value: 49.995

d.f.: 2

Significance level: <0.0001

TABLE 2-12. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY RECKLESS/FELONIOUS CONVICTIONS

Number of Crashes	Number of R/F Convictions: 0	1+
0	681 (642)	46 (85)
1	289 (297)	47 (39)
2+	131 (163)	53 (22)

Chi Square value: 74.076

d.f.: 2

Significance level: <0.0001

TABLE 2-13. CRASH FREQUENCY OF HURLEY ALCOHOLICS BY SPEEDING

Number of Crashes	Number of Speeding Convictions: 0,1	2+
0	674 (625)	53 (102)
1	284 (289)	52 (47)
2+	114 (158)	70 (26)

Chi Square value: 115.904

d.f.: 2

Significance level: <0.0001

Demographic attributes. The following attributes were found to be significantly associated with driving convictions during the 1961-67 period: (1) sex: males tended to have a higher conviction rate; (2) race: blacks had a higher driving conviction rate than whites; (3) age: individuals 45 years and younger had a significantly higher driving conviction rate than those over 45 years of age; (4) occupation: those persons who were skilled manual employees tended to be over-represented in the highest driving conviction category; (5) marital status: those individuals who were single, separated, or divorced tended to have a higher crash rate than those who were married or widowed.

See Tables 2-14 to 2-18 for the level of significance.

TABLE 2-14. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY SEX

Number of Convictions	Male	Female
0,1	598 (620)	100 (78)
2,3	262 (260)	30 (33)
4+	248 (228)	9 (29)

Chi Square value: 22.516

d.f.: 2

Significance level: <0.0001

TABLE 2-15. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY RACE

Number of Convictions	White	Black
0,1	648 (647)	50 (52)
2,3	259 (271)	33 (22)
4+	248 (238)	9 (19)

Chi Square value: 12.275

d.f.: 2

Significance level: 0.0022

TABLE 2-16. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY AGE (YEARS)

Number of Convictions	26-35	36-45	46-55	56-65	66-75
0,1	45 (74)	153 (196)	264 (242)	178 (145)	52 (36)
2,3	36 (31)	95 (82)	97 (102)	55 (61)	8 (15)
4+	51 (27)	102 (72)	71 (89)	26 (53)	4 (13)

Chi Square value: 101.895

d.f.: 8

Significance level: <0.0001

TABLE 2-17. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY OCCUPATION

Number of Convictions	Occupational Groups*				
	1	2	3	4	5 and 6
0,1	56 (55)	49 (48)	335 (357)	112 (104)	136 (124)
2,3	25 (23)	25 (20)	144 (150)	44 (43)	50 (52)
4+	18 (20)	11 (18)	159 (131)	29 (38)	36 (46)

Chi Square value: 17.686

d.f.: 8

Significance level: 0.0237

*Refer to Appendix J for occupational code.

TABLE 2-18. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY MARITAL STATUS

Number of Convictions	Single, Separated and Divorced	Married and Widowed
0,1	240 (278)	458 (420)
2,3	142 (116)	150 (176)
4+	114 (102)	143 (155)

Chi Square value: 20.280

d.f.: 2

Significance level: <0.0001

Medical attributes. The medical characteristics which were most associated with a high rate of driving convictions during the same period, 1961-67, were as follows: (1) admission rate: the higher the rate of admission, the higher the rate of driving conviction, i.e., an admission rate higher than once every three years was over-represented in the higher driving conviction categories; (2) trauma admissions: those individuals with one or more hospital admissions for trauma were over-represented in the group with a high rate of driving convictions. The frequency of hospital admissions for alcoholism was found to be unrelated to number of driving convictions. This fact seems to suggest that, for the most part, the group therapy program did not receive many alcoholic individuals who were referred to the hospital following a traffic conviction.

See Tables 2-19 to 2-21.

TABLE 2-19. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY ALCOHOLISM ADMISSIONS

	Number of Admissions	
Number of Convictions	1	2+
0,1	313 (315)	385 (383)
2,3	134 (132)	158 (160)
4+	115 (116)	142 (141)

Chi Square value: 0.105

d.f.: 2

Significance level: 0.9489

TABLE 2-20. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY TRAUMA ADMISSIONS

Number of Convictions	Number of Admissions: 0	Number of Admissions: 1+
0,1	476 (447)	222 (251)
2,3	186 (187)	106 (105)
4+	136 (165)	121 (93)

Chi Square value: 19.039

d.f.: 2

Significance level: 0.0001

TABLE 2-21. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY ADMISSION RATE FOR ALL CAUSES

Number of Convictions	≤Once Every Three Years	>Once Every Three Years
0,1	216 (209)	482 (489)
2,3	96 (87)	196 (205)
4+	61 (77)	196 (180)

Chi Square value: 6.257

d.f.: 2

Significance level: 0.0438

Behavioral attributes. The behavioral deviancy characteristics which were related to high rates of driving convictions 1961-67 are as follows: (1) incarceration: those individuals who, at any time in their lives were sentenced and served time in prison, were over-involved in driving convictions; (2) drunkenness convictions not related to driving: the more a person was convicted of drunkenness, the higher the rate of driving convictions; (3) criminal convictions other than criminal driving convictions: the more criminal convictions, the higher the rate of driving convictions. Of the 1247 drivers, 17.8% had at least one criminal conviction during the 1961-67 period; 34.6% had at least one criminal conviction in their lifetime.

See Tables 2-22 to 2-24.

TABLE 2-22. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY INCARCERATION

Number of Convictions	Yes	No
0,1	46 (52)	652 (647)
2,3	15 (22)	277 (271)
4+	31 (19)	226 (238)

Chi Square value: 11.032

d.f.: 2

Significance level: 0.0040

TABLE 2-23. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY DRUNKENNESS CONVICTIONS NOT RELATED TO DRIVING

Number of Convictions	Number of Crashes 0,1	2,3	4+
0,1	542 (486)	73 (94)	83 (118)
2,3	193 (204)	44 (39)	55 (49)
4+	134 (179)	51 (35)	72 (43)

Chi Square value: 61.152

d.f.: 4

Significance level: <0.0001

TABLE 2-24. DRIVING CONVICTION FREQUENCY OF HURLEY ALCOHOLICS BY OTHER CRIMINAL CONVICTIONS

Number of Convictions	Number of Crashes 0,1	2,3	4+
0,1	578 (542)	62 (78)	58 (77)
2,3	229 (227)	32 (33)	31 (32)
4+	162 (200)	46 (29)	49 (28)

Chi Square value: 42.811

d.f.: 4

Significance level: <0.0001

2.3.2 MULTIVARIATE ANALYSIS. The Automatic Interaction Detector (AID) was used to determine which sets of factors were descriptive of alcoholic drivers having records of motor vehicle crashes during the period January 1, 1961 through June 30, 1967 and having records of driving convictions during the same period. The analysis includes driver record data for only the above period. The descriptor factors* which were candidates are listed below:

1. Demographic
    a. sex
    b. race
    c. religion
    d. age
    e. marital status
    f. occupation
2. Medical and group therapy
    a. total days in therapy
    b. number of admissions for trauma
    c. number of admissions for alcoholism
    d. mean group therapy score
    e. rate of hospital admissions
3. Deviancy
    a. number of admissions for neurosis and mental illness
    b. suicide
    c. state hospital
    d. incarceration
    e. drunkenness convictions not related to driving (ever)
    f. other criminal convictions (ever)
    g. family problems
4. Specific driving convictions**
    a. total DUIL (1961-1967)
    b. total reckless, felonious (1961-1967)
    c. total speeding (1961-1967)
    d. total driver's license convictions (1961-1967)
    e. total other driving convictions (1961-1967)
5. Total driving convictions not related to crashes

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*Refer to Sections 2.2.3.1 - 2.2.3.4

**This category of driving convictions is 83% independent of crashes.

Figures 2.3 to 2.12 are AID-generated representations of the data structure. In a total sample of 1,247 drivers, the average number of crashes per driver is 0.65; the average number of driving convictions per driver is 2.04. However, it does appear that there are differences in crashes as well as driving convictions for various subgroups of this total population.

The most significant demographic factor relating to crashes is age. (Fig. 2.3) As shown, the total sample of 1,247 drivers having an average of 0.65 crashes per driver, was divided into:

A. A group of 486 drivers between 20-45 years of age having an average of 0.84 crashes per driver, a value 1.5 times greater than group (B).

B. A group of 761 drivers 46 years of age and older with an average of 0.53 crashes per driver.

The further splitting of group (A) indicates the interaction between this younger age group and the factor of occupation; there is a tendency for most of this group to fall into the lower socio-economic categories.

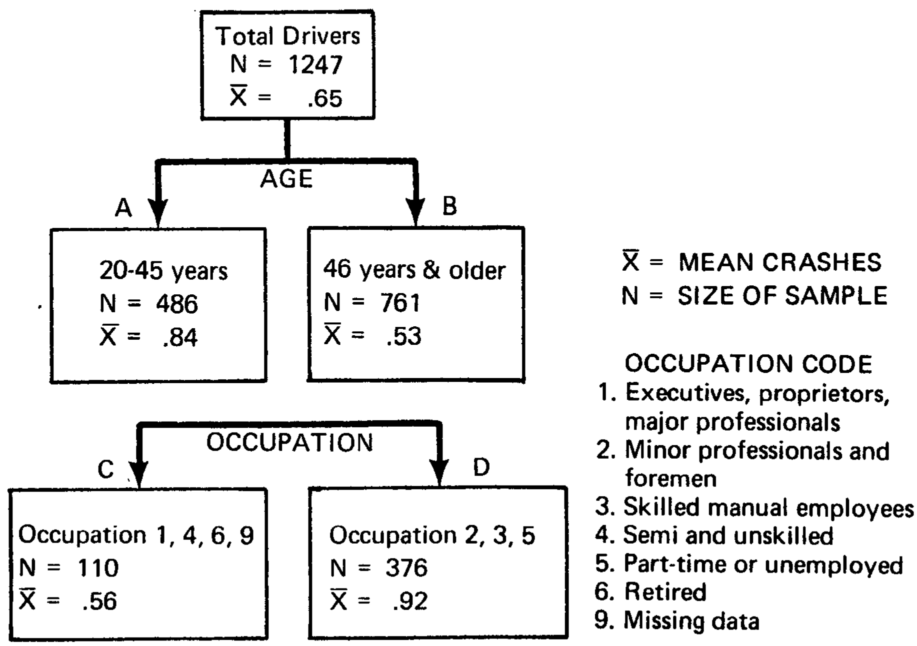

Figure 2.3. Association between demographic characteristics* and crashes for all alcoholic drivers (1961-1967).

* See page 124 for all demographic characteristics considered.

Age again is the most significant factor found to relate to driving convictions. As shown in Fig. 2.4, for the age group 20-45 years (group A) the average number of convictions per driver is 2.89, a value which is 1.3 times higher than that for the age group 46 years and older (group B), which has an average number of 1.50 driving convictions per driver.

Further study of Fig. 2.4 reveals that most of the splitting occurs from the high conviction group (A) indicating a definite interaction between convictions and other factors such as sex, race, and age. For example:

1. In group (A), the high conviction group, males receive almost 3 times as many convictions ($\overline{Y}$ = 3.10) as females ($\overline{Y}$ = 1.33).
2. Furthermore, of this high-conviction group of males, the mean rate of convictions for blacks ($\overline{Y}$ = 4.51) is almost twice the rate for whites ($\overline{Y}$ = 2.84).
3. Driving convictions for blacks exceed that for whites even when the age bracket is further narrowed. In the 20-35-year-old category (group I), the conviction rate for blacks nearly doubles that of whites. ($\overline{Y}$ = 6.17 black, $\overline{Y}$ = 3.55 white)
4. Race also appears to be a significant factor in group (B), the lower conviction group; blacks have an average of 2.71 convictions per driver, a value 1.9 times greater than a $\overline{Y}$ of 1.40 for whites.

From this analysis of demographic variables, it appears that while the factor of race is not an influential element in relation to crashes, it is highly associated with driving convictions. A possible explanation may be differential rates of apprehension and/or police surveillance of blacks, coupled with differential treatment by the courts. Another possible explanation is that blacks may be geographically concentrated in the inner city areas where police surveillance is automatically heavier. Furthermore, socio-economic factors may contribute to the under-reporting of crashes by blacks. The cost of collision insurance is prohibitive to many blacks who therefore may lack motivation or consider it unnecessary to call police or to file an accident report.

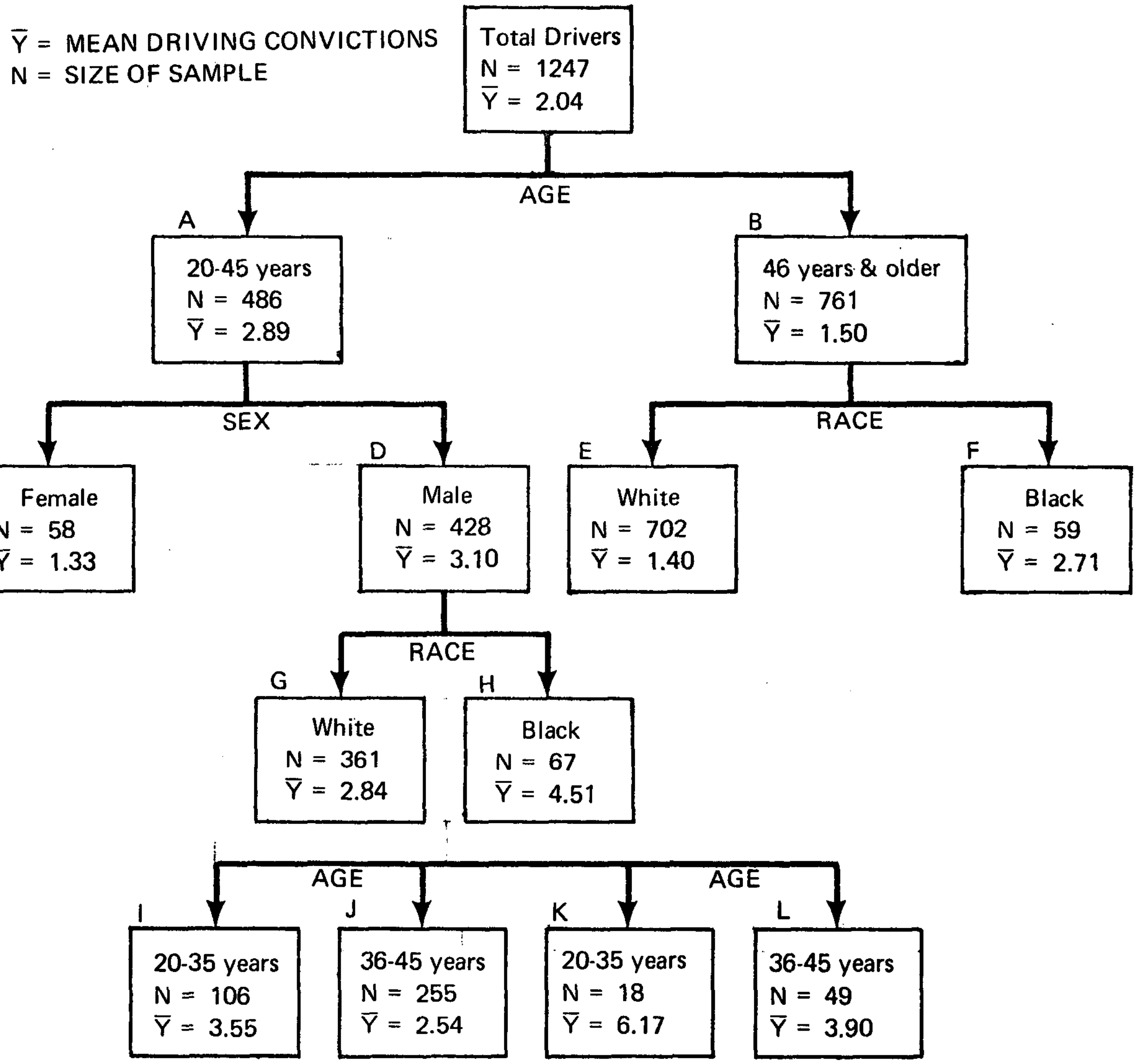

Figure 2.4. Association between demographic characteristics* and driving convictions** for all alcoholic drivers (1961-1967).

* See page 124 for all demographic characteristics considered.
** This category of driving convictions is 83% independent of crashes.

The most significant medical and group therapy factor found to relate to crashes is the number of admissions for trauma. Fig. 2.5 shows the effect of even one admission on the prediction* of crashes. However, there is a possibility that the category of trauma is biased as a predictor variable because injuries diagnosed as trauma may have been received as a result of the crash.

The number of admissions for trauma is also the strongest descriptor of the medical and group therapy factor relating to driving convictions. Fig. 2.6 shows total drivers divided into two groups:

A. Those drivers having 0 or 1 admission for trauma with an average number of 1.87 convictions per driver; and

B. Those drivers having 2 to 21 admissions for trauma with an average of 2.82 convictions per driver, a value 1.5 times that of group (A) above.

As the most significant splitting factor relating to driving convictions, trauma may reveal tendencies either for carelessness towards one's self and others, or for a subcultural sanctioning of settling differences by physical aggressiveness and the use of guns and knives. The greater numbers of those hospitalized for trauma were black; the average number of admissions for trauma for blacks was 1.38 as compared to 0.069 for whites. (See Hospital Admissions for Trauma, Appendix K, Table K-27.)

Figure 2.7 reveals that the most significant deviancy factor related to crashes appears to be drunkenness convictions not related to driving. Such convictions would include "drunk and disorderly conduct" or "drunk in a public place." A higher number of convictions is coupled with a higher rate of crashes. ($\overline{X} = 0.81$ compared to $\overline{X} = 0.58$). It is of interest to note that the split into admissions for neurosis and mental illness comes from the low conviction group which had zero or one conviction. We might conclude from Fig. 2.7 that group (B), the high conviction group, (identified by 2 to 37 convictions) is a deviant group which publicly "acts out" behavior, while group (A), the lower conviction

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*The word "predict" or "predictor" is used in a non-global sense in this study; it refers only to the context of our data.

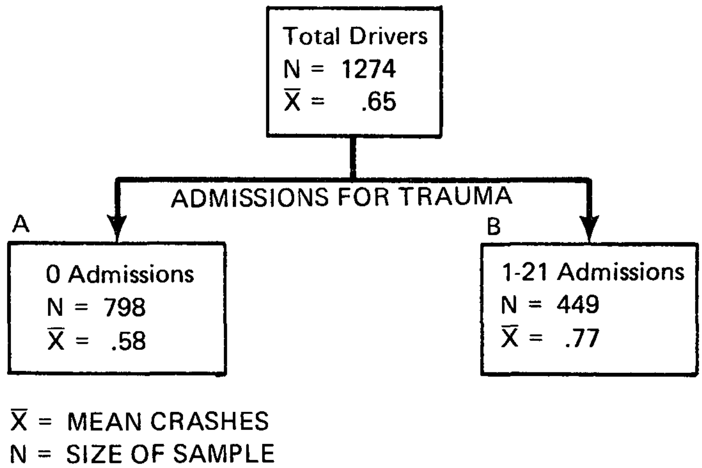


Figure 2.5. Association between medical and group therapy,* and crashes for all alcoholic drivers (1961-1967).

* See page 124 for all medical and group therapy characteristics considered.

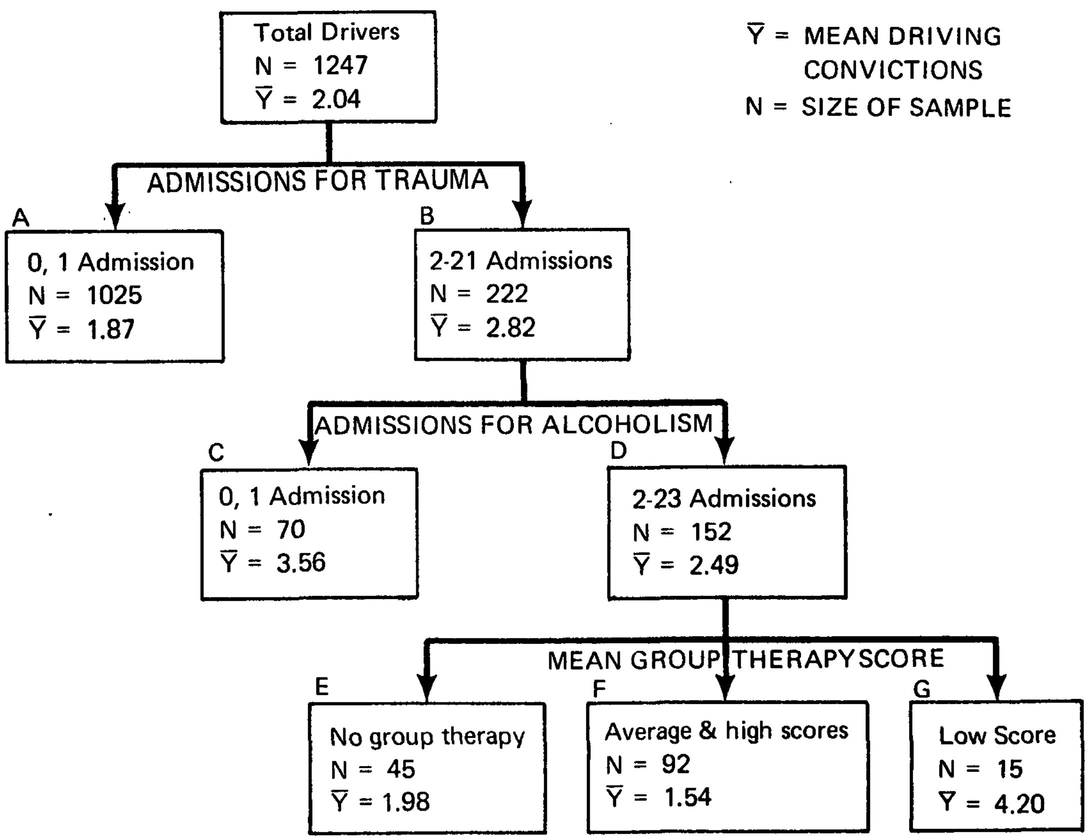


Figure 2.6. Association between medical and group therapy,* and driving convictions for all alcoholic drivers (1961-1967).

* See page 124 for all medical and group therapy characteristics considered.

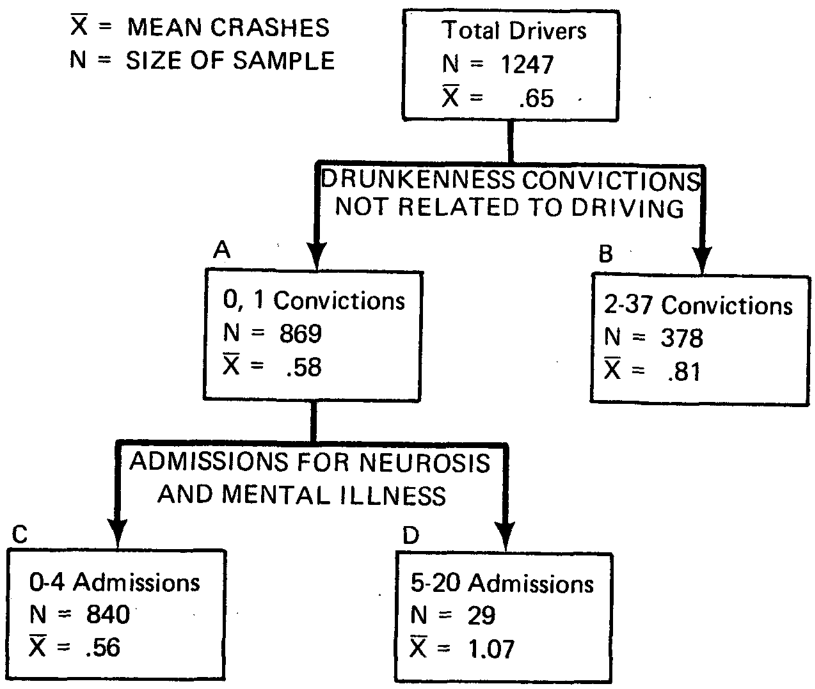


Figure 2.7. Association between deviancy* and crashes for all alcoholic drivers (1961-1967).

* See Page 124 for all deviancy characteristics considered.

group, with interacting factors of neurosis and mental illness, may tend to internalize problems or drink more privately.

However, the number of crashes for those having 5 to 20 admissions for neurosis and mental illness (group D) was almost double the number for those having 0 to 4 admissions. This indicates that the greater severity of neurosis and mental illness may create a similarly greater disturbance or distortion of awareness which makes people more liable to crashes.

Figure 2.8 depicts the effects of even one drunkenness conviction not related to driving or one other criminal conviction on the prediction of driving convictions. Again, the number of drunkenness convictions not related to driving is seen as the strongest deviancy factor relating to driving convictions. Group (B), which consists of persons having 2 to 36 drunkenness convictions, has an average of 2.70 driving convictions per driver. This value is 1.8 times greater than that for group (A) which consisted of alcoholics having no drunkenness convictions related to driving ($\overline{Y}$ = 1.48). In addition, group (D), composed of alcoholics having

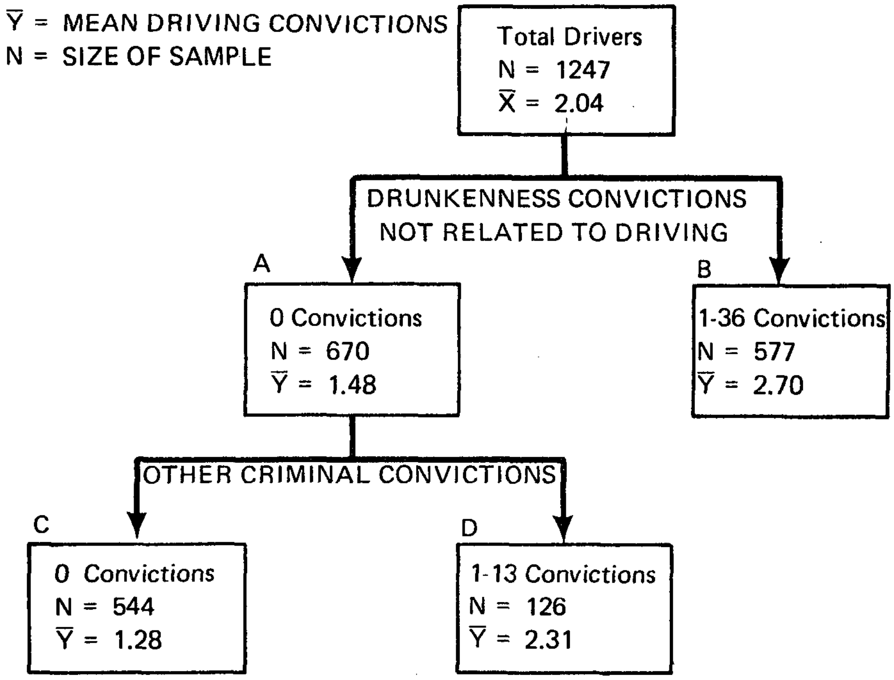


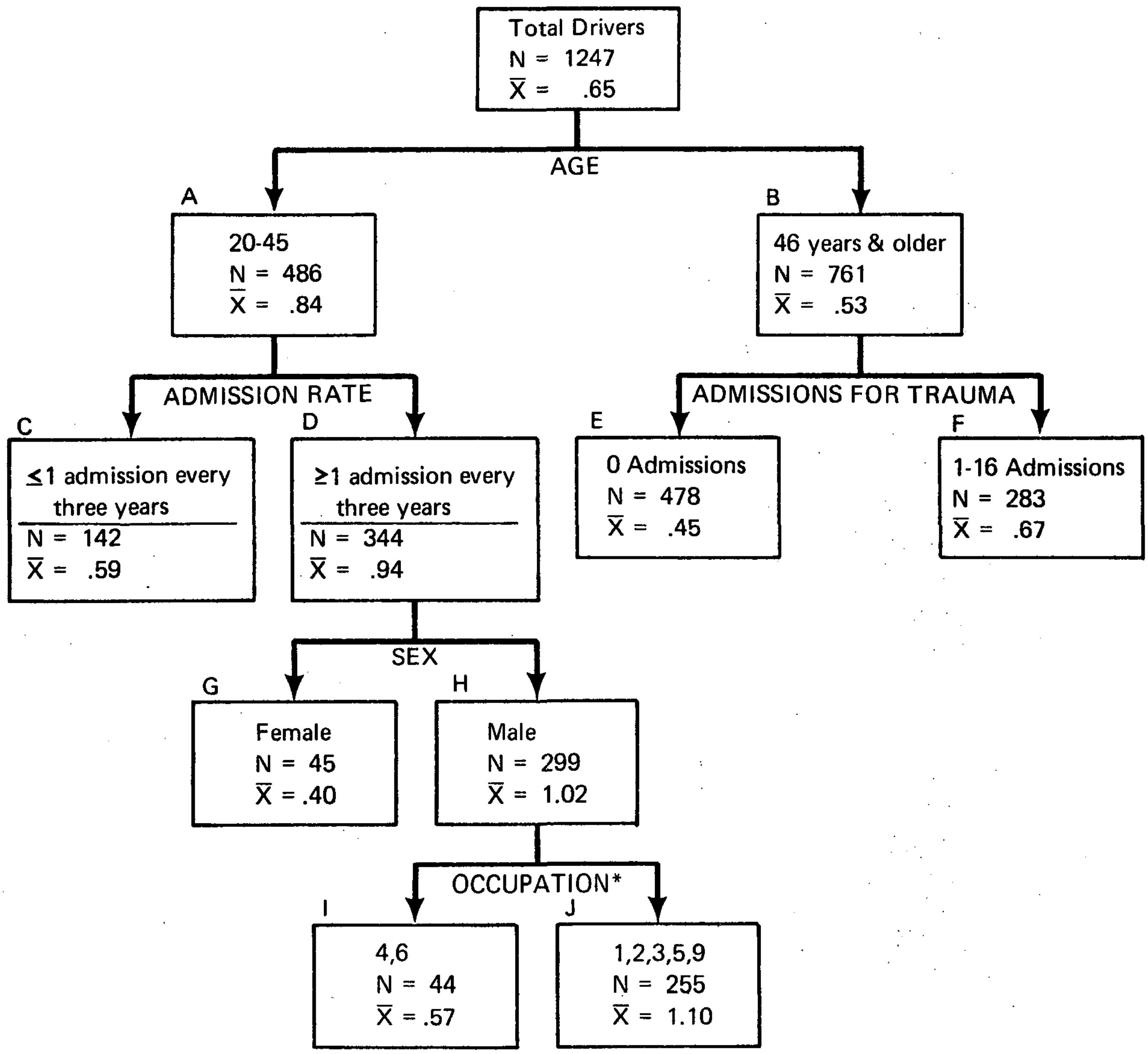
Figure 2.8. Association between deviancy* and driving convictions for all alcoholic drivers (1961-1967)

* See page 124 for all deviancy characteristics considered.

no drunkenness convictions but 1 to 13 other criminal convictions, has a mean number of driving convictions almost twice as high as group (C), which consists of alcoholics with neither drunkenness convictions nor other criminal convictions.

It might be reasonable to hypothesize that a liability toward getting driving convictions is part of a total pattern or configuration of deviancy which involves a liability toward getting convictions in other areas. This pattern of deviancy may stem from a characteristic "acting out" behavior and lack of self-control, coupled with a disregard for authority demonstrated by disruption and violation of legal and social norms.

Figure 2.9 depicts the combination of group factors (demographic, medical or group therapy, deviancy) as they relate to crashes. The most influential factor this time appears to be age, divided again into the same two groups as in Figure 2.3:



$\overline{X}$ = MEAN CRASHES
N = SIZE OF SAMPLE
*See Figure 1

Figure 2.9. Association between the combined demographic, medical and group therapy, and deviancy characteristics* and the crashes for all alcoholic drivers (1961-1967).

* See page 124 for all demographic, medical-group therapy, and deviancy characteristics considered.

A. A group of 486 drivers 20-45 years of age, with a mean crash rate of 0.84, and

B. A group of 761 drivers 46 years or older with a mean crash rate of 0.53.

Most of the splitting occurred in group (A), the younger age group, indicating how age and other factors, such as admission rate, sex, and occupation, interacted in explaining crashes. Those 20-45-year-old males with more than one hospital admission every three years, and executive, professional, managerial or skilled manual occupations, have a higher number of crashes per driver than 20-45-year-old females with one or fewer hospital admissions every three years, and either retired or semi- and unskilled manual occupations.

Figure 2.10 depicts the combination of group factors (demographic, medical and group therapy, deviancy) associated with driving convictions. From this analysis it appears that age is the most influential factor relating to driving convictions. The younger age group (20-45 years) had an average of 2.89 driving convictions per driver, a value 1.9 higher than that for the age group 46 years and older ($\overline{Y} = 1.50$).

The younger age group, group (A), was further split by deviancy factors and again by age. Figure 2.10 shows the direct effect of one or more criminal convictions not associated with drinking on the rate of driving convictions. In addition, a group (H), identified by 3 to 23 drunkenness convictions not related to driving, splits off from that group which has no other criminal convictions. The average number of crashes per driver in group (H) (4.17) is more than twice as high as that for group (G) which was identified by 0, 1, or 2 drunkenness convictions not related to driving.

The older age group, group (B), is further split by deviancy factors and race. The effect of even one drunkenness conviction not related to driving as an explanation of driving convictions is depicted in Figure 2.10. Group (F), which had 1 to 37 drunkenness convictions has an average of 2.10 driving convictions per driver, a value twice as high as that for group (E) which was composed of alcoholics having no convictions ($\overline{Y} = 1.05$).

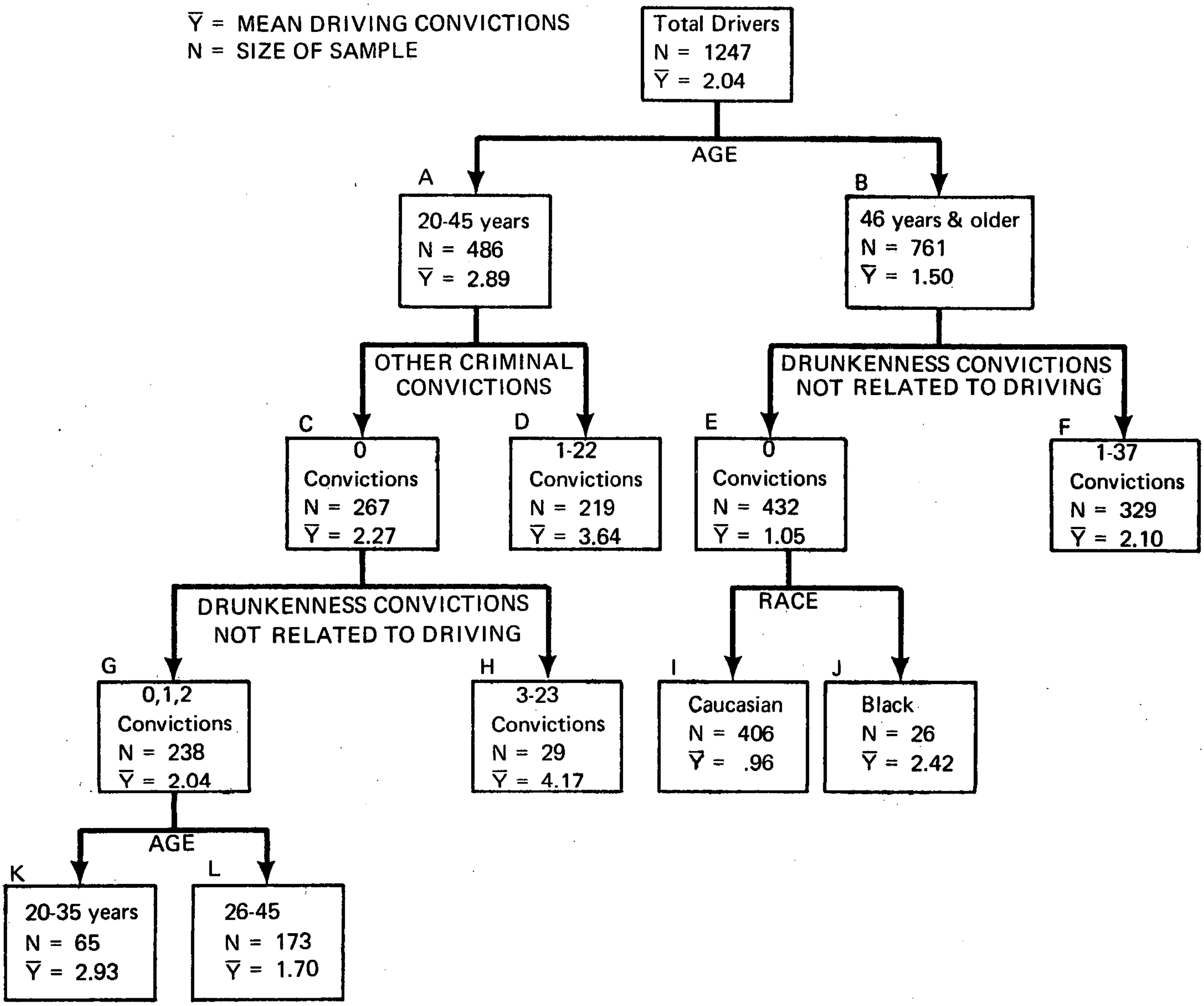


Figure 2.10. Association between the combined demographic, medical and group therapy, and deviancy characteristics*, and the driving convictions for all alcoholic drivers (1961-1967).

* See page 124 for all demographic, medical-group therapy, and deviancy characteristics considered.

Of particular interest is further evidence of the factor of race in relation to driving convictions. Blacks, even in the older age group having no drunkenness convictions, show an average number of driving convictions 2.5 times higher ($\overline{Y}$ = 2.42) than that of whites in the same category ($\overline{Y}$ = 0.96).

Figure 2.11 displays the association between specific driving convictions and crashes. The most pertinent factor found to relate to crashes is speeding convictions. As shown, the total sample of drivers is divided into:

A. A group of 814 drivers with no speeding convictions with an average of 0.39 crashes per driver, and

B. A group of 433 drivers with 1 to 12 speeding convictions with an average of 1.13 crashes per driver, a value which is 2.9 times higher than that of the first group.

These two groups contrast further on the next split. Group (A) (identified by fewer crashes and no speeding convictions) splits on other driving convictions, a less serious category than DUIL, which is the comparable level split for group (B) (identified by more crashes, and 1 to 12 speeding convictions). Group (F) containing 100 people with 1 to 4 DUIL convictions has exactly twice as many crashes per driver than its corresponding group (E) containing alcoholics having no DUIL convictions. However, looking at the many splits coming from this "0 DUIL" group suggests that these people may have been charged with other or less serious offenses. At any rate, the structure of the data depicts an interaction of other factors (other driving convictions, reckless and felonious driving, speeding) with this group of 333 people having no DUIL convictions. The data also suggest that the higher number of convictions in these interacting factor categories is associated with a greater number of crashes per driver. This is true for the entire display of the data: those groups containing the highest number of convictions show a proportionately higher number of crashes per driver. Group (L) which has the greatest number of crashes contains alcoholics with 2 to 12 speeding convictions and 1 to 4 DUIL convictions (N = 53, $\overline{X}$ = 2.21). In contrast, group (C) which has the least number of crashes contains alcoholics with no speeding convictions and no other driving convictions (N = 544, $\overline{X}$ = 0.26).

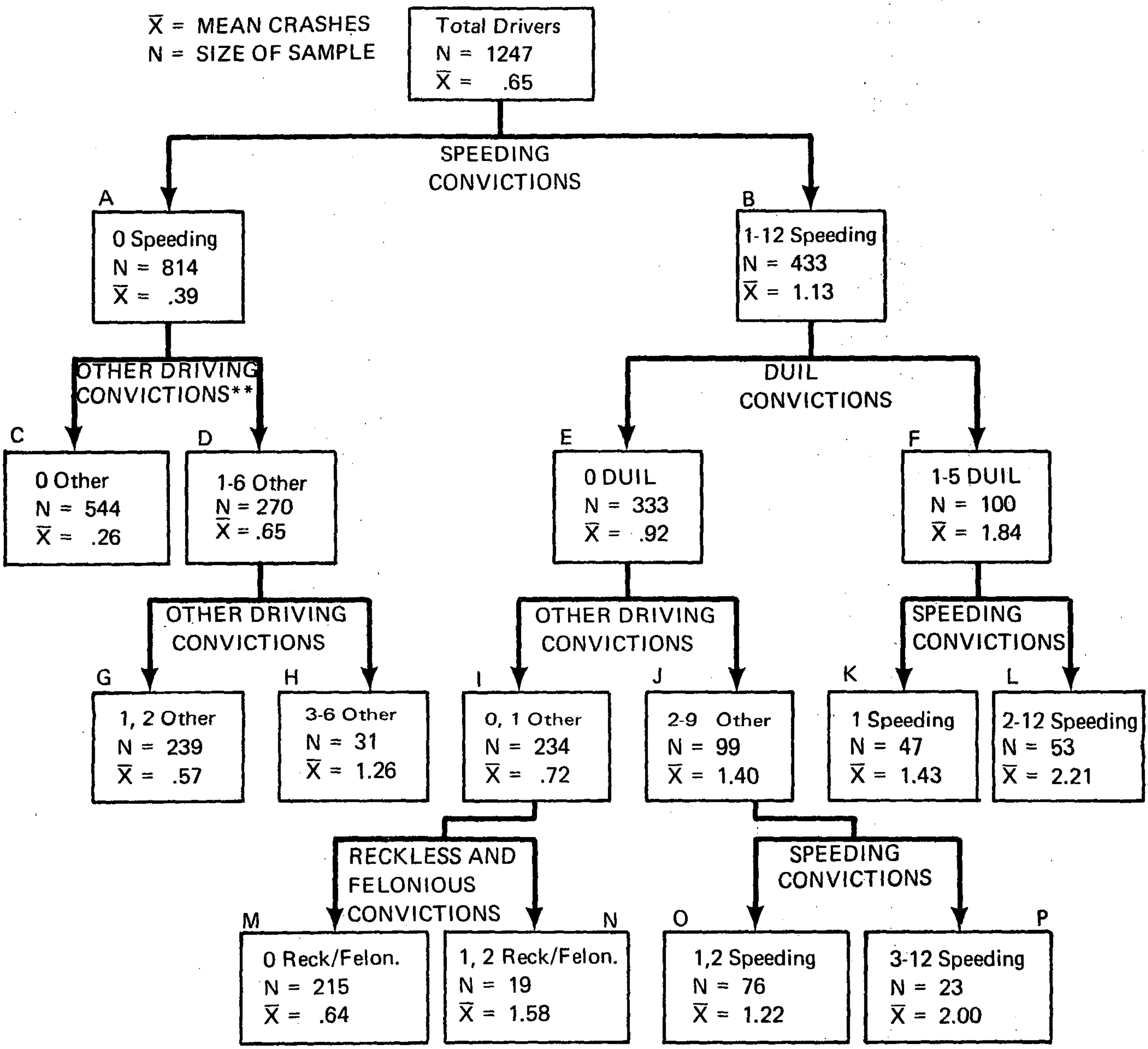


Figure 2.11. Association between specific driving convictions* and crashes for all alcoholic drivers (1961-1967).

* 83% of these convictions are independent of crashes. See page 124 for a list of all driving convictions considered.

** Other Driving Convictions are all of the driving convictions other than DUIL, Reckless and Felonious, Speeding, and Driver's License convictions.

Figure 2.12 combines those AID-selected characteristics that are most highly correlated with crashes. Variables for this analysis included the most significant descriptors resulting from the factors previously considered (Figure 2.9); these variables are: age, admission rate, admissions for trauma, sex, and occupation. In addition, the variable of driving convictions not associated with crashes was added since our data suggest (Fig. 2.11) that a higher number of driving convictions is associated with a higher number of crashes.

We find three groups of high-crash alcoholic drivers as a result of this analysis:

1. Those drivers who have more than eight convictions not related to crashes; group (F).
2. Those drivers who have 2 to 7 convictions not related to crashes, who have more than one hospital admission every three years, and whose occupation can be denoted by occupational codes 1, 2, 3, and 6; group (L).
3. Those drivers who have 0 to 1 conviction not related to crashes, are under 46 years of age and have one or more trauma admissions; group (H).

These groups are further described in the section following.

2.3.2.1 Comparison of Critical Driving Groups Selected by AID with Alcoholic Drivers Having No Crashes and Convictions. In order to highlight characteristics of the alcoholic problem driver, we found it useful to compare groups of drivers having high numbers of crashes and driving convictions with a group having no crashes or driving convictions. All of the tables in Appendix K characterize these groups of drivers in terms of demographic, medical and group therapy, and deviancy variables.* The groups of alcoholics studied are as follows:

1. A group of 313 alcoholic drivers who are licensed and without driving convictions or crashes.

*Refer to Sections 2.2.3.1 - 2.2.3.3 for further explanation of these variables.

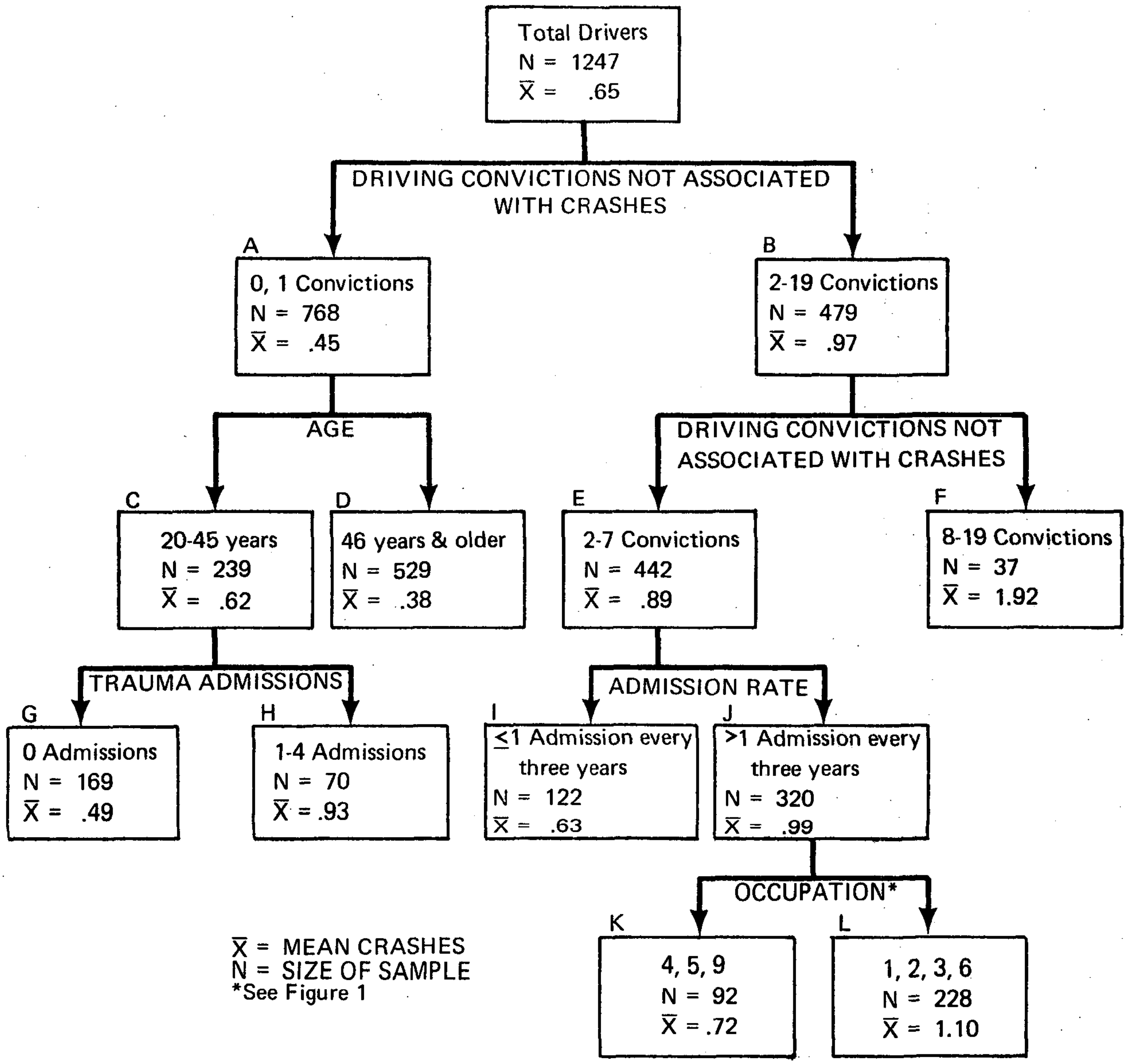


Figure 2.12. Characteristic descriptors associated with crashes for all alcoholic drivers (1961-1967).

2. A group of 335 alcoholic drivers with high crash rates. Included in this group are three high-crash groups (F, H, L) shown in Figure 2.12 of the AID analysis:
   a. A group of 37 alcoholic drivers who have 8 to 19 driving convictions independent of crashes and whose mean crash rate is 1.92.
   b. A group of 228 alcoholic drivers identified as having 2 to 7 driving convictions independent of crashes, more than one hospital admission for all causes every three years, occupations denoted by 1, 2, 3, or 6 of our occupational code*, and a mean crash rate of 1.10.
   c. A group of 70 alcoholic drivers identified by 0 or 1 driving convictions independent of crashes, are 20 to 45 years of age, have 1 to 4 hospital admissions for trauma, and a mean crash rate of 0.93.
3. A group of 76 alcoholic drivers with high crash and conviction rates. Included in this group are two groups (L, P) shown in Figure 2.11 of the AID analysis:
   a. A group of 53 alcoholic drivers with 2 to 12 speeding convictions, 1 to 4 DUIL convictions, and a mean crash rate of 2.21.
   b. A group of 23 alcoholic drivers with 3 to 12 speeding convictions, 2 to 19 other driving convictions, 0 DUIL convictions, and a mean crash rate of 2.00.

Group (1) has a relatively higher proportion of females than the other two groups. Since women normally move in safer environments and follow living styles with low individual exposure to hazards (Adams 1970), we may in part explain the absence of crashes and convictions in group (1) by lower "exposure proneness" of women. In addition, since these women are alcoholics, it may be

*Refer to Appendix J for occupational code.

reasonable to hypothesize that either they drink more privately and drive less often after drinking or are more circumspect in their driving behavior after drinking.

Group (1) also exhibits a relatively lower proportion of blacks in comparison with the other two groups, a factor consistent with our findings that suggest an over-representation of blacks in obtaining driving convictions. Moreover, most of the drivers in this group without crashes or convictions are between 46 and 55 years of age in contrast to the other two groups who average between 36 and 45 years of age.

While the greater proportion of those in all three groups are married, more people in group (2) are separated and divorced than in any other group. Furthermore, this group of high-crash drivers also has a higher percentage of suicides. While all three groups present similar mean rates of admission for alcoholism, admissions for trauma in group (2) are more than twice those in group (1), and 1.3 times that of group (3). It is of interest to note that this same group of high-crash drivers has a mean rate of drunkenness convictions not related to driving 2.5 times higher than the mean rate for group (1). Likewise, the mean rate for other criminal convictions in group (2) is the highest of all three groups. The Wayne County Fatality Study* and the Carlson and Klein (1970) study suggest a relationship between driving deviancy and other non-driving deviancy; these data tend to support these findings.

Group (3) has a relatively higher proportion of state hospital patients, prisoners, and admissions for neurosis and mental illness than the other two groups. This group of drivers with a high rate of conviction and crashes also contains the highest proportion of blacks and the greatest incidence of family problems.

2.3.3 EVALUATION OF GROUP THERAPY AS A DETERRENT TO ALCOHOLIC DRIVER INVOLVEMENT IN CRASHES. The evaluation of group therapy as a deterrent to crashes (1961-67) should be considered in light of the following five observations: (1) The objective of this alcoholic group therapy program was to help the individual

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*See Section I of this report.

develop sufficient behavioral control to abstain from drinking beverage alcohol, and not to develop control of his driving behavior. (2) The relatively rare crash event may not be sufficiently sensitive, as a dependent variable, to allow us to differentiate between the rates of those who attended group therapy, and those alcoholics who did not attend. (3) The relative lateness (age 49) of identification and referral to group therapy in the life of the alcoholic driver presented difficulties--first, the younger (25-35 years) alcoholics have the higher rates of crash, and it is invalid to attribute the expected decrease in crash rate to the effect of group therapy alone; secondly, the lateness of the occurrence of group therapy did not provide sufficient time after therapy for the development of a meaningful difference in the crash rate. (4) The individuals who were referred to group therapy seemed for the most part to be physically deteriorated alcoholic patients in advanced stages of the syndrome. This was reflected in the fact that several other hospital admissions seemed to cluster around each group therapy admission, and therefore a reduction of driving would be expected during this time period*. Finally: (5) The more distressed alcoholic individuals seemed to be those who were referred to the hospital group therapy program. This is based on the fact that there were significantly higher rates of individuals with suicide attempts, mental illness, and family problems in the group that the physicians referred to group therapy. In addition, the group referred had a higher rate of state hospital admissions than those individuals not referred to therapy. The literature suggests that these individuals might have a higher crash and driver conviction rate (Selzer and Ehrlich 1969).

Considering these confounding factors, we cannot determine whether group therapy caused the alcoholic to be sober or deterred him from driving while inebriated. Nevertheless, if the literature is correct, one would expect that those alcoholic individuals who were most disturbed and attended group therapy would have a worse driving record than those who were not as socially deviant and also did not attend. However, this was not the case. The driving performance of those alcoholics who attended group therapy was not significantly different from those who did not attend, but were diagnosed alcoholic by a physician. Table 2-25 compares the means of the crash and driver conviction record of those who had therapy and those alcoholics who did not have therapy.

*See Analysis of Life Patterns of Alcoholics, Section 2.3.4.

TABLE 2-25. CRASH AND DRIVING CONVICTION YEARLY RATE (1961-67) BY GROUP THERAPY PARTICIPATION

Sample	Crashes	Total Driving Convictions	Driving Convictions Not Associated with Crashes	DUIL	Reckless & Felonious	Speeding	Driver's License	Other*
Group Therapy (N=834)	0.69	2.10	1.71	0.34	0.13	0.68	0.19	0.76
No Group Therapy (N=413)	0.56	1.92	1.65	0.34	0.13	0.55	0.25	0.66

*Offenses under "Other" are listed in Appendix J.

Even when we evaluated the 1120 available updated (1968-1969) driver records for those who attended and those who did not, there was no significant difference (see Table 2-26).

TABLE 2-26. CRASH AND DRIVING CONVICTION YEARLY RATE (1968-1969) BY GROUP THERAPY PARTICIPATION

Sample	Crashes	Driving Convictions	DUIL	Speeding	Reckless/ Felonious	Other Driving Offenses
Group Therapy (N=763)	0.15	0.43	0.04	0.14	0.01	0.16
No Group Therapy (N=357)	0.15	0.42	0.02	0.16	0.01	0.16

The data suggested that there was little significant difference between the driving behavior descriptors or the characteristics of the alcoholic group that was treated, and the group that was untreated. Consequently, we felt that perhaps by analyzing the self-selection factor of those who participated longer in group therapy, we might uncover differences in driving behavior. We, therefore, hypothesized that the longer one participated in therapy, the more effective the therapy would be in changing drinking behavior and other life style behaviors. And then it was felt that this change would be displayed in a reduction of traffic crashes and offenses.

We then proceeded to divide the sample of those who attended group therapy into four groups. The groups consisted of those with three or fewer, four to six, seven to twelve, and thirteen or more days of therapy. Individuals with fewer than three days of therapy barely participated in the program. Often it is the case that patients are obstreperous and simply awake from the effects of tranquilizer drugs only to withdraw from the program. Those individuals who stayed for about a week participated to some extent in the program. For the most part, the group that participated from seven to twelve days completed a full session of didactic lectures and discussion sessions. And those who attended therapy for thirteen or more days, in effect, repeated the program either because there was a slip back to previous uncontrolled drinking, or because they simply continued to feel the need to participate in the ongoing group therapy program. We reasoned that, for the most part, had the program been effective in instilling behavioral control in the first full session, a second or third time through group therapy would have been uncalled for.

Our findings tended to corroborate the hypothesis that there was a trend for the alcoholic individuals who refused or for some reason could not complete group therapy to be those who contributed the most to the driving conviction rate.

The driving conviction rate is lower for the group that completed one full therapy session, and the crash rate remained relatively constant.

In addition, the analysis of the available updated driving records revealed similar results. Table 2-27 reflects a driving record that includes only convictions that occurred after group therapy. Table 2-28 includes all driving convictions during the six and a half years of the therapy program. It includes driving convictions that occurred both before and after therapy. This confounds any effect that group therapy would have on crash and conviction rates.

There was a consistently high crash and driving conviction rate for those who through a self-selection process declined or could not cooperate in group therapy. The group with the lowest rate included those individuals who cooperated, completed one group therapy session, and for whom one session was apparently successful.

TABLE 2-27. CRASH AND DRIVING CONVICTION YEARLY RATES (1968-1969) BY DAYS OF GROUP THERAPY ATTENDED

	Days of Group Therapy			
Group Rates	0-3 (N = 131)	4-6 (N = 137)	7-12* (N = 225)	13 (N = 270)
Crashes	0.22	0.17	0.11	0.14
Driving Convictions	0.57	0.51	0.33	0.41
DUIL	0.04	0.04	0.01	0.07
Reckless & Felonious	0.01	0.01	0.00	0.01
Speeding	0.18	0.20	0.10	0.11
Driver's License Offenses	0.08	0.07	0.05	0.06
Other Driving Offenses	0.25	0.18	0.13	0.14
Age (Years)	47.9	48.3	49.2	48.5

*One group therapy series.

TABLE 2-28. CRASH AND DRIVING CONVICTION YEARLY RATES (1961-1967) BY DAYS OF GROUP THERAPY ATTENDED

	Days of Group Therapy			
Crashes and Convictions	0-3 (N = 149)	4-6 (N = 149)	7-12* (N = 246)	≥13 (N = 290)
Crashes	0.73	0.70	0.67	0.70
Driving Convictions	2.44	2.27	1.92	1.99
DUIL	0.41	0.30	0.26	0.39
Reckless & Felonious	0.12	0.12	0.13	0.14
Speeding	0.83	0.66	0.65	0.64
Driver's License Offenses	0.16	0.36	0.17	0.13
Other Driving Offenses	0.93	0.82	0.70	0.69
Age (Years)	47.2	47.9	49.1	48.5

*One group therapy series.

For those who repeated group therapy ($\geq$13 days), the rates were slightly elevated, except in the case of driving under the influence of liquor, where the rates were higher in the group which underwent little or no therapy, and in the group that repeated group therapy. It is reasonable to expect that a successful alcoholic therapy program would show its greatest effect in the DUIL rate because the goal of the program is to bring drinking behavior under control.

It may be that the self-selection process is contributing to the high crash rate of those who withdraw early from therapy. It seems that a modification of the program would be desirable to reduce the program withdrawal rate and to reduce the crash and conviction rate for alcoholics. Clearly more research is needed in order to evaluate both the effect of group therapy and the quality of the participant's performance as deterrents to the alcoholic's crash situation.

2.3.4 ANALYSIS OF LIFE PATTERNS OF ALCOHOLICS. In this task we have conducted an initial investigation of the relation between deviant life style and alcoholism, as reflected in the variables in this data set. A major thrust of the NHSB alcohol and traffic safety program is the prevention and control of the deviant driving behavior of problem drinkers. The association between deviant driving behavior and other deviant life behavior has been established in this report and in numerous other studies by researchers such as Selzer (1969), Waller (1964), and Haddon (1962).

In addition, other parts of this report show that alcoholics are over-involved in hospital admittances, motor vehicle violations, crashes, and criminal convictions.

Since it is known that deviant events occur excessively in the life of an alcoholic, it is reasonable to question whether certain groups of alcoholics exhibit well defined and predictable life patterns over time. Specifically, certain easily measured types of deviant behavior events have been obtained from the data collected from the Hurley Hospital population. The nature of the event (e.g., traffic violation, hospitalization) and the time between events (measured in months) has been determined. Appropriate analyses have been conducted to examine sequential relationships.

2.3.4.1 Definition of Event Variables and Research Questions. The events that have been considered in this study are:

1. Traffic Violation
2. Crash
3. Crash and Violation
4. Financial Responsibility
5. Criminal Offense
6. Death
7. Hospital Admission (Normal)
8. Hospital Admission (Emergency)
9. Group Therapy Treatment

The analysis has dealt with two important questions:

1. Do particular patterns of events occur in the life of an alcoholic?

Under this question the probability of particular events following other events was examined. For example, if a subject has a traffic conviction, what is the probability that the event--a traffic conviction--will be followed by some other event (e.g., a crash). If such patterns exist, it may be possible to select points of intervention in an alcoholic's life in order to reduce crashes.

2. Does the time interval between events provide a means of predicting life behavior in terms of event types and/or subsequent time intervals?

For this question, the time in months between adjacent pairs of events was computed. We assumed that the occurrence of two events within a very "short" time interval of each other indicates more life problems than does the occurrence of two events at "long" time intervals. This leads to a hypothesis that serious life problems may have resulted in two or more events occurring within a short time period. This bunching of events can be identified by a short time interval following another short time interval. We also investigated whether or not certain event types are predictors of short time intervals (e.g., life problems).

This task is seen as an exploratory step in the study of the life pattern of alcoholics. By using the above two rather simplified research questions, we have attempted to gain some insight into the problem of predicting deviant life patterns for alcoholics. The analysis has used some fairly gross measurements of life events and the time between them. If some insight can be gained through the use of these gross measurements, a more rigorous research procedure might be developed. Thus, we view this analysis as exploratory and observational in nature.

2.3.4.2 Analytical Structure. The analysis uses as its population a group of 1,071 alcoholic drivers who have been treated at Hurley Hospital. By defining our population to include all 1,071 alcoholics, it is possible to compare probabilities and conditional probabilities for various subgroups of the population defined in terms of the occurrence of the events listed above. It should be kept in mind that all of the conclusions reached in this analysis are conditional on the defined population.

Before beginning a discussion of the analysis and results, it will be useful to define the terms and notation to be used.

Event Type: A major occurrence in the life of a subject which can be defined in terms of a public record and a particular date (month and year). The subscript "j" will be used to identify event types. As indicated previously, the event types considered are:

j = 1:	Traffic Violation	j = 5:	Criminal Offense
j = 2:	Crash	j = 6:	Death
j = 3:	Crash and Violation	j = 7:	Hospital Admission (Normal)
j = 4:	Financial Responsibility	j = 8:	Hospital Admission (Emergency)

j = 9: Group Therapy Treatment

Event Sequence Position: The event types occur in some order over the life of each subject. The date of January 1951 was arbitrarily selected as the initial or zero time for all subjects. The event types which occurred after the initial time were placed in order by their date. This order defines a series of event sequence positions. Thus, the first event type which occurred after January 1951 is in event sequence position (1) and the event sequence positions are indexed by the letter "i" and proceed from one to twenty.

Time Interval: The time in months between two successive events.

Interval Sequence Number: A number used to identify how a particular time interval relates to a particular event sequence position. The interval number is the same as the event sequence position number which precedes it. Thus, the time interval between event sequence positions (1) and (2) is defined as having its interval sequence number equal to 1. The letter "k" will be used to indicate interval sequence number.

Figure 2.13 summarizes the notation conventions.

2.3.4.3 Analysis of Sequence of Events. The objective in this section was to study the probability of specific event types following other event types. The results will be presented in terms of probabilities, conditional probabilities, and over-involvement ratios. Because the population is defined as all of the subjects, the probability of any particular event type (j) in a particular event sequence position (i) is merely equal to the number of occurrences divided by the number of subjects. The probability of the individual event types averaged over the first ten event sequence positions (i = 1 through 10) are:

Event (j)	Percent Occurrence (P_j)
1. Traffic Violation	10.7%
2. Crash	2.2%
3. Crash & Violation	1.4%
4. Financial Responsibility	3.9%
5. Criminal Offense	24.5%
6. Death	0.6%
7. Hospital Admission (Normal)	38.4%
8. Hospital Admission (Emergency)	8.1%
9. Group Therapy	12.8%

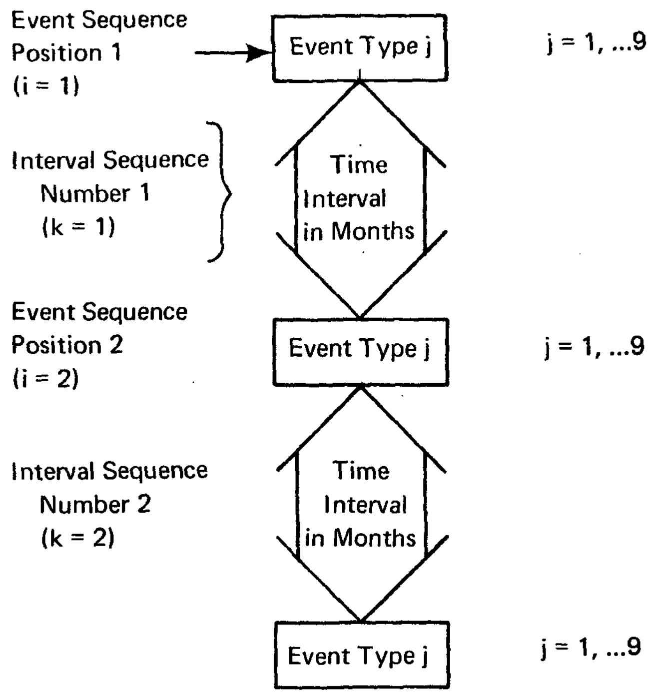

Figure 2.13. Time and event model for a typical subject.

These percentages varied slightly from event position to event position. (An indication of the amount of variation can be obtained by observing the marginal percentage distributions in Tables 2-30, 2-34, and 2-38.)

Probabilities will be defined as follows:

$P_{j,i}$ -The probability of event type j in event sequence position i. For example, the probability of a "crash" ($j=2$) in event sequence position (5) would be defined as $P_{2,5}$.

$P_{j,i|j',i+r}$ -The probability of event type j in event sequence position i given that event j' occurred in the event sequence position defined by $i+r$, where r can be positive or negative. For example, the probability of a "crash" in event sequence position (5) given that a "traffic violation" occurred in event sequence position (4) would be defined as $P_{2,5|1,4}$. In this case position (4) = -1 and we are referring to the events following each other in event sequence positions (4) and (5).

Table 2-29 is the bivariate frequency distribution of event sequence position (4) versus event sequence position (5). From similar tables not presented here we know that the results of the analysis would be approximately the same if two other event sequence positions were used. The table entries are a count of the number of subjects having a particular combination of event types (j) in event sequence positions (4) and (5). For example, 136 subjects had a criminal offense (j=5) in both their fourth and fifth event sequence positions.

Table 2-30 presents the marginal and cell percent frequency distributions for event sequence position (4) versus event sequence position (5). The marginal distributions represent the probability of a particular event type occurring at the event sequence position. For example:

Probability of a criminal offense in event sequence position (4) = $P_{5,4} = 0.227$

Probability of a criminal offense in event sequence position (5) = $P_{5,5} = 0.222$

If the occurrence of an event type, j , in event sequence position, i , is independent of the event type in the immediately preceding event sequence position, i-1 , then their joint probability* should be equal to the product of their individual probabilities:

$$P_{j,i|j,\, i-1} = (P_{j,i})(P_{j,\, i-1}) \Rightarrow \text{Independence} \qquad (1)$$

For example:

$$(P_{5,5})\,(P_{5,4}) = (0.222)\,(0.227) = 0.0505 \qquad (2)$$

*The probability of this combination of event types following each other.

TABLE 2-29. FREQUENCY OF VARIOUS EVENT COMBINATIONS

Fourth Sequential Event	Fifth Sequential Event: Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	38	9	4	2	16	0	20	4	11	104
Crash	4	2	1	2	2	0	0	1	1	13
Crash & Violation	1	1	0	0	3	1	2	0	1	9
Financial Responsibility	5	0	1	4	12	0	10	4	3	39
Criminal Offense	24	2	2	8	136	0	48	4	19	243
Death	0	0	0	0	0	0	1	0	0	1
Hospital Admission (Normal)	54	14	6	15	51	5	178	30	75	428
Hospital Admission (Emergency)	3	1	1	1	10	0	29	15	3	63
Group Therapy	2	1	2	0	8	2	151	4	1	171
Total	131	30	17	32	238	8	439	62	114	1071

TABLE 2-30. MARGINAL AND CELL PERCENTAGE DISTRIBUTIONS FOR SEQUENTIAL EVENT COMBINATIONS

Fourth Sequential Event	Fifth Sequential Event: Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	3.5	0.8	0.4	0.2	1.5	0.0	1.9	0.4	1.0	9.7
Crash	0.4	0.2	0.1	0.2	0.2	0.0	0.0	0.0	0.1	1.2
Crash & Violation	0.1	0.1	0.0	0.0	0.3	0.1	0.2	0.0	0.1	0.8
Financial Responsibility	0.5	0.0	0.1	0.4	1.1	0.0	0.9	0.4	0.3	3.6
Criminal Offense	2.2	0.2	0.2	0.7	12.7	0.0	4.5	0.4	1.8	22.7
Death	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1
Hospital Admission (Normal)	5.0	1.3	0.6	1.4	4.8	0.5	16.6	2.8	7.0	40.0
Hospital Admission (Emergency)	0.3	0.1	0.1	0.1	0.9	0.0	2.7	1.4	0.3	5.9
Group Therapy	0.2	0.1	0.2	0.0	0.7	0.2	14.1	0.4	0.1	16.0
Total	12.2	2.8	1.6	3.0	22.2	0.7	41.0	5.8	10.6	100.0

However, from Table 2-30 the joint probability of a criminal offense (j=5) being followed by a criminal offense is actually:

$$P_{5,5|5,4} = 0.127 \tag{3}$$

Therefore, since:

$$0.127 = P_{5,5|5,4} \neq (P_{5,5})\ (P_{5,4}) = 0.0505 \tag{4}$$

we conclude that the probability of a criminal offense given a previous criminal offense is <u>not independent</u> of the occurrence of the previous criminal offense. In other words, criminal offenses are more likely to follow other criminal offenses than they are to follow some other event type, j .

Thus, the probability of a criminal offense is increased if the previous event type was a criminal offense*. This observation may be expressed analytically as an over-involvement ratio.

$$\text{Over-involvement ratio } O_{i,\ i-1,j} = \frac{\begin{pmatrix}\text{Observed Probability} \\ \text{of Event Type j in} \\ \text{Cell i, i+1}\end{pmatrix}}{\begin{pmatrix}\text{Marginal} & \text{Marginal} \\ \text{Probability} & \text{Probability} \\ \text{Event Type j} & \text{Event Type j} \\ \text{in Event Sequence} & \text{in Event} \\ \text{Position i} & \text{Sequence i+1}\end{pmatrix}} \tag{5}$$

An analysis definition can be constructed if the event types are not the same in event sequence positions i and i+1 . For the cell under discussion

$$O_{4,5,5} = \frac{P_{5,5|5,4}}{(P_{5,5})(P_{5,4})} = \frac{0.127}{(0.227)(0.222)} = 2.52 \tag{6}$$

Because a number of the cells in Table 2-30 have zero entries, it was decided to convert to the coarser definition of events shown in Table 2-31. The event type death (j=6) was removed because there was not a sufficient number of entries for analysis. This caused the resulting reduction in the number of subjects. The remaining combinations are self-explanatory.

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*As stated previously, these probabilities apply to the Hurley Hospital population of alcoholic drivers used as subjects.

If the two succeeding (i=4 and i=5) event type distributions are independent, (e.g., the probability of the second event type is not changed by the previous event type) then each row of the table should have the same distribution over the column event types. The probability of the event types in succeeding event sequence positions being independent can be obtained by means of the Chi square statistic. For this table, the Chi square test indicates that the probability of independence is less than 0.001. Since this probability is small, we conclude that the event type in event sequence position (5) is dependent on the event type in event sequence position (4). Table 2-32 indicates the over-involvement ratio for each of the cells. As stated previously, the over-involvement ratio is an indication of the degree of dependence. An over-involvement ratio greater than 1 indicates that a particular event follows another more frequently than would be expected purely on the basis of the marginal distributions. A ratio less than 1 indicates the opposite result. Examination of Table 2-32 indicates that driving problems tend to repeat as do criminal offenses. Thus, we conclude that a bunching of problems of the same type did occur in the life of these alcoholics.

The evaluation of events leading to and proceeding from group therapy cannot be made using Table 2-32. This is because of the combined occurrence of group therapy and hospitalization. To overcome this problem, event sequence positions (4) and (6) were compared. Tables 2-33 through 2-36 present the results of this comparison, which is parallel to that presented in Tables 2-29 through 2-32.

By examining the over-involvement ratios in Table 2-36, the analysis including the event group therapy (j=9) can be performed. Again the bunching of traffic problems and criminal offenses can be seen. In addition, the bunching of hospital admissions and particularly group therapy treatment is apparent. The occurrence of traffic problems after group therapy is actually higher than expected, whereas the occurrence of criminal offenses is lower than expected.

The event sequence positions considered up to this point occurred early in the life of these alcoholics. In order to determine the later life pattern of event types, we have compared events in event sequence positions (10) and (12). Tables 2-37 through 2-40

TABLE 2-31. COLLAPSED LIFE SEQUENCE TABLE

Fourth Sequential Event	Fifth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy	
Traffic Event	74	33	41	16	164
Criminal Offense	36	136	52	19	243
Hospital Admission	95	61	252	78	486
Group Therapy	5	8	155	1	169
TOTAL	210	238	500	114	1062

Chi Square = 403 $\alpha < .001$
d.f. = 9

TABLE 2-32. OVER-REPRESENTATION RATIOS--COLLAPSED LIFE SEQUENCE TABLE (OBSERVED/EXPECTED)

Fourth Sequential Event	Fifth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy
Traffic Event	2.28	0.90	0.53	0.91
Criminal Offense	0.75	2.52	0.45	0.73
Hospital Admission	0.99	0.56	1.10	1.49
Group Therapy	0.15	0.21	1.95	0.06

TABLE 2-33. FREQUENCY OF VARIOUS EVENT COMBINATIONS

Sixth Sequential Event

Fourth Sequential Event	Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	26	8	2	4	13	1	23	5	8	90
Crash	2	0	0	0	1	1	1	0	2	7
Crash & Violation	1	1	0	1	0	0	1	0	1	5
Financial Responsibility	3	0	1	4	10	0	13	1	6	38
Criminal Offense	29	2	1	9	115	1	55	8	21	241
Death	0	0	0	0	0	0	0	0	1	1
Hospital Admission (Normal)	44	10	8	7	52	3	203	38	41	406
Hospital Admission (Emergency)	3	2	0	1	12	0	23	9	8	58
Group Therapy	28	9	0	3	14	1	38	10	51	154
Total	136	32	12	29	217	7	357	71	139	1000

TABLE 2-34. MARGINAL AND CELL PERCENTAGE DISTRIBUTIONS FOR SEQUENTIAL EVENT COMBINATIONS

	Sixth Sequential Event									
Fourth Sequential Event	Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	2.6	0.8	0.2	0.4	1.3	0.1	2.3	0.5	0.8	9.0
Crash	0.2	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.2	0.7
Crash & Violation	0.1	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.5
Financial Responsibility	0.3	0.0	0.1	0.4	1.0	0.0	1.3	0.1	0.6	3.8
Criminal Offense	2.9	0.2	0.1	0.9	11.5	0.1	5.5	0.8	2.1	24.1
Death	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
Hospital Admission (Normal)	4.4	1.0	0.8	0.7	5.2	0.3	20.3	3.8	4.1	40.6
Hospital Admission (Emergency)	0.3	0.2	0.0	0.1	1.2	0.0	2.3	0.9	0.8	5.8
Group Therapy	2.8	0.9	0.0	0.3	1.4	0.1	3.8	1.0	5.1	15.4
Total	13.6	3.2	1.2	2.9	21.7	0.7	35.7	7.1	13.9	100.0

TABLE 2-35. COLLAPSED LIFE SEQUENCE TABLE

Fourth Sequential Event	Sixth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy	Number
Traffic Event	53	24	44	17	138
Criminal Offense	41	115	63	21	240
Hospital Admission	75	64	273	49	461
Group Therapy	40	14	48	51	153
TOTAL	209	217	428	138	992

Chi Square = 231 $\alpha < .001$
d.f. = 9

TABLE 2-36. OVER-REPRESENTATION RATIOS--COLLAPSED LIFE SEQUENCE TABLE (OBSERVED/EXPECTED)

Fourth Sequential Event	Sixth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy
Traffic Event	1.82	0.80	0.74	0.89
Criminal Offense	0.81	2.19	0.61	0.64
Hospital Admission	0.77	0.64	1.37	0.80
Group Therapy	1.24	0.42	0.73	2.40

TABLE 2-37. FREQUENCY OF VARIOUS EVENT COMBINATIONS

Tenth Sequential Event	Twelfth Sequential Event: Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	26	2	4	2	8	1	17	3	7	70
Crash	4	0	1	0	2	0	4	1	3	15
Crash & Violation	1	1	1	0	2	0	5	1	0	11
Financial Responsibility	7	0	0	3	5	0	3	0	2	19
Criminal Offense	13	7	3	3	70	0	25	3	15	139
Hospital Admission (Normal)	21	7	4	2	18	0	127	20	15	214
Hospital Admission (Emergency)	3	2	1	2	3	1	15	10	8	45
Group Therapy	11	1	2	1	11	2	16	15	34	93
Total	86	20	16	13	119	4	211	53	84	606

TABLE 2-38. MARGINAL AND CELL PERCENTAGE DISTRIBUTIONS FOR SEQUENTIAL EVENT COMBINATIONS

Tenth Sequential Event	Twelfth Sequential Event: Traffic Violation	Crash	Violation & Crash	Financial Responsi-bility	Criminal Offense	Death	Hospital Admission (Normal)	Hospital Admission (Emergency)	Group Therapy	Total
Traffic Violation	4.3	0.3	0.7	0.3	1.3	0.2	2.8	0.5	1.2	11.6
Crash	0.7	0.0	0.2	0.0	0.3	0.0	0.7	0.2	0.5	2.5
Crash & Violation	0.2	0.2	0.2	0.0	0.3	0.0	0.8	0.2	0.0	1.8
Financial Responsibility	1.2	0.0	0.0	0.5	0.8	0.0	0.3	0.0	0.3	3.1
Criminal Offense	2.1	1.2	0.5	0.5	11.6	0.0	4.1	0.5	2.5	22.9
Death	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hospital Admission (Normal)	3.5	1.2	0.7	0.3	3.0	0.0	21.0	3.3	2.5	35.3
Hospital Admission (Emergency)	0.5	0.3	0.2	0.3	0.5	0.2	2.5	1.7	1.3	7.4
Group Therapy	1.8	0.2	0.3	0.2	1.8	0.3	2.6	2.5	5.6	15.3
Total	14.2	3.3	2.6	2.1	19.6	0.7	34.8	8.7	13.9	100.0

TABLE 2-39. COLLAPSED LIFE SEQUENCE TABLE

Tenth Sequential Event	Twelfth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy
Traffic Event	52	17	33	12
Criminal Offense	26	70	28	15
Hospital Admission	42	21	172	23
Group Therapy	15	11	31	34

TABLE 2-40. OVER-REPRESENTATION RATIOS--COLLAPSED LIFE SEQUENCE TABLE (OBSERVED/EXPECTED)

Tenth Sequential Event	Twelfth Sequential Event: Traffic Event	Criminal Offense	Hospital Admission	Group Therapy
Traffic Event	2.03	0.76	0.66	0.76
Criminal Offense	0.83	2.54	0.46	0.77
Hospital Admission	0.73	0.41	1.52	0.64
Group Therapy	0.74	0.61	0.78	2.68

present our analysis of these later life event types. The overinvolvement ratios in Table 2-40 indicate that the tendency for events to bunch continues to occur. In particular, if Tables 2-36 and 2-40 are compared, it can be seen that there is a stronger tendency for bunching of event types in later life. The overinvolvement ratios on the diagonals are all larger in Table 2-40 than in Table 2-36. Thus, the probability of, for example, a group therapy treatment event following a group therapy treatment event is larger, relative to the marginal probabilities of group therapy, in later life than in earlier life. As life progressed, more of the subjects developed a repetitive life pattern. In some cases, this pattern consisted of repeated hospitalization or group therapy treatment while in other cases it consisted of repeated criminal or deviant driving behavior.

2.3.4.4 Analysis of Time Interval Between Events. The relationship between the length of time before an event and the event type was studied to a limited extent. The general hypothesis was that alcoholics having problems, defined by a series of events occurring within short time intervals of each other, might tend to respond with a particular event type. Thus, for example, a short interval between events might be predictive of a particular problem type, such as a driving problem.

A correlation analysis was performed to determine whether or nct short time intervals or long time intervals tended to occur in pairs. In particular, correlation coefficients were computed for all pairs of time intervals. These correlation coefficients were very small, thus indicating that time intervals of a particular length do not tend to bunch. Thus, for the aggregate population a series of short time intervals following each other at successive interval sequence numbers did not occur to any great extent. A short time interval was just as likely to be followed by a long time interval as by another short time interval.

An alternative hypothesis that was tested is that a particularly long or short time period is predictive of a particular event type. Thus, for example, if a short time interval is indicative of a life problem, it would be desirable to identify events immediately preceding or immediately following this short time interval.

Figure 2.14 indicates the relationship between the mean time interval for each interval sequence number and the event sequence position immediately following this interval sequence number for approximately 700 alcoholic drivers from the aggregate population. The individual graphs compare the mean of the time interval which occurs just before the event type for traffic convictions or crashes (j=1 through 3) in the event sequence position versus all other event types (j=4 through 9) in the event sequence position. The population size was reduced to 700 from the original group because of the need to use only subjects with a sufficient number of time intervals for analysis. This reduction had the effect of selecting only those persons who had eleven or more of the defined events occurring in a period of 17 years. Thus, a deviant alcoholic driver population was used in this analysis. The larger time intervals at the lower interval sequence numbers are due to incomplete data in earlier periods. In particular, traffic event types were not available prior to 1961. All times were expressed relative to January 1951. In addition, if a person had one hospital admission early in 1951 and then did not have another event until

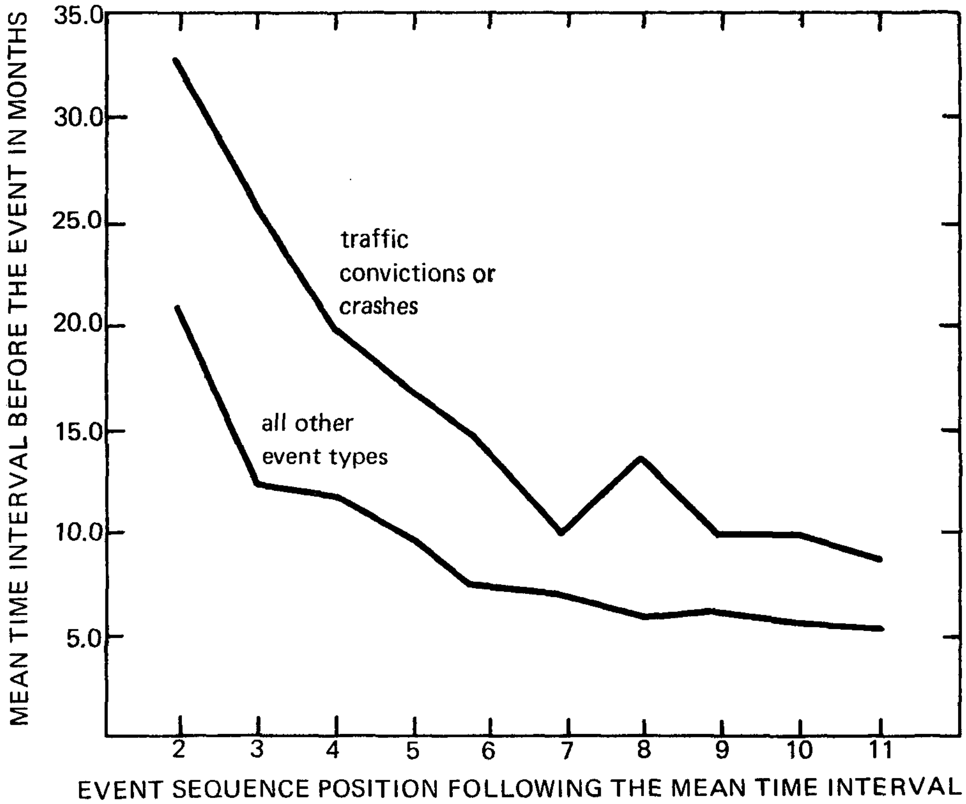

Figure 2.14. Comparison of time interval preceding traffic events with the time interval preceding other event types.

1959, his first interval would be very long. If this situation were followed by a series of short time intervals (e.g., an alcoholic life pattern), the subject would be in the population of 700 being analyzed. However, his first time interval would be much longer than the later time intervals.

As indicated in Figure 2.14, traffic convictions or crashes occurred after longer time intervals as compared to the other events. However, Figure 2.15 indicates that the time interval after a traffic conviction or crash was shorter compared to other events. This might suggest that traffic convictions or crashes tended to occur at the start of problem periods in the lives of these subjects.

2.3.4.5 Conclusions. The analysis of life patterns resulted in the following conclusions:

1. The time interval between events is not correlated with preceding or following time intervals.
2. Traffic convictions or crashes are preceded by longer time intervals, compared to other events.

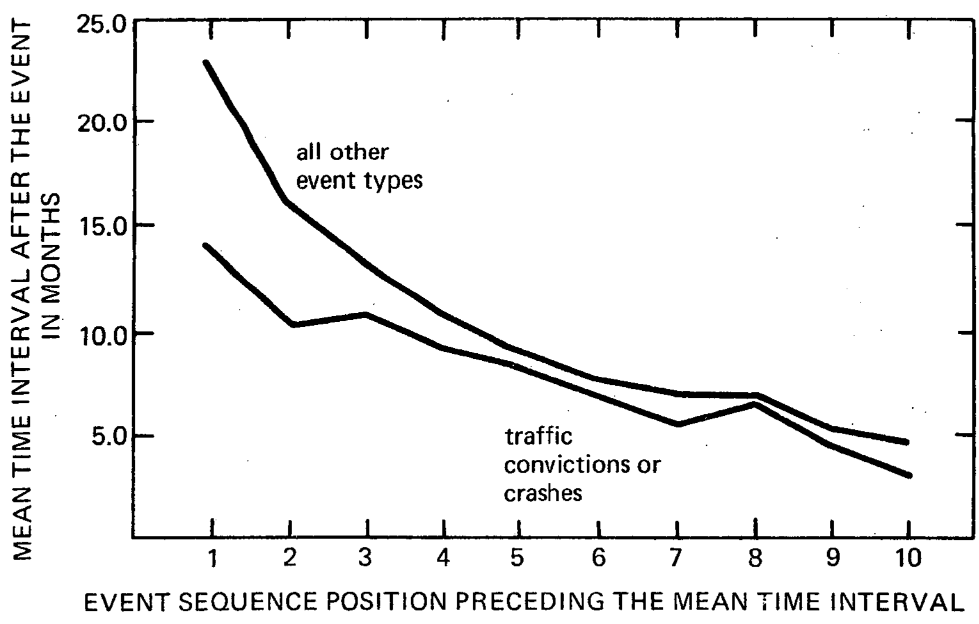

Figure 2.15. Comparison of time interval following traffic events with the time interval following other event types.

3. Traffic convictions or crashes are followed by shorter time intervals, compared to other events.
4. Events of the same type tend to follow each other. In particular the most likely event to follow a traffic event is another traffic event.

Based on the assumption that short time intervals indicate a life problem, conclusion (3) indicates that a crash or traffic conviction precedes a life problem period. Thus, if a successful intervention could have been made into the alcoholic's life, additional problems could have been prevented. In particular, since traffic problems tended to follow each other, the problem prevented would have been more likely to be another traffic problem.

These conclusions, particularly (3) and (4), have significant operational implications for workers in the highway safety and alcoholism fields with respect to early detection and subsequent intervention. However, they are derived from a highly specialized sample of alcoholics, and we believe it desirable to pursue the underlying hypotheses on a broader scale. The following recommendations are offered for the consideration of future investigators:

1. Subjects should be selected on a random sampling basis in order to represent as broad a spectrum of the national alcoholic population as possible. This consideration would obviously be modified somewhat by the operational problems of obtaining subjects for whom suitable data are available.
2. The subjects selected should have alcoholic life patterns which begin at or near the same point in time. This would reduce the differences in reporting of events by public agencies. In addition, it would eliminate events which have little or nothing to do with the alcoholic life pattern under consideration.
3. The procedure for identifying and describing events should be carefully analyzed. It may be that event types somewhat different from those used in this study should be used. However, the event types used should be such that the fundamental hypotheses can be tested.

2.3.5 THE HOSPITALIZED ALCOHOLIC DRIVING POPULATION COMPARED TO THE MICHIGAN DRIVER PROFILE. This anslysis is directed toward a comparison of the 1,247 drivers in the alcoholic sample with a normal sample of Michigan drivers, the Michigan Driver Profile (MDP), in terms of driving performance characteristics. We have utilized the Chi square test for the purpose of evaluating the differences in distributions of driving events in the two samples. These events are:

1. Total number of crashes
2. Total number of driving convictions
3. Total number of alcohol-related convictions (DUIL)
4. Total number of speeding convictions
5. Total number of reckless and felonious driving convictions

For purposes of comparison, we restricted the time unit of study to the period 1961-1967. In addition, for this comparative analysis, data on the above variables were determined from the driver record only, excluding data on the criminal record. While this procedure does not provide a true rate of driving convictions and crashes, it does provide comparable driving record data, which is a valid means of comparison, for the two samples. This is a necessary requisite for comparison since the MDP data are derived from the driver record only. Table 2-41 displays sources of driving performance data for the alcoholic drivers from 1961-67 and further illustrates the extent of under-reporting of driving convictions and crashes by exclusion of criminal record data. For example, 13% of total driving convictions, and 4% of crashes are found only on the criminal record.

Comparison of the two samples in terms of total numbers of crashes, driving convictions, DUIL, speeding, and reckless/felonious convictions is displayed in Appendix L, Figure L.1. Frequencies for a further breakdown of variables are shown in Table 2-42. It appears that the alcoholic sample exceeds the Michigan drivers in rates of crashes, driving convictions, DUIL, and reckless/felonious convictions at a significant level of 0.01. Differences in speeding convictions are not significant at the 0.05 level, i.e., alcoholics are similar to a normal driving population in regard to

TABLE 2-41 (A) SOURCE OF DRIVING CONVICTIONS OR CRASHES 1961-1967

Driving Convictions and Crashes	Number of driver convictions found on driver record or criminal record and driver record		Number of driving convictions or record of crash found on criminal record only		Total number of driving Convictions	
	Number	Percent	Number	Percent	Number	Percent
DUIL	269	63%	156	37%	425	100.0%
Reckless & Felonious	142	88	19	12	161	100.0
Speeding	800	99	4	1	804	100.0
Driver's License	184	70	79	30	263	100.0
Other Driving Convictions	833	92	72	8	905	100.0
Total Driving Convictions	2217	87	330	13	2547	100.0
Crashes	779	96%	32	4%	811	100.0%

TABLE 2-41 (B) SOURCE OF INDIVIDUAL RECORD FOR SPECIFIC OFFENSES 1961-1967

Driving Convictions and Crashes	Number of persons with record for the given offense located on driver record or driver record and criminal record		Number of persons with record for given offense located only on the criminal record		Total number of persons	
	Number	Percent	Number	Percent	Number	Percent
DUIL	206	61%	132	39%	338	100.0%
Reckless & Felonious	131	87	19	13	150	100.0
Speeding	431	99	4	1	435	100.0
Driver's License	123	66	63	34	186	100.0
Other Driving Convictions	502	90	58	10	560	100.0
Total Driving Convictions	818	79	222	21	1040	100.0
Crashes	504	94%	31	6%	535	100.0%

this variable. Further examination of Table 2-42 reveals that the greatest differences between the Hurley sample and the MDP* appear in these categories:

1. Two or more crashes
2. Two to three driving convictions
3. One or more DUIL convictions
4. One or more reckless/felonious convictions

Refinement of the driver populations by sex and age groups provided another perspective for comparative purposes. Figures L.2 and L.3 (Appendix L) compare means on the variables of crashes, total driving convictions, DUIL, speeding, and reckless/felonious convictions for males and females in both samples. It appears that males in both samples contribute more significantly to these five events than do females; the differences are especially large in terms of total driving convictions, speeding, and crashes. Frequencies for males and females in respect to these variables are displayed in Tables 2-43 and 2-44. The data demonstrate that males in the alcoholic sample exceed those in the MDP in rates of crashes, DUIL, speeding, and reckless/felonious convictions at a

TABLE 2-42. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS

EVENTS	POPULATIONS	NUMBER OF EVENTS		
		0	1	2+
CRASHES	Total (1247) Hurley	743	325	179
Significance level: 0.01	Total (1070) MDP	757	227	86
		0, 1	2-3	4+
DRIVING CONVICTIONS	Total (1247) Hurley	744	296	207
Significance level: 0.01	Total (1068) MDP	751	185	132
		0	1+	
DUIL	Total (1247) Hurley	1041	206	
Significance level: 0.01	Total (1070) MDP	1059	12	
		0, 1	2+	
SPEEDING	Total (1247) Hurley	1072	175	
Not Significant at 0.05	Total (1070) MDP	910	160	
		0	1+	
RECKLESS & FELONIOUS	Total (1247) Hurley	1116	131	
Significance level: 0.01	Total (1071) MDP	1036	35	

*Differences between the two samples mean that the Hurley sample is over-represented in a particular category of a driving event, while MDP is under-represented.

TABLE 2-43. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (MALES)

EVENTS	POPULATIONS	NUMBER OF EVENTS		
		0	1	2+
CRASHES	Male (1108) Hurley	648	297	163
Significance level: 0.01	Male (715) MDP	473	169	73
		0, 1	2-3	4+
CONVICTIONS	Male (1108) Hurley	640	266	202
Not significant at 0.05	Male (716) MDP	452	144	120
		0	1+	
DUIL	Male (1108) Hurley	913	195	
Significance level: 0.01	Male (719) MDP	707	12	
		0, 1	2+	
SPEEDING	Male (1108) Hurley	941	167	
Significance level: 0.01	Male (718) MDP	579	139	
		0	1+	
RECKLESS & FELONIOUS	Male (1108) Hurley	984	124	
Significance level: 0.01	Male (719) MDP	689	30	

TABLE 2-44. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (FEMALES)

EVENTS	POPULATIONS	NUMBER OF EVENTS		
		0	1	2+
CRASHES	Females (139) Hurley	95	28	16
Significance level: 0.01	Females (348) MDP	280	55	13
		0, 1	2-3	4+
CONVICTIONS	Females (139) Hurley	104	30	5
Significance level: 0.05	Females (347) MDP	294	41	12
		0	1+	
DUIL	Females (139) Hurley	128	11	
	Females (347) MDP	347	0	
		0, 1	2+	
SPEEDING	Female (139) Hurley	131	8	
Not significant at 0.05	Female (347) MDP	326	21	
		0	1+	
RECKLESS & FELONIOUS	Female (139) Hurley	132	7	
Significant level: 0.05	Female (347) MDP	342	5	

significance level of 0.01. On the other hand, males in the alcoholic sample are not unlike Michigan drivers in regard to total driving convictions, at a significance level of 0.05. Further examination of Table 2-43 (males) reveals that the greatest differences between the Hurley sample and the MDP appear in these categories:

1. Two or more crashes
2. One or more DUIL convictions
3. Two or more speeding convictions
4. One or more reckless and felonious convictions

Table 2-44 reveals that female alcoholics exceed females in the MDP in rates of crashes, total driving convictions, and reckless and felonious convictions at a significance level of 0.05. There were no significant differences at the 0.05 level in regard to speeding convictions, however. We were not able to test the statistical significance of DUIL differences since the MDP sample contained virtually no female drivers with one or more DUIL convictions. Therefore, the differences in DUIL convictions between the samples may be considered logically, if not statistically, significant. The greatest differences between the samples as shown in Table 2-44 (female) appear in these categories:

1. Two or more crashes
2. Two to three driving convictions
3. One or more reckless and felonious convictions

Table 2-45 and Figure L.4 to L.7 (Appendix L) present a comparison of the Hurley sample and the MDP on the variables of crashes, total driving convictions, DUIL, speeding, and reckless and felonious convictions by analysis of different age groups. Of particular interest is the inverse relationship between the mean rates of these driving events and age; there is a marked tendency in both samples for the means to diminish with advancing age, with the highest means in the 26-35-year-old age group. One exception to this tendency appears in the DUIL category in the Hurley sample where the incidence of these convictions is fairly uniform throughout. It appears that DUIL convictions do not diminish markedly until the oldest age group (66-75 years). The highest DUIL rates occur in the 36-45-year-old category.

Table 2-45 also highlights another interesting feature. It appears that crash rates for the alcoholic sample nearly double those of the MDP in every age group but the 56-65 year olds. The raw crash rate (1961-1967) for the alcoholic drivers is 0.63 compared to 0.36 for the Michigan drivers. However, since the alcoholic drivers were under-represented in those age categories below 25 years and over 75 years, we "age adjusted" the two samples for further comparison, i.e., we calculated the number of crash events which would occur if the alcoholic sample were equal in number to the Michigan drivers in ages below 25 years and above 75 years. The resulting "age adjusted" crash rate for the alcoholic drivers is 0.68*. These data, which are pictorially displayed in Figure L.8, strikingly support previous findings that the pathological drinker accounts for a greatly disproportionate share of highway crashes. We might explain the fact that the crash rate of the age group 56-65 years approaches that of a normal population by postulating that a chronic alcoholic becomes "burnt out" in these years and slows down in his physical pace because of the deleterious effects of alcohol. He may also be spending more time in hospitals or his recuperative ability may be lower than in previous years. In addition, driving exposure may be reduced for this age group because of reduced ownership of cars.

Frequencies for the different age groups on the variables of crashes, total driving convictions, DUIL, speeding, and reckless/felonious convictions are displayed in Tables 2-46 to 2-49. (Age group 66-75 years is omitted from these tables because of the limited number of cases in each cell from the Hurley sample.) It appears that the alcoholic sample exceeds the MDP in crashes, total driving convictions, and reckless/felonious convictions in all age groups except that of 56-65 years. (Significance level is 0.01 with the exception of age group 46-55 years, reckless/felonious where significance level is 0.05.)

Further examination of Tables 2-46 to 2-49 shows that the greatest differences between the Hurley sample and MDP in crash frequencies for all age groups (except 56-65 years) occur in the 2-or-more-crashes category. The second highest discrepancy between the samples occurs in the 0-crash category.

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*See Appendix M for further explanation of age adjustment.

TABLE 2-45. DRIVING EVENT MEANS FOR HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY AGE GROUPS*

HURLEY SAMPLE

Ages (Years)	Crashes	Convic- tions	DUIL	Speeding	Reckless/ Felonious	Number in Sample
26-35	0.92	3.07	0.22	1.21	0.16	(N = 132)
36-45	0.76	2.19	0.26	0.86	0.16	(N = 350)
46-55	0.58	1.50	0.21	0.47	0.09	(N = 432)
56-65	0.41	1.19	0.19	0.35	0.10	(N = 259)
66-75	0.47	0.83	0.13	0.27	0.00	(N = 64)

MICHIGAN DRIVER PROFILE

Ages (Years)	Crashes	Convic- tions	DUIL	Speeding	Reckless/ Felonious	Number in Sample
26-35	(N=206) 0.44	(N=205) 1.86	(N=207) 0.01	(N=207) 0.97	(N=207) 0.04	
36-45	(N=218) 0.36	(N=221) 1.29	(N=222) 0.02	(N=222) 0.69	(N=222) 0.03	
46-55	0.30	1.12	0.02	0.57	0.03	(N = 182)
56-65	0.38	1.00	0.01	0.27	0.03	(N = 142)
66-75	0.25	0.82	0.00	0.08	0.00	(N = 60)

*Age groups below 26 years are omitted because there were too few cases in the Hurley sample to be used for comparative purposes.

TABLE 2-46. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (AGES 26-35 years)

EVENTS	POPULATION (years, sample)	NUMBER OF EVENTS		
		0	1	2+
CRASHES	26-35 (132) Hurley	55	47	30
Significance level: 0.01	26-35 (206) MDP	140	49	17
		0,1	2-3	4+
CONVICTIONS	26-35 (132) Hurley	53	35	44
Significance level: 0.01	26-35 (205) MDP	124	41	40
		0	1+	
DUIL	26-35 (132) Hurley	111	21	
	26-35 (207) MDP	205	2	
		0,1	2+	
SPEEDING	26-35 (132) Hurley	93	39	
Not significant at 0.05	26-35 (207) MDP	165	42	
		0	1+	
RECKLESS & FELONIOUS	26-35 (132) Hurley	114	18	
Significance level: 0.01	26-35 (207) MDP	198	9	

TABLE 2-47. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (AGES 36-45 years)

EVENTS	POPULATIONS (years, sample)	NUMBER OF EVENTS		
		0	1	2+
CRASHES	36-45 (350) Hurley	184	102	64
Significance level: 0.01	36-45 (218) MDP	159	43	16
		0,1	2-3	4+
CONVICTIONS	36-45 (350) Hurley	171	102	77
Significance level: 0.01	36-45 (221) MDP	157	39	25
		0	1+	
DUIL	36-45 (350) Hurley	279	71	
	36-45 (222) MDP	218	4	
		0,1	2+	
SPEEDING	36-45 (350) Hurley	284	66	
Not significant at 0.05	36-45 (222) MDP	189	33	
		0	1+	
RECKLESS & FELONIOUS	36-45 (350) Hurley	299	51	
Significance level: 0.01	36-45 (222) MDP	216	6	

TABLE 2-48. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (AGES 46-55 years)

EVENTS	POPULATIONS (years, sample)	NUMBER OF EVENTS		
		0	1	2+
CRASHES	46-55 (432) Hurley	271	102	59
Significance level: 0.01	46-55 (182) MDP	137	37	8
		0,1	2-3	4+
CONVICTIONS	46-55 (432) Hurley	275	99	58
Significance level: 0.01	46-55 (182) MDP	137	24	21
		0	1+	
DUIL	46-55 (432) Hurley	365	67	
	46-55 (182) MDP	179	3	
		0,1	2+	
SPEEDING	46-55 (432) Hurley	386	46	
Not significant at 0.05	46-55 (182) MDP	155	27	
		0	1+	
RECKLESS & FELONIOUS	46-55 (432) Hurley	397	35	
Significance level: 0.05	46-55 (182) MDP	177	5	

TABLE 2-49. FREQUENCY OF HURLEY ALCOHOLICS AND MICHIGAN DRIVERS BY DRIVING EVENTS (AGES 56-65 years)

EVENTS	POPULATIONS (years, sample)	NUMBER OF EVENTS		
		0	1	2+
CRASHES	56-65 (259) Hurley	182	58	19
Not significant at 0.05	56-65 (142) MDP	107	25	10
		0,1	2-3	4+
CONVICTIONS	56-65 (259) Hurley	186	52	21
Not significant at 0.05	56-65 (142) MDP	109	21	12
		0	1+	
DUIL	56-65 (259) Hurley	218	41	
	56-65 (142) MDP	140	2	
		0,1	2+	
SPEEDING	56-65 (259) Hurley	240	19	
Not significant at 0.05	56-65 (142) MDP	133	9	
		0	1+	
RECKLESS & FELONIOUS	56-65 (259) Hurley	234	25	
	56-65 (142) MDP	139	3	

The two samples demonstrate the greatest variance in frequencies of total driving convictions in the 0,1-driving-conviction category. This is true for the two younger age groups (26-35 years and 36-45 years), while the greatest disparity in the 46-55 year age group occurs in the category of 2 to 3 total driving convictions. The second highest category of divergence is that of 4 or more driving convictions, consistent for all of these three age groups (Tables 2-46 to 2-48; ages 26-35 years, and 46-55 years).

Tables 2-46 to 2-48 also demonstrate that in these three age groups the greatest differences between the samples in frequencies of reckless/felonious driving convictions occur consistently in the category of one or more of these convictions.

Table 2-49 displays the frequencies of crashes, total driving convictions, DUIL, speeding, and reckless/felonious convictions of the 56-65 years age group. None of the differences between the samples on these variables is significant at the 0.05 level. Because there were too few cases in the MDP who had one or more reckless/felonious convictions, we were not able to determine the statistical significance of differences in this category. Thus, it appears that alcoholics who are 56-65 years of age are not unlike the Michigan drivers of comparable age in regard to crashes, total driving convictions, and speeding. Alcoholic drivers in this age group do, however, have a markedly higher frequency of both reckless/felonious convictions and DUIL convictions.

Differences between the two samples in frequencies of speeding convictions are not significant at the 0.05 level for any age group, i.e., alcoholic drivers in any age group do not differ from a sample of normal drivers of comparable age groups in respect to speeding convictions.

We were not able to determine the statistical significance of differences between the Hurley sample and MDP regarding DUIL convictions in any age group since the frequencies for this variable in the MDP were too low (below 5). However, we can conclude that these differences appear logically rather than statistically significant.

2.3.6 A CASE DESCRIPTION OF THREE ALCOHOLIC DRIVERS WITH HIGH RATES OF DRIVING CONVICTIONS AND CRASHES. This section describes the sequence of events which takes place in the life of an alcoholic problem driver. These unfolding events tend to confirm the idea that the problem driver is identifiable. Included for presentation is a complete history of the specific driving, criminal, and medical events of three alcoholic drivers with high rates of driving convictions and crashes. The discussion following the case presentations suggests possible strategies of early intervention.

Case I. Male; White; Catholic; residence near Flint; Occupation Truck Driver; Divorced.

Age 18 First recorded event: driving conviction for failure to yield to another vehicle.

Age 19 Hospitalized for one day for lacerations as a result of a fall.

Age 21 Two speeding convictions four months apart; one-vehicle crash (one injury) with a concurrent conviction for speeding and reckless driving.

Age 26 One vehicle crash (one injury); license suspended for one month. Following reinstatement, two speeding convictions in one month. License again suspended; upon reinstatement, one conviction for speeding followed by a three vehicle crash two months later.

Age 27 Alimony charge of 40 days or $300. Five months later, hospitalized for 4 days; diagnosed as severe character disorder with marked emotional immaturity, noted as being chronically nervous and depressed. Divorced from 3rd wife.

Age 27 Two months later was rehospitalized for 5 days with diagnosis of acute alcoholism. He was referred to alcoholic group therapy and was noted as being tremulous, weak, and anxious.

Age 28 Speeding conviction; one month later, he was hospitalized for chronic alcoholism; complained of many financial problems particularly regarding alimony payments.

Age 29 Driver license conviction (license was defaced).

Age 30 Ticketed for improper turn; twice ticketed for speeding.

Age 31 Involved in a two-vehicle crash, received speeding conviction one month later. He was involved in another two-vehicle crash (two injured) four months after this; concurrently ticketed for following too close.

Age 32 Two-vehicle crash (one injured), conviction for lack of driver's license. Four months later was ticketed for driving the wrong way on a one-way street. License suspended for one month in 1965 and is the last recorded information for this driver on either driving, criminal, or medical records.

Case II. Male; Black; Protestant; Residence Flint; Occupations (sequentially) were: Janitor, Truck Driver, Assembly Line Worker; Single.

Age 19 First recorded event: involvement in a two-vehicle crash.

Age 20 Conviction for speeding and ignoring traffic signal; another speeding conviction six months later.

Age 21 Involved in a crash; concurrently convicted for leaving the scene of that crash. Five months later, was ticketed for ignoring traffic signal; received another speeding conviction soon after this.

Age 22, 23 Ticketed for improper lane usage; one month later involved in two-vehicle crash (three injured). Although he was hospitalized for one day following this crash, no information concerning drinking was recorded on medical record. Rehospitalization a few weeks later for fainting spells with the diagnostic impression of emotional rather than physical origin. A few months subsequently, ticketed for speeding, followed closely by a DUIL conviction. License was suspended for two months; following reinstatement, however, he was involved in a one-vehicle crash (one injury). License was revoked but in this same month he was ticketed for

Age 22, 23 operating a vehicle with a revoked license. Several months later, he was hospitalized for nine days with the diagnosis of probable peptic ulcer and possible alcohol addiction. A few months subsequent to his hospital discharge, he was picked up for intoxication.

Age 24 Appearing on the criminal record were charges of furnishing alcoholic beverages to a minor and drunk in a public place. Received a reckless driving conviction. He was hospitalized four months later for three weeks; the medical record indicated that he had a two-year history of delusions of persecution and again at this time entertained persecutory and aggressive ideas. He was committed to a state hospital for one year.

Age 26 Conviction for improper lane usage in the same month as his state hospital release; a few days later, conviction for reckless driving. Ticketed for improper backing, followed a few months later by a two-vehicle crash (two injured) with a concurrent conviction for not having his car under control.

Age 27 Hospitalized for one month; diagnosis was acute alcoholism and active duodenal ulcer. The medical record noted that he had been drinking heavily, was depressed and withdrawn; referral to alcoholic group therapy made at this time. After discharge from the hospital, he was ticketed for failure to yield the right of way, followed three months later by a ticket for improper lane usage.

Rehospitalization for 15 days for gastro-intestinal complaints; referral again made to alcoholic group therapy. After hospital release, involvement in a one-vehicle crash and concurrently was convicted of DUIL and failure to have his car under control. He received another driving conviction two months later for excessive noise.

Age 30 Ticketed for driving left of center; several months later for speeding; three months later for a defaced license.

Age 31 Last recorded event: involvement in a two-vehicle crash (three injured) and ticketed concurrently for improper passing.

Case III. Male; White; Protestant; Residence Flint; Occupation Used-Car Salesman; Married.

Age 19 First recorded event: drunk and disorderly conviction.

Age 23 Drunk and disorderly conviction; the following month, a DUIL conviction.

Age 29 Ticketed for speeding.

Age 30 Involvement in a two-vehicle crash and concurrently ticketed for failure to stop at an assured clear distance. A few months later, received two convictions concurrently for improper turn and improper lane usage. The next month he was involved in a two-vehicle crash (two injured) and received a conviction of failure to keep his car under control. His license was subsequently revoked. The next month he was picked up for drunkenness in a public place. Within two weeks of this last charge was found unconscious and was hospitalized for three days. The medical record noted that he was a spree drinker and a referral was made to the alcoholic group therapy program.

Age 31 After suicide attempt, he was hospitalized for one day. Diagnosis at that time was emotional problems and acute alcoholism. His drinking history revealed many years of alcoholism coupled with depression and thoughts of suicide since age 26. Aggravating his depression at this time were divorce proceedings.

Age 33 Driver's license was reissued but within three months he was ticketed for speeding. Six months later was involved in a one-vehicle crash (one injury) and concurrently received a conviction of driving without due regards.

Age 34 Ticketed for a prohibited left turn; involved in a two-vehicle crash (two injured); several months later was picked up for drunk and disorderly conduct.

Age 36 Ticketed for equipment violation (driving with one headlight); soon after, received DUIL conviction. Consequently, his license was again revoked early in 1967.

2.3.6.1 <u>Discussion of Possible Intervention.</u>

<u>Case I.</u> When the truck driver client was 25 years of age, he had several driving convictions, including two crashes. Any of these crash events could have led the courts to evaluate this individual's drinking behavior. Moreover at age 27 as part of the divorce procedure, there was a chance to uncover the client's drinking and emotional problems. Had this been done, effective intervention and identification might have prevented several additional offenses and crashes.

<u>Case II.</u> At age 22 this individual was not only ticketed but was involved in a two-vehicle accident where three persons were injured. Subsequently, this person was hospitalized for fainting spells of an emotional origin, then convicted for speeding, and later his license was suspended for two months for driving under the influence of liquor. At this time, had there been a "linking" of the court system with the medical diagnostic and treatment effort, several additional driving convictions and crashes might have been avoided. In addition, this individual later went to a state hospital, which also did not effectively treat his problem with alcohol. Had this institution been able to screen and treat alcoholics, the client would have had the benefit of a year of inpatient treatment, which might have helped him to develop control over his alcohol intake, as well as reduce his threatening behavior.

<u>Case III.</u> At 23 years of age, this individual was arrested and convicted for both DUIL and for disorderly conduct. If his drinking behavior had been evaluated, and his subsequent identification as an alcoholic established and treated, perhaps it would have helped to deter his long record of crashes and driving convictions.

Each of these cases suggests that early identification, diagnosis, and treatment could have provided intervention, had there been a cooperative comprehensive community approach to the problems presented instead of an isolated, punitive, and ineffective effort.

2.4 CONCLUSIONS

In this section we present a summary of the important conclusions about alcoholic problem driving. All of the findings included are based on the analysis described in the previous sections.

1. The average number of crashes per alcoholic driver over a six-and-one-half-year period (January 1, 1961-June 30, 1967) was 0.65. The average number of crashes during the same period for a random sample of Michigan drivers was 0.42.

2. The crash rate (1961-67) for this alcoholic population of drivers (0.65) is about twice as great as the crash rate for the same group (26-75 years) in the Michigan Driver Profile (0.36).

3. The higher crash rate for alcoholic drivers is associated with both younger (45 years and under) age groups (see Appendix L, Figure L.18) and a higher rate of driving convictions not associated with crashes.

4. Those alcoholics who withdrew from the alcoholic group therapy program prior to the third day of the program had the highest rates of crash and driving convictions.

5. Those alcoholics who completed one group therapy series (see table 2-28) consistently had the lowest crash and driving conviction rates, when compared with those who did not complete the series, or those who completed the series, but returned for more therapy.

6. The hypothesis that there is a direct correlation between behavioral deviancy, in terms of criminal convictions, drunkenness convictions not associated with driving, mental illness diagnoses, and high rates of driving convictions was substantiated.

7. Behavioral instability as reflected in family problems, and associated with being single, separated, or divorced, was associated with a high crash rate.

8. Twenty-five percent of the alcoholic drivers (N=1247) had no crashes or driving convictions in the six-and-one-half-year period of the study.

9. The death rate of the alcoholic sample is higher than the 1965 U.S. experience in all age categories except the 56-65 years category.

10. The high crash group had a high rate of DUIL convictions.

11. The number of hospital admissions citing a diagnosis of alcoholism is statistically independent of the number of driving convictions. This suggests that previously diagnosed alcoholics who are convicted of many traffic offenses either are not being recognized as alcoholics while they are accruing these offenses, or they are being recognized but are referred to treatment sources other than those at the hospital. (See Table 2-19.)

12. Traffic convictions or crashes follow each other by time intervals that are shorter than those between any other events in the life of the alcoholic. If one assumes that a short time interval between events indicates a life problem, then this conclusion indicates that a crash or traffic conviction precedes a life problem period.

13. Events of the same type tend to follow each other. In particular, the most likely event to follow a traffic event is another traffic event.

14. The mean age of final admission to group therapy was 49 years of age.

15. There were 100 drivers in this alcoholic sample who were driving during the period 1961-67 but who were unlicensed.

16. There is a statistically significant difference (at the 0.061 level) in the distribution of male and female alcoholics with regard to the number of crashes. Furthermore, the 1108 males have a crash rate of 0.67 compared to 0.47 for the 139 females.

2.5 RECOMMENDATIONS

2.5.1 IMPLICATIONS FOR COUNTERMEASURE DEVELOPMENT. In general, the crash rate for the alcoholic sample was inversely related to advancing age. Yet the younger age groups were under-represented in group therapy attendance This under-representation may have resulted from the lack of physical deterioration and illness that causes the alcoholic to seek medical help. It may also be due to failure of the physicians to recognize and diagnose alcoholism before it reaches the chronic phase. Nonetheless, the alcoholic problem driver was not identified and referred sufficiently early for therapy to affect his crash rate. Moreover, there was a trend for the worst drivers to withdraw from therapy prior to the third day of treatment. This process of early withdrawal tended to negate the effect of therapy on these drivers. However, the alcoholic drivers who were sufficiently cooperative and took part in the therapy program had lower crash- and driver-conviction rates following therapy. In addition, the rate of hospital admission with a diagnosis of alcoholism was independent of the rate of driving convictions. This reflected the fact that, for the most part, previously diagnosed alcoholic drivers who were involved in traffic convictions were not recognized as alcoholics and referred to this hospital program.

The identification of alcoholic problem drivers is possible, but is not carried out soon enough to allow effective intervention. With continued research, the descriptors of alcoholic problem drivers should become even more refined. However, our research shows that there is a need for integration in the process of developing programs which will bring community resources to intervene in the lives of alcoholic individuals. The task remains to strengthen the cooperative effort by linking the behavior-controlling institutions such as courts, mental hospitals, and prisons, with the behavior-changing processes, such as those used in the Hurley Hospital alcoholism group therapy program. Moreover, the implied cooperation and mutual understanding of objectives should include: (1) the incorporation of information related to alcoholics' problem driving into the core of information dealt with in the therapy process, and (2) the routinization of the referral process on the part of the legal institutions.

2.5.2 PREDICTIVE MODEL IMPLICATIONS. This pilot model-building effort should be continued, tested, and refined so that we would be able to establish priorities in selecting from a population previously identified as alcoholics those groups of alcoholic drivers who should be treated first. The AID algorithm (Figure 2.12) has so far suggested that the characteristics of this alcoholic population which identify critical groups of high-crash alcoholic drivers are as follows:

1. Group (1) drivers had eight or more driving convictions not associated with crashes during the 1961-1967 period. (N = 37)

2. Group (2) drivers had 2 to 7 driving convictions not associated with crashes, more than one hospital admission every three years, and an occupation code indicating "retired" or work included in one of the upper three occupational categories, i.e., skilled manual employees or higher. (N - 228)

3. Group (3) drivers had 0 or 1 driving convictions not associated with crashes, age under 46 years, and 1 or more trauma admissions. (N = 70)

These three groups account for 27% of the sample of Hurley Hospital alcoholic drivers and 48% of all the crashes reported for the sample. However, these groupings have not been tested against independently collected data. This procedure would be necessary to validate their use in a different population of alcoholics. In addition, we have not been able to establish whether or not this alcoholic population is representative of all groups of alcoholics.

3. COMPARISON OF FOUR POPULATIONS

3.1 INTRODUCTION

In order to provide more information on similarities and dissimilarities among different driving populations, four driving populations were compared in terms of several variables. The four driving populations have been discussed in detail in earlier sections of this report. They include the Wayne County fatalities, the Hurley Hospital alcoholics, and the drivers in the Michigan Driver Profile -- a randomly selected population of Michigan drivers. The fourth population is a group of persons convicted of Driving Under the Influence of Liquor (DUIL) or Driving While Impaired (DWI). This sample will henceforth be identified as the DUIL sample.

The driving analyses for all four populations have, in all cases, been done only for drivers with Department of State driving records. They include 1,070 drivers randomly selected from the Michigan Department of State files in June 1967; 1,247 alcoholic drivers from the Hurley Hospital population; 276 drivers from the Wayne County study of fatalities; and the group of 169 drivers convicted of DUIL or DWI during the same two-year period in which the fatalities had their crashes.

Comparison between the four populations was limited to a six-and-one-half-year period as shown on the driving record. In all cases but one, this period was from January 1961 to June 1967. The DUIL sample covered a driving history period exactly two years later, January 1963 to June 1969, due to a later sample collection period. Comparison was generally limited to those driving variables which appeared with a frequency adequate for analysis. They include number of driving violation convictions, number of accidents, number of DUIL or DWI convictions (for the DUIL group: convictions previous to that used for drawing the sample), number of reckless driving convictions, and number of speeding convictions.

3.2 SEX

The four populations were compared with regard to sex of drivers. The Michigan Driver Profile (MDP) has the highest proportion of females with 33%, the Hurley alcoholics and the Wayne

County driver fatalities have 11% and 10% females, respectively. The DUIL sample has the fewest females, with only four, or 2% of the sample. One interesting sidelight to this percentage is that when this sample was first collected it included 8 females and 221 males arrested for DUIL or DWI. When the final sample was limited to persons actually convicted of DUIL and DWI, we found that half of the females had been convicted of lesser charges, although only 25% of the males had their charge reduced.

TABLE 3-1. SEX OF FOUR POPULATIONS

Population	Percent Male	Percent Female
Michigan Driver Profile	67%	33%
Hurley Alcoholics	89%	11%
Wayne County Fatalities	90%	10%
DUIL Sample	98%	2%

3.3 AGE

Fig. 3.1 shows the age distribution for each sample. As can be clearly seen, the DUIL sample and the Hurley alcoholic drivers have nearly the same age distribution, peaking between 36-55 years and with means of 44 years and 49 years, respectively. The random sample of Michigan drivers has a more even distribution across all age groups, while the driver fatalities peak at the younger ages, with 25% of the drivers between 20-25 years of age. The dotted line shows those driver fatalities with a BAL of 0.15% or higher; it can be seen that the distribution for these heavy drinkers is more closely approaching that of the alcoholic and DUIL samples, though it is still at a younger age.

The great similarity between the alcoholics and DUIL sample gives additional support to a view presented in the section on the Hurley alcoholics: The true seriousness of problem drinking, whether it be evidenced by medical complaints, a poor physical condition coupled with a referral to group therapy, or very serious driving convictions, does not become evident until a late age. It would seem that these exacerbated conditions indicating quite serious drinking problems are not recognized and acted upon until it is perhaps too late to make the desired inroads in changing the patterns of heavy drinking.

On the other hand, it is now known that the alcohol involvement of the younger crash-involved fatalities is less than that of their older fatality counterparts. Young people are more often involved in crashes, whether it be due to driving inexperience, drinking inexperience, or a combination of the two conditions perhaps exacerbated by more reckless attitudes about driving. What is not known, of course, is whether these young crash-involved drivers would subsequently have shown up some years later in the population of alcoholic or DUIL-convicted drivers, had they survived their accidents.

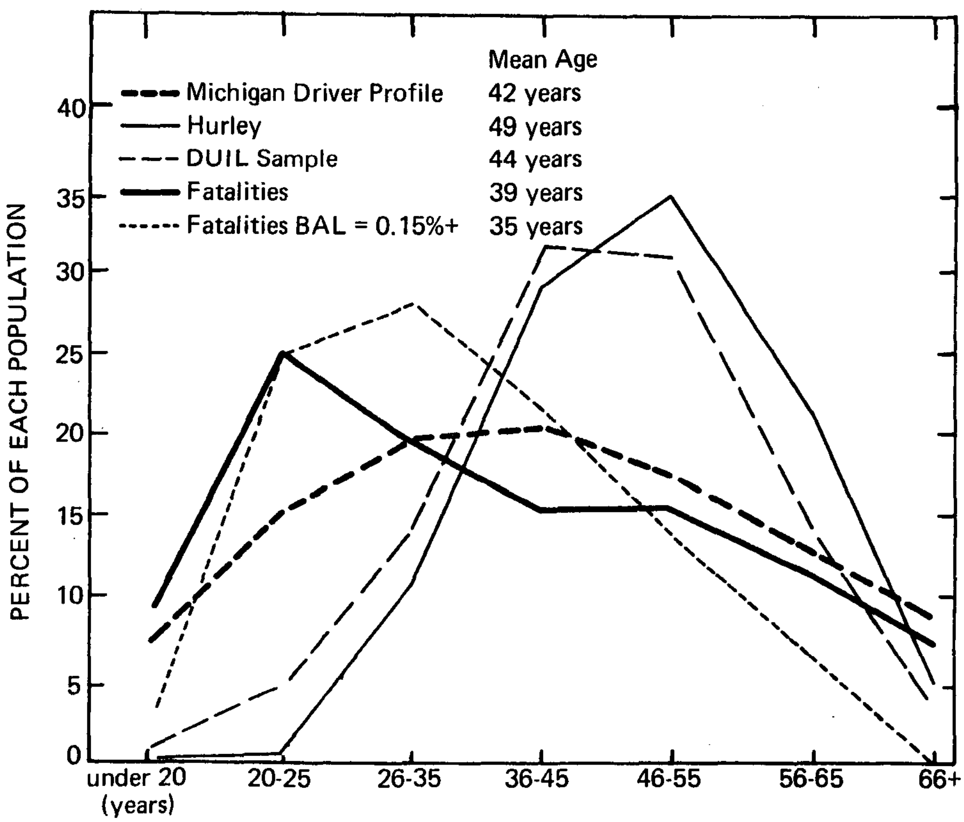

Figure 3.1. Age distribution for four populations.

3.4 DRIVING HISTORY COMPARISON

When the study of hospitalized alcoholics and crash-involved fatalities began, we expected that the alcoholics and the heavily drinking fatalities would perhaps be subsets of the same population and would thus show many similarities in driving history. When the DUIL sample was added to the study, we expected to find a third population very similar to the two aforementioned ones. Results from an analysis of the driving records of these populations indicate that the three are qualitatively similar in their driving deviancy. However, the types and degrees of deviancy differ among the populations. These degrees of deviancy are illustrated in the following discussion which compares the three populations and the MDP on each driving variable.

3.4.1 NUMBER OF DRIVING VIOLATION CONVICTIONS. The bar graph displaying the number of driving violation convictions in six and one-half years (Fig. 3.2) is a graphic presentation of the degrees of driving deviancy among the samples, as evidenced by number of convictions.

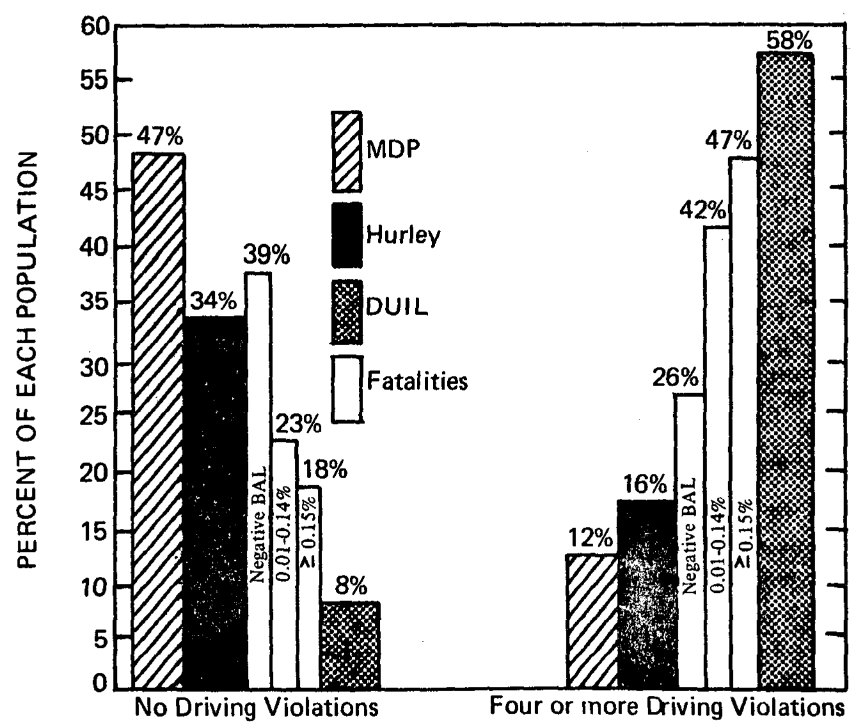

Figure 3.2. Number of driving violations in 6.5 years.

As was expected, the randomly selected Michigan drivers (MDP) had by far the fewest convictions with 47% of that sample having no convictions during the analyzed time period. Conversely, the DUIL sample had a very high number of convictions, with 58% having four or more convictions. The hospitalized alcoholics had more driving convictions than the MDP, fewer than the fatalities, and many fewer than the DUIL sample. There are at least two potential explanations for the large difference between the alcoholics and the DUIL sample. Perhaps the alcoholics are in fact not driving deviates as are the DUILs and a large number of the heavily drinking fatalities. Or perhaps because of the advanced nature of their drinking problems they are no longer able to drive, either because they are too sick, are incarcerated, or are patients in state hospitals much of the time.

We can also see that the driver fatalities have more moving violation convictions than the general population of persons holding driver's licenses, although driver fatalities who were not drinking at the time of their crash have fewer previous convictions than do their counterparts who were drinking, and especially those who were drinking heavily. In the case of the driver fatalities with negative BALs, their fatal crash involvement can perhaps be explained by a previous pattern of deviant driving behavior which left them somewhat poorly prepared to avoid a fatal crash. Because the driving records of the negative-BAL fatalities show more convictions than those of the MDP, we are less likely to attribute the occurrence of the fatal crash to external variables, but rather to the practice of driving habits which are unsafe and lead to multiple convictions for driving violations. Because the number of previous convictions for the heavily drinking fatalities is higher than for the non-drinking fatalities but more nearly similar to the DUIL group, we would be inclined to say that this is due to a lack of driving skills or lack of proper driving attitudes made much worse when combined with social or problem drinking.

If we look at the mean number of driving convictions as well as the frequencies of convictions as displayed by the bar graphs, we find the same gradation of driving deviancy between the samples (see Table 3-2).

TABLE 3-2. MEAN NUMBER OF DRIVING CONVICTIONS FOR FOUR POPULATIONS

Populations	Population Size	Mean Number of Driving Convictions
Michigan Driver Profile	1068*	1.35
Hurley Alcoholic Drivers	1247	1.78
Wayne County Fatality Drivers		
a. BAL less than 0.15%	154	3.13
b. BAL greater than 0.15%	122	4.27
DUIL Sample	169	5.47

*2 missing data

3.4.2 NUMBER OF CRASHES DURING SIX AND ONE HALF YEARS. The distribution of number of crashes (not including the fatal crash for the fatality group) does not show the gradation of driving deviancy between all four populations quite as clearly as did number of driving violations. Thus, the data suggests that crashes are not as sensitive measures of deviancy as violations, perhaps because they are rare events. The Chi square test for significant differences in previous accident distributions was used on all four populations. All groups were found to be significantly different from one another (significance level = 0.02 or lower) except when the Hurley alcoholic drivers were compared to the driver fatalities (significance level = 0.63). Thus, the alcoholic drivers and the fatalities had statistically the same distribution of accidents. As can be seen from Fig. 3.3, the MDP drivers had the lowest accident rate. Of that group 71% had no accidents in six and one half years; the mean number of accidents was a low 0.42. The DUIL sample had nearly 3 times as many accidents as did the MDP, with a mean number of 1.12 accidents and 66% of the sample having one or more crashes. This in itself clearly shows that problem drinking is highly associated with many accidents, though for this DUIL sample, at least, they were not as yet fatal to the DUIL offender.

When the accident distribution for the Hurley alcoholic drivers and the driver fatalities is compared, they are not very similar. Both rates are considerably higher than the MDP but are approximately half that of the DUIL sample. Table 3-3 presents

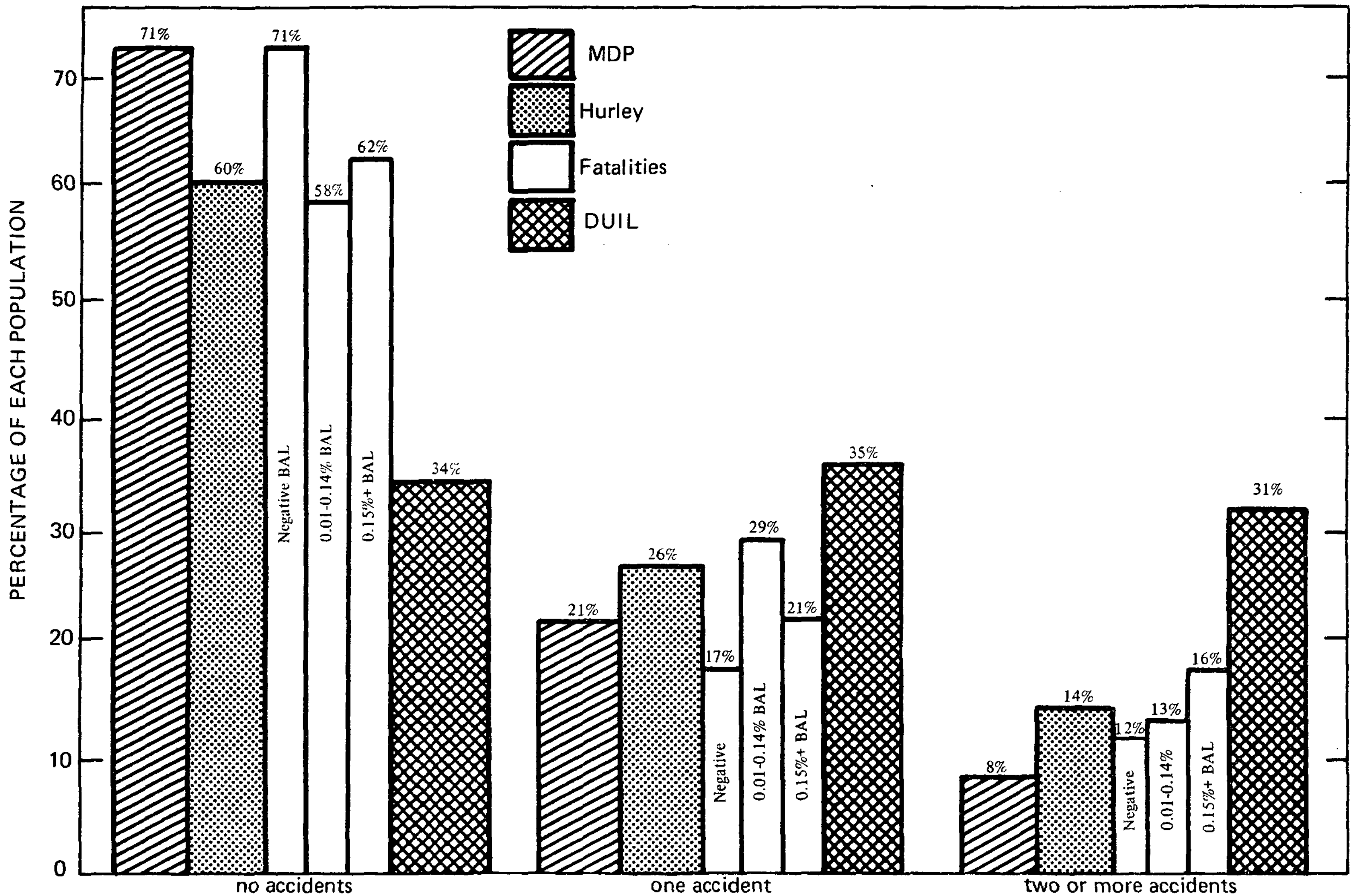

Figure 3.3. Distribution of number of accidents for four populations.

the mean number of crashes for each population. For the driver fatalities means are given both for those with BAL less than and greater than 0.15%.

TABLE 3-3. MEAN NUMBER OF ACCIDENTS FOR FOUR POPULATIONS

Population	Mean Number Accidents
Michigan Driver Profile	0.42
Hurley Alcoholic Drivers	0.62
Wayne County Fatalities	
a. BAL < 0.15%	0.53
b. BAL ≥ 0.15%	0.66
DUIL Sample	1.12

Driver fatalities who were not drinking or who were drinking but had a BAL less than 0.15% had a mean of 0.53 crashes, which was higher than that for the MDP, but lower than that for the Hurley alcoholics. The heavily drinking fatalities (BAL ≥ 0.15%) had a mean of 0.66, which was higher than that for their counterpart fatalities and slightly higher than that for the Hurley alcoholics.

Although the rank order is similar to that found in the group with driving violation convictions, there is an anomaly in the previous crash rate of the fatalities. Table 3-4 shows the mean number of crashes for those fatalities who had their fatal crash in Detroit and those who had their fatal crash outside Detroit but within Wayne County.

TABLE 3-4. MEAN NUMBER OF PREVIOUS CRASHES FOR DETROIT AND NON-DETROIT FATALITIES

	BAL			
Fatalities	Neg. to 0.14%		0.15%+	
	(N)	(Mean)	(N)	(Mean)
Detroit Fatalities	70	0.51	64	0.43
Non-Detroit Fatalities	84	0.54	58	0.90
All Fatalities	154	0.53	122	0.66

As would be expected, the mean for the non-Detroit fatalities with BAL ≥ 0.15% is much higher than that for the lower BAL group who also had their fatal crash outside the Detroit city limits.

However, this expected distribution does not hold for the Detroit fatalities. The high BAL group has a low mean of 0.43 crashes. The reasons for this are as yet unclear. Perhaps there is an unknown bias in the reporting of crashes in Detroit* which especially affects drivers who in the past, as well as during their fatal crash, are likely to have been drinking heavily. If we thought that Detroit provided a special environment not likely to produce as many crashes as the remainder of the County we would expect to find a lower crash mean for those Detroit fatalities who were drinking less or not at all during their fatal crash. Yet, this hypothesis is not supported by the data.

3.4.3 DRIVING UNDER THE INFLUENCE OF LIQUOR OFFENSES. For all four populations DUIL/DWI offenses were relatively rare events compared to the occurrence of other specific types of driving violations. The sample with the fewest number of DUIL/DWI offenses was the Michigan Driver Profile, with 1% having this type of violation. Four percent of the driver fatalities had such an offense. The groups with the highest percentage were the DUIL sample with 12% (exclusive of the violation for which sampled) and 16% for the Hurley alcoholics. Table 3-5 shows the frequency of occurrence of these violations. As can be seen, the Hurley and DUIL samples are the sole ones in which persons had more than two such violations in the six and one-half years.

TABLE 3-5. NUMBER OF DUIL/DWI OFFENSES FOR FOUR POPULATIONS

		Number of DUIL/DWI Offenses			
Population	Population Size	0	1	2	3+
Michigan Driver Profile	1071	1059	11	1	0
Wayne County Fatalities	276	264	8	4	0
DUIL Sample	169	149	16	3	1
Hurley Alcoholics	1247	1041	156	39	11

*Non-fatal accidents occuring in Detroit were under-reported to the Department of State until 1967. However, this under-reporting should affect both groups of Detroit fatalities, not just those with high BAL.

All four samples were statistically different from one another when number of persons with and without DUIL convictions were compared by frequency.

The mean number of DUIL/DWI convictions (see Table 3-6) is another interesting way to look at the differences and similarities between the samples, especially when the fatality sample is subdivided into two groups, high BAL at death and low BAL at death.

TABLE 3-6. MEAN NUMBER OF DUIL/DWI CONVICTIONS FOR FOUR POPULATIONS

Population	Population Size	Mean Number DUIL/ DWI Convictions
Michigan Driver Profile	1071	0.01
Wayne County Fatalities		
a. BAL Neg.-0.14%	154	0.01
b. BAL 0.15%+	122	0.11
DUIL Sample	169	0.15
Hurley Alcoholics	1247	0.22

This shows very clearly that those fatalities who were not drinking or who were drinking with BALs less than 0.15% have the same mean number of convictions as the MDP. The mean for those fatalities who died after heavy drinking involvement approaches very nearly that for the DUIL sample, although that sample still has a mean half that of the Hurley alcoholics.

3.4.4 RECKLESS DRIVING OFFENSES. Convictions for reckless driving are one of the more interesting types of convictions to compare, not only because they are a rather serious type of offense, but also because there are good indications that alcohol-related charges have often been reduced to reckless driving in the past. The percentages for the occurrence of this offense (see Table 3-7) indicate that all the samples are quite similar in the percentage having a reckless driving conviction, with the exception of the Michigan Driver Profile.

Of further interest is the fact that of the 28 fatalities with a reckless driving conviction (10% of the sample), 18 had a BAL 0.15% or higher, and 5 drivers had a BAL from 0.01%-0.14%.

TABLE 3-7. PERCENTAGE OF FOUR POPULATIONS WITH RECKLESS DRIVING CONVICTIONS

Population	Sample Size	Percent Having Reckless Driving Convictions 0	1 or more
Michigan Driver Profile	1071	97%	3%
Wayne County Fatalities	276	90%	10%
DUIL Sample	169	86%	14%
Hurley Alcoholics	1247	90%	10%

The mean number of reckless driving convictions shows a gradation of deviancy similar to that found between the samples on other variables. For the MDP the mean was 0.04; driver fatalities with a BAL less than 0.15%, 0.08; BAL greater than 0.15%, 0.18; the DUIL sample, 0.15; and the Hurley alcoholics, 0.11.

3.4.5 SUMMARY OF FOUR-POPULATION COMPARISON. Table 3-8 ranks the populations according to the mean incidence of each type of driving event. They are ranked from 1 to 5. The population with the lowest mean number of events is ranked 1. The population with the highest mean number in any category is ranked 5.

TABLE 3-8. RANKING OF FOUR POPULATIONS BASED ON MEAN INCIDENCE OF EACH DRIVING EVENT

	Driving Variables							
	Driving Convictions		Previous Crashes		DUIL Convictions		Reckless Convictions	
Population	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean
MDP	1	1.35	1	0.42	1.5	0.01	1	0.04
Hurley Alcoholics	2	1.78	3	0.62	5	0.22	3	0.11
Low BAL Fatalities	3	3.13	2	0.53	1.5	0.01	2	0.08
High BAL Fatalities	4	4.27	4	0.66	3	0.11	5	0.18
DUIL Sample	5	5.47	5	1.12	4	0.15	4	0.15

Results indicate that in these rankings, high BAL fatalities and the DUIL sample are most similar. They both rank high on all events. Low BAL fatalities are similar to the MDP in their low ranking on all events. Hurley alcoholics have a low mean number of driving convictions although they are highest on mean number of previous DUIL convictions.

When age was compared between the populations, the Hurley alcoholic and the DUIL sample had nearly the same distribution, peaking between 36-55 years. Driver fatalities peak at a much younger age; and the Michigan Driver Profile distribution shows a bell-shaped curve across all ages.

4. RÉSUMÉ OF TEN COURT-RELATED TREATMENT PROGRAMS FOR THE ALCOHOLIC (PROJECT III)

4.1 INTRODUCTION

A description and analysis has been made of ten published accounts of court-related alcoholic treatment programs conducted in the United States over the past twenty years.

Evaluation techniques were used in seven of the ten programs. The results consistently indicated that court-related treatment could be successful for at least half of the clients seen. The somewhat coercive approach was not a detriment to the treatment outcome, and the courts provided a readily available case-finding source.

The personnel of both the evaluated and non-evaluated programs expressed a very positive reaction to the court-related treatment approach.

Therefore, mindful of the delicate problems involved in dealing with the rights of the individual, the tentative conclusion is that enforced therapy can be a constructive deterrent to future deviant behavior by motivating the alcoholic to seek help in changing his pattern of response to crisis events and to his life situation. When adequate evaluative measures are incorporated into the planning of experimental programs, and the results analyzed, conclusions drawn in the future will be more than tentative.

4.2 BACKGROUND

The World Health Organization has written the following definition of an alcoholic:

> Alcoholics are those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable mental disturbance or an interference with their bodily and mental health, their interpersonal relations, and their smooth social and economic functioning; or who show the prodromal signs of such development. (World Health Organization, 1952)
>
> Other persons, such as some sociopaths, who do not manifest evidence of pharmacologic dependency on alcohol are also problem drinkers, repeatedly exhibiting social difficulties associated with alcohol abuse. (U.S. Department of Transportation, 1968)

The alcoholic or problem-drinker is detrimental to himself and society. Not only do he and his family suffer but he is also costly to industry.

> Due to the progressive nature of alcoholism there is usually a period of several years between the onset of the disease and the time when the disease becomes obvious to management. During this period, an employee is relatively unproductive--he costs management money .... Professor Harrison M. Trice...has listed three aspects of the problem drinker's work life which reflect his alcoholic condition--job efficiency, absenteeism, and accidents. (Dana 1963).

The problem drinker constitutes a traffic problem: in highway fatalities, 1% to 4% of drivers with a blood alcohol concentration of 0.10% or more have been causing 50% to 55% of all single-vehicle crashes in which drivers are fatally injured. And in all types of fatal crashes almost half the drivers are found to have blood alcohol concentrations of 100 mg per 100 ml (0.10% by wt/vol.) and greater. "Alcoholics and other problem drinkers, account for a very large part of the overall problem" (U.S. Department of Transportation 1968).

He is expensive to the legal system: In 1964, 40% of all arrests in America were for drunkenness, either in a public place or while driving (Plaut 1967). In 1958, at least 70% of the local jails were filled with those arrested on charges involving inebriation (Willard 1958). Because the above offenders were also repeaters (Pittman 1965), the assumption is made that within this group are also a disproportionate number of problem drinkers or alcoholics.

There are two approaches used to prevent alcoholic behavior and protect society from the alcoholic. One is a punitive, short-term approach. The other is a therapeutic long-term approach. The punitive approach includes job loss, fine or jail, and license suspension. It is intended to reprimand the offender for his deviant behavior and to protect society by preventing recurrence of that behavior, either by removing the offender from society or convincing him not to repeat that particular action.

The second approach, therapy or treatment, is any effort outside of the punitive approach which attempts to constructively guide the individual toward a changed pattern of behavior sothat he may exist as a functioning element within society. Essentially the goals of both approaches are the same: to protect society and prevent the individual from repeating his deviant behavior. Treatment offers something additional: the goal of rehabilitating the individual so that he can again be a productive member of society.

Society has often relied upon the punitive approach although the results seem minimal. The many driving offenders who may eventually cause fatalities seem impervious to threat of license suspension or revocation (Coppin & Van Oldenbeck 1965). The large number of drunkenness offenders who are also recidivists indicates that the common punishment of fine and jail is not always an adequate deterrent--although the alcoholic subset from skid-row seems to be more affected by fine than the work-house (Lovald and Stub 1968). Job loss probably increases the chance that the alcoholic will drink more heavily and precipitate a traffic crash (Selzer and Ehrlich 1969).

There are indications that the therapeutic approach is a viable alternative to punishment. However, according to Ditman, et al. (1967) "there is no available body of evidence which clearly indicates the relative effectiveness of these two approaches."

Court-related treatment programs attack the problem presented by the alcoholic by combining the two approaches, thereby increasing the chances of successful rehabilitation. Courts have the option of giving the defendent a choice of fine and jail, or therapy after a pre-sentence investigation which determines what approach is most advantageous for the individual. Given the two choices of fine/jail or treatment, it becomes obvious that a certain amount of pressure is being exerted to induce the alcoholic to choose treatment. It must then be asked whether treatment becomes ineffective if entered unwillingly.

There is a prevalent attitude, which is fostered by programs such as Alcoholics Anonymous, that an alcoholic cannot benefit from treatment unless he admits his problem and actively seeks help. The first step in the Twelve Steps "creed" of Alcoholics Anonymous reads: "We admitted we were powerless over alcohol--that our lives had become unmanageable." Unfortunately a long period of time can elapse before the life of the problem drinker indeed becomes unmanageable and he is motivated to seek help in order to change his pattern of behavior. In the interim he is causing harm both to himself and others. What motivations prod the alcoholic toward treatment besides his own recognition of need? Are other reasons for accepting help less successful?

> [O]rdinarily an alcoholic will not seek help until he has incurred great losses. Alcoholics still employed often do not feel this pressure, but referral by the employer using a probationary status and threat of loss of employment impels acceptance of treatment. Thus an attempt is made to manipulate the alcoholic's denial system (Demone, 1963).

This approach is now being used more frequently by industry (Dana, 1963).

According to Lemere _et al._ (1958), patients were seldom willing to receive treatment within a hospital setting. He studied the motives of 1,038 patients for accepting treatment and concluded:

> [F]ew...would have sought abstinence had not some sort of pressure been put on them to give up their habit. The decision to stop drinking is usually prompted by the threatened loss of job, family, security, physical or mental health, or the respect of associates. Many patients, for example, agree to treatment only after a wife has filed suit for divorce or an employer has made it clear that employment is contingent on elimination of the drinking problem.... Once brought to treatment by either direct or indirect duress many patients who at first want to continue drinking and do not believe they are alcoholics eventually change their minds and choose abstinence as a way of life.

4.2.1 PURPOSE. What follows is a general analysis of published court-related treatment programs. It is a guide to be utilized by program planners as they consider the court system as a method of inducing the alcoholic to accept treatment. They and others directly concerned with alcoholics will be interested in the tentative results indicated here of the court-related treatment approach.

4.2.2 METHODS. An endeavor was made to evaluate and synthesize a representative cross section of published descriptions of alcoholism programs which deal solely with court-related treatment or which handle clients referred by the courts. This review is further limited to programs attempted in out-patient settings within the United States over the past twenty years.

By outlining these programs, an effort will be made to ascertain how a subject was selected for treatment; the role played by the courts in this selection; the duration and type of therapy used and their results; methods used for evaluating the results; staffing and the role of each member. Following discussion of the programs, evaluation techniques and other approaches to motivation will be considered.

The outline used in summarizing each published account was based on the format used by Hill and Blane (n.d.) but elaborated upon in order to include some peripheral questions:*

1. Is therapy more advantageous if the client's family is included?
2. What subgroup of alcoholics is predominately being treated through these programs?
3. What are the referral sources?
4. Is use made of other community agencies in treating the alcoholic?

4.3 DISCUSSION

The following is a summary of Table 4-1 which deals with author, follow-up, length of therapy, number of patients, location, and year of publication. Out of ten programs only one (Ditman, et al. 1967), performed a follow-up study one year or more after the end of the program. Other programs collected their results immediately to six months after treatment completion but did not incorporate long term follow-up activities in their evaluation. Three of the ten programs were not evaluated at all.

The length of therapy varied from ten days to one year. It was reported by Thomas, et al. (1959) that there appeared to be a direct correlation between the length of therapy and its success: eight or more visits yielded 80% success on two or more variables whereas only 26% improved with fewer than eight sessions.

Half of the programs had a flexible range of treatment length. In one description (Thomas, et al. 1960) certain patients remained in treatment for 2 weeks while others remained through 37 weeks,

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*The format used and detailed summaries of the treatment programs analyzed are presented in Appendix O.

TABLE 4.1 PROGRAM PARTICULARS

Author	Follow-Up	Length of Therapy	Number of Patients/Study	City & State	Year of Article
Bourne	Immediately after therapy	1-9 months	62 volunteers 132 controls	Atlanta, Georgia	1966
Brown	No evaluation	not stated	258	Prince George County, Maryland	1962
Brunner-Orne	2 months after therapy	up to 10 months	38	Stoughton, Massachusetts	1951
Davis & Ditman	Immediately after therapy	15 weeks	26	Los Angeles, California	1963
Ditman ('67)	30 days to 1 year	30 days to 1 year	301	San Diego, California	1967
Maier & Fox	3 months after therapy	3 months	29	Georgian Clinic, Atlanta, Georgia	1958
Mills & Hetrick	No evaluation	--------	---------	Cincinnati, Ohio	1963
Thomas ('59)	Immediately after therapy	2-37 weeks	77	Maryland Alcoholic Clinic	1958
Thomas ('60)	Not stated (length of project: 3 years)	10 weeks	80	Maryland	1960
Pinardi	No evaluation	court program 90 days; C-4: 10-30 days	---------	Miami, Florida	1966

depending on need. Other programs had a set period of time for which attendance was required (Davis 1963, Ditman 1967, Maier and Fox 1958, Pinardi 1966, and Thomas, et al. 1960).

The majority of the programs were located in the East: Massachusetts (2) and Maryland (3). Two were set up on the West Coast, one each in Florida and Cincinnati, and two in Georgia.

On the basis of published accounts it is assumed that relatively little effort was made in the area of treatment programs prior to 1958. There is little published information about current efforts being made in the area of court-related treatment programs and it could not be determined if any of the reported programs are still in existence.

The number of patients per study ranged from 26 to 201. In most cases there was an adequate sample size but only one program (Bourne, et al. 1966) had a control group.

The most useful and detailed description of a health department related alcohol clinic was given by Thomas, et al. (1959). Mills and Hetrick (1963) gave a thorough description of the court referral process. Readers interested in more detail should refer directly to these articles. The above authors both felt that social agencies tend to reject alcoholics for treatment.

Table 4-2 deals with the method of evaluation used for each study and the criteria for success. The methods range from use of arrest records only, to combined reporting by probation officers, therapist, friends, relatives, and other patients. Of seven programs only five described their methods and only three of the five used more than one method.

The criteria for success (Table 4-3) ranged from a single criterion (e.g., a reduction in the number of arrests) to a complex overview including improvement in drinking pattern, (amount and frequency), family and social adjustment, occupational adjustment and physical status. One program did not state criteria and only three had more than one criterion for suceess.

Table 4-4 summarizes the success of each program. Because of the diversity and number of evaluative methods, variations in criteria for success and lack of follow-up, the results of the programs cannot be rigorously summarized. Nevertheless, all

TABLE 4-2. METHOD OF EVALUATION

Number of Studies	Method of Evaluation Used for Each Study
3	No evaluation
1	Arrest records
2	Not stated
2	Case records and reports from courts and probation officers
1	Questionnaires
1	Reports from probation office, therapist, friends, relatives and other patients

TABLE 4-3. CRITERIA FOR SUCCESS

Number of Studies	Criteria for Success Used for Each Study
1	Reduction in number of arrests
2	Number in treatment for full length of program
1	Continued contact; improvement in drinking, decreased arrests
3	No evaluation
1	Not stated
2	Improvement in: drinking pattern (amount and frequency) family and social adjustment ocupational adjustment physical status

TABLE 4-4. PROGRAM PARTICULARS: METHODS OF EVALUATION, CRITERIA FOR SUCCESS AND RESULTS

Author	Method of Evaluation	Criteria for Success	Results
Brown, Mills & Hetrick, Pinardi	No evaluation	-------------------	---------------------
Bourne	Not stated	Number still in treatment at end of program period	Volunteers: 32 of 64, 50% (1-9 months) Controls: 61 of 132, 46% (1-3 1/2) months) Of 71 inactives, 17 had completed sentences
Brunner-Orne	Case records and reports from courts and probation officers	Not described	58% improved
Davis & Ditman	Not stated	Drop-out rate	90% still attending at the end of 6 months
Ditman ('67)	Local police "rap" California criminal identification and investigation report	Number of re-arrests	Failed to reduce likelihood of recidivism
Maier & Fox	Reports from probation office; friends and relatives, other patients, therapist	Continued contact, drinking, arrests	Improved: 38%
Thomas ('59)	4 questionnaires	Drinking Family Occupation, employed Physical	Improved: 69% 51% 45% 39%
Thomas ('60)	Police and caseworker records	Drinking Family and social history Occupational (became employed) Health	Improved: (no. of cases out of 80) 60 (75%) 48 (60%) 12 out of 18 (67%) 42 (58%)

of the authors felt that the court-related approach had potential as a motivational technique. According to the individual program's criteria for success, a range of 38%-90% of the clients showed improvement.

Table 4-5 lists the various types of treatment methods and staff. Treatment varied from singular reliance on medication to a combination of methods including individual and group therapy, medication, and casework counseling with the spouse of the client. The treatment services in most cases appeared to be substantial.

The staff ranged from probation officers to medical teams including psychiatrist, psychologist, psychiatric social workers, and mental health nurses. The role of each member was usually minimally described.

Two authors summarized necessary stipulations for successful treatment in relation to court or clinic.

> The success of the judge-directed referral for compulsory treatment depends upon (1) the Court Clinic's careful screening of the alcoholic (limiting participation in treatment to those who seem potentially responsive to it), (2) preparation of the defendent for the referral by clinic and probation staff, (3) an effective working liaison between the Alcoholism Clinic and the Municipal Court, (4) the Alcoholism Clinic's ability to adjust its therapeutic strategy and outlook to accommodate Court referrals, and (5) most important, supervision by a probation officer during the treatment period. A weak link in the above procedures creates an opportunity for the patient to evade treatment and consequently brings about another failure for him. (Mills & Hetrick, 1968)

> The quality of medical care can be measured by three variables: The technical skills of the caretaker, the time for the patient, and continuity of care. In each of the experiments, improvement over existing practices by these three measures was introduced into the institutional setting. Time was given to the patient. Contact was made prior to discharge from the institution. Referrals were made to specific clinics and individuals for a definite time. Follow-through occurred. The caretakers were competent and experienced in working with alcoholics, although their specific training did not appear to be a critical variable. However, these caretakers shared two beliefs--that the patient could be helped, and that the responsibility rested upon them, not upon the patient. Their approach was "aggressive" (Demone 1963).

TABLE 4-5. TREATMENT METHODS AND STAFF

Author	Treatment Methods	Staff
Bourne	Antabuse and tranquilizers	physician, court probation officer
Brown	Medical, group, and individual therapy	psychiatrist, psychologist, psychiatric social workers, mental health nurse
Brunner-Orne	Medication, disulfide therapy, individual and group therapy	psychiatrist, probation officers, physician, psychologist
Davis & Ditman	Group psychotherapy and medication	not stated
Ditman ('67)	No treatment, or alcoholic clinic, or Alcoholics Anonymous	not stated
Maier & Fox	Medical, group, and individual therapy	psychologist
Mills & Hetrick	Individual and group psychotherapy, therapy and medication, casework counseling with spouse	probation officer, psychiatrist, psychologist, psychiatric caseworker
Pinardi	Counseling, group therapy, vocational rehabilitation counseling, AA meetings with community resources	probation officer and C-4 staff (not described)
Thomas ('59)	Individual and group psychotherapy, nursing and medical care	psychiatrist
Thomas ('60)	Counseling	social worker

It was slightly more difficult to answer some of the peripheral questions. Half of the studies mentioned inclusion of the family in the treatment complex and four specifically stated that admission of the spouse to counseling increased chances for successful rehabilitation of the alcoholic.

The economic and social subgroups of alcoholics treated through these programs depended upon the location of the clinic, and the purpose of the program. While three did not state which social and economic groups were involved, four programs treated lower- to upper-middle class clients who were somewhat stable financially and maritally. Three programs dealt with recidivists, i.e., persons repeatedly arrested for offenses related to alcohol consumption--two of these groups specifically mentioned dealing with skid-row alcoholics.

Clients were referred solely by the courts in seven programs while two clinics accepted referrals from several origins: doctors, family, service agencies, Alcoholics Anonymous, and the courts.

Five programs mentioned using other community agencies as additional treatment sources but the use was generally minimal. Four programs did not state whether or not they referred clients to other agencies.

In summary, there were obvious omissions in the programs:

1. Not all of the programs were evaluated and there was little follow-up data collected after an appropriate time lapse for determination of long-term program effectiveness.
2. It was difficult to determine from existing data whether the length of the treatment was adequate or inadequate in terms of long-range effectiveness.
3. Sample size was generally sufficient but most programs had no control groups.
4. Methods of evaluation and criteria for success often appeared insufficient or were poorly described.
5. Types of available treatment appeared to be ample. Staff description was sparse.
6. Information about the role of the court in pre-sentence investigation was sketchy.

4.4 CONCLUSION

Aside from these criticisms, results were consistent enough to indicate that court-related treatment is successful. However, the general community needs to reconsider its lack of response to the alcoholic and search for a variety of motivational techniques.

Five authors specified a need for immediate contact with helping agencies at the time of crisis (Thomas 1959, Davis and Ditman 1963, Brown 1962, Mills and Hetrick 1963).

This may indeed be a key element in getting the problem drinker into the treatment complex. Partial intake could occur the same day a potential client contacts an agency--as in the Maryland clinics (Brown 1962).

Various other types of crisis situations could be used to persuade the client to seek treatment. Family doctors, clergy, and employers could all be highly effective referral sources.

If a patient indicated need and willingness, a doctor could take the initiative, call an alcohol clinic or social agency, make an appointment and, if necessary, prod and check to make sure his patient kept that appointment. This would be time-consuming for the already harrassed doctor but it could save much of his valuable time in the future.

Consistent, <u>coordinated</u> community interaction is necessary. Help for an individual client can come from numerous sources, e.g., state employment services, welfare services, and legal aid societies.

Within the court diagnostic work-up, terms should be defined (e.g., problem drinker and alcoholic) and objective criteria set for deciding who needs treatment. Fines and punishment should be consistently applied (Burnett 1965).

Authors of the various programs indicated other needs:

1. Alcohol education for professional workers in a variety of fields (e.g., education, social work, medicine, and law).
2. A central information and emergency counseling service should exist (e.g., The Crisis Center in Ann Arbor, Michigan).

3. Intensive follow-up is needed for those who terminate treatment early.
4. If the patient begins therapy within an institution, follow-through should take place in an out-patient setting.

In order to develop the above ideas into workable endeavors, evaluation of existing programs must occur and be utilized as references.

Researchers agree that countermeasure programs should be subjected to evaluation: Do the programs do what they purport to do? The cost of implementation and continued operation of any program must be borne by the society. Society has a right to know whether it is getting its money's worth and individual sponsors of countermeasure programs ought to have a similar concern. Cost/benefit criteria need not be satisfied on clearly experimental programs, but evaluation procedures must be included. Only then can sensible decisions regarding the desirability of full-fledged program implementation be made.

To ensure objectivity in data collection, analysis, and interpretation, the program evaluators should be different from those operating the program and evaluation techniques should be designed before, rather than after, a program starts.

Data analysts ought to be engaged at the very outset to clarify program objectives, devise measures of effectiveness that will be used in evaluation, define the data needed, and advise. When the data analysis actually begins, the time and effort spent on these activities will pay for themselves and will contribute immeasurably to the quality of evaluation. (Filkins 1970)

Hill and Blane (1967) spell out what they consider to be basic requirements for the development of adequate evaluation measures to be incorporated in the program planning:

1. In order to attribute change to a specific treatment, it is necessary to show that the change would not have occurred without the treatment; this requires the use of a comparison or control condition (either a non-treated group or a group treated with a form of treatment other than that under investigation).

2. In order to make treatment and control conditions truly comparable, the individual patients in each group must have had an equal chance of being assigned to the treatment or control conditions. This entails the use of a subject-selection procedure that ensures random assignment of patients to various treatment conditions.
3. In studying change in behavior it is necessary to select and define the type of behavior that is to be evaluated; this selection, however arbitrary, must be either theoretically or empirically relevant to the presumed effects of treatment.
4. It is necessary to establish reliable methods and instruments for measuring any change in behavior.
5. If a change in behavior is to be measured, it is necessary to obtain pretreatment baseline measures against which later measures, either during or after treatment, can be compared. This means that the same measures must be applied before and after treatment.

Elaboration is made on each of the above points within the context of the article. They also discuss the necessary elements to consider when reporting a program in the literature.

Chafetz (1965) comments on criteria of success:

> ...there exists a distinct and unfortunate tendency to accept therapists' or patients' statements about therapeutic change and effectiveness as being the ultimate in validity. Unfortunately, with time and repetition, these statements of treatment effectiveness assume unwarranted conviction...many of the inadequacies of treatment-effectiveness evaluation can be remedied. For example, beside collecting the statements of therapists and patients, we can cross check them with relatives and friends. Further, we can categorize a wide variety of life experiences such as occupational change, marriage, death of a relative, change in residence, and so forth, which may have an effect on change during the course of treatment. Variables of change, operationally defined and hence amenable to reliability study, can be developed. The most obvious relevant variable of change for alcohol-related conditions is change in drinking behavior. Please note I have not said abstinence, but change in drinking behavior.
>
> For certain alcoholics, a meaningful, indirect measure of change in drinking behavior not subject to distortion is change in pattern of arrest and imprisonment for drunkenness. Another measure for certain alcoholic subgroups, is change in pattern of hospitalization for sobering up or as a consequence of drinking. A third measure for change in drinking patterns can be established by measuring patterns of work days and absenteeism...these measures with the statements of the patients, their relatives, and others close to

> the patient, and by a system of cross checking, the evaluator may derive more reliable evidence of change... Crucial to measuring change are follow-up procedures for long periods to gather material to assess effectiveness of treatment. Only after activity where pre-therapeutic levels have been assessed, multiple measures of change have been used, and follow-up has been at a significant level is one relatively justified in generalizing findings of change.

The alcoholic is a problem to society in terms of cost to the legal system, and cost and loss to industry. He is a contributory cause of highway death and injury, and most importantly he represents the loss of a viable, productive human being. If six million is an accurate estimate of the number of alcoholics in this country today, then attempts at solutions are very meager. Even more so is the effort to evaluate the solutions being offered.

Though there were inadequacies in the evaluation procedures of the programs presented, there was a consistent trend toward success. But in order to have continuing success with any alcohol program, research must be methodically and thoughtfully planned. Results should provide planners with a sense of direction. Hopefully, future evaluation will support the above trends toward success and provide more substantial knowledge that program efforts are <u>not</u> exercises in futility.

Appendix A

PATHOLOGICAL AND TOXICOLOGICAL METHODOLOGY

by

John F. Burton, M.D. and Herbert R. Wetherell, Ph.D.

Contents

A.1. SUMMARY REPORT (July 15, 1967 to August 31, 1969) OF THE OFFICE OF THE MEDICAL EXAMINER OF WAYNE COUNTY on SUBCONTRACT NO. 1 (Under PRIME CONTRACT FH-11-7129)

This report can be conveniently divided into two topics, pathology and toxicology. Certain general remarks, however, are applicable to both fields.

The case material consisted of all drivers, passengers, and pedestrians 16 years of age and older whose bodies were brought to the Wayne County Morgue as traffic fatalities. In practice, nearly all such bodies are brought to the morgue; the only exceptions are persons who survive for such an extended period of time in a local hospital that the attending physician is qualified to to sign the death certificate. Not all of the bodies brought to the morgue would be suitable case material for this study, however, since analysis for alcohol and certain other drugs would be meaningless where the individual had survived long in the hospital. It was decided to include those cases where death had occurred within 24 hours of the accident. The accepted rate of disappearance of alcohol from the blood (0.01 - 0.015% w/v per hour) indicates that only in those cases where the alcohol concentration had been approximately 0.25% w/v or greater at the time of the accident would there be a positive result 24 hours later. As will be seen from the summary of the results, a significant number of the persons who died at the time of the accident had concentrations of alcohol of 0.25% w/v or greater. Obviously, the shorter the interval between the accident and death, the greater the oppurtunity of detecting a positive alcohol and of extrapolating back to a presumed concentration of alcohol in the blood at the moment of the accident. This latter calculation is beset with many difficulties, however, and is at best an approximation. It was felt, therefore, that the 24-hour time interval which was adopted had much to recommend it.

Specimens were withdrawn for both toxicological and pathological studies. When an autopsy was performed, blood, spinal fluid, urine, stomach contents, and liver were obtained (if all were available). The blood was a pooled specimen from the heart and great vessels. The spinal fluid was obtained either by lumbar puncture or from the ventricles in the brain at the discretion of the pathologist. When no autopsy was performed, stomach contents could not be obtained. The blood was obtained via cardiac puncture with needle and syringe, the spinal fluid by lumbar puncture, and the urine from the urinary bladder by means of needle and syringe.

Finally, it should be emphasized that these are specimens from dead bodies and of course cannot be compared to the similar fluids obtained from living patients in a hospital. Many times the spinal fluid and/or urine was bloody. The blood often had large clots present, the relative proportions of serum and red blood cells were greatly disturbed by hemorrhage and/or stagnation, etc.

A.2. PATHOLOGY

The focus of the pathologic study was on the liver, and cirrhosis, in particular. When no autopsy was performed, a surgical biopsy was obtained. The specimens were obtained by an incisional entry three to four inches in length through the right 8th intercostal space in the anterior axillary line. The overlying diaphragm was then incised, the rib edges were separated by instrument, and the tissue block was removed from the surface of the liver. This block averaged 4 x 2.5 x 0.4 cm. The sections taken from the block included the liver capsular surface and a portion of the deep part of the block. In cases that were autopsied, the approach permitted sections from deeper areas within the right lobe of the liver.

The standard microscopic examination followed histologic preparation after fixation in 10% neutral formalin fixative. The usual embedding and cutting procedures were followed and the sections were stained in the routine manner with Hematoxylin-Eosin using Harris' Alum Hematoxylin and acid alcohol Eosin. Masson's trichrome procedure was followed using Bouin's fixative for a mordant (Armed Forces Institute of Pathology, 1960). The stains employed were Weigert's iron hematoxylin, Biebrich scarlet-acid fuchsin solution, and aniline blue solution.

The examinations were viewed microscopically first through the scanning lens, then the low-power lens with objective magnification of 10 diameters, and finally with the high-dry objective with magnification of 40 diameters.

The histologic sections of liver so obtained were evaluated for the presence or absence of cirrhosis and graded by the use of a score sheet. This method of appraisal was chosen to arrive at a uniform standard for final diagnosis, since the grading of the severity of disease may vary among pathologists of long experience. The basic textbook changes common to cirrhosis of the liver were applied to all cases, and each feature was checked as the slide was read. These included fibrosis, fat, necrosis, bile duct proliferation, bile stasis, and infiltration by various leucocytes, including lymphocytes, plasmacytes, monocytes, and neutrophils.

On the basis of the aforementioned features the question of cirrhosis: Yes or No, was then answered and checked on the score sheet. A separate column for gradation of cirrhosis through early, intermediate, and late stages was added to be used when needed. The concentration of alcohol in the blood in each case was not known to the pathologist at the time of the tissue evaluation, to avoid prejudice to his decision.

A.3. TOXICOLOGY

A.3.1. ALCOHOL DETERMINATION. The determination of ethyl alcohol in the specimens (blood, spinal fluid, urine, and stomach contents) was carried out utilizing the microdiffusion technics of Conway (1958). Specifically, the method of Williams and Zak (1958) was employed, which depends upon the reduction of dichromate ion in 50% sulfuric acid. The minimum detectable concentration of alcohol is 0.01% w/v and the method has a standard error of $\pm$0.01% w/v.

Specificity for ethanol was assured by demonstrating the absence of formaldehyde, methanol, acetone, and isopropyl alcohol using qualitative tests (Feldstein 1960). These tests are capable of detecting as little as 2 mg/100 ml of methyl and/or isopropyl alcohols, and 0.2 mg/100 ml of formaldehyde and/or acetone. The absence of any of these four substances is implied in each case analyzed for ethyl alcohol unless otherwise reported. Acetone is the most frequently found of the four, and probably indicates the subject was diabetic.

A.3.2. BARBITURATE DETERMINATION. The barbiturate concentration in blood was determined by a differential ultraviolet spectrophotometric technique as reported by Williams and Zak (1959). The minimum detectable concentration is 0.1 mg/100 ml and the standard error of the method is $\pm$0.1 mg/100 ml.

A.3.3. CARBON MONOXIDE DETERMINATION. Carbon monoxide was determined using the microdiffusion principle mentioned earlier. Palladium chloride was the reactant employed; the palladium ion being reduced to elemental palladium in proportion to the amount of carbon monoxide present in the blood sample (Williams 1960). The minimum detectable quantity of carbon monoxide by this procedure is 5% saturation of the hemoglobin. The standard error of the method is $\pm$2% saturation. Since carbon monoxide is so rapidly eliminated once the individual has been removed from the offending atmosphere, this analysis is omitted in cases where the victim survived four hours or longer after the accident.

A.3.4. SALICYLATE DETERMINATION. A simple qualitative test for salicylate was employed. Urine or spinal fluid was treated with 2.5% ferric chloride reagent; a purple color indicated the presence of salicylate. A positive test in spinal fluid is usally obtained only if the corresponding concentration in the blood is greater than 15 mg/100 ml. This concentration is attained following moderately high salicylate dosages. The test on urine is more sensitive but does not accurately reflect a particular blood concentration. In any event, when a positive qualitative test was obtained on either urine or spinal fluid, a quantitative analysis of the blood was carried out using a differential ultraviolet spectrophotometric method (Williams 1959). The minimum detectable concentration is 1 mg/100 ml, and the standard error of the method is $\pm$0.1 mg/100 ml. Occasionally a spinal fluid specimen would be so contaminated with blood that the resultant red pigmentation interfered with the ferric chloride qualitative test. If also there was no urine specimen available from that case, then no salicylate result was recorded.

A.3.5. CYANIDE DETERMINATION. This test is part of the routine procedure of our laboratory not so much because of the frequency of cyanide intoxication, but because of its extreme lethality, and also because cyanide is found in significant concentrations in the blood of fire victims (including automobile fires)(Wetherell 1966). The method employed is that reported by Gettler and Goldbaum (1947), involving the Prussian Blue reaction. The sensitivity is such that concentrations of 50 mcg/100 ml are readily detected. The standard error of the method is ±5 mcg/100 ml. Like carbon monoxide, cyanide is rapidly removed from the blood; the test was therefore omitted in cases where the victim survived four hours or longer after the accident.

A.4. PERSONNEL

PATHOLOGY

John F. Burton, M.D.

M.D., Meharry Medical College, 1941.
Pathology Resident, 1951-1955, Wayne County General Hospital and Veterans Administration Hospital, Dearborn, Michigan.
Staff Pathologist, Veterans Hospital, Dearborn, Michigan, 1955-1962.
Pathologist, Wayne County Medical Examiner's Office, 1962-1967.
Chief Medical Examiner, Wayne County, 1967-.
Certified by the American Board of Pathology in Anatomic, Clinical, and Forensic Pathology.

Joseph F. Juliar, M.D.

M.D., University of Michigan, 1941.
Private practice of medicine, 1946-1959.
Pathology Resident, New York University, Bellevue Medical Center, 1959-1963.
Pathologist, Wayne County Medical Examiner's Office, 1965-.
Associate Clinical Professor of General Pathology, University of Detroit Dental School, 1965-.
Certified by the American Board of Pathology in Anatomic and Clinical Pathology.

George Russanow, M.D.

M.D., University of Munich, Germany, 1950.
Pathology Resident, Johnson City, N.Y., 1953-1958.
Pathologist, Wayne County Medical Examiner's Office, 1958-.
Board Eligible in Clinical and Anatomic Pathology.

Alice Barnhart, M.T. (A.S.C.P.)

B.S., Wayne State University, 1952.
Hospital Clinical Laboratory, 1952-1955.
Tissue Technologist, Wayne County Medical Examiner's Office, 1955-.

TOXICOLOGY

Herbert R. Wetherell, Ph.D.

Ph.D., Yale University, 1954.
Instructor, Assistant Professor, University of Nebraska, College of Medicine, Department of Pharmacology, 1953-1961.
Toxicologist, Wayne County Medical Examiner's Office, 1962-.

Yvonne Brusock, M.T. (A.S.C.P.)

B.S., Michigan State University, 1952.
Private Clinical Laboratory, 1952-1956.
Principal Technologist, Toxicology Laboratory, Wayne County Medical Examiner's Office, 1956-.

Rosemary Furlong, M.T. (A.S.C.P.)

Hospital Clinical Laboratory, 1952-1961.
Wayne County Medical Examiner's Office, 1961-.

Edna Carlen, M.T. (A.S.C.P. Eligible)

B.S., Alfred University, 1948.
Hospital Clinical Laboratory, 1948-1958.
Wayne County Medical Examiner's Office, 1958-.

Appendix B

SAMPLE REPORTS FROM THE OFFICE OF THE WAYNE COUNTY MEDICAL EXAMINER

Contents

B.1. SUMMARY REPORT: AUTOPSY PERFORMED

Morgue No. ...xxxx   Autopsy No. xx
Laboratory No. xxxx   Traffic Fatality Study No. xxx

NAME   ADDRESS

41 yrs.   Male   Colored   Divorced   Truck driver

Accident: October 15, 1967, 3:05 P.M., Detroit, Michigan. Passenger. Northbound Chrysler ramp north of Warren.

Deceased, passenger in car traveling northbound on Chrysler Expressway at speeds of 70 mph. Driver lost control of car striking bridge abutment.

Death: October 15, 1967, 4:30 P.M., Detroit General Hospital.
Condition leading directly to death:
Fracture of skull.
Other significant conditions:
Bilateral multiple rib fractures.

Toxicology:	Blood Alcohol	0.22% (w/v)
	Spinal Fluid Alcohol	0.24% (w/v)
	Urine Alcohol	0.22% (w/v)
	Stomach Alcohol	0.66% (w/v)
	Blood Barbiturate	Negative.
	Blood Cyanide	Negative.
	Blood Carbon Monoxide	Negative.

Pathology: Cirrhosis - No.

Body weight ..... 176 lbs
Liver weight ..... 1510 g

B.2. SUMMARY REPORT: NO AUTOPSY

Morgue No. ...xxxx	No Autopsy
Laboratory No. xxxx	Traffic Fatality Study No. xxx

NAME ADDRESS

25 yrs. Male White Married Laborer

Accident: October 3, 1967, 4:00 P.M., Plymouth Township, Michigan. Driver - Motorcycle. Southbound Edward Hines, north of Six Mile Rd

Deceased was driving his motorcycle southbound on Edward Hines Drive at high rate of speed, tried to pass a car and lost control and hit a tree.

Death: October 3, 1967, 4:35 P.M., Wayne County General Hospital.

Condition leading directly to death:

Fracture of skull.

Antecedent causes:

Lacerations of ear and scalp.

Generalized contusions.

Toxicology:	Blood Alcohol	0.19% (w/v)
	Blood Barbiturate	Negative.
	Blood Carbon Monoxide	Negative.
	Blood Cyanide	Negative.

Pathology: Cirrhosis - No

Score Sheet
Nov. 15, 1967
Dec. 14, 1967

File #	Gross	Soft	Yellow	Firm	Nodular	Micro	fibrosis	fat	Necrosis	Bile duct Prolif.	bile stasis	Lymphocytes	Plasma cells	Monocytes	P.M.N.S.	Cirrhosis	Yes	No	1. Early "fatty"	2. Intermediate	3. Late "Atrophic"		Blood Ethanol
8605		✓																✓					0.24
8634		✓																✓					0.17
8640			✓	✓			✓	✓		✓		✓					✓			✓			0.00
8641		✓																✓					0.24
8763		✓						✓	✓			✓						✓					0.00
8785		✓						✓										✓					0.18
8789		✓																✓					0.29
8791		✓													✓			✓					0.18
8798		✓																✓					0.15
8819		✓																✓					0.28
8821		✓																✓					0.02
8845		✓																✓					0.26
8874		✓																✓					0.23
8876		✓																✓					0.08
8954		✓																✓					0.00
9083		✓						✓										✓					0.22
9085		✓																✓					0.00
9089		✓					✓		✓			✓			✓		✓		✓				0.17
9114		✓																✓				*	0.00
9149		✓	✓					✓	✓						✓			✓					0.01
9171		✓																✓					0.03
9245		✓						✓	✓			✓			✓			✓					0.14
9266		✓										✓						✓					0.00
9309				✓			✓	✓		✓							✓		✓				0.24
9339		✓																✓					0.09
9387		✓																✓					0.12
9423		✓																✓					0.26

* SPINAL FLUID

Figure B.3. Pathology Score Sheet

Appendix C

PREDICTION OF BLOOD ALCOHOL FROM SPINAL ALCOHOL USING TOXICOLOGICAL DATA

By

William C. Carlson

A sample of 344 persons fatally injured in auto crashes in Wayne County was used in this analysis. The blood alcohol and the spinal alcohol level were determined for each of these subjects by means of a carefully conducted toxicological examination. The data obtained were used to fit a least squares regression model which predicted blood alcohol given a measurement of spinal alcohol. Figure 1 and Exhibit 1 describe the estimated function. The dashed lines in Figure C.1 indicate approximate 95% confidence limits for the prediction of blood alcohol given spinal alcohol. The multiple

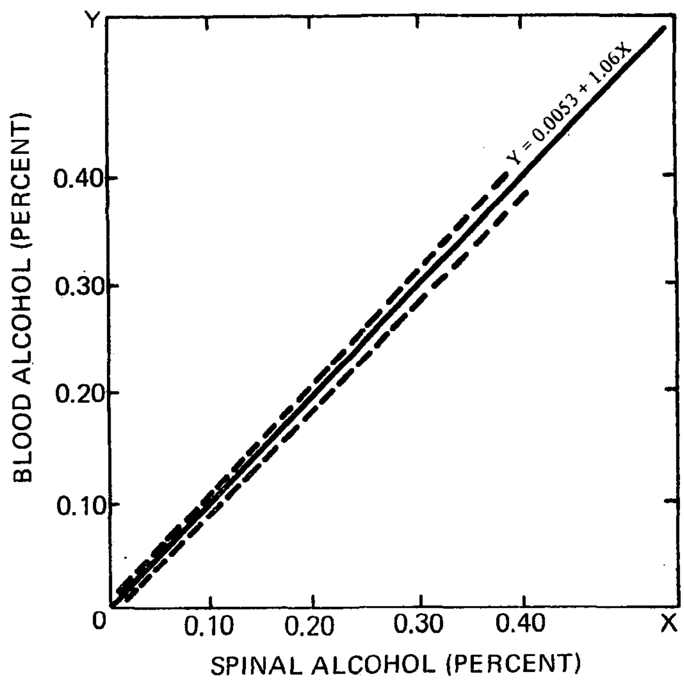


Figure C.1. Relationship between blood and spinal alcohol for 344 fatalities using a regression analysis.

correlation coefficient for the relationship was 0.96 indicating that this fitted model explains 92% of the observed variability in blood alcohol. The 95% confidence limits about the predicted function are approximately ± 0.0002 to ± 0.0003 depending upon the value of the relationship being predicted. Thus the predicted values have a precision which is smaller than the unit of blood alcohol measurement (e.g. 0.01%). The relationship has a small upward bias as indicated by its slope of 1.06 and its constant of 0.0054%. Thus if a spinal alcohol of 0.30% was measured, the fitted model would predict a blood alcohol of 0.31%.

As a result of this analysis it appears that the spinal alcohol measurement could be substituted for the blood alcohol measurement in autopsy analysis. Using the spinal alcohol measurement and the predicting model a very accurate prediction of blood alcohol level could be obtained. The two measurements are almost interchangeable with the exception that the blood alcohol measurement is between 0.0054% to 0.0100% higher than the corresponding spinal alcohol. This of course assumes that the pathological procedures used are not significantly different from those used at the Wayne County morgue.

Exhibit C-1

Summary of Important Values from the Regression Analysis.

Predicted Model

$$\hat{Y} = 0.0053 + 1.06X \qquad (1)$$

$\hat{Y}$ - Blood Alcohol (Percent)

X - Spinal Alcohol (Percent)

$S_Y = 0.0344$

$R = 0.96$

$R^2 = 0.92$ (Fraction of Explained Variability)

$DF = 342$

$N = 344$

$\overline{X} = 0.088$

$\overline{Y} = 0.099$

$S_x' = 0.119$

$$S_{\hat{Y}}^2 = S_Y^2 \left[\frac{1}{N} + \frac{(x^* - \overline{x})^2}{S_x'^2 \; (N-2)} \right]$$ (Bowker and Lieberman 1959) (2)

S_Y - Standard deviation of the predicted value

S_y^2 - Standard deviation of the least squares analysis

N - Number of observations

$\overline{X}$ - Mean of X

X* - X value at which a prediction of Y is being computed.

An approximate 95% confidence limit can be obtained from the following relationship:

$$C.L. = 2(S_{\hat{Y}}) \qquad (3)$$

This relationship is a function of the particular X value at which Y is predicted, as indicated by equation (2). The computed confidence limits are as follows:

X	C.L.
0.0	±0.0002
0.10	±0.0002
0.20	±0.0002
0.30	±0.0003

Appendix D

SAMPLE ACCIDENT FORMS

(Figures D.1 and D.2 are samples of the accident forms on which crash data are recorded. The first is the State of Michigan Official Traffic Accident Report used by all agencies in Wayne County except the City of Detroit, and the second is that used by Detroit. The data recorded are essentially the same in both cases.)

Engineering Copy

STATE OF MICHIGAN

OFFICIAL TRAFFIC ACCIDENT REPORT

UD-10A
(1-65)

No. of sheets attached.................. Department.. Complaint No.......................

TIME Date.............................19....... Day of Week..............................at....................A.M.......................P.M. File Class Number.................

LOCATION

County.. City.. Twp.. Sec..........

Highway or street on which accident occurred *(Name)*....................................... Trunkline No....................... County Road No...................

AT ITS INTERSECTION WITH *(street, highway or R. R. crossing)*..

OR

IF NOT AT INTERSECTION: *(feet or miles or fractions thereof)*.................................... N | S | E | W

of *(intersecting street, highway, city, village, county line or R.R.)*...

Special reference ....
Use to indicate more precise location: *(alley, house number, stream, milepost, underpass, or other landmark)*

Damage to property other than vehicles...
Name object and state nature of damage

In roadway ☐ , or.................feet from N | S | E | W edge of roadway

Name and address of owner of object struck..

....

CODE OF INJURY

(Use only the most serious one in each space for injury.)

K - Dead
A - Visible signs of injury, as bleeding wound or distorted member, or had to be carried from scene.
B - Other visible injury, as bruises, abrasions, swelling, limping, etc.
C - No visible injury but complaint of pain or momentary unconsciousness.
O - No indication of injury.

VEHICLE NO. 1

Year............... Make.................................. Type.............................. Year, No., & State of Reg.. ICC No........................ MPSC No.......................

Parts of vehicle damaged.. Vehicle removed to:.................................By:...............................

Owner...St. or RR.. City............................. State...............

Driver...St. or RR..
City, County, State

Driver's License..............♦ .... Reg. Op. Lic. ☐ Other ☐.................................... Date of Birth.......................
State *Number* *Specify Type and/or Restrictions* *Month, Day, Year*

AGE	SEX	INJURY

Total number vehicles involved ....

OCCUPANTS

Front Center...Address..
Front Right..Address..
Rear Left..Address..
Rear Center...Address..
Rear Right...Address..
Name *Street or RR* *City and State*

VEHICLE NO. 2; Pedestrian or Bicycle

Year............... Make.................................. Type.............................. Year, No., & State of Reg.. ICC No........................ MPSC No.......................

Parts of vehicle damaged.. Vehicle removed to:.................................By:...............................

Owner...St. or RR.. City............................. State...............

Driver...St. or RR..
City, County, State

Driver's License.. Reg. Op. Lic. ☐ Other ☐.................................... Date of Birth.......................
State *Number* *Specify Type and/or Restrictions* *Month, Day, Year*

AGE	SEX	INJURY

OCCUPANTS

Front Center...Address..
Front Right..Address..
Rear Left..Address..
Rear Center...Address..
Rear Right...Address..
Name *Street or RR* *City and State*

Injured taken to..By...

WEATHER *(Check one)*	LIGHT CONDITION *(Check one)*	KIND OF LOCALITY *(Check one)*	ROADWAY — CONSTRUCTION *(Check one)*	ROADWAY — SURFACE *(Check one)*	ROADWAY — CHARACTER *(Check two)*	ROADWAY — CONDITION *(Check one)*
☐ Clear or cloudy	☐ Daylight	☐ Mfg. or industrial	☐ Concrete	☐ Dry	☐ Straight road	☐ Defect *(describe)*
☐ Raining	☐ Dusk or dawn	☐ Shopping or business	☐ Blacktop	☐ Wet	☐ Curve	
☐ Snowing	☐ Darkness	☐ Apartments	☐ Gravel	☐ Snowy or icy	☐ Level	*Low shoulder, slippery when wet, etc.*
☐ Fog		☐ School or playground	☐ Dirt or sand	☐ Other *(specify)*	☐ On grade	☐ No defect
☐ Other *(specify)*		☐ One family homes	☐ Other *(specify)*		☐ Hillcrest	
		☐ Farms, fields				
		☐ Not developed				

WITNESSES

Name...Address..Age..........Sex..........
Name...Address..Age..........Sex..........
Name...Address..Age..........Sex..........

This form is prescribed by Director, Michigan State pursuant to Section 622, Act 300, P.A. 1949, as amended.

Figure D.1. State of Michigan Official Traffic Accident Report

ALL APPLICABLE SCHEDULES MUST BE CHECKED. OFFICER'S CONSIDERED OPINION SHOULD BE GIVEN IF FACTS ARE NOT OBTAINABLE.

WHAT DRIVERS WERE GOING TO DO BEFORE ACCIDENT

Driver No. 1 was headed [N] [S] [E] [W] on.......................................at..........MPH
Street or Highway

Driver No. 2 was headed [N] [S] [E] [W] on.......................................at..........MPH

DRIVER
1 2 (Check one for each driver)

- ☐ ☐ Go straight ahead
- ☐ ☐ Overtake
- ☐ ☐ Make right turn
- ☐ ☐ Make left turn
- ☐ ☐ Make U turn
- ☐ ☐ Slow or stop
- ☐ ☐ Start in traffic lane
- ☐ ☐ Start from parked position
- ☐ ☐ Back
- ☐ ☐ Remain stopped in traffic lane
- ☐ ☐ Remain parked

ROAD TYPE (Check one or more for each driver)

DRIVER
1 2

- ☐ ☐ 1 driving lane
- ☐ ☐ 2 driving lanes
- ☐ ☐ 3 driving lanes
- ☐ ☐ 4 or more lanes
- ☐ ☐ Divided roadway (limited access)
- ☐ ☐ Divided roadway (other)
- ☐ ☐ One way street
- ☐ ☐ Unpaved - any width

WHAT PEDESTRIAN WAS DOING

Pedestrian was going [N] [S] [E] [W] (Check one) ☐ Along ☐ Across or into.......................From.......................To.......................
Street Name, Highway No. N.E. corner to S.E. corner, or west to east side, etc.

- ☐ Crossing or entering at intersection
- ☐ Crossing or entering not at intersection
- ☐ Getting on or off vehicle
- ☐ Walking in roadway—with traffic
- ☐ Walking in roadway—against traffic
- ☐ Standing in roadway
- ☐ Pushing or working on vehicle
- ☐ Other working in roadway
- ☐ Playing in roadway
- ☐ Other in roadway
- ☐ Not in roadway

VIOLATION INDICATED (Check one or more for each driver)

DRIVER
1 2

- ☐ ☐ Speed too fast
- ☐ ☐ Failed to yield right of way
- ☐ ☐ Drove left of center
- ☐ ☐ Improper overtaking
- ☐ ☐ Passed stop sign
- ☐ ☐ Disregarded traffic signal
- ☐ ☐ Followed too closely
- ☐ ☐ Made improper turn
- ☐ ☐ Improper or no signal
- ☐ ☐ Improper parking location
- ☐ ☐ Other improper driving (describe)
- ☐ ☐ No violation indicated

APPARENT PHYSICAL CONDITION (Check one or more as applicable)

DRIVER
1 2 PED.

- ☐ ☐ ☐ Ill
- ☐ ☐ ☐ Fatigued
- ☐ ☐ ☐ Asleep
- ☐ ☐ ☐ Other impairment

(describe)__________

- ☐ ☐ ☐ Normal
- ☐ ☐ ☐ Condition not known
- ☐ ☐ Restriction on license complied with
- ☐ ☐ Restriction on license not complied with (describe)__________

DRINKING CONDITION (Check one)

DRIVER
1 2 PED. HAD BEEN DRINKING:

- ☐ ☐ ☐ Under the influence
- ☐ ☐ ☐ Not under the influence
- ☐ ☐ ☐ Influence not known
- ☐ ☐ ☐ HAD NOT BEEN DRINKING
- ☐ ☐ ☐ NOT KNOWN IF DRINKING

CHECK IF APPLICABLE:

- ☐ ☐ ☐ Chemical test given

VISION OBSTRUCTION
(Check one or more for each driver)

DRIVER
1 2

- ☐ ☐ Windshield or windows

(describe)__________

- ☐ ☐ Bldgs., signs, bushes, crops, embankment, parked cars, etc.

(describe)__________

- ☐ ☐ No vision obstruction

VEHICLE CONDITION
(Check one or more)

VEHICLE
1 2

- ☐ ☐ Defective brakes
- ☐ ☐ Defective lights
- ☐ ☐ Defective steering
- ☐ ☐ Defective tires
- ☐ ☐ Other defective equipment

(specify)__________

- ☐ ☐ Not known if defective
- ☐ ☐ No defect

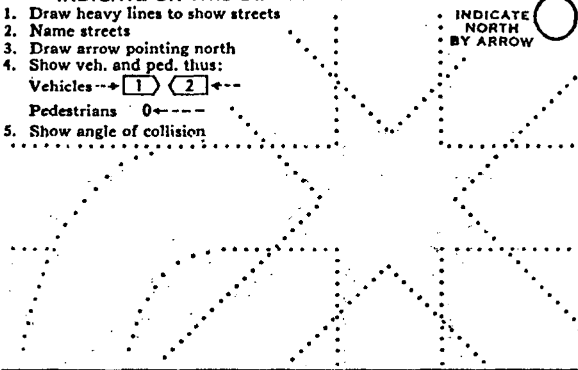
TRAFFIC CONTROL
(Check one or more)

- ☐ Stop sign
- ☐ Stop and go signal
- ☐ Officer or watchman
- ☐ R.R. gates or signals
- ☐ Other (specify)__________
- ☐ Control not functioning, inadequate or obscured (describe)__________
- ☐ No traffic control present

INDICATE ON THIS DIAGRAM WHAT HAPPENED

1. Draw heavy lines to show streets
2. Name streets
3. Draw arrow pointing north
4. Show veh. and ped. thus:
   Vehicles --→ [1] [2] ←--
   Pedestrians 0←---
5. Show angle of collision

INDICATE NORTH BY ARROW



REMARKS AND RECOMMENDATIONS

Inspect scene for need of traffic engineering? ☐ Yes (explain)

Re-examine driver for license competency? ☐ #1 ☐ #2 (explain)

....

....

....

Use complaint form or sheet of paper for more extensive remarks or diagram.

POLICE RECORD

Arrest: Name...Charge.......................................

Arrest: Name...Charge.......................................

Reported by (name)...Address.......................................

Date received.......................Time..............☐ AM ☐ PM Report received by (officer).......................

Investigator...
Signature and Rank Badge No. Station or Department

Investigated at scene? ☐ Yes ☐ No Photographs taken? ☐ Yes ☐ No Complaint closed by: ☐ Arrest ☐ Other Date.......................Post No..........

Figure D.1. (cont'd)

DETROIT POLICE DEPARTMENT TRAFFIC ACCIDENT REPORT

VEHICLE NO. 3

Year Make Type | Car Reg. No. State Year | Driveable? ☐ Yes ☐ No
Going N S E W on | Est. Speed MPH | Lawful Speed MPH | Disposition Of Vehicle | DATE OF BIRTH
Driver's Name | Address | City | Phone | Month Day Year
Driver's License | ☐ Oper. ☐ Chauf. | State | Weight | Height | Age | Sex | Inj.
OCCUPANTS Front Center | Address | City | Phone
Front Right | Address | City | Phone
Rear Left | Address | City | Phone
Rear Center | Address | City | Phone
Rear Right | Address | City | Phone
Owner | Address | City | Phone

Damage to property other than vehicles | City ☐ Private | Kind of Property
Name and address of owner
State nature of damage

CODE OF INJURY
(Use only the most serious one in each space for injury.)
K – Fatal
A – Visible signs of injury, as bleeding wound or distorted member, or had to be carried from scene.
B – Other visible injury, as bruises, abrasions, swelling.
C – No visible injury but complaint of pain or momentary unconsciousness.
O – No indication of injury.

WITNESSES
Name | Address | City | Phone
Name | Address | City | Phone
Name | Address | City | Phone

ARREST
Name | Charge | Ct. File No. | Ct. Date
Name | Charge | Ct. File No. | Ct. Date

Time notified of accident | Date | Hour | ☐ A.M. ☐ P.M. | Was investigation made at scene? | Happened in Prect. Scout Car Territory
Is investigation completed? ☐ Yes ☐ No | Signature | Badge | Car Number
ACCIDENT INVOLVED | Hour A.M. P.M. | Day of Week | Date
(Pedestrian, other motor vehicle, railroad train, fixed object, etc.)

DETROIT POLICE DEPARTMENT
APB FILE NO.
LOCATION ON | At or N S E W of

VEHICLE NO. 1

Year Make Type | Car Reg. No. State Year | Driveable? ☐ Yes ☐ No
Going N S E W on | Est. Speed MPH | Lawful Speed MPH | Disposition Of Vehicle | DATE OF BIRTH
Driver's Name | Address | City | Phone | Month Day Year
Driver's License | ☐ Oper. ☐ Chauf. | State | Weight | Height | Age | Sex | Inj.
OCCUPANTS Front Center | Address | City | Phone
Front Right | Address | City | Phone
Rear Left | Address | City | Phone
Rear Center | Address | City | Phone
Rear Right | Address | City | Phone
Owner | Address | City | Phone

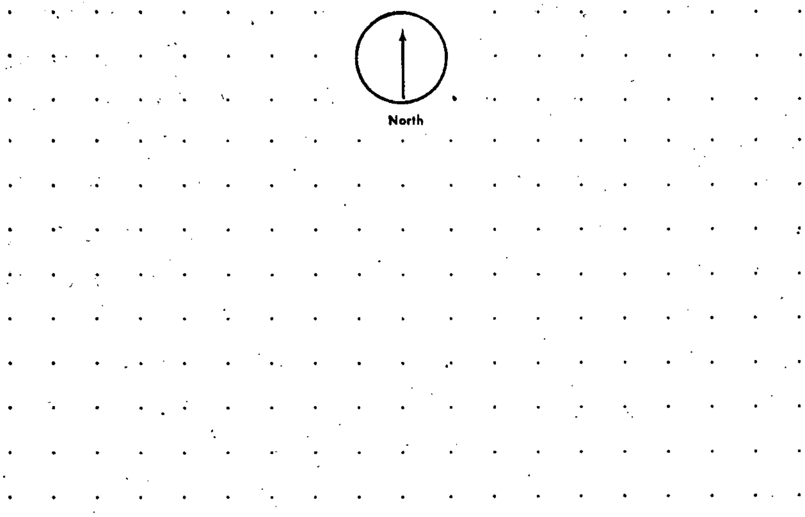
VEHICLE NO. 2 Or Pedestrian

Year Make Type | Car Reg. No. State Year | Driveable? ☐ Yes ☐ No
Going N S E W on | Est. Speed MPH | Lawful Speed MPH | Disposition Of Vehicle | DATE OF BIRTH
Driver's Name | Address | City | Phone | Month Day Year
Driver's License | ☐ Oper. ☐ Chauf. | State | Weight | Height | Age | Sex | Inj.
OCCUPANTS Front Center | Address | City | Phone
Front Right | Address | City | Phone
Rear Left | Address | City | Phone
Rear Center | Address | City | Phone
Rear Right | Address | City | Phone
Owner | Address | City | Phone

Injured taken to | By | Injured taken to | By | Total Inj.
If injured is student name school attended

Figure D.2. Detroit Police Department Traffic Accident Report

DRAW DIAGRAM OF ACCIDENT



APB FILE NO.

INSTRUCTIONS:
(1) Use dotted lines as guides to draw heavy lines which will show outline of roadway at place of accident.
(2) Use dotted lines as guides to draw light dashes between solid lines to show lanes of travel and/or divided roadways.
(3) Number each vehicle and draw them in proper lane.

POINT OF IMPACT
(Check one for each vehicle involved)

Vehicle 1. 2. 3.		Vehicle 1. 2. 3.	
☐ ☐ ☐	1. Front	☐ ☐ ☐	5. Left side
☐ ☐ ☐	2. Right front	☐ ☐ ☐	6. Rear
☐ ☐ ☐	3. Left front	☐ ☐ ☐	7. Right rear
☐ ☐ ☐	4. Right side	☐ ☐ ☐	8. Left rear

Describe briefly what happened including exact point of impact with fixed object:

	EMPLOYER'S NAME	ADDRESS	CITY	PHONE NUMBER
DRIVER NO. 1				
DRIVER NO. 2				
DRIVER NO. 3				

ADDITIONAL INFORMATION

Assisted by Patr. | A.P.B. Notified: | Date | Time M.

Badge No. | Precinct or Bureau | Officer | Badge

PEDESTRIAN
Was going ______ ☐ On ☐ Across ______
Direction (West, NE, etc.) — Street name
From ______ To ______
(NW Corner, South Side, Etc.) — (SE Corner, North Side, Etc.)

☐ 1. Crossing at intersection—with signal
☐ 2. Same—against signal
☐ 3. Same—no signal
☐ 4. Same—diagonally
☐ 5. Crossing not at intersection—coming from behind parked cars
☐ 6. Same — not coming from behind parked cars
☐ 7. Coming from behind parked cars to enter vehicle
☐ 8. Playing in alley
☐ 9. Getting on or off other vehicle
☐ 10. Standing in roadway
☐ 11. Playing in roadway
☐ 12. Working in roadway
☐ 13. Walking in roadway
☐ 14. Hitching on vehicle
☐ 15. Lying in roadway
☐ 16. Not in roadway (Explain in remarks)

WHAT DRIVERS WERE DOING
Vehicle (Check intent of each driver)
1. 2. 3.
☐ ☐ ☐ 1. Making right turn
☐ ☐ ☐ 2. Making left turn
☐ ☐ ☐ 3. Making U turn
☐ ☐ ☐ 4. Going straight ahead
☐ ☐ ☐ 5. Slowing down or stopping
☐ ☐ ☐ 6. Overtaking
☐ ☐ ☐ 7. Leaving curb
☐ ☐ ☐ 8. Changing lanes
☐ ☐ ☐ 9. Backing
☐ ☐ ☐ 10. Stopped in traffic
☐ ☐ ☐ 11. Parked
(Check if applicable)
☐ ☐ ☐ 1. Skidding
☐ ☐ ☐ 2. Tire blew out
☐ ☐ ☐ 3. Avoiding vehicle, object or pedestrian
☐ ☐ ☐ 4. Emerging from alley or driveway

VIOLATIONS INDICATED (Check one or more for each vehicle)
Vehicle 1. 2. 3.
☐ ☐ ☐ 1. Exceeding lawful speed
☐ ☐ ☐ 2. Did not have right of way
☐ ☐ ☐ 3. On wrong side of road
☐ ☐ ☐ 4. Exceeding safe speed
☐ ☐ ☐ 5. Improper backing
☐ ☐ ☐ 6. Struck rear of vehicle
☐ ☐ ☐ 7. Improper passing
☐ ☐ ☐ 8. Cutting in
☐ ☐ ☐ 9. Failure to signal, improper signal
☐ ☐ ☐ 10. Improper turn—wide right turn
☐ ☐ ☐ 11. Same—cut corner on left turn
☐ ☐ ☐ 12. Same—turned from wrong lane
☐ ☐ ☐ 13. Disregarded STOP sign, signal
1. 2. 3.
☐ ☐ ☐ 14. Same—WARNING sign, signal
☐ ☐ ☐ 15. Disregarded Stop-&-Go light
☐ ☐ ☐ 16. Disregarded police officer
☐ ☐ ☐ 17. Improper starting from parked position
☐ ☐ ☐ 18. Improper parking
☐ ☐ ☐ 19. Disregarded YIELD RIGHT-OF WAY Sign
☐ ☐ ☐ 20. Other improper action (explain)
☐ ☐ ☐ 21. No improper driving indicated
Explain others: ______

CONDITION OF VEHICLE
Vehicle 1. 2. 3. (Check one or more)
☐ ☐ ☐ 1. No defects
☐ ☐ ☐ 2. Improper lights
☐ ☐ ☐ 3. Defective brakes
☐ ☐ ☐ 4. Defective steering gear
☐ ☐ ☐ 5. Other defects
(Explain fully in remarks)

TRAFFIC CONTROL
Functioning	Not Functioning	
☐	☐	1. Stop–&–Go light
☐	☐	2. STOP sign or signal
☐	☐	3. WARNING sign or signal
☐		4. No control present
☐	☐	5. Officer or watchman
☐	☐	6. Railroad crossing gates
☐	☐	7. Railroad automatic signal

CONDITION OF DRIVER AND PEDESTRIAN
1. 2. 3. Ped. (Check one)
☐ ☐ ☐ ☐ 1. Had not been drinking
2. Had been
☐ ☐ ☐ ☐ (a) Drinking–Ability impaired
☐ ☐ ☐ ☐ (b) Drinking–Ability not impaired
☐ ☐ ☐ ☐ (c) Drinking — Not known whether impaired

1. 2. 3. Ped.
☐ ☐ ☐ ☐ 1. Apparently normal
☐ ☐ ☐ ☐ 2. Physical handicap
Explain: ______
Alcohol Tests? ☐ Yes ☐ No

ROAD TYPE (Check one or more for each driver)
DRIVER 1. 2. 3.
☐ ☐ ☐ 1 driving lane
☐ ☐ ☐ 2 driving lanes
☐ ☐ ☐ 3 driving lanes
☐ ☐ ☐ 4 or more lanes
☐ ☐ ☐ Divided roadway (limited access)
☐ ☐ ☐ Divided roadway (other)
☐ ☐ ☐ One way street

ROAD SURFACE CONDITION
☐ 1. Dry
☐ 2. Wet
☐ 3. Ice
☐ 4. Snow
☐ 5. Mud
☐ 6. Other (Specify)

LOCALITY
☐ 1. Business
☐ 2. Industrial
☐ 3. Multi-Dwelling
☐ 4. Single Dwelling
☐ 5. School
☐ 6. Park
☐ 7. Other (Specify)

WEATHER
☐ 1. Clear
☐ 2. Cloudy
☐ 3. Raining
☐ 4. Snowing
☐ 5. Fog
☐ 6.

LIGHT CONDITIONS
☐ 1. Daylight
☐ 2. Dusk
☐ 3. Dawn
Darkness with—
☐ 4. Artificial lights
☐ 5. No artificial lights

ROAD DEFECTS (Check one or more)
☐ 1. No defects
☐ 2. Holes or deep ruts
☐ Loose material on surface
☐ 4. Defective shoulders
☐ 5. Other defects
☐ 6. Under construction or repair

ROAD CHARACTER ☐ Straight ☐ Curve or turn ☐ Hillcrest
☐ Level ☐ Grade ☐

Officer in Charge | Rank | Precinct or Bureau

Checked by

D.P.D.-159 (Rev. 1-64) Form C of D–618-RE

Figure D.2. (cont'd)

Appendix E
DESCRIPTION OF DRIVING AND CRIMINAL RECORDS

Contents

E.1. DEPARTMENT OF STATE, DRIVER RECORD INFORMATION

The Michigan Department of State, Driver Services Division, maintains more than 4,000,000 drivers' records. These are filed by the soundex system, employing the driver name and birth date to generate a numerical code which also becomes the driver license number when it is preceded by the first letter of the surname. A file is opened for all drivers licensed in Michigan. Files are also opened for unlicensed or out-of-state drivers arrested for traffic violations and accidents in Michigan.

After a record has been opened, it is continually updated, adding such things as: accident information, motor vehicle offense convictions, driver improvement information (warning letters, re-examination, instruction, license revocation or restriction), financial responsibility actions, and mandatory license suspension or revocation following certain driving offenses.

Filing and updating are done manually although the whole system is in the process of being transferred to computer storage.

Names and addresses for all 616 cases were submitted to the Department of State. If the birth date and driver license number were available from the accident report (usually only when the person killed was a driver) this information was included. Common surnames and inability to ascertain exact birth dates may have prevented us from identifying additional records.

A sample driving record is given in Figure E.1.

E.2. MICHIGAN STATE POLICE, IDENTIFICATION BUREAU

The Michigan State Police have records of 6.5 million names. These come from several sources. Patients at state institutions for the insane, feeble-minded or epileptic have been fingerprinted since 1935 and their records go to the State Police. The State Police have records of most persons fingerprinted while making job applications; they have records and fingerprints of all inmates at penal or correctional institutions, and of all persons convicted of a felony or of a misdemeanor not cognizable by a justice of the peace. In addition, Michigan participates with 30 other states and the FBI in an exchange of conviction information.

E.2.1. TYPES OF FILES. The three main files are (1) name card, (2) fingerprint, and (3) master jacket file. The name card file is ordered first alphabetically and then by date of birth. Fingerprints are filed numerically, with men and women differentiated by colored cards. When a person has more than two convictions or entries, a master jacket folder is started and given a State Police I.D. number.

Records are expunged for people over 90 years or if proof of death is received. However, this process is about 2 years behind.

All 616 names were submitted to the I.D. section. In addition to name, the date of birth, last known address, aliases, social security number and driver license number were included where possible.

Figure E.2 is a sample criminal record.

4-22-68 legal

8-525-758-013-310	R-CHAUFF	07/07/68	04/22/21	PAGE
LICENSE NUMBER	TYPE OF LICENSE	EXPIRES	BIRTH DATE	

SEX M. NAME ADDRESS DETROIT MICH 12/13/67

CONVICTION DATE OR COURT FINDING	PLACE OF CONVICTION OR FINDING	ARREST DATE	OFFENSE, ACTIONS TAKEN OR OTHER INFORMATION	PTS.	ACCIDENT NUMBER
		***	FIN, RESP, UJ56-614, UNSATISFIED JUDGEMENT, DETROIT, SUSPENSION LIFTED 6-22-64		
01/30/63	DETROIT	09/28/62	IMPROPER LANE USE		A/23700
10/13/65	DETROIT	09/22/64	DISOBEY TRAFFIC CONTROL DEVICE	2	A/25701
10/13/65	DETROIT	07/05/65	PROHIBITED TURN	2	A/25701
10/13/65	DETROIT	07/18/65	SPEED 45/30	3	A/25701
03/19/66	DETROIT	12/10/65	DISOBEY RED TRAFFIC SIGNAL	3	A/25701
		***	WARNING LETTER 05/05/66		
11/23/66	DETROIT	04/29/66	DISOBEY RED TRAFFIC SIGNAL	3	A/55991
		***	FIN, RESP, R 2260125, MOTOR VEHICLE ACCIDENT CLAIMS FUND 1-11-66, SUSPENSION LIFTED 11-16-66		
11/23/66	DETROIT	07/06/66	IMPROPER TURN	2	A/56369
11/23/66	DETROIT	07/06/66	SPEED 35/30	2	A/56833
		***	REF'D FOR RE-EXAM D 03/06/67	17	TOTAL
01/31/67	DETROIT	12/10/66	FAIL YIELD TO VEHICLE	2	C198
		***	RE-EXAM DATE 4-10-67, SUSPENSION FROM 5-10-67 THRU 6-10-67 & ACT 174 PA 1966 & COMPLIED WITH ON 6-20-67		C198
		***	LICENSE APPEAL BOARD HEARING 5-15-67 AT DETROIT, SUBJECT FAILED TO APPEAR FOR HEARING ON SUSPENSION FROM 5-10-67 THRU 6-10-67, UPHELD		C198
			ACCIDENT 08/18/67, #023978 DETROIT PD 2 VEH 0 INJ 0 KILLED		D/20479
09/09/67	DETROIT	11/23/66	SPEED 45/35	2	E/48435

Figure E.1. Sample Driving Record

Record compiled
by: pw

March 5, 1968

The following is a transcript of the record, including the most recently reported data, as shown in the files of the Michigan State Police Bureau of Identification concerning our bureau number 361504

Name: SEX M CLR Negro FPC: (amp)I 5 A II 12
I 17 Aa aI 9

Aliases:

FBI: 220 747 B

Contributor	Name and Number	Date	Charge	Disposition
*SHosp Pontiac, Mich.	#23938	6-7-50 (prt'd)	Patient	
PD Royal Oak Twp., Ferndale, Mich.	#—	8-20-51	Invest.	discharged
PD Royal Oak Twp., Ferndale, ..ich.	#3878	11-24-52	Disorderly Conduct	Susp. Sent., 90 days Probation.
PD Royal Oak Twp., Ferndale, Mich.	#3878	4-3-53	D & D	discharged
PD Royal Oak Twp., Ferndale 20, Mich.	# 3878	4-17-53	D & D	susp. sent. 5/16/53
PD Royal Oak Twp., Ferndale, Mich.	#3878	5-15-53	D & D	$5 fine 6/6/53
Royal Oak Twp. PD Ferndale, Michigan	#3878	7-4-53	disorderly	discharged
PD Royal Oak Twp. Ferndale, Mich.	#3878	1/24/55	Loitering	$5 F & C paid

* Represents notations unsupported by fingerprints in this bureau.

Figure E.2. Sample Criminal Record

Appendix F

DESCRIPTION OF SOCIAL, COURT, AND MEDICAL AGENCIES USED IN CASE RECORD COLLECTION

A search for case records on persons in the fatality population was carried on in several agencies in, or serving residents of Wayne County. The major thrust of this effort was to ascertain if the case record search was a viable method for case-finding of problem-drinking accident-involved drivers which could also be used in the future to identify such persons prior to accident involvement. A secondary reason for the search for records in these agencies was to provide information about the drinking behavior of these accident-involved persons in addition to that which could be obtained through more publicly available records such as criminal or driving histories.

The records of a number of agencies were searched for evidence that a particular agency had seen a traffic fatality or a member of his immediate family. Agencies contacted were those in the Wayne County area which have services primarily for the alcoholic or are known to see a large number of alcoholics. A list of the agencies used and brief description of the services they offer follows.

Wayne County Department of Social Services:

This very large organization, which has records on over 1,000,000 cases, handles such social services cases as Aid to Dependent Children, Aid to Dependent Parents, Medical Assistance, Old Age Assistance, Aid to the Blind, Children's Services (foster homes, day care, and adoptions) and General Assistance.

Recorder's Court, Probation Department:

The probation department of Recorder's Court handles those probationers who have committed either misdemeanors or felonies in the City of Detroit.

Wayne County Circuit Court, Probation Department:

This probation department handles the same type of offender as Recorder's Court, except that cases come from non-Detroit areas of Wayne County.

Family Services of Metropolitan Detroit:

This is a non-sectarian agency servicing the county and some out-County areas. They offer casework counseling on marriage, family and personal adjustment. In addition they have specialized services for the aged and community groups.

Catholic Social Services of Wayne County:

This agency offers family service, marriage counseling, adoption, and children's services for any resident of Wayne County.

Greater Detroit Council on Alcoholism:

The Council is an alcohol information center for the Detroit area which also offers consultation and referral services for alcoholics and their families. Generally they serve a broader range of persons in differing socio-economic groups than some of the other agencies which are primarily interested in alcoholism.

Mayor's Rehabilitation Committee on Skid Row Problems:

This committee and its services are supported by the City of Detroit. Emphasis is placed on the rehabilitation of homeless alcoholic men and they offer such services as emergency financial help, lodging, medical, legal or social assistance.

Mercywood Hospital:

This is a 125-bed hospital, which although located in Ann Arbor also serves many Wayne County residents. It is a neuropsychiatric hospital with a multidisciplinary treatment approach for persons with emotional and mental disorders. Included among these are a fairly large number of alcoholics.

Ypsilanti State Hospital:

The Michigan Department of Mental Health operates this 4,000-bed psychiatric hospital. They accept patients who come voluntarily or by committment through Probate Court in Wayne and five other counties. Treatment is offered on both an in-patient and out-patient basis.

Towne Hospital:

A small 50-bed psychiatric hospital with an out-patient clinic and social service department. Also equipped to handle acute alcoholic patients.

Brighton Hospital:

Although Brighton Hospital is located 40 miles from Detroit, it accepts many alcoholic patients from this area. Its program includes educational lectures, individual counseling, and medical care. It also has a close identification with Alcoholics Anonymous.

North Woodward Hospital:

This hospital is similar to Towne Hospital, but handles a smaller number of patients. Primary service is detoxification of acute alcoholics.

Salvation Army: Alcoholism Treatment Center; Men's Social Service Center; and Harbor Light Residence

The Alcoholism Treatment Center is a relatively new in-patient treatment center offering a 30-day total rehabilitation program. The Social Service Center offers a rehabilitation program primarily for homeless males, and Harbor Light Residence is a half-way type home for men.

In addition to the above agencies listed where records were searched, contacts were made with certain other agencies. However, usually due to concern about the confidential nature of the records, permission to do a record search was not obtained at the following agencies: Lafayette Clinic, a psychiatric hospital and research center; Lynn Hospital, a general hospital; and St. Joseph Hospital, a general hospital with an alcoholism out-patient department.

Appendix G

FREQUENCY TABLES FOR THE WAYNE COUNTY FATALITY STUDY AND FOUR-POPULATION COMPARISON

CONTENTS

G.1. Wayne County Fatality Study

TABLE G-1. COMPARISON OF DRIVER, PASSENGER, AND PEDESTRIAN FATALITIES AND BLOOD ALCOHOL LEVEL

Road Status Group	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%	Total Number
Drivers	105(34%)	20(6%)	14(5%)	36(12%)	90(29%)	44(14%)	309
Passengers	60(43%)	29(21%)	13(9%)	12(8%)	19(14%)	7(5%)	140
Pedestrians	68(41%)	19(11%)	9(5%)	7(4%)	28(17%)	36(22%)	167
Total Fatality Population	233(38%)	68(11%)	36(6%)	55(9%)	137(22%)	87(14%)	616

TABLE G-2. AGE AND BLOOD ALCOHOL LEVELS FOR THE TOTAL FATALITY POPULATION

AGE (Years)	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
16-19	37	16	5	4	6	3	71
20-25	25	12	12	20	35	9	113
26-35	22	3	5	11	33	17	91
36-45	19	7	2	8	21	30	87
46-55	29	7	3	8	20	18	85
56-65	34	12	5	1	15	8	75
66+	63	11	4	3	7	2	90
Missing data	4	0	0	0	0	0	4
Total	233	68	36	55	137	87	616

TABLE G-3. COMPARISON OF DRINKING INVOLVEMENT BETWEEN AGE AND ROAD STATUS GROUPS

AGE (Years)	Road Status Group	Percent of Total Road Status Group	Percent Not Drinking	Percent Drinking	Percent 0.10%+ Legally Impaired*	Percent 0.15%+ Legally Intoxicated*
16-19	Drivers	11%	50%	50%	29%	18%
	Passengers	23	47	53	9	9
	Pedestrians	2	100	0	0	0
20-25	Drivers	25%	25%	75%	63%	42%
	Passengers	22	17	83	38	24
	Pedestrians	4	13	87	63	63
26-35	Drivers	19%	19%	81%	81%	68%
	Passengers	15	33	67	43	24
	Pedestrians	8	38	62	23	23
36-45	Drivers	14%	20%	80%	73%	66%
	Passengers	11	27	73	67	47
	Pedestrians	17	21	79	61	54
46-55	Drivers	15%	33%	67%	51%	38%
	Passengers	9	62	38	23	15
	Pedestrians	16	22	78	74	70
56-65	Drivers	10%	56%	44%	31%	31%
	Passengers	12	62	38	13	13
	Pedestrians	16	22	78	44	41
66+	Drivers	6%	80%	20%	5%	5%
	Passengers	8	73	27	0	0
	Pedestrians	35	66	34	19	14

*Blood Alcohol Level of legal impairment and intoxication according to State of Michigan Statutes

TABLE G-4. DRIVER AGE AND BLOOD ALCOHOL LEVEL

Age (Years)	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
		Blood Alcohol Level					
16-19	17	5	2	4	3	3	34
20-25	19	4	5	16	27	5	76
26-35	10	0	1	7	27	12	57
36-45	9	3	0	3	14	15	44
46-55	15	6	1	6	11	6	45
56-65	18	1	3	0	7	3	32
66+	16	1	2	0	1	0	20
Missing Data	1	0	0	0	0	0	1
Total	105	20	14	36	90	44	309

TABLE G-5. PASSENGER AGE AND BLOOD ALCOHOL LEVEL

Age (Years)	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
		Blood Alcohol Level					
16-19	15	11	3	0	3	0	32
20-25	5	7	6	4	5	2	29
26-35	7	2	3	4	3	2	21
36-45	4	1	0	3	5	2	15
46-55	8	1	1	1	1	1	13
56-65	10	4	0	0	2	0	16
66+	8	3	0	0	0	0	11
Missing Data	3	0	0	0	0	0	3
Total	60	29	13	12	19	7	140

TABLE G-6. PEDESTRIAN AGE AND BLOOD ALCOHOL LEVEL

Age (Years)	Negative	Blood Alcohol Level 0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
16-19	5	0	0	0	0	0	5
20-25	1	1	1	0	3	2	8
26-35	5	1	1	0	3	3	13
36-45	6	3	2	2	2	13	28
46-55	6	0	1	1	8	11	27
56-65	6	7	2	1	6	5	27
66+	39	7	2	3	6	2	59
Total	68	19	9	7	28	36	167

TABLE G-7. DRIVER SEX AND BLOOD ALCOHOL LEVEL

Sex	Negative	Blood Alcohol Level 0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
Male	92	16	14	32	84	40	278
Female	13	4	0	4	6	4	31
Total	105	20	14	36	90	44	309

TABLE G-8. PASSENGER SEX AND BLOOD ALCOHOL LEVEL

Sex	Negative	Blood Alcohol Level 0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
Male	28	13	8	9	13	5	76
Female	32	16	5	3	6	2	64
Total	60	29	13	12	19	7	140

TABLE G-9. PEDESTRIAN SEX AND BLOOD ALCOHOL LEVEL

Sex	Negative	Blood Alcohol Level 0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
Male	38	11	6	6	22	33	116
Female	30	8	3	1	6	3	51
Total	68	19	9	7	28	36	167

TABLE G-10. PEDESTRIAN MARITAL STATUS AND BAL

Marital Status	Total	Drinking 0.01%+		0.10%+		0.15%+	
Married	69	43	(63%)	29	(42%)	27	(39%)
Single	50	34	(68%)	26	(52%)	24	(48%)
Divorced or Separated	16	9	(56%)	6	(38%)	5	(31%)
Widowed	30	11	(37%)	9	(30%)	7	(23%)
Missing data	2	-	-	-	-	-	-
Total	167	97	(58%)	70	(42%)	63	(38%)

TABLE G-11. DRIVER MARITAL STATUS AND BAL

Marital Status	Total	Drinking 0.01%+		0.10%+		0.15%+	
Married	155	105	(64%)	89	(58%)	70	(45%)
Single	114	70	(71%)	56	(49%)	45	(40%)
Divorced or Separated	30	26	(87%)	22	(73%)	17	(57%)
Widowed	5	2	(40%)	2	(40%)	1	(20%)
Missing Data	5	-	-	-	-	-	-
Total	309	203	(66%)	169	(55%)	133	(43%)

TABLE G-12. MARITAL STATUS AND BLOOD ALCOHOL LEVEL FOR THE TOTAL FATALITY POPULATION

	Blood Alcohol Level						
Marital Status	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
Married	99	33	11	27	62	45	277
Single	89	27	20	17	54	26	233
Divorced	9	3	1	6	11	5	35
Separated	5	1	3	2	6	5	22
Widowed	26	4	0	3	3	5	41
Not Given	5	0	1	0	1	1	8
Total	233	68	36	55	137	87	616

TABLE G-13. RACE AND BLOOD ALCOHOL LEVEL FOR THE TOTAL FATALITY POPULATION

	Blood Alcohol Level						
Race	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
White	195	49	25	43	106	62	480
Black	38	19	11	12	31	25	136
Total	233	68	36	55	137	87	616

TABLE G-14A. AGE, MARITAL STATUS, AND BAL
FOR THE TOTAL FATALITY POPULATION *

Age (Years)	Married		Single		Divorced→	Combined		←Separated	Widowed		Total
16-19	5	7%	64	93%	0	0	0%	0	0	0%	69
20-25	35	31	68	60	6	10	9	4	0	0	113
26-35	56	62	27	30	1	7	8	6	0	0	90
36-45	54	62	15	17	7	13	15	6	5	6	87
46-55	50	60	18	21	12	15	18	3	1	1	84
56-65	37	51	20	27	7	10	14	3	6	8	73
66+	39	44%	20	22%	2	2	2%	0	28	31%	89
								Missing Data			11
									Total		616

*Percentages given are for percent of each age.

TABLE G-14B. AGE, MARITAL STATUS, AND BAL
FOR THE TOTAL FATALITY POPULATION

Age (Years)	Married:	Not Drinking	BAL 0.15%+	Single:	Not Drinking	BAL 0.15%+
16-19	5	0	1	64	35	8
20-25	35	7	10	68	15	30
26-35	56	12	35	27	8	10
36-45	54	15	27	15	2	11
46-55	50	19	21	18	6	11
56-65	37	20	10	20	10	5
66+	39	25	3	20	12	5
Total	276	98	107	232	88	80

TABLE G-14C. AGE, MARITAL STATUS, AND BAL FOR THE TOTAL FATALITY POPULATION

Age (Years)	Divorced & Separated	Not Drinking	BAL: 0.15%+	Widowed	Not Drinking	BAL: 0.15%+
16-19	0	0	0	0	0	0
20-25	10	3	4	0	0	0
26-35	7	2	4	0	0	0
36-45	13	1	9	5	1	4
46-55	15	3	6	1	0	0
56-65	10	3	4	6	0	3
66+	2	2	0	28	24	1
Total	57	14	27	40	25	8

TABLE G-15. SOCIAL CLASS AND BLOOD ALCOHOL LEVEL

Social Class	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14-	0.15-0.24%	0.25%+	Total
Blue collar, unskilled, semi-skilled	72	21	18	25	74	52	262
White collar, skilled technician	38	12	4	15	31	12	112
Profession-al, manager-ial, semi-profession-al	14	2	3	4	2	4	29
Retired, disabled	31	7	4	4	8	2	56
Housewife	29	9	0	0	4	1	43
Student, Armed Forces	22	10	2	4	4	3	45
Unemployed	12	3	3	1	7	8	34
No infor-mation	15	4	2	2	7	5	35
Total	233	68	36	55	137	87	616

TABLE G-16. NUMBER OF CASES AUTOPSIED OR WITH PATHOLOGY AND TOXICOLOGY EXAMINATIONS

Type of Examination	Number Examined
Toxicological examinations	616
Pathological examinations	509
Autopsies	323

TABLE G-17. TIME LAPSE BETWEEN ACCIDENT AND DEATH AND BAL FOR ALL FATALITIES

Time lapse between accident and death	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Immediate through 30 minutes	99	30	18	21	66	52	286
31 to 60 minutes	57	11	7	19	36	18	148
1 to 4 hours	47	21	9	9	30	15	131
4 to 6 hours	11	5	1	3	3	1	24
6 to 12 hours	6	1	1	2	0	0	10
12 to 24 hours	11	0	0	1	0	0	12
24 to 96 hours	1	0	0	0	1	1	3
Beyond 96 hours	1	0	0	0	0	0	1
Missing data	0	0	0	0	1	0	1
Total	233	68	36	55	137	87	616

TABLE G-18. MORGUE REPORT: THE PRESENCE OF FAT IN THE LIVERS OF THE TOTAL FATALITY POPULATION

Fat Present	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
No	175	59	23	36	93	57	443
Yes	58	9	13	19	44	30	173
Total	233	68	36	55	137	87	616

TABLE G-19. MORGUE REPORT: THE PRESENCE OF FAT IN THE LIVERS OF THE FATALITY POPULATION ABOVE AGE 25

Fat Present	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
No	113	32	8	18	59	47	277
Yes	54	8	11	13	37	28	151
Total	167	40	19	31	96	75	428

TABLE G-20. MORGUE REPORT: THE PRESENCE OR ABSENCE OF CIRRHOSIS, AND BLOOD ALCOHOL LEVEL FOR THE TOTAL FATALITY POPULATION

Fat Present	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
Not Done	31	12	2	8	24	26	103
No	197	54	34	46	108	60	499
Yes	5	2	0	1	5	1	14
Total	233	68	36	55	137	87	616

TABLE G-21. DESTINATION OF DECEASED AT THE TIME OF THE FATAL ACCIDENT AND REAL BAL

Going to	Blood Alcohol Level Negative	0.01- 0.04%	0.05- 0.09%	0.10- 0.14%	0.15- 0.24%	0.25%+	Total Number
No information	172	51	32	47	105	71	478
Visiting friends or relatives	4	2	0	3	2	3	14
Work or school	10	4	0	0	3	1	18
Home	28	8	3	4	24	12	79
Errand, appointment	14	2	0	1	1	0	18
Entertainment, recreation	2	0	1	0	2	0	5
On the job - drinking establishment	1	1	0	0	0	0	2
On the job	2	0	0	0	0	0	2
Total	233	68	36	55	137	87	616

TABLE G-22. TIME OF THE ACCIDENT AND BAL FOR THE TOTAL FATALITY POPULATION

Time of Accident	Blood Alcohol Level Negative	0.01- 0.04%	0.05- 0.09%	0.10- 0.14%	0.15- 0.24%	0.25%+	Total Number
Midnight - 3 am	23	13	13	22	53	33	157
3:01 - 6 am	11	5	5	5	21	8	55
6:01 - 9 am	24	11	2	4	2	5	48
9:01 - Noon	25	2	0	2	3	2	34
12:01 - 3 pm	36	6	3	0	4	1	50
3:01 - 6 pm	35	7	3	2	9	3	59
6:01 - 9 pm	44	11	6	9	20	20	110
9:01 - Midnight	35	13	4	11	25	15	103
Total	233	68	36	55	137	87	616

TABLE G-23. DRIVER BAL AND TIME OF ACCIDENT

Time of Accident	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Midnight - 3 am	12	3	4	17	33	19	88
3:01 - 6 am	5	0	2	4	17	4	32
6:01 - 9 am	15	2	2	3	2	2	26
9:01 - noon	13	1	0	1	3	1	19
12:01 - 3 pm	15	1	1	0	3	1	21
3:01 - 6 pm	16	2	3	1	6	2	30
6:01 - 9 pm	16	6	1	6	11	8	48
9:01 - Midnight	13	5	1	4	15	7	45
Missing data	0	0	0	0	0	0	0
Total	105	20	14	36	90	44	309

TABLE G-24. PASSENGER BAL AND TIME OF ACCIDENT

Time of Accident	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Midnight - 3 am	7	9	7	5	12	3	43
3:01 - 6 am	6	4	3	1	1	2	17
6:01 - 9 am	0	2	0	1	0	0	3
9:01 - noon	5	1	0	1	0	0	7
12:01 - 3 pm	9	4	1	0	0	0	14
3:01 - 6 pm	8	1	0	0	1	0	10
6:01 - 9 pm	15	2	1	2	3	2	25
9:01 - Midnight	10	6	1	2	2	0	21
Missing data	0	0	0	0	0	0	0
Total	60	29	13	12	19	7	140

TABLE G-25. PEDESTRIAN BAL AND TIME OF ACCIDENT

Time of Accident	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Midnight - 3 am	4	1	2	0	8	11	26
3:01 - 6 am	0	1	0	0	3	2	6
6:01 - 9 am	9	7	0	0	0	3	19
9:01 - Noon	7	0	0	0	0	1	8
12:01 - 3 pm	12	1	1	0	1	0	15
3:01 - 6 pm	11	4	0	1	2	1	19
6:01 - 9 pm	13	3	4	1	6	10	37
9:01 - Midnight	12	2	2	5	8	8	37
Missing data	0	0	0	0	0	0	0
Total	68	19	9	7	28	36	167

TABLE G-26. DRIVER BAL AND DAY OF THE WEEK

Day	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Sunday	13	2	3	5	18	5	46
Monday	19	1	1	5	9	4	39
Tuesday	19	1	1	3	12	2	38
Wednesday	15	4	2	4	6	12	43
Thursday	13	3	2	3	9	3	33
Friday	15	3	4	5	14	9	50
Saturday	11	5	1	10	22	9	58
Missing Data	0	1	0	1	0	0	2
Total	105	20	14	36	90	44	309

TABLE G-27. PASSENGER BAL AND DAY OF THE WEEK

Day	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
	Blood Alcohol Level						
Sunday	12	11	7	3	5	0	38
Monday	6	3	0	2	0	1	12
Tuesday	6	1	0	1	0	1	9
Wednesday	5	5	0	0	1	1	12
Thursday	11	0	1	0	1	1	14
Friday	14	0	1	5	7	1	28
Saturday	6	9	4	1	5	2	27
Total	60	29	13	12	19	7	140

TABLE G-28. PEDESTRIAN BAL AND DAY OF WEEK

Day	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%	Total Number
		Blood Alcohol Level					
Sunday	7	0	2	2	8	6	25
Monday	9	1	0	1	2	3	16
Tuesday	9	2	0	0	2	5	18
Wednesday	8	2	1	2	3	0	16
Thursday	10	3	1	1	3	2	20
Friday	12	8	2	0	5	8	35
Saturday	13	3	3	1	5	12	37
Total	68	19	9	7	28	36	167

TABLE G-29. DAY OF THE WEEK, TIME OF DAY, AND BAL:
NEGATIVE AND $\geq$0.10% FOR DRIVERS

Day	Total	Midnight to 6 am			6 am - Noon			12:01 - 6 am			6 pm - Midnight		
		Blood Alcohol			Blood Alcohol			Blood Alcohol			Blood Alcohol		
		Total	Neg.	0.10%+	Total	Neg.	0.10%+	Total	Neg.	0.10%+	Total	Neg.	0.10%+
Sunday	46	27	4	19	2	2	0	4	2	2	13	5	7
Monday	39	13	3	10	5	4	1	9	5	3	12	7	4
Tuesday	38	14	4	9	9	7	2	6	4	2	9	4	4
Wednesday	43	18	1	16	3	3	0	12	10	0	10	1	6
Thursday	33	10	0	10	8	6	2	10	5	3	5	2	0
Friday	50	12	2	8	11	5	4	4	2	1	23	6	15
Saturday	58	25	3	21	7	1	3	6	3	2	20	4	15
Total Number	307	119	17	93	45	28	12	51	31	13	92	29	51

Missing data: 2 (day of week)

TABLE G-30. DRIVER BAL AND MONTHS OF THE YEAR*

Month	Blood Alcohol Level: Negative to 0.09%		0.10%+		Total	
January	9	(43%)	12	(54%)	21	(7%)
February	11	(50%)	11	(50%)	22	(7%)
March	11	(48%)	12	(52%)	23	(8%)
April	9	(60%)	6	(40%)	15	(5%)
May	7	(33%)	14	(67%)	21	(7%)
June	13	(50%)	13	(50%)	26	(9%)
July	15	(58%)	11	(42%)	26	(9%)
August	12	(41%)	17	(59%)	29	(10%)
September	9	(45%)	11	(55%)	20	(8%)
October	16	(48%)	17	(51%)	33	(11%)
November	13	(33%)	24	(67%)	37	(12%)
December	6	(25%)	18	(75%)	24	(8%)
Total	131		166		297	

* July, 1967 and August, 1969 have been eliminated to make a complete two year period.

TABLE G-31. TYPE OF ROAD AND BAL FOR DRIVER FATALITIES

Type Road	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Divided - limited access	23	3	3	6	18	11	64
Divided - other	9	3	0	5	8	3	28
One-way street	0	0	1	0	0	0	1
Unpaved-any width	1	0	0	1	1	0	3
Missing data	72	14	10	24	63	30	213
Total	105	20	14	36	90	44	309

TABLE G-32. STRAIGHT OR CURVED ROADS AND BALS OF DRIVING FATALITIES

Road Type	Blood Alcohol Level Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Straight	88	17	11	29	64	35	244
Curved	10	2	3	3	22	7	47
Missing data	7	1	0	4	4	2	18
Total	105	20	14	36	90	44	309

TABLE G-33. DRIVER ACTIVITY AND BAL IMMEDIATELY PRIOR TO ACCIDENT

Driver Activity	Blood Alcohol Level Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Going straight ahead	87	18	14	26	81	43	269
Overtaking another vehicle	3	1	0	1	6	0	11
Making right turn	1	0	0	3	0	0	4
Making left turn	6	1	0	1	0	1	9
Slowing or stopping (in traffic)	3	0	0	2	2	0	7
Starting from parked	1	0	0	0	0	0	1
Missing data	4	0	0	3	1	0	8
Total	105	20	14	36	90	44	309

TABLE G-34. NUMBER OF VEHICLES INVOLVED IN DRIVER FATALITY ACCIDENTS AND BAL OF DRIVERS

	Blood Alcohol Level						
Number of Vehicles Involved	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
One	28	3	7	13	38	19	108
Two	60	16	7	21	49	20	173
Three	9	0	0	1	1	4	15
Four	3	1	0	1	1	1	7
Five	1	0	0	0	0	0	1
Missing Data	5	0	0	0	0	0	5
Total	106	20	14	36	89	44	309

TABLE G-35. COLLISION TYPE IN DRIVER FATALITY ACCIDENTS AND DRIVER BAL

	Blood Alcohol Level						
Picture Interpretation (collision type)	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Rear-end	12	2	0	5	12	5	36
Head-on	6	5	1	8	20	11	51
Right-angle	45	9	6	6	17	8	91
Side-swipe	9	0	0	2	4	0	15
Out-of-control (to right side)	19	2	5	6	20	8	60
Out-of-control (to left side)	12	2	2	9	17	12	54
Missing data	2	0	0	0	0	0	2
Total	105	20	14	36	90	44	309

TABLE G-36. THE NUMBER OF VEHICLES INVOLVED IN DRIVER FATALITIES BY COLLISION TYPE

Number of Vehicles Involved	Picture Interpretation							
	Rear-end	Head-on	Right-angle	Side-swipe	Out-of-control right	Out-of-control left	Missing data	Total Number
One	0	5	1	0	54	47	1	108
Two	26	42	83	11	5	5	1	173
Three	6	3	3	3	0	0	0	15
Four	1	1	1	1	1	2	0	7
Five	1	0	0	0	0	0	0	1
Missing Data	0	2	0	3	0	0	0	5
Total	36	51	91	15	60	54	2	309

TABLE G-37. LOCALITY AND COLLISION TYPE FOR DRIVER FATALITIES

Kind of Locality	Picture Interpretation							
	Rear-end	Head-on	Right-angle	Side-swipe	Out-of-control right	Out-of-control left	Missing data	Total Number
Manufacturing; industry	3	6	9	1	5	3	0	27
Shopping or business	19	14	44	5	12	12	1	107
Apartments	0	1	2	3	3	3	0	12
School or playground	2	0	0	0	4	2	0	8
One family home	4	7	15	1	8	5	0	40
Farms, fields	1	5	6	0	4	4	0	20
Not developed	2	10	9	4	12	18	0	55
Unknown	3	1	2	1	9	5	0	21
and Missing Data	2	7	4	0	3	2	1	19
Total	36	51	91	15	60	54	2	309

TABLE G-38. DESCRIPTION OF ACCIDENT TYPE AND SURROUNDING ENVIRONMENT

Collision type	Number of collisions		BAL negative		BAL 0.10%+		Locality Over-rep.	Locality Under-rep.	Over-represented road surface weather
Rear-end	36	(13%)	12	(33%)	22	(61%)	business	farm/field	road - wet/snow
Head-on	51	(17%)	6	(12%)	39	(76%)	--	--	road - wet/snow
Right Angle	91	(29%)	45	(49%)	31	(34%)	business	undeveloped	road - dry weather - clear
Side-swipe	15	(5%)	9	(60%)	6	(40%)	undevelop/ apartments	residential	--
Out-of-control	114	(37%)	31	(27%)	72	(63%)	undevel- oped	business	--
Missing Data	2	(0%)	0	(0%)	0	(0%)	--	--	--
All Accidents	309	(101%)	103	(34%)	170	(55%)	--	--	--

TABLE G-39. WEATHER CONDITIONS AND COLLISION TYPE FOR DRIVER FATALITIES

	Picture Interpretation							
Weather	Rear-end	Head-on	Right-angle	Side-swipe	Out-of-control right	Out-of-control left	Missing data	Total Number
Clear or cloudy	30	36	84	13	50	45	0	258
Rain	4	8	2	2	4	6	0	26
Snow	1	4	1	0	4	0	0	10
Freezing rain	0	0	1	0	0	0	0	1
Missing data	1	3	3	0	2	3	2	14
Total	36	51	91	15	60	54	2	309

TABLE G-40. ROAD SURFACE AND COLLISION TYPE FOR DRIVER FATALITIES

	Picture Interpretation							
Surface	Rear-end	Head-on	Right-angle	Side-swipe	Out-of-control right	Out-of-control left	Missing data	Total Number
Dry	26	31	80	13	45	40	0	235
Wet	7	11	5	2	12	11	0	48
Snow or ice	2	3	3	0	1	1	0	10
Other	0	3	0	0	0	0	0	3
Missing data	1	3	3	0	2	2	2	13
Total	36	51	91	15	60	54	2	309

TABLE G-41. ESTIMATED SPEED OF DRIVER FATALITIES IMMEDIATELY PRECEDING THE FATAL CRASH

MPH Driver Speed	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
0	1	0	0	0	0	0	1
1	1	0	0	0	0	0	1
3	1	0	0	0	0	0	1
5	3	0	0	0	0	0	3
10	4	2	0	0	1	1	8
11	0	1	0	0	0	0	1
15	4	2	0	2	0	1	9
20	4	1	0	2	0	0	7
25	6	1	2	2	1	0	12
30	10	2	0	0	7	3	22
35	2	3	2	1	6	4	18
40	9	1	0	3	6	2	21
45	2	1	1	2	4	2	12
50	6	1	2	0	9	4	22
55	8	1	0	5	10	2	26
60	3	0	1	1	9	3	17
65	2	0	1	0	2	3	8
68	0	0	0	0	1	0	1
70	0	0	1	0	3	2	6
75	1	0	0	0	1	2	4
80	4	0	1	1	2	3	11
85	0	0	0	1	0	0	1
90	0	0	0	3	1	2	6
95	0	0	0	1	0	0	1
98 and above	0	0	1	1	2	0	4
Missing data	34	4	2	11	25	10	86
Total	105	20	14	36	90	44	309

TABLE G-42. SPEED AT THE TIME OF CRASH AND AGE OF DRIVER*

Miles Per Hour	Age (Years) 16-19	20-25	26-35	36-45	46-55	56-65	66+	Total
0-20	5 (24%)	6 (10%)	0 (0%)	2 (6%)	8 (25%)	6 (22%)	4 (29%)	31 (14%)
21-40	8 (38%)	10 (18%)	12 (31%)	11 (33%)	13 (41%)	13 (48%)	6 (43%)	73 (33%)
41-60	3 (14%)	21 (37%)	20 (51%)	13 (40%)	10 (31%)	7 (26%)	3 (21%)	77 (35%)
61-80	5 (24%)	11 (19%)	5 (13%)	6 (18%)	1 (3%)	1 (4%)	1 (7%)	30 (13%)
81-100+	0 (0%)	9 (16%)	2 (5%)	1 (3%)	0 (0%)	0 (0%)	0 (0%)	12 (5%)
Total	21 (100%)	57 (100%)	39 (100%)	33 (100%)	32 (100%)	27 (100%)	14 (100%)	223 (100%)
Missing data on speed	13	19	18	11	13	5	6	86
Total with missing data	34	76	57	44	45	32	20	209
Number of speeding violations at accident	5	19	8	9	4	1	0	46
Speeding violators with BAL 0.10%+	4	14	7	9	4	1	0	39

*Percentages are based on totals before inclusion of missing data.

TABLE G-43. DRIVER VIOLATIONS WHICH OCCURRED IMMEDIATELY PRIOR TO THE ACCIDENT AND DRIVER BAL

Driver Violations	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
More than one violation	4	0	2	2	11	9	28
Speed too fast	5	0	4	7	21	11	48
Fail to yield or stop	9	3	1	3	3	4	23
Drove left of center	2	2	1	3	5	4	17
Improper over-taking	0	0	0	0	1	0	1
Follow too closely	1	0	0	0	0	0	1
Improper turn, fail to signal	3	0	0	1	0	0	4
Other	11	2	2	5	16	5	41
No violation issued	70	13	4	15	33	11	146
Total	105	20	14	36	90	44	309

TABLE G-44. PEDESTRIAN ACTIVITY IMMEDIATELY PRIOR TO ACCIDENT

Pedestrian Activity	Blood Alcohol Level Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Crossing at intersection	32	5	2	3	5	7	54
Crossing at non-inter-section	16	10	2	4	12	20	64
Walking with traffic	3	0	0	0	0	2	5
Walking against traffic	3	0	0	0	0	0	3
Standing in road	5	0	3	0	5	1	14
Pushing or working on vehicle	1	0	0	0	0	1	2
Other activity besides playing in road	1	1	1	0	0	3	6
Not in road	7	3	1	0	6	2	19
Total	68	19	9	7	28	36	167

TABLE G-45. PHYSICAL CONDITION OF DRIVER FATALITY IMMEDIATELY PRIOR TO THE ACCIDENT AND DRIVER BAL

Physical Condition	Blood Alcohol Level Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Ill	2	1	0	0	0	0	3
Asleep	0	0	1	0	2	0	3
Other impairments	4	0	1	2	1	2	10
Normal	31	4	7	14	28	13	97
Not known	38	10	3	11	35	16	113
Missing Data	30	5	2	9	24	13	83
Total	105	20	14	36	90	44	309

TABLE G-46. POLICE INTERPRETATION OF DRINKING INVOLVEMENT OF DRIVERS AND REAL BAL

Drinking involvement	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Had been drinking	6	2	7	7	10	8	40
Had not been drinking	38	6	3	3	16	6	72
Not known if drinking	33	6	1	14	39	14	107
Missing Data	28	6	3	12	25	16	90
Total	105	20	14	36	90	44	309

TABLE G-47. POLICE INTERPRETATION OF DRINKING INVOLVEMENT OF PEDESTRIANS AND REAL BAL

Pedestrians	Blood Alcohol Level: Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Had been drinking	0	0	1	1	6	9	17
Had not been drinking	31	5	3	0	0	2	41
Not known if drinking	9	2	0	3	2	3	19
Missing Data	28	12	5	3	20	22	90
Total	68	19	9	7	28	36	167

TABLE G-48. NUMBER OF DRIVERS WITH PASSENGERS IN THE FRONT SEAT AND DRIVER BAL

Passengers in front	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
Driver alone	85	14	9	23	64	35	230
One passenger	16	3	2	9	24	7	61
Two passengers	2	2	3	4	2	1	14
Missing Data	2	1	0	0	0	1	4
Total	105	20	14	36	90	44	309

TABLE G-49. NUMBER OF DRIVERS WITH BACK SEAT PASSENGERS AND DRIVER BAL

Passengers in rear	Blood Alcohol Level						
	Negative	0.01-0.04%	0.05-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total
One	3	1	2	3	9	1	19
Two	1	1	3	1	1	2	9
Three	1	1	0	1	0	0	3
Four	0	0	1	0	0	0	1
None	100	17	8	31	80	41	277
Total	105	20	14	36	90	44	309

TABLE G-50. AGE OF DRIVER FATALITIES AND VEHICLE OWNER/DRIVER RELATIONSHIP

	Owner/Driver Relationship						
Age (Years)	Owner/ driver same	Owner/ driver differ- ent	Owner/ driver same family	Busi- ness car	No infor- mation	Owner: rental agency	Total Number
16-19	13	6	11	1	3	0	34
20-25	48	15	8	2	3	0	76
26-35	43	6	2	3	3	0	57
36-45	32	3	2	5	2	0	44
46-55	36	0	1	3	4	1	45
56-65	24	2	1	3	2	0	32
66+	16	0	0	1	3	0	20
Missing data	1	0	0	0	0	0	1
Total	213	32	25	18	19	1	309

G.2. FOUR POPULATION COMPARISON

TABLE G-51. ACCIDENT FREQUENCY FOR FOUR POPULATIONS: DRIVER RECORDS ONLY (N = 2762)

	Number of Accidents					
Population	0	1	2	3	4+	Total
DUIL	58(34%)	59(35%)	34(20%)	11(7%)	7(4%)	169
Fatalities	177(64%)	60(21%)	25(9%)	9(3%)	5(2%)	276
Michigan Driver Profile	757(71%)	227(21%)	59(6%)	20(2%)	7(0.7%)	1070
Hurley (Drivers Only)	743(60%)	325(26%)	111(9%)	46(4%)	22(2%)	1247

TABLE G-52. DRIVING VIOLATIONS FREQUENCY FOR THE FOUR POPULATIONS (N = 2760)

	Number of Violations					
Population	0	1	2	3	4+	Total
DUIL	15(9%)	15(9%)	21(12%)	19(11%)	99(59%)	169
Fatality	70(25%)	42(15%)	31(11%)	26(9%)	107(39%)	276
MDP	505(47%)	246(23%)	115(11%)	70(7%)	132(12%)	1068
Hurley	429(34%)	315(25%)	188(15%)	108(9%)	207(17%)	1247

TABLE G-53. SPEEDING VIOLATIONS FREQUENCY FOR FOUR POPULATIONS (N = 2762)

	Number of Violations					
Population	0	1	2	3	4+	Total
DUIL	74(44%)	42(25%)	21(12%)	15(9%)	17(10%)	169
Fatalities	131(48%)	55(20%)	31(11%)	21(8%)	38(14%)	276
MDP	718(67%)	192(18%)	71(7%)	31(3%)	58(5%)	1070
Hurley	816(65%)	256(21%)	93(8%)	38(3%)	44(4%)	1247

TABLE G-54. RECKLESS VIOLATIONS FREQUENCY FOR FOUR POPULATIONS (N = 2763)

Population	Number of Violations				Total
	0		1+		
DUIL	146	(86%)	23	(14%)	169
Fatalities	248	(90%)	28	(10%)	276
MDP	1036	(97%)	35	(3%)	1071
Hurley	1116	(90%)	131	(10%)	1247

TABLE G-55. FREQUENCY OF DUIL/DWI CONVICTIONS FOR FOUR POPULATIONS (N = 2763)

Population	Number of Violations				Total
	0		1+		
DUIL	149	(88%)	20	(12%)	169
Fatalities	264	(96%)	12	(4%)	276
MDP	1059	(99%)	12	(1%)	1071
Hurley	1041	(84%)	206	(16%)	1247

G.3. CONTINGENCY TABLES

The distribution of fatalities by several different variables of classification is presented in the following contingency tables. The usual Chi square test for dependency between the classification variables has been applied, and the significance level is shown. In cases where four populations were compared, the frequency tables and significance levels are only given for the four-way comparison. It should be noted that each of the four populations was also compared pair-wise to the other three populations. Because the frequencies remain the same, they are not repeated. Any change in the significance level for pair comparisons is given in the text. The following frequency tables are listed in the order in which they appeared in the text.

TABLE G-56. SOCIAL CLASS AND BAL BY NUMBER OF FATALITIES

Social Class	Blood Alcohol Level Neg.-0.04%	0.05-0.15%	0.15%+	Total
Blue Collar	93	43	126	262
White Collar	50	19	43	112
Professional	16	7	6	29
Total	159	69	175	403

CHI SQUARE = 9.952 D.F. = 4 SIG LEVEL = 0.0412

TABLE G-57. DRINKING FROM MIDNIGHT TO 6 AM BY NUMBER OF DRIVER FATALITIES

Time	Blood Alcohol Level 0.10%+	Neg.-0.09%	Total
Midnight to 6 am	94	26	120
All other times	85	104	189
Total	179	130	309

CHI SQUARE = 32.161 D.F. = 1 SIG LEVEL = 0.0000

TABLE G-58. WEEKEND AND WEEKDAY BAL BY NUMBER OF DRIVER FATALITIES

Type of day	Blood Alcohol Level Neg.-0.09%	0.10%+	Total
Week-day	92	75	167
Week-end	46	94	140
Total	138	169	307

CHI SQUARE = 14.327 D.F. = 1 SIG LEVEL = 0.0002

TABLE G-59. WEEKDAY AND WEEKEND NONDRINKERS BY NUMBER OF DRIVER FATALITIES

Type of day	Drinkers	Non-Drinkers	Total
Week-day	95	72	167
Week-end	107	33	140
Total	202	105	307

CHI SQUARE = 12.070 D.F. = 1 SIG LEVEL = 0.0005

TABLE G-60. MAY, NOVEMBER, AND DECEMBER; NUMBER OF DRIVER FATALITIES AND BAL

	Blood Alcohol Level		
Month	Neg.-0.09%	0.10%+	Total
May, November, December	26	56	82
Other Months	105	110	215
Total	131	166	297

CHI SQUARE = 6.388 D.F. = 1 SIG LEVEL = 0.0115

TABLE G-61. NUMBER OF DRIVER FATALITIES AGE 16-25 YEARS BY WARM WEATHER (APRIL-AUGUST)

Weather	16-25 Years	>25 Years	Total
Warm	52	65	117
Other	55	125	180
Total	107	190	297

CHI SQUARE = 5.348 D.F. = 1 SIG LEVEL = 0.0208

TABLE G-62. BAL AND CURVED ROADS BY NUMBER OF DRIVER FATALITIES

BAL	Straight	Curved	Total
Negative	88	10	98
≥0.10%	128	33	161
Total	216	43	259

CHI SQUARE = 3.947 D.F. = 1 SIG LEVEL = 0.05

TABLE G-63. BAL AND SPEED BY NUMBER OF DRIVER FATALITIES

	Blood Alcohol Level		
Speed	Negative	≥0.10%	Total
<40 MPH	45	41	86
40-60 MPH	19	51	70
60+	7	31	38
Total	71	123	194

CHI SQUARE = 17.276 D.F. = 2 SIG LEVEL = 0.0002

TABLE G-64. HIGH SPEED AND YOUNG (16-25 YEARS) DRIVER FATALITIES

	Age (Years)		
Speed	≤25	≥25	Total
<60 MPH	53	128	181
>60 MPH	25	17	42
Total	78	145	223

CHI SQUARE = 12.411 D.F. = 1 SIG LEVEL = 0.0004

TABLE G-65. LOW SPEED AND OLDER (>55 YEARS) DRIVER FATALITIES

Speed	55 Years	>55 Years	Total Number
<40 MPH	75	29	104
>40 MPH	107	12	119
Total	182	41	223

CHI SQUARE = 10.563 D.F. = 1 SIG LEVEL = 0.0012

TABLE G-66. ACCIDENT VIOLATIONS AND DRINKING BY NUMBER OF DRIVER FATALITIES

Drinking Status	No Violation	Violation	Total
Drinking	76	128	204
Not Drinking	69	35	104
Total	145	163	308

CHI SQUARE = 22.245 D.F. = 1 SIG LEVEL = 0.0000

TABLE G-67. DRIVING CONVICTIONS AND BAL FOR DRIVER FATALITIES

	Blood Alcohol Level				
Number of Convictions	Negative	0.01-0.09%	0.10-0.14%	0.15%+	Total Number
0	34	8	6	22	70
1	17	6	5	14	42
2	8	4	1	18	31
3	9	2	4	11	26
4+	24	12	14	57	107
Total	92	32	30	122	276

CHI SQUARE = 20.624 D.F. = 12 SIG LEVEL = 0.0562

TABLE G-68. DRIVING CONVICTIONS AND BAL FOR DRIVER FATALITIES

Number of Convictions	Blood Alcohol Level Neg.-0.09%	0.10%+	Total Number
0	42	28	70
1	23	19	42
2	12	19	31
3	11	15	26
4+	36	71	107
Total	124	152	276

CHI SQUARE = 14.130 D.F. = 4 SIG LEVEL = 0.0069

TABLE G-69. ACCIDENTS AND BAL FOR DRIVER FATALITIES

Number of Accidents	Blood Alcohol Level Negative	0.01-0.09%	0.10-0.14%	0.15-0.24%	0.25%+	Total Number
0	65	18	18	53	23	177
1+	27	14	12	31	15	99
Total	92	32	30	84	38	276

CHI SQUARE = 3.041 D.F. = 4 SIG LEVEL = 0.5510

TABLE G-70. ACCIDENTS AND BAL FOR DRIVER FATALITIES

Accidents	Blood Alcohol Level Neg.-0.09%	0.10%+	Total Number
0	83	94	177
1+	41	58	99
Total	124	152	276

CHI SQUARE = 0.565 D.F. = 1 SIG LEVEL = 0.4524

TABLE G-71. DUIL CONVICTIONS AND BAL FOR DRIVER FATALITIES

Convictions	Blood Alcohol Level: Negative	0.01-0.09%	0.10%+	Total Number
0	92	31	141	264
1+	0	1	11	12
Total	92	32	152	276

CHI SQUARE = 7.347 D.F. = 2 SIG LEVEL = 0.0254

TABLE G-72. CRIMINAL CONVICTIONS AND BAL FOR FATALITIES

Convictions	Blood Alcohol Level: Negative	0.01-0.09%	0.10%+	Total Number
0	220	95	218	533
1+	13	9	61	83
Total	233	104	279	616

CHI SQUARE = 31.373 D.F. = 2 SIG LEVEL = 0.0000

TABLE G-73. NON-DRIVING DRUNK OFFENSES AND BAL FOR ALL FATALITIES

Offenses	Blood Alcohol Level: Negative	0.01-0.09%	0.10%+	Total Number
0	229	101	257	587
1+	4	3	22	29
Total	233	104	279	616

CHI SQUARE = 11.696 D.F. = 2 SIG LEVEL = 0.0029

TABLE G-74. DRIVING CONVICTIONS - FOUR POPULATIONS

Population	Convictions 0	1	2	3	4+	Total Number
DUIL Sample	15	15	21	19	99	169
Fatalities	70	42	31	26	107	276
MDP	505	246	115	70	132	1068
Hurley	429	315	188	108	207	1247
Total	1019	618	355	223	545	2760

CHI SQUARE = 334.812 D.F. = 12 SIG LEVEL = 0.0

TABLE G-75. ACCIDENTS FOR FOUR POPULATIONS

Population	Accidents 0	1	2	3	4+	Total Number
DUIL Sample	58	59	34	11	7	169
Fatalities	177	60	25	9	5	276
Michigan Driver Profile (MDP)	757	227	59	20	7	1070
Hurely	743	325	111	46	22	1247
Total	1735	671	229	86	41	2762

CHI SQUARE = 115.081 D.F. = 12 SIG LEVEL = 0.0

TABLE G-76. DUIL/DWI CONVICTIONS FOR FOUR POPULATIONS

Population	Convictions 0	1+	Total Number
DUIL Sample	149	20	169
Fatalities	264	12	276
MDP	1059	12	1071
Hurley	1041	206	1247
Total	2513	250	2763

CHI SQUARE = 175.385 D.F. = 3 SIG LEVEL = 0.0

TABLE G-77. RECKLESS DRIVING CONVICTIONS - FOUR POPULATIONS

Population	Convictions: 0	Convictions: 1+	Total Number
DUIL Sample	146	23	169
Fatalities	248	28	276
MDP	1036	35	1071
Hurley	1116	131	1247
Total	2546	217	2763

CHI SQUARE = 52.973 D.F. = 3 SIG LEVEL = 0.0000

TABLE G-78. SPEEDING CONVICTIONS FOR FOUR POPULATIONS

Population	Convictions: 0	1	2	3	4+	Total Number
DUIL Sample	74	42	21	15	17	169
Fatalities	131	55	31	21	38	276
MDP	718	192	71	31	58	1070
Hurley	816	256	93	38	44	1247
Total	1739	545	216	105	157	2762

CHI SQUARE = 113.617 D.F. = 12 SIG LEVEL = 0.0000

Appendix H

HISTORICAL BACKGROUND OF THE CHRONOLOGICAL STUDY OF CHRONIC ALCOHOLICS AT HURLEY HOSPITAL

by

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Hurley Hospital in Flint, Michigan, an 11-story, 716-bed, non-sectarian general hospital, has been admitting diagnosed alcoholics as patients for approximately 30 years. During the earlier years, all alcoholics were admitted exclusively to the psychiatric unit. Now they are housed indiscriminably on all floors according to the patients' indicated needs.

After experimenting for two years with a weekly Alcoholics Anonymous oriented meeting, the Genesee County Medical Society in 1956, sponsored the establishment, by the Hurley Department of Medicine, of a unit to supplement attending physicians in the medical management of alcoholics. In December of 1957 the Michigan State Board of Alcoholism matched funds with the Flint Committee on Alcoholism to employ a Group Therapy Program Director to: (1) organize and develop the unit at Hurley into a practical service to supplement attending physicians in handling and treating alcoholics in a hospital environment; (2) develop the service as a guide for other hospitals; and (3) develop an orientation and training center for therapists, interns, and residents. During the 12-year period, the program has expanded from three (1-hour) weekly group meetings to twenty-two (1 1/2-hour) weekly group therapy sessions, and from use by only a few physicians during the early days, to involvement of more than 200 physicians who have referred patients to the program. Hurley provides out-patient service in addition to the in-patient program and offers an alcoholism therapist training program. The program's therapists conduct and participate in alcoholism orientation and training for local and state organizations.

Early in 1964, a major research project was proposed to determine how effective Hurley Hospital is as a general hospital which admits and treats alcoholics, and how effective the Group Therapy Program for Alcoholics is as a service within Hurley. In addition to this specific information about the effectiveness of the Hurley Program in alcoholism treatment, the project would collect and interpret generalized, factual information about the alcohoic patients and their families for a better understanding of crucial factors in diagnosing and treating alcoholics in any similar facility. The Hurley Program has served as one of the few recognized training centers in alcoholism management for therapists, interns, and residents from other general hospitals and institutional communities. Thus, another objective of the proposed research was to define more adequately the chief factors in the program important to recovery, and to provide material for a manual which might later be developed for use in such training.

Also with this study the researchers hoped to develop an effective model for evaluating other treatment resources in Michigan and to suggest some useful standardized procedures for the gathering of treatment facility records which, if introduced into record keeping at similar institutions, would eventually allow more meaningful comparison of the effectiveness of assorted programs of treatment throughout the State of Michigan. Thus the project has been characterized from its inception by close cooperation and interaction with the Michigan Department of Public Health Alcoholism Program. The state program contributed both funds and technical assistance to the original selection of the records to be analyzed and continued to play a supportive role in the execution of the research.

In the Spring of 1965, a small preliminary grant was received which allowed the project to set up and design the study. In March of 1966, funds were made available for a one-year period by two private foundations in Flint to carry the research as far forward as possible. Personnel for data collection and processing were hired, and the actual research project got under way.

Nearly 2400 Hurley patients with drinking problems, who had at least one admission to the hospital between June 15, 1956 and January 1, 1964 were selected for study. Information collected on these patients included hospital records for each different admission to Hurley Hospital (including admissions occurring prior to 1956 as well as those during the criterion period); in-patient and out-patient group therapy records for all referrals to group therapy; and Health Department death records for patients who expired after leaving Hurley. Follow-up questionnaires, mailed to all presently living subjects, inquired about their current social and economic adjustment and drinking patterns. The responses to these questionnaires were coded and added to the store of information accumulated on each patient. In addition, traffic violation records and criminal conviction records on these subjects were provided by the Michigan Department of State. In addition Hurley physicians were canvassed by the Genesee County Medical Society to examine their attitudes and impressions about the therapy service and about their patients who used it.

Recognizing that these data contained simultaneously discrete information and chronological histories of both the drinking and driving problems manifested by the subjects, I, as the senior investigator, requested assistance from the Highway Safety Research Institute in carrying the data collection and analysis phase of the study through its second year. This was accomplished under a contract granted to HSRI by the National Highway Safety Bureau to study alcohol and road safety. By the end of that contract year, all the data had been collected, and coding and tabulation of the findings had proceeded far enough to allow a preliminary description of the sample (see RFP 173--Final Report on Contract FH-11-6555, 2/1/69).

The next task was to recode and reduce the several hundred variables originally extracted from a dozen different record sources into more malleable form for sophisticated analysis. The project coordinator of HSRIs Alcohol Safety Research Program and the project director of the original Hurley study (whose affiliation is with the Mental Health Research Institute, MHRI) agreed that the two groups should proceed independently, with the MHRI group continuing generalized processing and analysis of the total study, and the HSRI group concentrating on those aspects of the data specifically relevant to highway safety. With this strategy they hoped to provide earlier access to a variety of findings useful in accomplishing all of the comprehensive study's objectives.

Thus, in the past year, HSRI researchers worked independently, sharing the coded data but using different personnel and different analytic strategies than the researchers concurrently proceeding with their analysis at MHRI. Senior investigators for the two groups have conferred regularly during the year to keep apprised of each other's activities. The findings reported in this document deal exclusively with the results of the HSRI analysis, conducted in fulfillment of its current contract with NHSB. As information becomes available from the continuing investigation of the original Hurley Study research group, it will be circulated to HSRI and, where appropriate, to NHSB.

Appendix I

ALCOHOLIC SAMPLE CHARACTERISTICS
BY SAMPLE SIZE AND PERCENT

SEX

SAMPLES	SIZE OF SAMPLES	% MALE	% FEMALE
TOTAL ALCOHOLIC POPULATION	1517	87.8% (N=1332)	12.2% (N=185)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	83.0 (224)	17.0 (46)
DRIVERS	1247	88.9 (1108)	11.1 (139)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES:			
NO CRASHES	727	87.1 (633)	12.9 (94)
ONE CRASH	336	91.4 (307)	8.6 (29)
TWO OR MORE CRASHES	184	91.3 (168)	8.7 (16)
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTION	698	85.7 (598)	14.3 (100)
TWO OR THREE DRIVING CONVICTIONS	292	89.7 (262)	10.3 (30)
FOUR OR MORE DRIVING CONVICTIONS	257	96.5 (248)	3.5 (9)
AGE:			
20-45 YEARS	486	88.1 (428)	11.9 (58)
46 YEARS AND OLDER	761	89.4 (680)	10.6 (81)
SEX:			
MALE	1108	----	----
FEMALE	139	----	----
RACE:			
WHITE	1111	88.8 (987)	11.2 (124)
BLACK	136	89.0 (121)	11.0 (15)
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	90.7 (450)	9.3 (46)
MARRIED, WIDOWED	751	87.6 (658)	12.4 (93)
LIVING - DECEASED:			
LIVING	1118	88.4 (988)	11.6 (130)
EXPIRED '61-'67	129	93.0 (120)	7.0 (9)

RACE

SAMPLES	SIZE OF SAMPLES	% WHITE	% BLACK
TOTAL ALCOHOLIC POPULATION	1517	88.3% (1339)	11.7% (178)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	84.4 (228)	15.6 (42)
DRIVERS	1247	89.1 (1111)	10.9 (136)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES:			
NO CRASHES	727	90.6 (659)	9.4 (68)
ONE CRASH	336	89.0 (299)	11.0 (37)
TWO OR MORE CRASHES	184	83.2 (153)	16.8 (31)
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTION	698	92.8 (648)	7.2 (50)
TWO OR THREE DRIVING CONVICTIONS	292	88.7 (259)	11.3 (33)
FOUR OR MORE DRIVING CONVICTIONS	257	96.5 (248)	3.5 (9)
AGE:			
20-45 YEARS	486	84.2 (409)	15.8 (77)
46 YEARS AND OLDER	761	92.2 (702)	7.8 (59)
SEX:			
MALE	1108	89.1 (987)	10.9 (121)
FEMALE	139	89.2 (124)	10.8 (15)
RACE:			
WHITE	1111	----	----
BLACK	136	----	----
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	87.1 (432)	12.9 (64)
MARRIED, WIDOWED	751	90.4 (679)	9.6 (72)
LIVING - DECEASED:			
LIVING	1118	89.1 (996)	10.9 (122)
EXPIRED '61-'67	129	89.1 (115)	10.9 (14)

AGE

SAMPLES	SIZE OF SAMPLES	MEANS	YEARS 20-25	26-35	36-45	46-55	56-65	66-75	76 & older
TOTAL ALCOHOLIC POPULATION	1517	49.2	0.4% (6)	9.9% (150)	27.8% (421)	34.2% (519)	21.0% (319)	5.9% (90)	0.8% (12)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:									
NON-DRIVERS	270	51.1	0.7 (2)	6.7 (18)	26.3 (71)	32.3 (87)	22.2 (60)	9.6 (26)	2.2 (6)
DRIVERS	1247	48.8	0.3 (4)	10.6 (132)	28.1 (350)	34.6 (432)	20.8 (259)	5.1 (64)	0.5 (6)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:									
NUMBER OF CRASHES:									
NO CRASHES	727	50.4	0.3 (2)	7.4 (54)	24.2 (176)	36.6 (266)	24.9 (181)	5.9 (43)	0.7 (5)
ONE CRASH	336	47.3	0.3 (1)	14.3 (48)	32.4 (109)	30.6 (103)	17.6 (59)	4.5 (15)	0.3 (1)
TWO OR MORE CRASHES	184	45.1	0.6 (1)	16.3 (30)	35.3 (65)	34.2 (63)	10.3 (19)	3.3 (6)	0.0 (0)
NUMBER OF DRIVING CONVICTIONS:									
NONE OR ONE DRIVING CONVICTION	698	51.3	0.0 (0)	6.4 (45)	21.9 (153)	37.8 (264)	25.5 (178)	7.5 (52)	0.9 (6)
TWO OR THREE DRIVING CONVICTIONS	292	47.3	0.4 (1)	12.3 (36)	32.5 (95)	33.2 (97)	18.8 (55)	2.8 (8)	0.0 (0)
FOUR OR MORE DRIVING CONVICTIONS	257	43.7	1.2 (3)	19.8 (51)	39.7 (102)	27.6 (71)	10.1 (26)	1.6 (4)	0.0 (0)
AGE:									
20-45 YEARS	486	38.4	0.8 (4)	27.2 (132)	72.0 (350)	---- ----	---- ----	---- ----	---- ----
46 YEARS AND OLDER	761	55.4	--- ---	---- ----	---- ----	56.8 (432)	34.0 (259)	8.4 (64)	0.8 (6)
SEX:									
MALE	1108	49.0	0.4 (4)	10.8 (120)	27.4 (304)	33.7 (373)	21.9 (242)	5.3 (59)	0.5 (6)
FEMALE	139	47.4	0.0 (0)	8.6 (12)	33.1 (46)	42.5 (59)	12.2 (17)	3.6 (5)	0.0 (0)
RACE:									
WHITE	1111	49.3	0.3 (4)	10.0 (111)	26.5 (294)	34.5 (383)	22.5 (250)	5.7 (63)	0.5 (6)
BLACK	136	44.4	0.0 (0)	15.5 (21)	41.2 (56)	36.0 (49)	6.6 (9)	0.7 (1)	0.0 (0)
MARITAL STATUS:									
SINGLE, SEPARATED, DIVORCED	496	47.2	0.8 (4)	11.5 (57)	29.8 (148)	36.5 (181)	18.4 (91)	3.0 (15)	0.0 (0)
MARRIED, WIDOWED	751	49.7	0.0 (0)	10.0 (75)	26.9 (202)	33.4 (251)	22.4 (168)	6.5 (49)	0.8 (6)
LIVING - DECEASED:									
LIVING	1118	48.5	0.3 (3)	10.9 (122)	29.4 (329)	34.3 (384)	19.7 (220)	5.0 (56)	0.4 (4)
EXPIRED '61-'67	129	51.7	0.8 (1)	7.7 (10)	16.3 (21)	37.2 (48)	30.2 (39)	6.2 (8)	1.6 (2)

OCCUPATION

SAMPLES	SIZE OF SAMPLES	OCCUPATIONAL CODE 1	2	3	4	5	6	No Data
TOTAL ALCOHOLIC POPULATION	1517	7.4% (112)	6.7% (102)	47.6% (723)	14.8% (224)	15.5% (235)	6.5% (99)	1.5% (22)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:								
NON-DRIVERS	270	4.8 (13)	6.3 (17)	31.5 (85)	14.4 (39)	30.0 (81)	11.5 (31)	1.5 (4)
DRIVERS	1247	7.9 (99)	6.8 (85)	51.3 (638)	14.8 (185)	12.3 (154)	5.5 (68)	1.4 (18)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:								
NUMBER OF CRASHES:								
NO CRASHES	727	8.1 (59)	6.3 (46)	47.2 (343)	17.5 (127)	12.8 (93)	6.6 (48)	1.5 (11)
ONE CRASH	336	8.9 (30)	6.8 (23)	56.0 (188)	10.7 (36)	11.3 (38)	4.8 (16)	1.5 (5)
TWO OR MORE CRASHES	184	5.4 (10)	8.7 (16)	58.1 (107)	12.0 (22)	12.5 (23)	2.2 (4)	1.1 (2)
NUMBER OF DRIVING CONVICTIONS:								
NONE OR ONE DRIVING CONVICTION	698	8.0 (56)	7.0 (49)	48.0 (335)	16.0 (112)	11.9 (83)	7.6 (53)	1.5 (10)
TWO OR THREE DRIVING CONVICTIONS	292	8.6 (25)	8.6 (25)	49.3 (144)	15.0 (44)	13.7 (40)	3.4 (10)	1.4 (4)
FOUR OR MORE DRIVING CONVICTIONS	257	7.0 (18)	4.3 (11)	61.9 (159)	11.3 (29)	12.1 (31)	1.9 (5)	1.5 (4)
AGE:								
20-45 YEARS	486	5.8 (28)	5.6 (27)	58.6 (285)	15.0 (73)	13.2 (64)	0.6 (3)	1.2 (6)
46 YEARS AND OLDER	761	9.3 (71)	7.6 (58)	46.4 (353)	14.7 (112)	11.8 (90)	8.6 (65)	1.6 (12)
SEX:								
MALE	1108	7.0 (78)	6.9 (76)	52.7 (584)	14.9 (165)	11.2 (124)	5.8 (64)	1.5 (17)
FEMALE	139	15.1 (21)	6.5 (9)	38.8 (54)	14.4 (20)	21.6 (30)	2.9 (4)	0.7 (1)
RACE:								
WHITE	1111	8.7 (96)	7.2 (80)	50.5 (561)	14.7 (163)	11.4 (127)	5.9 (66)	1.6 (18)
BLACK	136	2.2 (3)	3.7 (5)	56.6 (77)	16.2 (22)	19.8 (27)	1.5 (2)	0.0 (0)
MARITAL STATUS:								
SINGLE, SEPARATED, DIVORCED	496	4.6 (23)	5.7 (28)	52.6 (261)	13.3 (66)	19.0 (94)	4.0 (20)	0.8 (4)
MARRIED, WIDOWED	751	10.1 (76)	7.6 (57)	50.2 (377)	15.8 (119)	8.0 (60)	6.4 (48)	1.9 (14)
LIVING - DECEASED:								
LIVING	1118	8.1 (91)	6.8 (76)	52.1 (582)	14.7 (164)	12.0 (134)	4.8 (54)	1.5 (17)
EXPIRED '61-'67	129	6.2 (8)	7.0 (9)	43.4 (56)	16.3 (21)	15.5 (20)	10.8 (14)	0.8 (1)

MARITAL STATUS

SAMPLES	SIZE OF SAMPLES	SINGLE	MARRIED	WIDOWED	SEPARATED & DIVORCED
TOTAL ALCOHOLIC POPULATION	1517	8.0% (121)	54.2% (822)	2.8% (43)	35.0% (531)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:					
NON-DRIVERS	270	14.1 (38)	37.0 (100)	5.2 (14)	43.7 (118)
DRIVERS	1247	6.7 (83)	57.9 (722)	2.3 (29)	33.1 (413)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:					
NUMBER OF CRASHES:					
NO CRASHES	727	6.6 (48)	59.1 (430)	2.8 (20)	31.5 (229)
ONE CRASH	336	6.9 (23)	57.7 (194)	1.8 (6)	33.6 (113)
TWO OR MORE CRASHES	184	6.5 (12)	53.3 (98)	1.6 (3)	38.6 (71)
NUMBER OF DRIVING CONVICTIONS:					
NONE OR ONE DRIVING CONVICTION	698	4.9 (34)	62.6 (437)	3.0 (21)	29.5 (206)
TWO OR THREE DRIVING CONVICTIONS	292	11.0 (32)	49.6 (145)	1.7 (5)	37.7 (110)
FOUR OR MORE DRIVING CONVICTIONS	257	6.6 (17)	54.5 (140)	1.2 (3)	37.7 (97)
AGE:					
20-45 YEARS	486	10.9 (53)	55.8 (271)	1.2 (6)	32.1 (156)
46 YEARS AND OLDER	761	3.9 (30)	59.3 (451)	3.0 (23)	33.8 (257)
SEX:					
MALE	1108	7.1 (79)	57.3 (635)	2.1 (23)	33.5 (371)
FEMALE	139	2.9 (4)	62.6 (87)	4.3 (6)	30.2 (42)
RACE:					
WHITE	1111	6.4 (71)	58.9 (654)	2.3 (25)	32.5 (361)
BLACK	136	8.8 (12)	50.0 (68)	3.0 (4)	38.2 (52)
MARITAL STATUS:					
SINGLE, SEPARATED, DIVORCED	496	16.7 (83)	---- ----	---- ----	83.3 (413)
MARRIED, WIDOWED	751	---- ----	96.1 (722)	3.9 (29)	---- ----
LIVING - DECEASED:					
LIVING	1118	6.9 (77)	58.3 (652)	2.0 (22)	32.3 (367)
EXPIRED '61-'67	129	4.6 (6)	54.3 (70)	5.4 (7)	35.7 (46)

RESIDENCE

SAMPLES	SIZE OF SAMPLES	FLINT	MICHIGAN NOT-FLINT	OUTSIDE MICHIGAN	NO DATA
TOTAL ALCOHOLIC POPULATION	1517	76.2% (1156)	23.2% (351)	0.5% (8)	0.1% (2)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:					
NON-DRIVERS	270	85.2 (230)	13.7 (37)	1.1 (3)	0.0 (0)
DRIVERS	1247	74.3 (926)	25.2 (314)	0.4 (5)	0.1 (2)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:					
NUMBER OF CRASHES:					
NO CRASHES	727	74.0 (538)	25.6 (186)	0.4 (3)	0.0 (0)
ONE CRASH	336	74.4 (250)	24.4 (82)	0.6 (2)	0.6 (2)
TWO OR MORE CRASHES	184	75.0 (138)	25.0 (46)	0.0 (0)	0.0 (0)
NUMBER OF DRIVING CONVICTIONS:					
NONE OR ONE DRIVING CONVICTION	698	71.8 (501)	27.8 (194)	0.3 (2)	0.1 (1)
TWO OR THREE DRIVING CONVICTIONS	292	76.4 (223)	22.6 (66)	0.7 (2)	0.3 (1)
FOUR OR MORE DRIVING CONVICTIONS	257	78.6 (202)	21.0 (54)	0.4 (1)	0.0 (0)
AGE:					
20-45 YEARS	486	70.3 (371)	23.3 (113)	0.2 (1)	0.2 (1)
46 YEARS AND OLDER	761	72.9 (555)	26.5 (20)	0.5 (4)	0.1 (1)
SEX:					
MALE	1108	74.6 (827)	24.7 (274)	0.5 (5)	0.2 (2)
FEMALE	139	71.2 (99)	28.8 (40)	0.0 (0)	0.0 (0)
RACE:					
WHITE	1111	71.4 (793)	27.9 (311)	0.5 (5)	0.2 (2)
BLACK	136	97.8 (133)	2.2 (5)	0.0 (0)	0.0 (0)
MARITAL STATUS:					
SINGLE, SEPARATED, DIVORCED	496	82.7 (410)	16.3 (81)	0.8 (4)	0.2 (1)
MARRIED, WIDOWED	751	68.7 (516)	31.1 (233)	0.1 (1)	0.1 (1)
LIVING - DECEASED:					
LIVING	1118	73.7 (824)	25.7 (287)	0.4 (5)	0.3 (2)
EXPIRED '61-'67	129	79.1 (102)	20.9 (27)	0.0 (0)	0.0 (0)

RELIGION

SAMPLES	SIZE OF SAMPLES	PROTESTANT	CATHOLIC	JEWISH	OTHER
TOTAL ALCOHOLIC POPULATION	1517	78.8% (1196)	20.1% (305)	0.1% (1)	1.0% (15)
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:					
NON-DRIVERS	270	76.3 (206)	23.0 (62)	0.0 (0)	0.7 (2)
DRIVERS	1247	79.4 (990)	19.5 (243)	0.1 (1)	1.1 (13)
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:					
NUMBER OF CRASHES:					
NO CRASHES	727	78.7 (572)	20.1 (146)	0.1 (1)	1.1 (8)
ONE CRASH	336	80.7 (271)	18.7 (63)	0.0 (0)	0.6 (2)
TWO OR MORE CRASHES	184	79.9 (147)	18.5 (34)	0.0 (0)	1.6 (3)
NUMBER OF DRIVING CONVICTIONS:					
NONE OR ONE DRIVING CONVICTION	698	78.1 (545)	20.9 (146)	0.0 (0)	1.0 (7)
TWO OR THREE DRIVING CONVICTIONS	292	82.5 (241)	16.8 (49)	0.0 (0)	0.7 (2)
FOUR OR MORE DRIVING CONVICTIONS	257	79.4 (204)	18.7 (48)	0.4 (1)	1.5 (4)
AGE:					
20-45 YEARS	486	79.2 (385)	19.1 (93)	0.2 (1)	1.5 (7)
46 YEARS AND OLDER	761	79.5 (605)	19.7 (150)	0.0 (0)	0.8 (6)
SEX:					
MALE	1108	79.9 (885)	19.0 (211)	0.1 (1)	1.0 (11)
FEMALE	139	75.5 (105)	23.0 (32)	0.0 (0)	1.5 (2)
RACE:					
WHITE	1111	77.4 (860)	21.7 (241)	0.1 (1)	0.8 (9)
BLACK	136	95.0 (130)	1.5 (2)	0.0 (0)	2.9 (4)
MARITAL STATUS:					
SINGLE, SEPARATED, DIVORCED	496	78.6 (390)	19.8 (98)	0.2 (1)	1.4 (7)
MARRIED, WIDOWED	751	79.9 (600)	19.3 (145)	0.0 (0)	0.8 (6)
LIVING - DECEASED:					
LIVING	1118	79.5 (889)	19.2 (215)	0.1 (1)	1.2 (13)
EXPIRED '61-'67	129	78.3 (101)	21.7 (28)	0.0 (0)	0.0 (0)

STATE HOSPITAL PATIENTS

SAMPLES	SIZE OF SAMPLES	PERCENT PATIENTS	NUMBER PATIENTS
TOTAL ALCOHOLIC POPULATION	1517	8.5%	129

TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:

NON-DRIVERS	270	10.7	29
DRIVERS	1247	8.0	100

DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:

NUMBER OF CRASHES:

NO CRASHES	727	7.0	51
ONE CRASH	336	8.3	28
TWO OR MORE CRASHES	184	11.4	21

NUMBER OF DRIVING CONVICTIONS:

NONE OR ONE DRIVING CONVICTION	698	7.0	49
TWO OR THREE DRIVING CONVICTIONS	292	9.6	28
FOUR OR MORE DRIVING CONVICTIONS	257	8.9	23

AGE:

20-45 YEARS	486	10.1	49
46 YEARS AND OLDER	761	6.7	51

SEX:

MALE	1108	7.8	86
FEMALE	139	10.1	14

RACE:

WHITE	1111	8.4	93
BLACK	136	5.1	7

MARITAL STATUS:

SINGLE, SEPARATED, DIVORCED	496	10.9	54
MARRIED, WIDOWED	751	6.1	46

LIVING - DECEASED:

LIVING	1118	8.5	95
EXPIRED '61-'67	129	3.9	5

SUICIDE

SAMPLES	SIZE OF SAMPLES	PERCENT	NUMBER
TOTAL ALCOHOLIC POPULATION	1517	6.7%	102
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	8.9	24
DRIVERS	1247	6.3	78
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES:			
NO CRASHES	727	6.2	45
ONE CRASH	336	5.7	19
TWO OR MORE CRASHES	184	7.6	14
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTION	698	6.0	42
TWO OR THREE DRIVING CONVICTIONS	292	5.8	17
FOUR OR MORE DRIVING CONVICTIONS	257	7.4	19
AGE:			
20-45 YEARS	486	7.6	37
46 YEARS AND OLDER	761	5.4	41
SEX:			
MALE	1108	5.3	59
FEMALE	139	13.7	19
RACE:			
WHITE	1111	6.5	72
BLACK	136	4.4	6
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	7.5	37
MARRIED, WIDOWED	751	5.5	41
LIVING - DECEASED:			
LIVING	1118	6.0	67
EXPIRED '61-'67	129	8.5	11

INCARCERATION

SAMPLES	SIZE OF SAMPLES	PERCENT PRISONERS	NUMBER PRISONERS
TOTAL ALCOHOLIC POPULATION	1517	9.2%	139
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	17.4	47
DRIVERS	1247	7.4	92
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES:			
NO CRASHES	727	6.9	50
ONE CRASH	336	7.7	26
TWO OR MORE CRASHES	184	8.7	16
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTIONS	698	6.6	46
TWO OR THREE DRIVING CONVICTIONS	292	5.1	15
FOUR OR MORE DRIVING CONVICTIONS	257	12.1	31
AGE:			
20-45 YEARS	486	8.2	40
46 YEARS AND OLDER	761	6.8	52
SEX:			
MALE	1108	8.2	91
FEMALE	139	0.7	1
RACE:			
WHITE	1111	6.9	77
BLACK	136	11.0	15
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	10.5	52
MARRIED, WIDOWED	751	5.3	40
LIVING - DECEASED:			
LIVING	1118	7.4	83
EXPIRED '61-'67	129	7.0	9

FAMILY PROBLEMS

SAMPLES	SIZE OF SAMPLES	PERCENT WITH FAMILY PROBLEMS	NUMBER WITH FAMILY PROBLEMS
TOTAL ALCOHOLIC POPULATION	1517	24.5%	371
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	21.9	59
DRIVERS	1247	25.0	312
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES:			
NO CRASHES	727	22.3	162
ONE CRASH	336	28.9	97
TWO OR MORE CRASHES	184	28.8	53
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTION	698	23.4	163
TWO OR THREE DRIVING CONVICTIONS	292	26.4	77
FOUR OR MORE DRIVING CONVICTIONS	257	28.0	72
AGE:			
20-45 YEARS	486	28.2	137
46 YEARS AND OLDER	761	23.0	175
SEX:			
MALE	1108	23.1	256
FEMALE	139	40.3	56
RACE:			
WHITE	1111	26.4	293
BLACK	136	14.0	19
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	29.0	144
MARRIED, WIDOWED	751	22.4	168
LIVING - DECEASED:			
LIVING	1118	25.3	283
EXPIRED '61-'67	129	22.5	29

CRIMINAL CONVICTIONS

SAMPLES	SIZE OF SAMPLES	MEANS: DRINKING CONVICTIONS NOT RELATED TO DRIVING	MEANS: OTHER CRIMINAL CONVICTIONS
TOTAL ALCOHOLIC POPULATION	1517	2.91	1.51
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:			
NON-DRIVERS	270	5.10	2.70
DRIVERS	1247	2.44	1.25
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:			
NUMBER OF CRASHES;			
NO CRASHES	727	2.51	1.17
ONE CRASH	336	2.31	1.41
TWO OR MORE CRASHES	184	2.40	1.25
NUMBER OF DRIVING CONVICTIONS:			
NONE OR ONE DRIVING CONVICTION	698	1.88	1.01
TWO OR THREE DRIVING CONVICTIONS	292	3.03	1.14
FOUR OR MORE DRIVING CONVICTIONS	257	3.28	2.03
AGE:			
20-45 YEARS	486	2.31	1.42
46 YEARS AND OLDER	761	2.52	1.14
SEX:			
MALE	1108	2.59	1.36
FEMALE	139	1.19	0.37
RACE:			
WHITE	1111	2.42	1.16
BLACK	136	2.56	2.01
MARITAL STATUS:			
SINGLE, SEPARATED, DIVORCED	496	4.15	1.77
MARRIED, WIDOWED	751	1.31	0.90
LIVING - DECEASED:			
LIVING	1118	2.59	1.28
EXPIRED '61-'67	129	1.12	0.99

HOSPITAL ADMISSIONS

SAMPLES	SIZE OF SAMPLES	MEANS ALCOHOLISM	TRAUMA	NEUROSES/ MENTAL ILLNESS
TOTAL ALCOHOLIC POPULATION	1517	3.33	0.80	0.81
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:				
NON-DRIVERS	270	3.68	0.95	0.92
DRIVERS	1247	3.25	0.76	0.79
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:				
NUMBER OF CRASHES:				
NO CRASHES	727	3.42	0.68	0.72
ONE CRASH	336	2.85	0.85	0.84
TWO OR MORE CRASHES	184	3.33	0.94	0.96
NUMBER OF DRIVING CONVICTIONS:				
NONE OR ONE DRIVING CONVICTION	698	3.35	0.69	0.78
TWO OR THREE DRIVING CONVICTIONS	292	3.10	0.64	0.76
FOUR OR MORE DRIVING CONVICTIONS	257	3.18	1.09	0.85
AGE:				
20-45 YEARS	486	2.54	0.63	0.88
46 YEARS AND OLDER	761	3.71	0.85	0.73
SEX:				
MALE	1108	3.27	0.78	0.73
FEMALE	139	3.15	0.63	1.28
RACE:				
WHITE	1111	3.29	0.69	0.81
BLACK	136	2.95	1.38	0.64
MARITAL STATUS:				
SINGLE, SEPARATED, DIVORCED	496	3.83	0.99	1.00
MARRIED, WIDOWED	751	2.87	0.62	0.65
LIVING - DECEASED:				
LIVING	1118	3.18	0.75	0.78
EXPIRED '61-'67	129	3.88	0.88	0.90

ADMISSION RATE PER YEAR

SAMPLES	SIZE OF SAMPLES	MEAN RATE
TOTAL ALCOHOLIC POPULATION	1517	1.10
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:		
NON-DRIVERS	270	1.16
DRIVERS	1247	1.10
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:		
NUMBER OF CRASHES:		
NO CRASHES	727	1.11
ONE CRASH	336	1.11
TWO OR MORE CRASHES	184	1.03
NUMBER OF DRIVING CONVICTIONS:		
NONE OR ONE DRIVING CONVICTION	698	1.11
TWO OR THREE DRIVING CONVICTIONS	292	1.16
FOUR OR MORE DRIVING CONVICTIONS	257	1.00
AGE:		
20-45 YEARS	486	1.14
46 YEARS AND OLDER	761	1.07
SEX:		
MALE	1108	1.07
FEMALE	139	1.30
RACE:		
WHITE	1111	1.09
BLACK	136	1.17
MARITAL STATUS:		
SINGLE, SEPARATED, DIVORCED	496	1.13
MARRIED, WIDOWED	751	1.07
LIVING - DECEASED:		
LIVING	1118	1.07
EXPIRED '61-'67	129	1.27

SPECIFIC DRIVING CONVICTIONS

SAMPLES	SIZE OF SAMPLES	DUIL	RECKLESS & FELONIOUS	SPEEDING	DRIVER'S LICENSE	OTHER
TOTAL ALCOHOLIC POPULATION	1517	----	----	----	----	----
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:						
NON-DRIVERS	270	----	----	----	----	----
DRIVERS	1247	0.34	0.13	0.64	0.21	0.72
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:						
NUMBER OF CRASHES:						
NO CRASHES	727	0.24	0.07	0.35	0.10	0.44
ONE CRASH	336	0.39	0.16	0.76	0.31	0.91
TWO OR MORE CRASHES	184	0.64	0.33	1.53	0.46	1.51
NUMBER OF DRIVING CONVICTIONS:						
NONE OR ONE DRIVING CONVICTION	698	0.11	0.03	0.13	0.02	0.18
TWO OR THREE DRIVING CONVICTIONS	292	0.45	0.14	0.74	0.18	0.87
FOUR OR MORE DRIVING CONVICTIONS	257	0.86	0.38	1.90	0.77	2.05
AGE:						
20-45 YEARS	486	0.39	0.19	0.99	0.34	0.98
46 YEARS AND OLDER	761	0.31	0.09	0.41	0.13	0.65
SEX:						
MALE	1108	0.36	0.14	0.68	0.23	0.76
FEMALE	139	0.18	0.05	0.32	0.09	0.41
RACE:						
WHITE	1111	0.33	0.12	0.57	0.18	0.65
BLACK	136	0.43	0.21	1.14	0.43	1.31
MARITAL STATUS:						
SINGLE, SEPARATED, DIVORCED	496	0.42	0.15	0.69	0.29	0.84
MARRIED, WIDOWED	751	0.29	0.12	0.60	0.16	0.65
LIVING - DECEASED:						
LIVING	1118	0.35	0.13	0.67	0.22	0.75
EXPIRED '61-'67	129	0.24	0.13	0.31	0.16	0.54

CRASHES

SAMPLES	SIZE OF SAMPLES	MEANS
TOTAL ALCOHOLIC POPULATION	1517	----

TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:

NON-DRIVERS	270	----
DRIVERS	1247	0.65

DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:

NUMBER OF CRASHES:

NO CRASHES	727	----
ONE CRASH	336	1.00
TWO OR MORE CRASHES	184	2.58

NUMBER OF DRIVING CONVICTIONS:

NONE OR ONE DRIVING CONVICTION	698	0.32
TWO OR THREE DRIVING CONVICTIONS	292	0.75
FOUR OR MORE DRIVING CONVICTIONS	257	1.44

AGE:

20-45 YEARS	486	0.84
46 YEARS AND OLDER	761	0.53

SEX:

MALE	1108	0.67
FEMALE	139	0.47

RACE:

WHITE	1111	0.62
BLACK	136	0.93

MARITAL STATUS:

SINGLE, SEPARATED, DIVORCED	496	0.71
MARRIED, WIDOWED	751	0.61

LIVING - DECEASED:

LIVING	1118	0.68
EXPIRED '61-'67	129	0.43

DRIVING CONVICTIONS NOT ASSOCIATED WITH CRASHES

SAMPLES	SIZE OF SAMPLES	MEANS
TOTAL ALCOHOLIC POPULATION	1517	----
TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:		
NON-DRIVERS	270	----
DRIVERS	1247	1.69
DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:		
NUMBER OF CRASHES:		
NO CRASHES	727	1.21
ONE CRASH	336	1.99
TWO OR MORE CRASHES	184	3.03
NUMBER OF DRIVING CONVICTIONS:		
NONE OR ONE DRIVING CONVICTION	698	0.39
TWO OR THREE DRIVING CONVICTIONS	292	1.97
FOUR OR MORE DRIVING CONVICTIONS	257	4.91
AGE:		
20-45 YEARS	486	2.40
46 YEARS AND OLDER	761	1.23
SEX:		
MALE	1108	1.80
FEMALE	139	0.77
RACE:		
WHITE	1111	1.54
BLACK	136	2.91
MARITAL STATUS:		
SINGLE, SEPARATED, DIVORCED	496	2.00
MARRIED, WIDOWED	751	1.48
LIVING - DECEASED:		
LIVING	1118	1.75
EXPIRED '61-'67	129	1.18

TOTAL DRIVING CONVICTIONS

SAMPLES	SIZE OF SAMPLES	MEANS
TOTAL ALCOHOLIC POPULATION	1517	----

TOTAL ALCOHOLIC POPULATION SUBGROUPED BY DRIVING STATUS:

NON-DRIVERS	270	----
DRIVERS	1247	2.04

DRIVERS SUBGROUPED BY THE FOLLOWING VARIABLES:

NUMBER OF CRASHES:

NO CRASHES	727	1.21
ONE CRASH	336	2.52
TWO OR MORE CRASHES	184	4.47

NUMBER OF DRIVING CONVICTIONS:

NONE OR ONE DRIVING CONVICTION	698	0.46
TWO OR THREE DRIVING CONVICTIONS	292	2.38
FOUR OR MORE DRIVING CONVICTIONS	257	5.95

AGE:

20-45 YEARS	486	2.89
46 YEARS AND OLDER	761	1.50

SEX:

MALE	1108	2.17
FEMALE	139	1.05

RACE:

WHITE	1111	1.86
BLACK	136	3.52

MARITAL STATUS:

SINGLE, SEPARATED, DIVORCED	496	2.39
MARRIED, WIDOWED	751	1.81

LIVING - DECEASED:

LIVING	1118	2.12
EXPIRED '61-'67	129	1.38

Appendix J

CODE TERMINOLOGY AND SUB-CATEGORIES

CONTENTS

J.1. MEDICAL DIAGNOSES

ALCOHOLISM

Alcohol Withdrawal
Alcoholic
Alcoholic Brian Syndrome
Alcoholic Cirrhosis
Alcoholic Gastritis
Alcoholism
Delirium Tremors
Ethanol Withdrawal
Ethanolism

TRAUMA

Abrasions
Amputations
Burns
Chest Injuries
Contusions
Dislocations
Fractures
Gun Shot Wounds
Lacerations
Puncture Wounds
Sprains
Stabbing Wounds

NEUROSIS/MENTAL ILLNESS

Attempted Suicide
Character Disorder
Conversion Reaction
Depression (Acute, Chronic, Severe)
Emotional Disturbance
Hysteria
Insanity
Manic-Depressive
Mental Illness
Neurosis
Paranoia
Personality Disorder
Psychoneurosis
Psychosis
Schizophrenia
Temporary Insanity

J.2. DRIVING CONVICTIONS

DUIL

Driving Under the Influence of Liquor
Drunk Driving
Drove While Impaired

RECKLESS & FELONIOUS

Reckless Driving
Manslaughter
Negligent Homicide
Felonious Driving

SPEEDING

Violation Basic Speed Law
Fail Drive Minimum Speed
Speed (no amount given) & Speed (amount given)
Excess Speed - Towed Vehicle
Drag Racing

DRIVER'S LICENSE

No Driver's License
No License in Possession
Drove While License Cancelled
Drove While License Denied
Drove While License Suspended
Drove While License Revoked
Violation of Instruction Permit
Drove W/O Special Equip. or Attachments
Drove W/O Corrective Lenses
Drove W/O Mirror
Drove W/O Knob
Violation of Restricted License
Violation Financial Responsibility License
Perjury
Fraud in Obtaining License
False Information on Application
Altered License
Mutilated License
Defaced License

OTHER DRIVING CONVICTIONS

Careless Driving
Drove W/O Due Care
Disobey Traffic Control Device
Disobey Policeman Signal
Improper Crossing - Divided Highway
Driving Under Influence Narcotic Drug
Drove on City Property
Fail Yield to Vehicle
Fail Yield to Pedestrian
Fail Yield to Funeral Procession
Fail Yield to Emergency Vehicle
Improper Use of Emergency Vehicle
Cross Fire Hose
Interfere With Fire Apparatus
Following Too Close
Fail to Signal
Vary Course W/O Safety/Signal

Unsafe Start
Unsafe Backing
Drove Wrong Way on One Way Road
Improper Lane Use
Drove Left of Center
Illegal Entrance or Exit to X-Way
Illegal Towing
Drove Without Proper Lights
Size of Load Violation
Obstructed Vision
Obstructed View or Control
Improper Passing
Passing Offense
Fail to Stop
Fail Stop Leaving Alley - Private Rd.- Drive
Fail to Stop R. R. Crossing
Disobey Red Traffic Signal
Disobey Flashing Red Signal
Disobey Flashing Yellow Signal
Fail Stop for School Bus
Disobey Stop Sign
Fail Stop After Personal Injury Accident
Failure Stop After Accident
Failure to Report Accident
Allow Intoxicated Person to Drive
Prohibited Turn
Improper Turn
Drove Motor Scooter at Night W/O Approval
Unlawful Rider on Motorcycle
Motor Cycle - Over 2 Abreast
Cycle - Improper or No Safety Equipment
Equipment Violation - Muffler
Equipment Violation - Lights
Equipment Violation - Windshield
Equipment Violation - Fender
Equipment Violation - Brakes
Equipment Violation - Steering
Equipment Violation - Bumper
Equipment Violation - Tires
Equipment Violation - Rear View Mirror
Equipment Violation - Mud Flap
Equipment Violation - Safety Chains
Equipment Violation - No Flag on Load
Equipment Violation - Defective

J.3. CRIMINAL CONVICTIONS

DRUNKENNESS CONVICTIONS NOT RELATED TO DRIVING

Drinking in Public Park
Drinking on Public Highway
Drinking on Street
Drunk
Drunk and Disorderly
Drunk in Bar
Drunk in Car (Non-moving)

Drunk in Private Place or Property
Drunk in Public Place
Drunk on Street
Inebriated
Intoxicated

OTHER CRIMINAL CONVICTIONS

Abandonment
Accosting
Arson
Assault
Attempted Murder
AWOL
Bigamy
Breaking and Entering
Bribery
Burglary
Child Neglect
Conspiracy
Contributing to the Delinquency of a Minor
Desertion
Disorderly Conduct
Disturbing the Peace
Embezzlement
Engaging in Illegal Business
Fictitious Checks
Forgery
Fraud
Fugitive
Gambling
Indecent Exposure
Kidnapping
Larceny
Loitering
Lottery
Making a False Report
Manslaughter
Molesting
Murder
Negligent Homicide
Non-Payment of Alimony
Non-Support
Obscene Conduct
Perjury
Pornography
Prostitution
Rape
Receiving Stolen Goods
Resisting Arrest
Robbery
Soliciting
Theft
Threat to Kill
Trespassing
Unlawful Possession of Firearms
Unlawful Use of Firearms

Vagrancy
Violation of Drug Law
Violation of Immigration Laws
Violation of Internal Revenue Code
Violation of Liquor Laws
Violation of Narcotic Act
Violation of Parole
Violation of Probation

J.4. OCCUPATION

1. Executives, Proprietors, Major Professionals
2. Minor Professionals and Foremen
3. Skilled Manual Workers
4. Semi and Unskilled Workers
5. Part Time and Unemployed Workers
6. Retired
9. Missing Data

Appendix K

FREQUENCY TABLES FOR ALCOHOLIC DRIVERS:
COMPARISON OF CRITICAL DRIVING GROUPS SELECTED BY AID
WITH DRIVERS HAVING NO CRASHES OR CONVICTIONS

TABLE K-1. SEX

	Sample	Number	Male	Female
	Licensed without driving convictions and crashes	313	82.4% (258)	17.6% (55)
	Three high-crash groups from AID	335	92.5% (310)	7.5% (25)
76	Two high-conviction crash groups	76	97.4% (74)	2.6% (2)

TABLE K-2. RACE

	Sample	Number	White	Black
	Licensed without driving convictions and crashes	313	95.5% (299)	4.5% (14)
	Three high-crash groups for AID	335	80.9% (271)	19.1% (64)
76	Two high-conviction crash groups	76	75.0% (57)	25.0% (19)

TABLE K-3. AGE

		Age (Years)						
Sample	Number	20-25	26-35	36-45	46-55	56-65	66-75	76 & older
Licensed without driving convictions and crashes	313	0.0% (0)	3.8% (12)	19.2% (60)	38.0% (119)	28.8% (90)	8.6% (27)	1.6% (5)
Three high-crash groups from AID	335	0.9% (3)	18.8% (63)	44.8% (150)	24.5% (82)	9.3% (31)	1.8% (6)	0.0% (0)
Two high-conviction crash groups	76	3.9% (3)	22.4% (17)	39.5% (30)	22.4% (17)	10.5% (8)	1.3% (1)	0.0% (0)

TABLE K-4. OCCUPATION*

Sample	Number	Code 1	2	3	4	5	6	9
Licensed without driving convictions	313	7.7% (24)	6.1% (19)	42.2% (132)	18.8% (59)	13.4% (42)	10.5% (33)	1.3% (4)
Three high-crash groups from AID	335	7.8% (26)	6.9% (23)	72.2% (242)	4.2% (14)	6.0% (20)	3.0% (10)	0.0% (0)
Two high-conviction crash groups	76	3.9% (3)	9.2% (7)	63.2% (48)	10.5% (8)	9.2% (7)	2.6% (2)	1.3% (1)

*Refer to Appendix J for occupation code

TABLE K-5. MARITAL STATUS

Sample	Number	Marital Status: Single	Married	Widowed	Separated or Divorced
Licensed without driving convictions & crashes	313	4.5% (14)	62.0% (194)	4.8% (15)	28.7% (90)
Three high-crash groups from AID	335	7.8% (26)	52.2% (175)	1.2% (4)	38.8% (130)
Two high-conviction crash groups	76	9.2% (7)	55.3% (42)	1.3% (1)	34.2% (26)

TABLE K-6. RESIDENCE

Sample	Number	Residence: Flint	Michigan (Not Flint)	Outside Michigan	Data
Licensed without driving convictions & crashes	313	74.1% (232)	25.6% (80)	0.3% (1)	0.0% (0)
Three high-crash groups from AID	335	81.5% (273)	18.2% (61)	0.0% (0)	0.3% (1)
Two high-conviction crash groups	76	81.6% (62)	18.4% (14)	0.0% (0)	0.0% (0)

TABLE K-7. RELIGION

Sample	Number	Religion			
		Protestant	Catholic	Jewish	Other
Licensed without driving convictions & crashes	313	76.4% (239)	22.7% (71)	0.0% (0)	0.9% (3)
Three high-crash groups from AID	335	79.4% (266)	18.5% (62)	0.3% (1)	1.8% (6)
Two high-conviction crash groups	76	86.8% (66)	13.2% (10)	0.0% (0)	0.0% (0)

TABLE K-8. SUICIDE

Sample	Number	Suicides	
		Percent	Number
Licensed without driving convictions and crashes	313	6.4%	20
Three high-crash groups from AID	335	9.0%	30
Two high-conviction crash groups	76	6.6%	5

TABLE K-9. STATE HOSPITAL PATIENTS

Sample	Number	Patients	
		Percent	Number
Licensed without driving convictions and crashes	313	8.0%	25
Three high-crash groups from AID	335	9.0%	30
Two high-conviction crash groups	76	14.5%	11

TABLE K-10. INCARCERATION

Sample	Number	Prisoners	
		Percent	Number
Licensed without driving convictions and crashes	313	5.8%	18
Three high-crash groups from AID	335	8.7%	29
Two high-conviction crash groups	76	9.2%	7

TABLE K-11. FAMILY PROBLEMS

Sample	Number	Percent with Family Problems	Number with Family Problems
Licensed without driving convictions and crashes	313	24.0%	75
Three high-crash groups from AID	335	28.7%	96
Two high-conviction crash groups	76	30.3%	23

TABLE K-12. CRIMINAL CONVICTIONS

		MEANS	
Sample	Number	Drunk Conviction Not Related to Driving	Other Criminal Convictions
Licensed without driving convictions and crashes	313	1.26	0.87
Three high-crash groups from AID	335	3.05	1.58
Two high-conviction crash groups	76	2.17	1.43

TABLE K-13. HOSPITAL ADMISSIONS FOR ALCOHOLISM, TRAUMA, NEUROSIS, AND MENTAL HEALTH PER YEAR

		MEANS		
Sample	Number	Alcoholism	Trauma	Neurosis/ Mental Illness
Licensed without driving convictions and crashes	313	3.28	0.53	0.86
Three high-crash groups from AID	335	3.50	1.15	0.94
Two high-conviction crash groups	76	3.57	0.87	1.08

TABLE K-14. ADMISSIONS (FOR ALL CAUSES) PER YEAR

Sample	Number	Mean Rate
Licensed without driving convictions and crashes	313	1.06
Three high-crash groups from AID	335	1.04
Two high-conviction crash groups	76	0.90

Appendix L

FIGURES

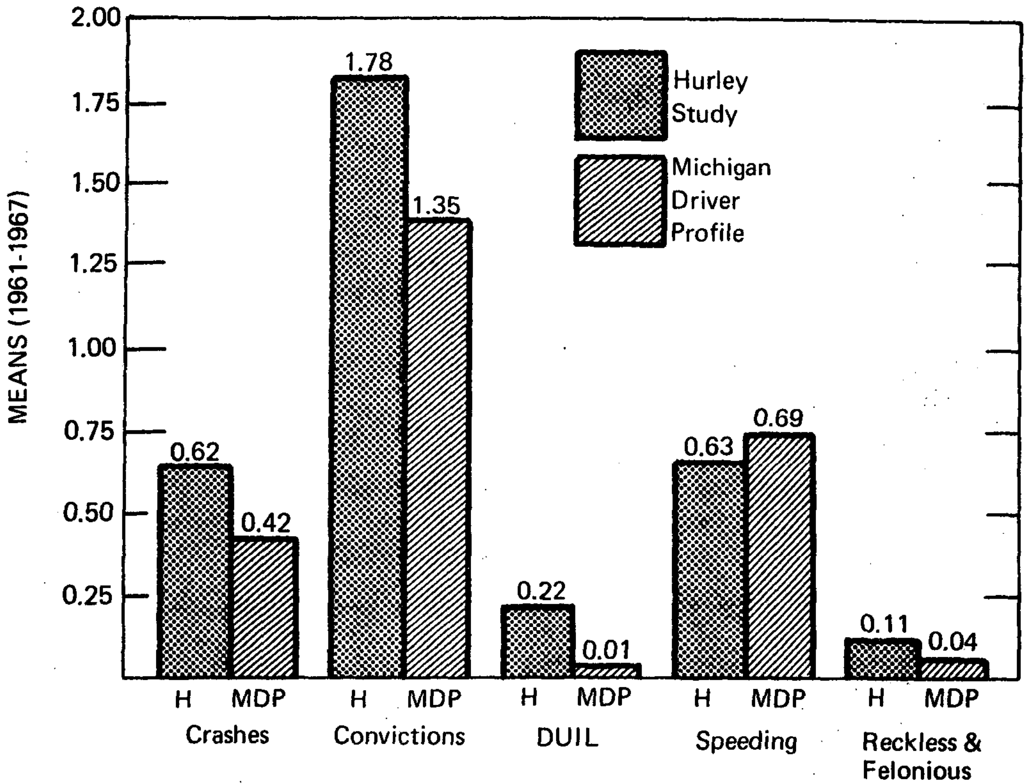

Figure L.1. Means for Hurley alcoholics and Michigan drivers by driving events. (Events derived from Michigan driver record).

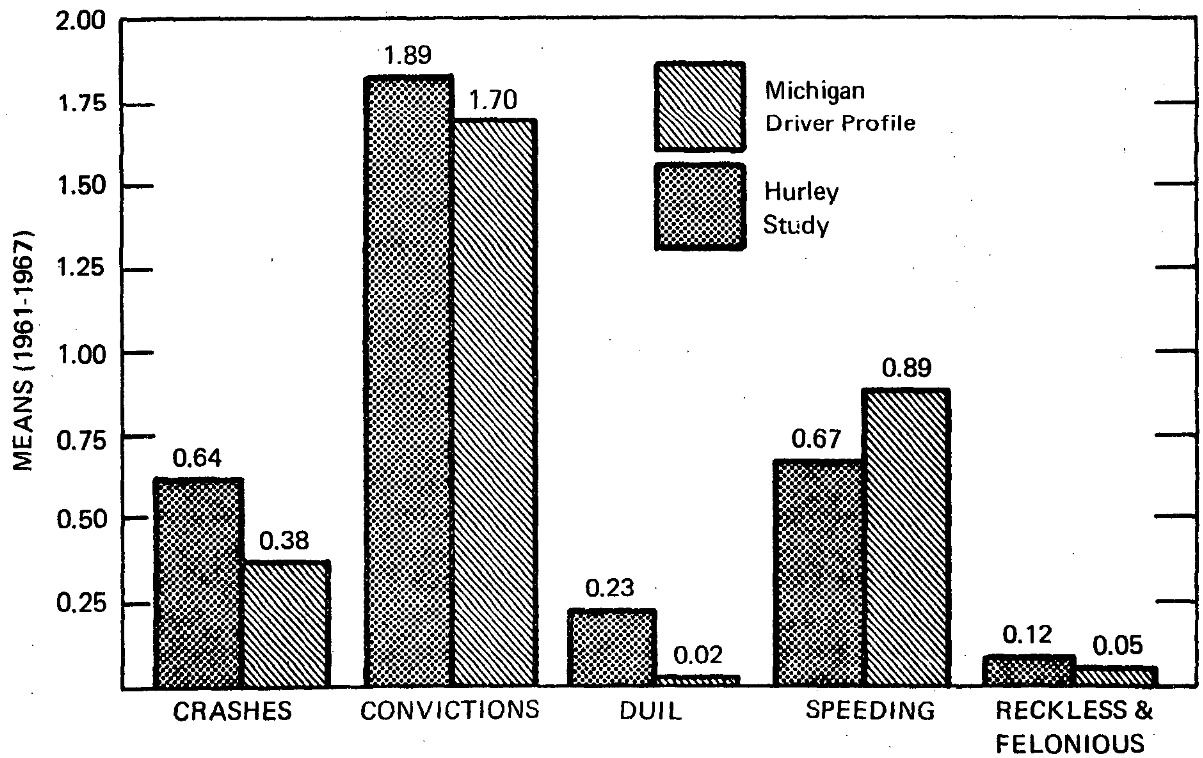

Figure L.2. Means for Hurley alcoholics and Michigan drivers by driving events (males). (Events derived from Mich. driving record).

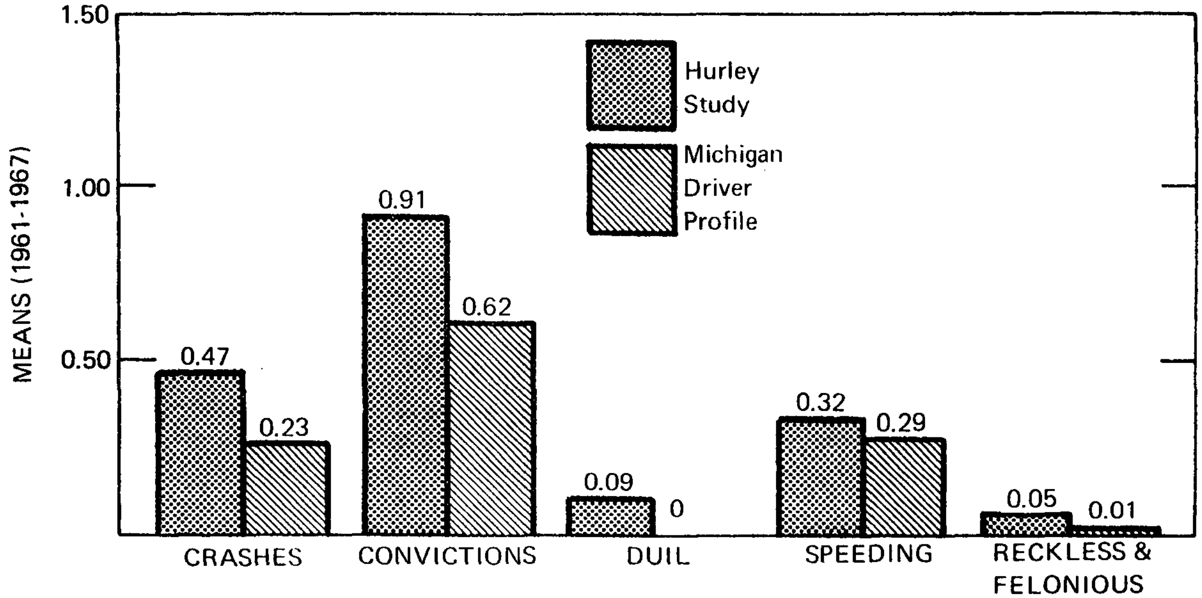

Figure L.3. Means for Hurley alcoholics and Michigan drivers by driving events (females). (Events derived from Mich. driving record).

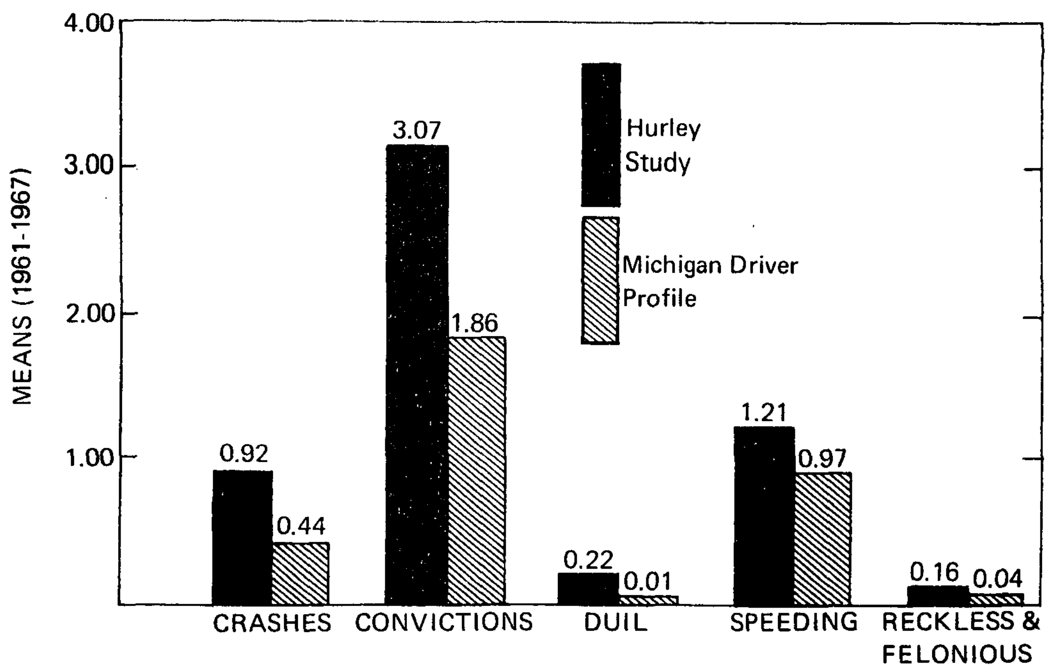

Figure L.4. Means for Hurley alcoholics and Michigan drivers by driving events (ages 26-35 years). (Events derived from Michigan driving record).

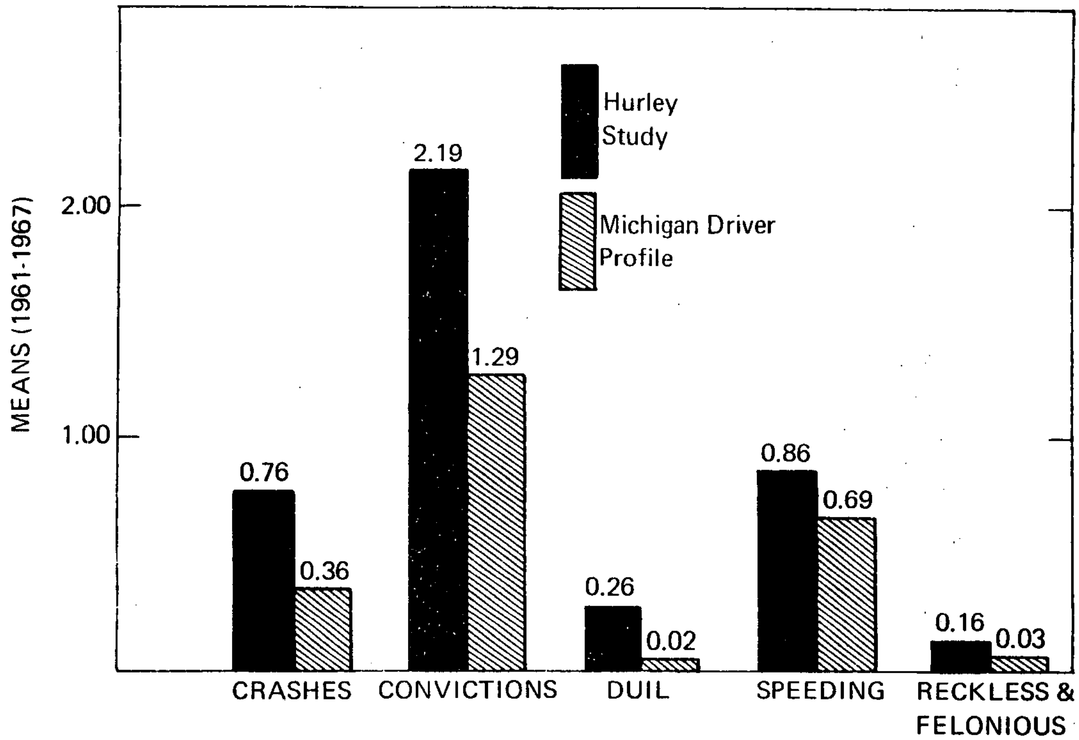

Figure L.5. Means for Hurley alcoholics and Michigan drivers by driving events (ages 36-45 years). (Events derived from Michigan driving record).

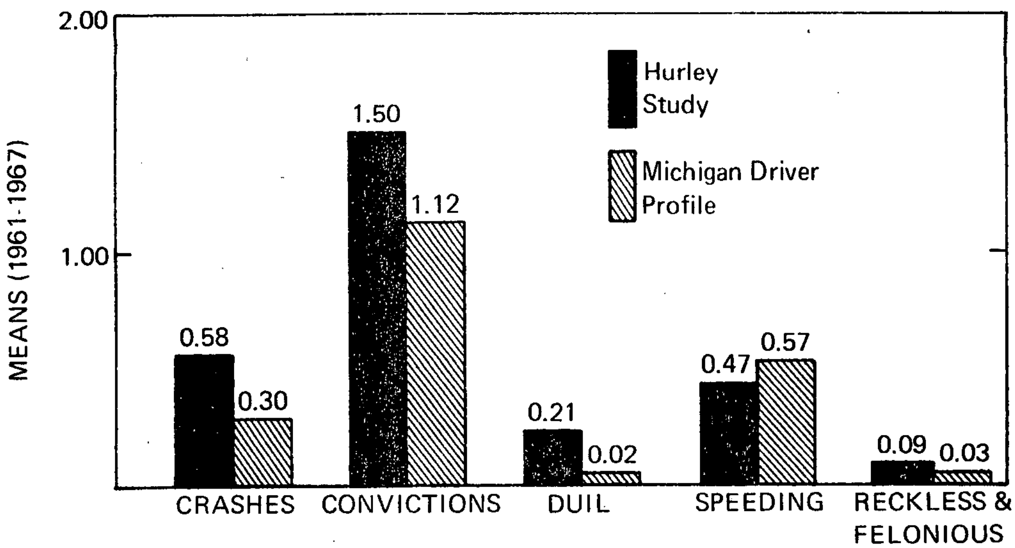

Figure L.6. Means for Hurley alcoholics and Michigan drivers by driving events (ages 46-55 years). (Events derived from Michigan driving record).

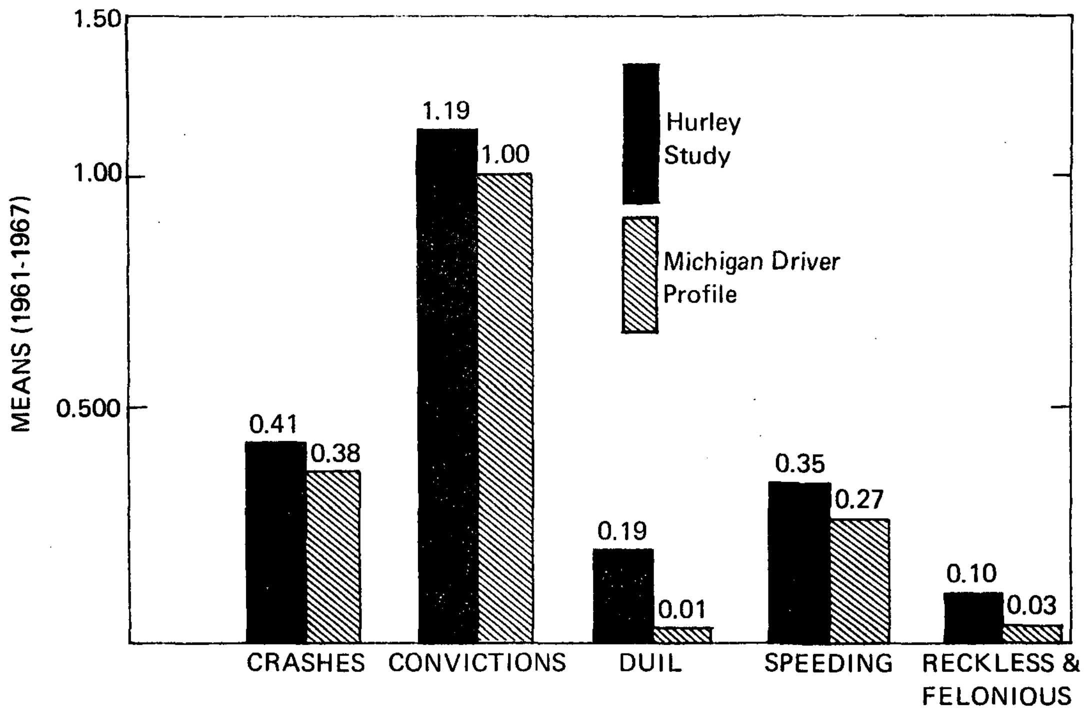

Figure L.7. Means for Hurley alcoholics and Michigan drivers by driving events (ages 56-65 years). (Events derived from Michigan driving record).

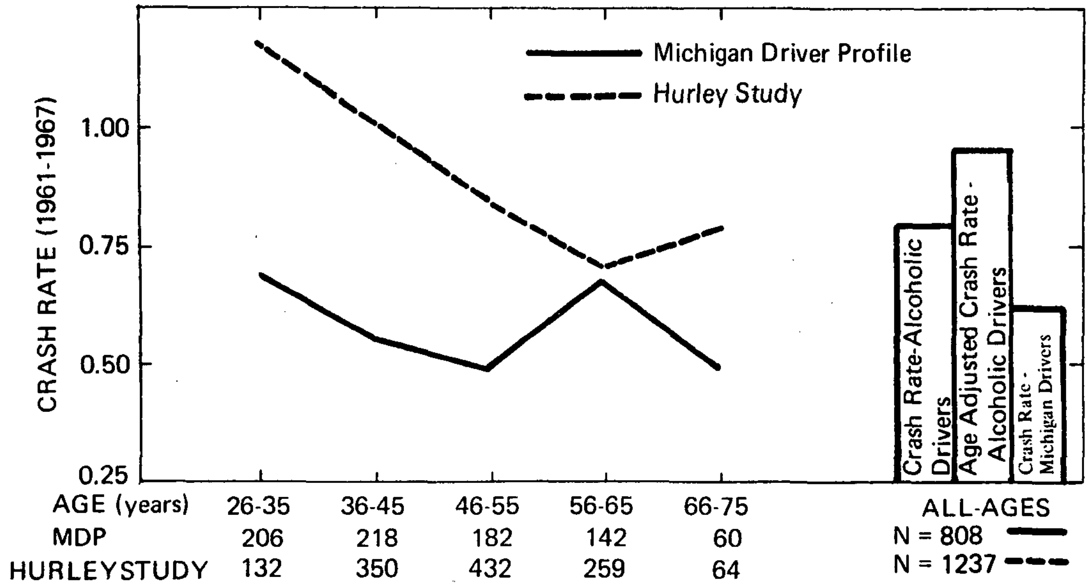

Figure L.8. Crash rate (average number crashes/person) for Hurley alcoholics and Michigan drivers by age groups and total. (Events derived from Mich. driving record).

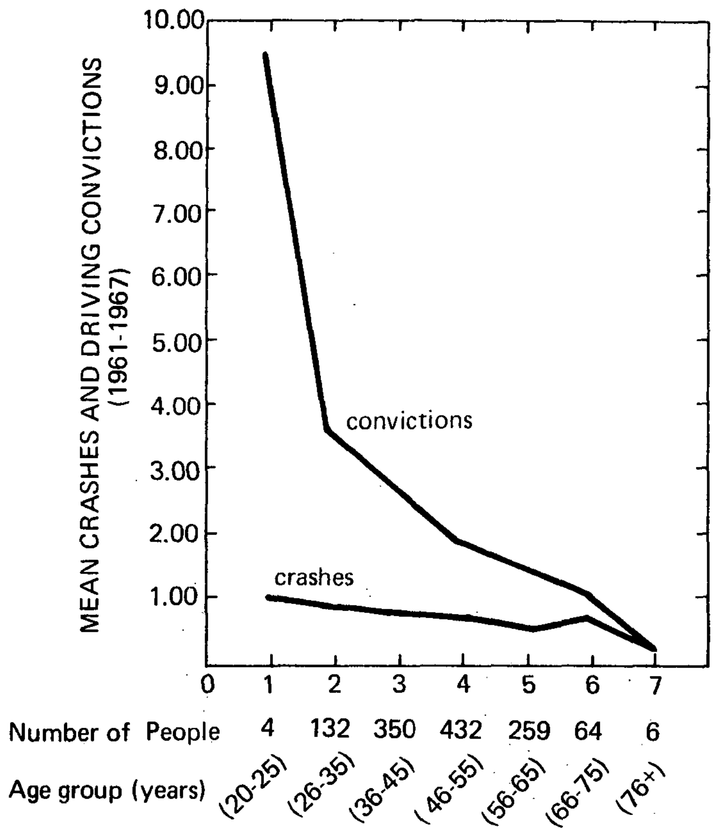

Figure L.9. Mean crashes and driving convictions of Hurley alcoholics by age groups. (Events derived from both Michigan driver and criminal records).

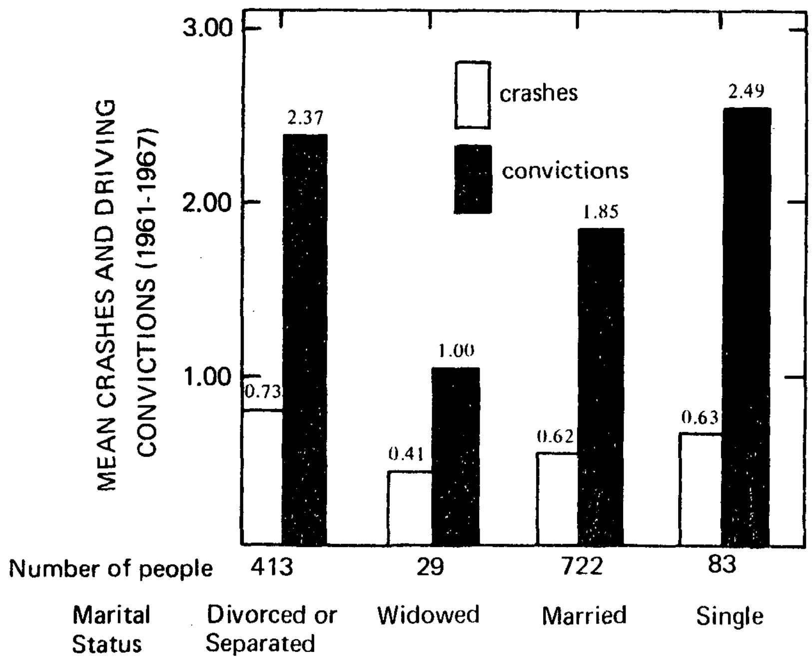

Figure L.10. Mean crashes and driving convictions of Hurley alcoholics by marital status. (Events derived from Mich. driver and criminal records).

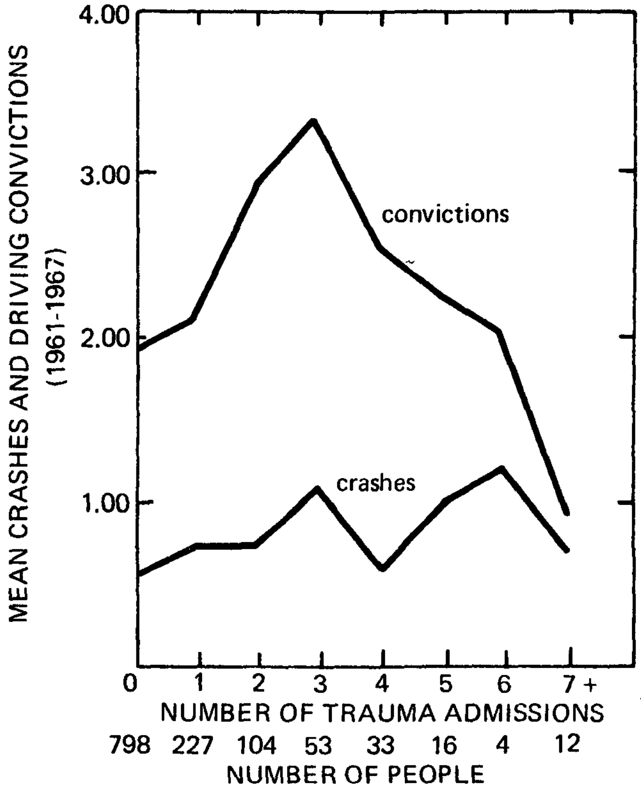

Figure L.11. Mean crashes and driving convictions of Hurley alcoholics by number of trauma admissions. (Events derived from Mich. driver and criminal records).

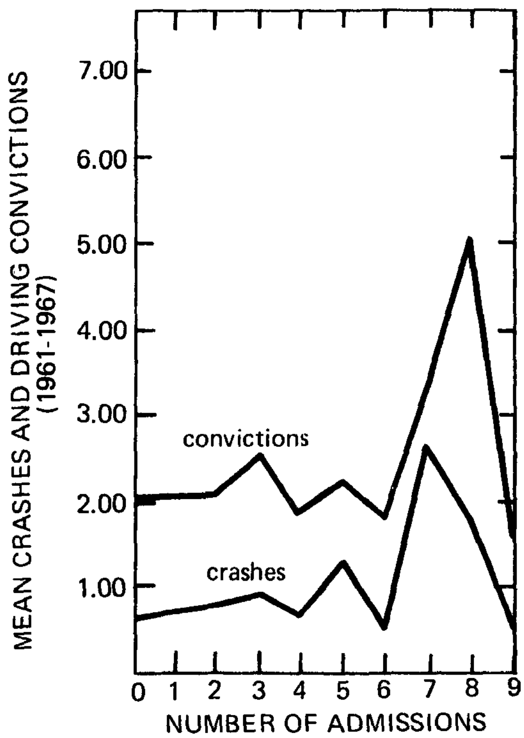

Figure L.12. Mean crashes and driving convictions of Hurley alcoholics by admissions for neurosis and mental illness. (Events derived from Mich. driver and criminal records).

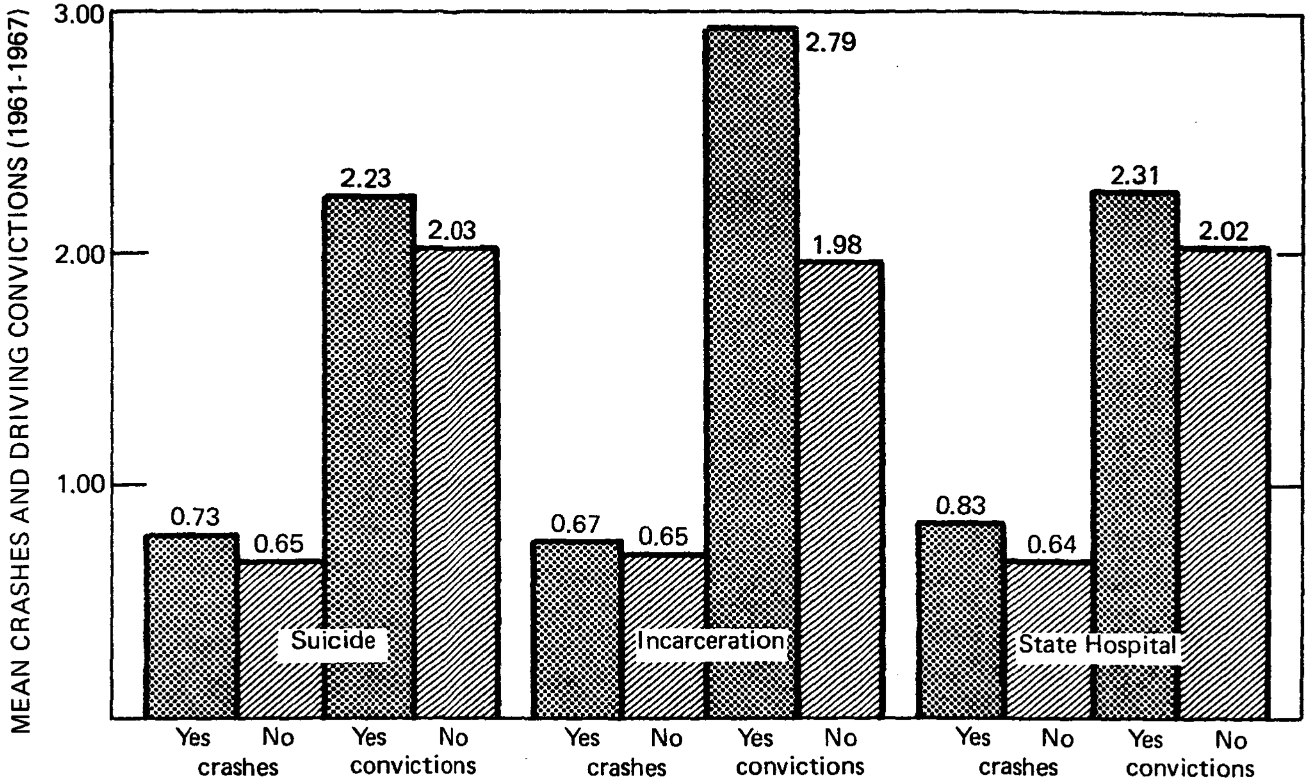

Figure L.13. Mean crashes and driving convictions of Hurley alcoholics by suicide, incarceration, and state hospital admissions. (Events derived from Michigan Driver and criminal records).

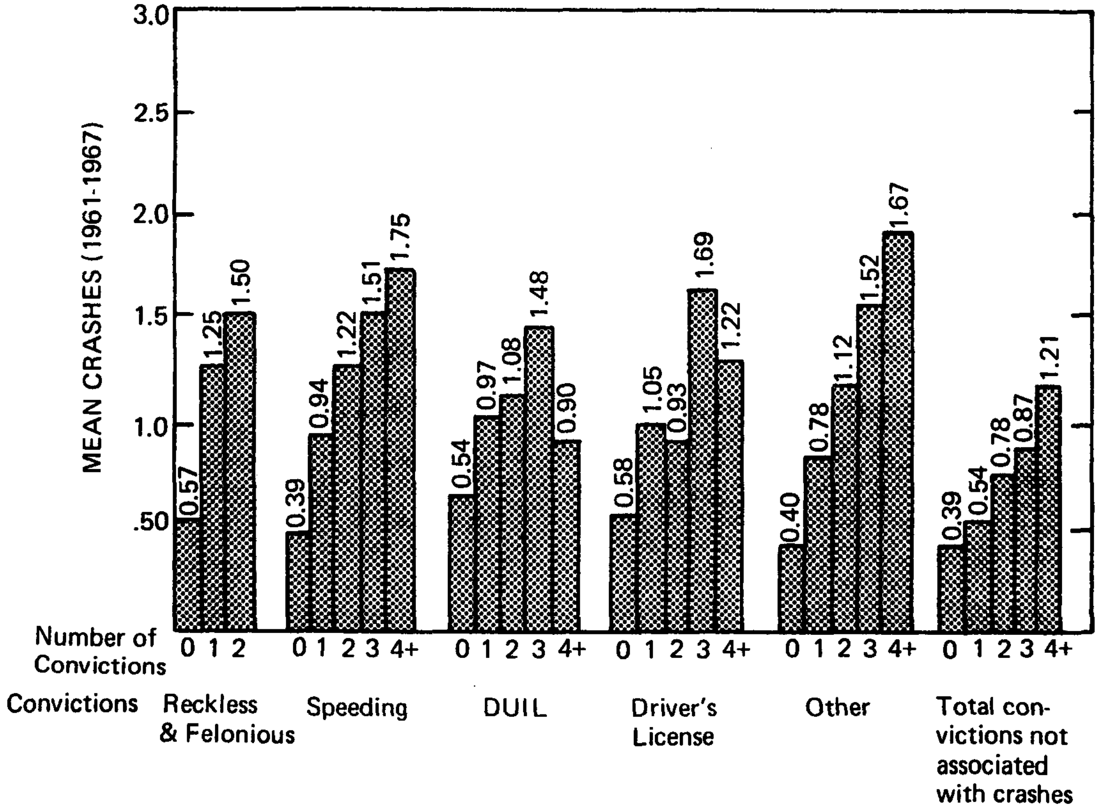

Figure L.14. Mean crashes of Hurley alcoholics by specific driving convictions. (Events derived from Michigan driver record and criminal record).

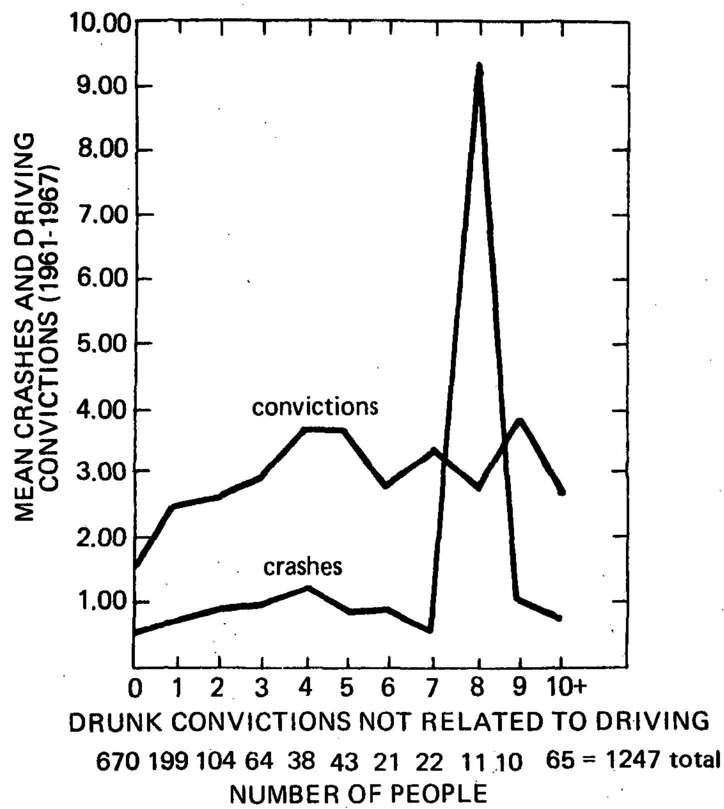

Figure L.15. Mean crashes and driving convictions of Hurley alcoholics by drunk convictions not related to driving. (Events derived from Michigan driver and criminal records).

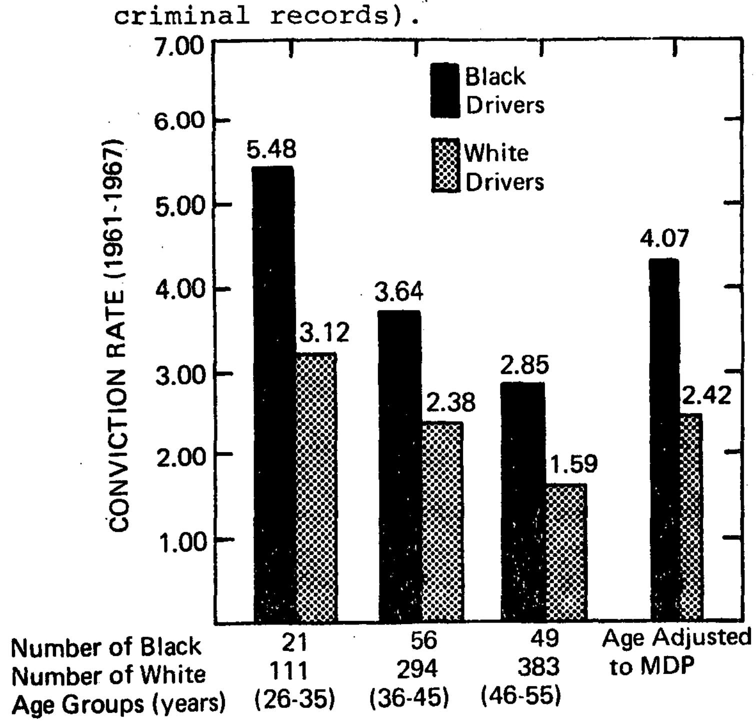

Figure L.16. Conviction rate of Black and White Hurley alcoholics by age groups and age adjusted to Michigan Driver Profile. (Events derived from Mich. driver and criminal records).

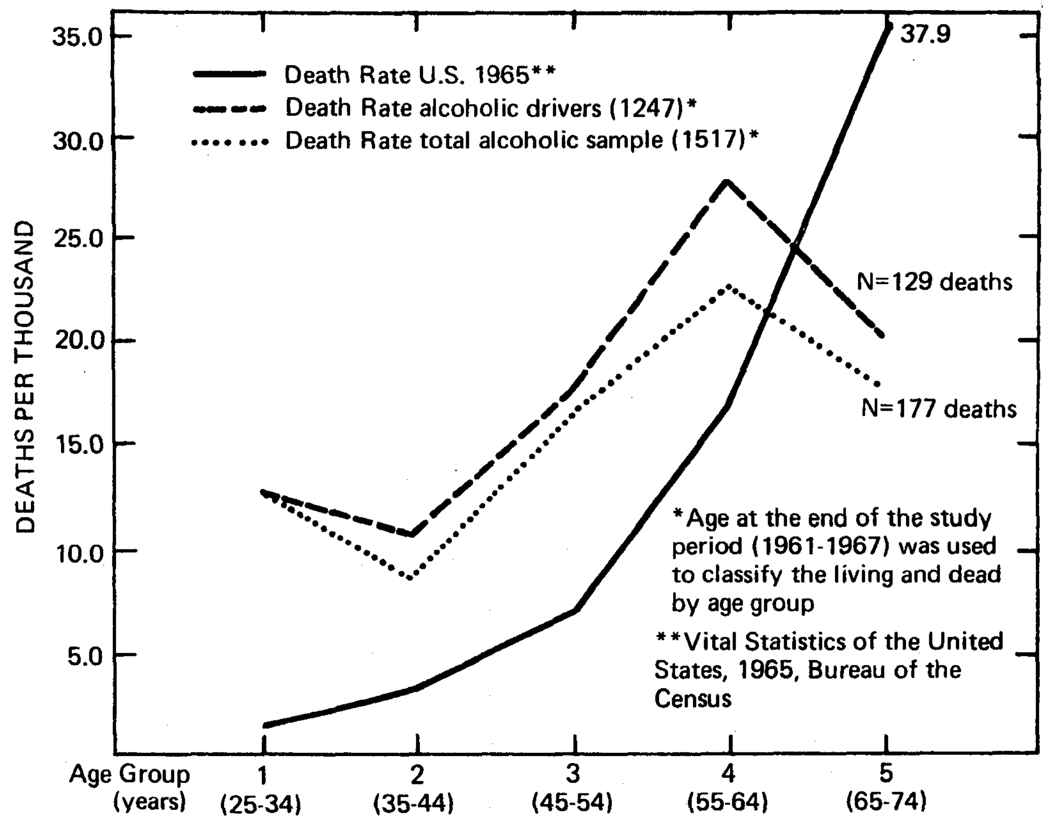

Figure L.17. Death rates by age groups.

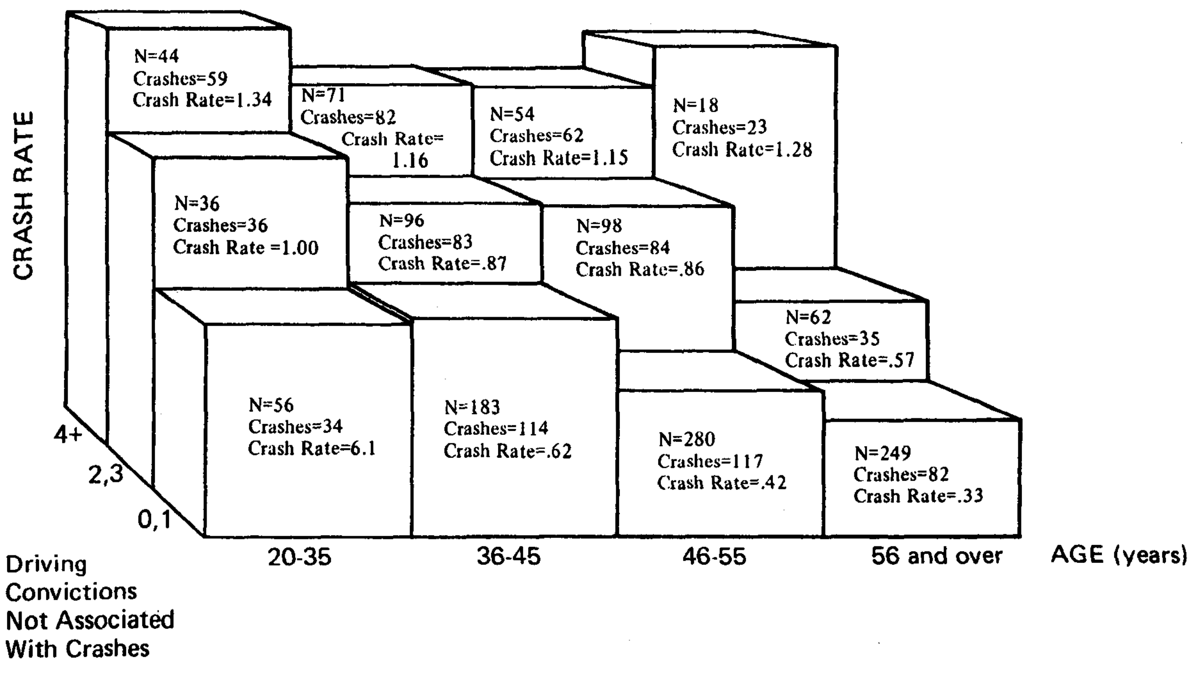

Figure L.18. Crash Rate by Driving Convictions Not Associated with Crashes, and Age for a Hospitalized Alcoholic Driving Population, 1961-67. (Rate derived from Michigan driver and criminal records) Three-dimensional Presentation.

Appendix M

PURPOSE AND EFFECT OF AGE ADJUSTMENT

M.1. BACKGROUND INFORMATION

Quite often it is either useful or necessary to compare rates (averages) for two different groups of people. Examples would be mortality or disease rates, unemployment rates, or in our case motor-vehicle accident rate (crash rate). Usually, the two groups we are comparing include people with many different demographic characteristics, both sexes, all races, income classes, and age. Any or all of these characteristics may be associated with variations in the rates we are comparing. For example, it is well known that increasing age is associated with a decreasing crash rate. Age is also associated with increasing mortality rate.

Because of these variations with age, it is difficult to rely on the comparison of raw death rates or raw crash rates in two populations that may have very different age-group compositions. If 25% of group A, and only 10% of group B, is over 70 years of age this will affect statistics which are dependent on age, such as death rate and crash rate.

The following table is taken from Vital Statistics of the United States, 1965, pp. 1-2, 1-3.

	Raw Death Rate	Age-Adjusted Death Rate*
1940	10.8**	10.8
1965	9.4	7.4

*Adjusted to the population of 1940.
** Number per thousand population

If we only computed the raw death rate we would not be so surprised at the change over time as we are at the change in the age-adjusted death rate. In this particular case, the age adjustment corrects for the increased percentage of elderly people in the population in 1965.

We can find many examples where age adjustment provides us with concrete evidence of what we otherwise would only feel intuitively. Washtenaw County, Michigan, with two large universities, has a raw death rate of about 6.5 per thousand population. The age-adjusted death rate, with respect to the U.S. population, is much closer to the national rate of 9.4. Vermont has a death rate of 11.0, while that for Michigan is 8.7. Age-adjusted death rates for both these states are very close to the national rate (9.4). The primary reason for the difference is that Vermont is an "older" state than Michigan.

M.2. THE UTILIZATION OF AGE-ADJUSTMENT IN COMPARING THIS STUDY TO THE MICHIGAN DRIVER PROFILE

We excluded those drivers who were under 26 years and over 75 years of age from both the Michigan Driver Profile and the Hurley Alcoholic Drivers samples because the alcoholic sample was not large enough in these age groups to compute valid rates.

The age-adjusted crash rate was then computed by the following formula for the remaining age groups.

$$\frac{\sum_{i=1}^{5} M_i \frac{C_i}{H_i}}{\sum M_i}$$

where

i = Indexes age group

M_i = Number of Michigan Driver Profile drivers in the i-th age group

H_i = Number of Hurley Alcoholic Drivers in the i-th age group

C_i = Number of crashes by the i-th Hurley age group.

Appendix N

SAMPLE RECORDS OF THE DEATH CERTIFICATE AND HURLEY HOSPITAL GROUP THERAPY EVALUATION FORM

CONTENTS

CERTIFICATE OF DEATH

BIRTH NO. STATE OF STATE FILE NO.

Form approved. Budget Bureau No. 68-R375.3

1. PLACE OF DEATH
   a. COUNTY
   b. CITY, TOWN, OR LOCATION
   c. LENGTH OF STAY IN 1b
   d. NAME OF HOSPITAL OR INSTITUTION (If not in hospital, give street address)
   e. IS PLACE OF DEATH INSIDE CITY LIMITS? YES ☐ NO ☐

2. USUAL RESIDENCE (Where deceased lived. If institution: Residence before admission)
   a. STATE
   b. COUNTY
   c. CITY, TOWN, OR LOCATION
   d. STREET ADDRESS
   e. IS RESIDENCE INSIDE CITY LIMITS? YES ☐ NO ☐
   f. IS RESIDENCE ON A FARM? YES ☐ NO ☐

3. NAME OF DECEASED (Type or print) First Middle Last

4. DATE OF DEATH Month Day Year

5. SEX

6. COLOR OR RACE

7. MARRIED ☐ NEVER MARRIED ☐ WIDOWED ☐ DIVORCED ☐

8. DATE OF BIRTH

9. AGE (In years last birthday) IF UNDER 1 YEAR: Months Days IF UNDER 24 HRS.: Hours Min.

10a. USUAL OCCUPATION (Give kind of work done during most of working life, even if retired)

10b. KIND OF BUSINESS OR INDUSTRY

11. BIRTHPLACE (State or foreign country)

12. CITIZEN OF WHAT COUNTRY?

13. FATHER'S NAME

14. MOTHER'S MAIDEN NAME

15. WAS DECEASED EVER IN U. S. ARMED FORCES? (Yes, no, or unknown) (If yes, give war or dates of service)

16. SOCIAL SECURITY NO.

17. INFORMANT Address

MEDICAL CERTIFICATION

18. CAUSE OF DEATH [Enter only one cause per line for (a), (b), and (c).] INTERVAL BETWEEN ONSET AND DEATH

PART I. DEATH WAS CAUSED BY:
IMMEDIATE CAUSE (a) ____

Conditions, if any, which gave rise to above cause (a), stating the underlying cause last.
DUE TO (b) ____
DUE TO (c) ____

PART II. OTHER SIGNIFICANT CONDITIONS CONTRIBUTING TO DEATH BUT NOT RELATED TO THE TERMINAL DISEASE CONDITION GIVEN IN PART I(a)

19. WAS AUTOPSY PERFORMED? YES ☐ NO ☐

20a. ACCIDENT ☐ SUICIDE ☐ HOMICIDE ☐

20b. DESCRIBE HOW INJURY OCCURRED. (Enter nature of injury in Part I or Part II of item 18.)

20c. TIME OF INJURY Hour a. m. p. m. Month, Day, Year

20d. INJURY OCCURRED WHILE AT WORK ☐ NOT WHILE AT WORK ☐

20e. PLACE OF INJURY (e. g., in or about home, farm, factory, street, office bldg., etc.)

20f. CITY, TOWN, OR LOCATION COUNTY STATE

21. I attended the deceased from ____, to ____ and last saw her/him alive on ____
Death occurred at ____ m on the date stated above; and to the best of my knowledge, from the causes stated.

22a. SIGNATURE (Degree or title)

22b. ADDRESS

22c. DATE SIGNED

23a. BURIAL, CREMATION, REMOVAL (Specify)

23b. DATE

23c. NAME OF CEMETERY OR CREMATORY

23d. LOCATION (City, town, or county) (State)

24. FUNERAL DIRECTOR ADDRESS

25. DATE RECD. BY LOCAL REG.

26. REGISTRAR'S SIGNATURE

1956 REVISION OF STANDARD CERTIFICATE

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE—PUBLIC HEALTH SERVICE

PHS-798 REV. 11/54

GPO: 1954 O - 311174

Figure N.1

HURLEY HOSPITAL

GROUP THERAPY EVALUATION AND PROGRESS REPORT

PATIENT DIAG. Alcoholic ,M.D.

ADM. ADMS. TO HOSP. CURRENT ATTENDANCE .DISCH.

ATTENDANCE

DATE: Nov.		11/1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
GOOD FAIR POOR NONE	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0	3 2 1 0
TOTAL NO. SESSIONS		1	3	4	7	10	13	16	19	21	22	25	28	31	34	37	38	

GENERAL PROGRESS

X'LENT GOOD FAIR POOR NONE	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0	4 3 2 1 0

OBSERVATION AND SUMMARY:

ms:11-26-68

DEPARTMENT OF GROUP THERAPY, MEDICAL DIRECTOR

675362

HURLEY HOSPITAL

GROUP THERAPY

EVALUATION AND

Figure N.2

Date																				
Total Hours Accumulated																				

PATIENT'S ATTENDANCE

Good	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Poor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PATIENT'S GENERAL PROGRESS -

Good	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Poor	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

RESPONSE TO THE GROUP THERAPY PROGRAM -

Favorable	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indifferent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
or Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hostile	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

ATTITUDE RE: ALCOHOLISM -

Accept	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indifferent or Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reject	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

ATTITUDE RE: A RECOVERY PROGRAM -

Accept	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indifferent or Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Do Not Need	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

PATIENT'S LEVEL OF PARTICIPATION (QUESTIONS AND COMMENTS)

Sincere	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indifferent	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
or Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Superficial	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

Figure N.2 (cont.)

HURLEY HOSPITAL

INFORMATION AND PROGRESS SHEET Rm.________

PATIENT________________________ ADM.__________ DIAG.____________ ____________

ADMS. TO HOSP.______ ALCOHOLISM DIAG.______ PHYSICIAN____________________

GROUP THERAPY: Current________ Previous________ Total________ DISCH.________

COMMENTS AND OBSERVATIONS: ____

(see reverse side)

____

Med. Dir., Dept. Group Therapy

Please return this sheet to the Group Therapy Office when patient is discharged.

Figure N.2 (cont.)

PATIENT NO.

																	SUMMARY
ATTITUDE RE: GROUP THERAPY	Favorable	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Attitude Re: Group Therapy . . .
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Indifferent	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Hostile	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
ATTITUDE RE. BEING ALCOHOLIC	Acceptance	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Attitude Re: Being Alcoholic . . .
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Indifferent or Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Rejection	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
ATTITUDE RE: SUPPORT, HELP	Acceptance	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Attitude Re: Help, Support, Etc. . .
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Indifferent or Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Do Not Need	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
REASON XPRESSED FOR DRINKING—	Internal	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Reasons Expressed For Drinking . . .
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	External	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
COMMENTS, QUEST. APPEAR—	Sincere	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Comments & Quest. Appear . . .
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Indifferent or Unknown	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
	Superficial	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
MOTIVATION		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	X'lent
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Good
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Fair
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Poor
COOPERATION & PARTICIPATION		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	X'lent
		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Good
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Fair
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Poor
ATTENDANCE		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	Good
		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	Fair
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	Poor
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	None

Figure N.2 (cont.)

PATIENT EVALUATION AND PROGRESS SHEET

DEPT. GROUP THERAPY
HURLEY HOSPITAL
FLINT, MICHIGAN

MEDICAL DIRECTOR

BY ______

TO ______ DATE ______

PATIENT ______ NO. ______

DIAGNOSIS ______

ADMITTED ______ DISCHARGED ______ NO. DAYS ______

ADMISSIONS TO HOSPITAL: Alcoholism Diag. ____ Other ____ Total ______

Other Institutions ______

NO. GROUP THERAPY SESSIONS ATTENDED:

Current ______ Previo. ______ Total ______

Relatives ______ Attended ______ Sessions

(______ Less than 9 sessions prevents adequate evaluation)

C O M M E N T S A N D O B S E R V A T I O N S :

PATIENT ATTENDED THE FOLLOWING

MONDAY	Effects of Alcohol on the Human Body	AM
	Group Discussion	PM
	Visual and Submerged Aspects of Alcoholism	EV
TUESDAY	Symptoms and Phases of Alcoholism	AM
	Group Discussion	PM
	Disease Aspects of Alcoholism	EV
WEDNESDAY	Religious and Spiritual Needs of Alcoholics	AM
	Group Discussion	PM
	Steps and Traditions of Alcoholic Anonymous	EV
THURSDAY	Supportive Therapy & Maintaining Sobriety	AM
	Group Discussion	PM
	Attitudes and Beliefs In Re: Alcoholism	EV
FRIDAY	Six Steps in Recovery from Alcoholism	AM
	Group Discussion	PM
	Personality, Emotional, and Social Aspects	EV
SATURDAY	The Tole of Mental & Emotional Health	AM
	Group Discussion	PM
UNDAY	Review and Discussion	AM
		P

Figure N.2 (cont.)

Appendix O

FORMAT AND INDIVIDUAL SUMMARIES OF ANALYZED TREATMENT PROGRAMS

O.1. FORMAT

Names of articles
Setting
Purpose (of program and/or articles)
Cases (number and sex)
Subject selection (voluntary, involuntary)
Court referral process
Sentence and probation provisions
Clinic intake process
Referral sources
Social history
Contact with family
Controls
Staff (and role of each member)
Treatment and duration
Community agencies involved
Period from treatment to follow-up
Total length of project
Method of evaluation
Criteria for success
Results
Number of references
Number of tables
Points of interest

O.2. INDIVIDUAL SUMMARIES OF ANALYZED TREATMENT PROGRAMS

BOURNE, Peter F., M. D., et al., "Treatment of Skid-Row Alcoholics with Disulfiram," Quarterly Journal of Studies on Alcohol, 27:42, March, 1966.

Setting: City of Atlanta, Georgia municipal court in conjunction with Department of Psychiatry, Emory University.

Purpose: Assess value of pilot program as means to alleviate number of arrests for public intoxication (50,000 per year) in city of Atlanta.

Subject Selection: Volunteer group; all those who appeared in court for public intoxication and had been arrested repeatedly for drunkenness were offered "Antabuse"* on voluntary basis. Controls: Selected arbitrarily by judge at time of sentence for public intoxication to take "Antabuse" on a mandatory basis, under control of probation officer.

Court referral process: Physical examination: medical and social history, review of drinking patterns and arrest records.

Sentence and probation provisions: Controls: 30-60 days; sentence suspended. If the patient failed to appear daily for drug intake, at the time of his next court appearance he would be subject to a jail sentence for the remaining days in addition to sentence for a new offense.
(Volunteers under no obligation to court at the time they begin treatment.)

Clinic intake process: Not applicable.

Referral sources: Not stated.

Social history: People arrested repeatedly for public intoxication.

Contact with families: Volunteer group: Relatives asked to take responsibility for patient taking dosage of Antabuse and contact proper physician if dosage was stopped.

Staff (& role of each member): Physician (for screening exam) and court probation officer.

Treatment and duration: Antabuse (and tranquilizers if necessary). The length per individual was not stated. Volunteer group: 1-9 months, Controls: 1-3 1/2 months.

Community agencies involved: Alcoholics Anonymous, religious groups and psychiatric facilities. The local Department of Labor aided in finding jobs for men and arrangements were made for physical treatment if necessary.

Period from treatment to follow-up: Not stated.

Total length of project: September 1962 - June 1963.

Method of Evaluation: Not stated.

Major criteria of success: Number still in treatment at end of program period.

*Antabuse or Disulfiram: trade name for tetraethylthiuram disulfide.

Volunteers: (1-9 months)	32 out of 64 (50%) (28 on drug, 4 not on drug)
Controls: (1-3 1/2 months) all on drug	61 out of 132 (46%) (of 71 inactives, 17 had completed sentences)

<u>Number of references:</u> 6

<u>Number of tables:</u> 0

Authors felt there was tremendous treatment potential in combining medical personnel with the authority of the court.

BROWN, Bertram S., et al., "Health Department Alcoholism Program in Prince Georges County, Maryland," Public Health Reports, 77: 480-484, June, 1962.

Setting: Mental Health Study Center Prince Georges County, Maryland, (Adjacent to Washington, D.C.) Population: 378,000.

Purpose: Description of alcohol treatment program in cooperation with the county health department. No evaluation.

Cases: 258 (2-year period).

Sentence and probation provisions: Treatment ordered in lieu of jail or fine - attendance mandatory during probation period.

Intake Process: (1) intake officer (Psychiatrist, psychologist, or social worker) available all day patient or family member invited to register same day, (2) information card filled out, (3) group (3-9 patients) meets with psychiatrist that same week and admitted to program, (4) family members seen within a week, (5) psychiatrist makes appraisal and confers with staff, (6) client referred for either further evaluation, social history, psychiatric diagnosis and/or treatment (group or individual) for patient or spouse and physical evaluation from physician.

Referral sources: Family, physician, social service agencies, Alcoholics Anonymous, and the courts (25%).

Social history: Not stated.

(controls, sentence, probation provisions, duration of therapy, follow-up, and evaluation not described in this article.)

Contact with family: [number (3) above].

Staff: Psychiatrist, psychologist, two psychiatric social workers, mental health nurse consultant, (health department supplies rooms, administrative structure and staff of mental health bureau) individual roles not described.

Treatment: Medical, group and individual psychotherapy.

Referral agencies used: County Health Department.

Number of references: 1 Number of tables: 1

Note: Public health nurses refer patients from their caseload and in turn nurses are used for home visits, and check on those who do not come following referral, or break appointments.

Other Programs: Research and evaluation and education (through health department) with Hospital cooperation: during hospital stay patient is contacted by psychiatrist from alcohol program so that transition into follow-up out-patient care is facilitated (30 of 42 hospital patients attended out-patient service one or more times following discharge). Introductory group proved effective way of keeping drop-outs to a minimum. Supplementary treatment was arranged for patients with cardiac conditions, arthritis, epilepsy, and other diseases. The total approach seemed to accelerate and sustain motivation.

BRUNNER-ORNE, Martha, "A court clinic for alcoholics," Quarterly Journal of Studies on Alcohol, 12:592-600, 1951.

Setting: experimental clinic, District Court of Southern Norfolk, Stoughton, Massachusetts (opened March, 1950) sessions held in courthouse.

Purpose: Description and tentative evaluation of court-based program for alcoholics.

Cases: 38 (6 voluntary)

Subject Selection: referred by court (compulsory)

Court referral process: not described

Sentence and Probation provisions: not described

Clinic intake process: (1) patients interviewed by staff member (within same week as court appearance), (2) physical examination given.

Referral sources: court

Social history: not described

Contact with families: not described

Controls: none

Staff: 4 plus a probation officer (all volunteers), psychiatrist, general physician, associate director on alcoholism, and a psychologist. Tasks not described.

Treatment and duration: medication, e.g., vitamins and sedatives if needed in some cases tetraethylthiuram disulfide therapy (Antabuse - voluntary) and individual group therapy. Group therapy: 10 consecutive weeks, then every other week, then once a month for as long as patient wants. (NB. clinic closed in December 1950- open total of 10 months.)

Community agencies involved: court, local industries providing jobs

Period from treatment to follow-up: 1 year from initial intake

Total length of project: 10 months

Method of evaluation: case records and reports from courts and probation officers

Major criteria of success: not described

Results: of 38 patients, 22 responded favorably (58%); 8 failures (no improvement - 21%).

Number of references: none Number of tables: none

Points of interest: (1) patients continued to come even after compulsory period was over, (2) court officer was invaluable aid: encouraged prospective and actual "clients" to attend clinic and often provided transportation, (3) group sessions valuable; group provided additional reward through approbation for remaining sober, (4) holding sessions in courthouse did not prove to be a handicap - it actually aided court's prestige as positive remedial force.

DAVIS, Frederick M., and DITMAN, Keith S., "The effect of court referral Disulfiram on motivation of alcoholics, "Quarterly Journal of Studies on Alcohol, 2:276-279, 1963.

This preliminary report reviews literature dealing with motivation for treatment at outpatient mental hygiene clinics (e.g., Lief et al.: drop-out rate nearly 50% before end of 6 sessions). The report also describes and evaluates a court referral program.

Setting: Los Angeles Municipal Court and UCLA Alcoholism Research Clinic.

Purpose: (1) determine whether court referral is effective means of keeping alcoholic in treatment, (2) determine whether Disulfiram (Antabuse) has any bearing on return rates.

Cases: 26

Subject selection: court referrals

Court referral process: not described

Sentence and probation provisions: mandatory treatment

Clinic intake process: (1) Social history obtained, (2) referral to clinic psychiatrist (evaluation, treatment)

Referral sources: court

Social history: (1) middle-class socioeconomic level (clerical and skilled workers, housewives, etc.), (2) family income range: $2500-$8000 per year.

Contact with families: not stated

Controls: 36 non-court, self referred (applied for treatment during same period) randomly selected.

Staff: not described

Treatment & duration of court referrals: 6 in group psychotherapy; 30 on medication. Duration for both groups: 15 weeks.

Community agencies involved: not stated

Period from treatment to follow-up: not stated

Length of program: 1960-1962

Method of evaluation: not stated

Major criteria for success: drop-out rate

Results: (1) non-significant trend towards better attendance with Disulfiram, (2) attendance in court and self referral nearly identical at end of 15 weeks, (3) at the end of 6 weeks only 10% dropped out, success attributed to speed with which treatment was begun.

Number of references: 7 Number of tables: 0

DITMAN, Keith G., CRAWFORD, George G., et al., "A controlled experiment for the use of court probation for drunk arrests," American Journal of Psychiatry, 124:3, August, 1967, pp. 160-63. (See also: Ditman 1966 - Pilot Study)

Setting: Municipal Court - City of San Diego.

Purpose: (1) compare effectiveness of three treatment procedures, (2) determine if there are characteristics of offenders which would indicate type of treatment.

Cases: 301* (90% men) court referrals (averaged 12 prior drunk arrests), average age: 40.

Subject selection: All chronic drunk offenders (defined), random selection by judge for each treatment.

Court referral process: Using definition of chronic drunk offender subjects randomly selected.

Sentence & probation provisions: $25.00 fine and 30-day suspended sentence with probation. Length: 1 year with report to court at six months. (1) abstain from alcohol during year, (2) complete three questionnaires, (3) accept one of three treatment programs. Evaluation of cooperation given to the court by the clinic or AA. Failure to comply, bench warrant issued for arrest plus fine or jail, then back into treatment.

Clinic intake process: Not stated.

Social history: One-third graduated from high school; 2% college graduates (median - "some high school"); 18% married, 50% separated or divorced; median income: about $3,000; 55% had no previous treatment for drinking. Of those with previous treatment: 10% went to rehabilitation clinic or psychiatrist.

Control: No treatment.

(Contact with family, community agencies involved, staff and total length of project were not stated.)

Treatment and duration: (1) no treatment - one year probation, (2) alcohol clinic (length and frequency of clinic visits not stated, (3) Alcoholics Anonymous - five meetings within 30 days, (If probation terms violated person considered treatment failure and given 30 day jail sentence.)

Follow-up: 1 year.

Method of evaluation: Local police "rap" sheet, State of California Criminal Identification and Investigation Report.

Major criteria: Number of rearrests.

Results: (1) no significant difference in recidivism between treatment groups, (2) no significant information on nature of recidivist population.

Number of references: 3 Number of tables: 2

Points of interest: recidivists tended to drink with others rather than alone.

*Half the sample had drunk driving arrests, more than 2/3 had been previously charged with disorderly conduct or disturbing the peace.

Possible reasons for poor results

(1) 30 days in jail (suspended for one year) strong enough motivation not to be rearrested.

(2) Number of treatment sessions inadequate.

(3) Conditions of court-imposed referral may have produced anxiety which led to increased drinking.

MAIER, R. A., and FOX, V., "Forced therapy of probationed alcoholics," Medical Times, New York, 86:1051-1054, 1958.

Setting: Georgian Clinic, Atlanta, Georgia

Purpose: description and evaluation of program

Cases: 27 male, 2 female, involuntary patients, court referrals on probation, (between 25 and 60 years old).

Subject selection: court referrals based upon: (1) more than two but less than 50 arrests within 5 years, (2) admittance of drinking problem, (3) absence of obvious psychosis, (4) white residents of Georgia.

Court referral process: not described

Sentence and probation provisions: suspended sentence with three months probation - mandatory meetings

Clinic intake process: obtain case history and knowledge of drinking pattern.

Referral sources: courts

Social history: professional, skilled, and unskilled workers

Contact with families: not stated

Controls: none

Staff: admissions counselor (intake process); clinical psychologist

Treatment: medical (promazine and vitamins), group and individual therapy by psychologist.

Length of therapy: 39 meetings during 3-month period. (34 one-hour group meetings twice a week plus 5 individual meetings - voluntary for another 3 months concurrent.)

Community agencies involved: not stated

Period from treatment to follow-up: three months after final clinic contact.

Total length of project: Six months.

Method of evaluation: reports from probation office, friends and relatives, other patients, therapist.

Major criteria: continued contact, drinking, arrests.

Results: Improved, 11 (38%); unimproved, 18 (62%) (two returned to clinic later requesting treatment.)

Number of references: 1. Number of tables: 5.

Points of interest: Three limiting factors in evaluating results: (1) small number of subjects, (2) possible bias of courts in selection, (3) short period of evaluation (six months).

MILLS, Robert B., and HETRICK, E. S., "Treating the unmotivated Alcoholic", Crime & Delinquency, 9:46-59, 1963.

This article provides a thorough description of court referral process and liaison between court and clinic.

Setting: Cincinnati Municipal Court & Court Psychiatric Clinics and Alcoholism Clinic (Cincinnati General Hospital). (Approximately 75% of all cases in Cincinnati Municipal Court involved drunk-related offenses.)

Purpose: Description of clinic (no evaluation)

Court referral process: presentence court clinic evaluation; examination by team: psychiatrist, psychologist, and psychiatric caseworker; brief physical and neurological examinations, families interviewed; contact with social agencies and previous probation or arrest records evaluated.

Sentence and probation provisions (if court referred): fine and/or jail suspended with probation to treatment at alcoholism clinic.

Clinic intake process: intake interview within week of sentencing at Alcoholism Clinic by clinic coordinator who in turn decides appropriate clinic requirements and then assigns patient to treatment psychiatrist.

Referral sources: the judge and court psychiatric clinic (with aid of probation officer). Basis: (1) evidence of advanced alcoholic deterioration, (2) seeming remorsefulness, (3) evidence of incipient drinking problem, (4) drinking under stress, (5) express interest in receiving help, (i.e. those who seem "potentially responsive" to treatment)

Social history: not stated

Contact with family: casework counseling

Staff (and role of each member): probation officer: serves as liaison between the court, court clinic, and alcohol clinic; in court: officer aids judge in referral selection to court clinic, interprets court clinic recommendations to judges, and reports probation violations. At the court clinic he reports on courtroom testimony and intake information, assists in formulating recommendations to the judge. At the alcohol clinic he follows alcoholics' progress, records attendance, does casework therapy with wives if need is indicated. Court Clinic: psychiatrist, psychologist, and psychiatric caseworker and a supervising probation officer make evaluation of offenders' treatment potential.

Treatment and duration: (1) individual psychotherapy (50 minutes a week), (2) Tuesday evening clinic: 15 to 20-minute sessions with a therapist - supportive guidance plus medication (Antabuse, vitamins, sedatives), (3) group psychotherapy, (4) casework counseling with spouses. Duration not stated.

Community agencies involved, total length of project, controls, methods of evaluation, and criteria for success were not applicable.

Results: 66% of 280 persons at least completed intake procedure

Number of references: 6   Number of tables: 1

One group psychotherapy session was conducted in a housing project office with wives who were on public assistance. Attendance was mandatory upon pain of withdrawal of public assistance funds.

Description is given of necessary attitude of court examiner and knowledge and methods he needs to approach the alcoholic.

Judgment made by authors: If judge is firm, explicit and insistent at time of sentence, subsequent management of the offender will proceed more smoothly.

Differing backgrounds and methods of the probation officer and psychiatrist may lead to uneasiness or rivalry for jurisdiction and breakdown in necessary communication between the two which probationer senses and uses to his advantage.

PINARDI, Norman J., "The chronic drunkenness offender," Crime and Delinquency, 12:339-343, 1966.

Setting: Miami Municipal Courts -- the city of Miami, alcoholic rehabilitation program.

Purpose: description of court program, no evaluation

Cases: not stated

Subject selection: chronic drunkenness offenders--court referrals who volunteer for program after introduction by probation officer who has done presentence investigation and made recommendations to the judge.

Court referral process: presentence investigation: probation officer who has obtained the arrests explains two programs offered - those who request it are assigned to one of the programs by judge upon recommendations of probation officer.

Sentence and probation provisions: either (1) C-4 program: sentence to special rehabilitation barracks in city stockade (counseling, group therapy vocational rehabilitation service, pastoral counseling and daily meetings about Alcoholics Anonymous) or (2) "court program" 90 days probation -- required attendence at Saturday morning meetings. Saturday meeting: talks with probation officers or member of Alcoholics Anonymous and other community resources. Those arrested second time move into C-4 program.

Clinic intake process: not stated

Referral sources: courts only

Social history: chronic drunkenness offenders

Contact with families: not stated

Controls: none

Staff (and role of each member): Probation officer + staff of C-4 program: (not described).

Treatment and duration: C-4 people encouraged to join court program after release and both groups acquainted with Alcoholics Anonymous. Court program: 90 days, C-4 program: 10-30 days.

Community agencies involved: Salvation Army, Alcoholics Anonymous, ARP Miami Clinic, Traveler's Aid, Protestant and Catholic Welfare, Juvenile and Domestic Relations Court, parole counselors, employment services, welfare agencies, and others. (Period from treatment to follow-up, length of project, method of evaluation, and criteria for success not applicable.)

Results: Better inter-agency relationships, more positive attitudes by court and police personnel towards chronic drunk offender. Classes were instituted in the Miami police academy to explain philosophy and mechanics of court programs for the purpose of developing positive attitudes among officers towards drunkenness offenders.

Number of references: none   Number of tables: none

Probation officer had only small amount of time to give to alcoholics, other, e.g. Alcoholics Anonymous, supplemented the officer's role.

THOMAS, R. E., et al., "Evaluation of the Maryland Alcoholic Rehabilitation Clinic, 1958," Quarterly Journal of Studies on Alcohol, 20: 65-76, 1959.

Setting: Maryland Alcoholic rehabilitation clinics

Purpose: (1) determine types of treatment employed and evaluate their effectiveness, (2) study optimal hours for clinic operation, (3) investigate merits of including family in therapy, (4) appraise intraclinic relationships, (5) study relations between clinics and other Health Department programs.

Cases: 77 patients: 57 men, 20 women; average age: 41

Subject selection: referrals

Court referral process: not stated

Sentence and probation provisions (if court referral): not stated

Clinic intake process: only 17% received psychological evaluations

Referral sources: family physician, 35%; self-referrals, 12%; courts, 10%; welfare and social agencies, 9%; relatives, 7%; Alcoholics Anonymous, 4%; and others 23%.

Social history: most patients married and employed

Contact with patients' families: 50% of patients' relatives had some contact with clinic. (12 spouses included in formal treatment)

Controls: none

Staff (and role of each member): Psychiatrist: evaluation and assignment of patients

Treatment and duration: individual and group psychotherapy, nursing and medical care, average duration 19 weeks (2-37 weeks), average number of visits, 10.3. Group meetings once a week. (One group included patients and relatives.)

Community agencies involved: few or none

Period from treatment to follow-up: no follow-up data

Method of evaluation: Four separate questionnaires or checklist devised by authors.

Major criteria of success: (compared to initial status) (1) drinking pattern (amount and frequency), (2) family and social adjustment, (3) occupational adjustment, (4) physical status.

Results:

(1) Patient History	% Improvement	% Worse	% Same
(a) drinking	69%	6%	26%
(b) family	51	7	42

		% Improvement	% Worse	% Same
(c)	occupational			
	employed: (at intake)	40	8	53
	unemployed: (at intake)	45 (became employed)	10	45
(d)	physical	39	3	59

(2) Limited amount of community activities, e.g., prevention and education being carried out.

(3) No intensive follow-up of those who terminated treatment prematurely.

(4) Insufficient exchange of program and clinical information among six counter clinics of state health department.

(5) Less than 1/3 of staff maintained professional contact with Alcoholics Anonymous.

(6) Overwhelming number of alcoholics still not being treated - estimated 80,000 in Maryland in 1962.

(7) Four of the six clinics did not treat patients who were psychotic, mentally defective, organically deteriorated or in need of hospital care.

Number of references: none

Number of tables: none

Points of Interest: (1) patients receiving group therapy tended to remain in treatment longer and reported greater success, (2) there was direct relationship between length of treatment and amount of improvement, (3) patients whose spouses received concurrent treatment showed the most improvement.

THOMAS, R. E., GILLEAM, J. H., and WALKER, D. R., "Casework services to alcoholics in a Magistrates' court," Social Work, 5 (#1): 33-38, 1960.

Setting: Northwestern Police District Court working with Maryland State Department of Health (Division of Mental Health)

Purpose: description and evaluation of court referral program

Cases: 80 male; 15-72 years (median age - 33 years)

Subject selection: court referrals

Court referral process: screened by judge and social worker to determine extent - if any - of drinking problem (alcoholic defined) and chosen for stability and family contact.

Sentence and probation provision: not specified

Clinic intake process: not described

Referral sources: court

Social history: those who evidenced stability and had family or relatives available for help

Contact with family: in 63 cases, relatives seen on regularly scheduled basis (1/2 - 1 hour every 2 weeks)

Staff: Social Worker: (assigned to court on part-time basis - weekends) (1) aid in screening process, (2) determine if defendant desires treatment, (3) work with alcoholic and family, (4) make collateral contacts.

Treatment and duration: Individual counseling: average duration 10 weeks.

Community agencies involved: minimally: police, Alcoholics Anonymous, employment services; private and public welfare; physicians; Legal Aid Society; Urban League, landlords, psychiatric clinics, selective service, state attorney's office.

Total length of project: Three years: 1954-1957.

Method of Evaluation: police and casework records

Major Criteria: improvement in: drinking habits; family, social, and occupational adjustment; physical status; conflicts with law (comparing equal periods before and after treatment)

Results:

	Improved	Worse	No Change
drinking (frequency and/or decrease in amount)	60 (75%)	2 (3%)	18 (23%)
family and social adjustment	48 (60%)	4 (5%)	28 (35%)
62 cases employed at beginning of treatment	14 (23%)	- --	48 (60%)
18 cases unemployed	12 (67%)	(obtained employment)	6 (33%)
health	42 (53%)	2 (3%)	36 (45%)

Number of references: 0 Number of tables: 3

Follow-up: 60% had no subsequent contact with the law during project period and up to time of survey (the time in individual cases ranging from 6 months to three years). Inclusion of spouses in treatment increased success rate.

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