DOCUMENT RESUME

ED 113 507 CE 005 027

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TITLE Identification of Countermeasures for the Youth Crash Problem Related to Alcohol.
INSTITUTION Dunlap and Associates, Inc., Darien, Conn.
SPONS AGENCY National Highway Traffic Safety Administration (DOT), Washington, D. C.
REPORT NO DOT-HS-801-344; PB-239-158
PUB DATE Jan 75
NOTE 241p.
AVAILABLE FROM National Technical Information Service, Springfield, Virginia 22161 (PB-239-158; HC, $7.50; MF $2.25)

EDRS PRICE MF-$0.76 HC-$12.05 Plus Postage
DESCRIPTORS *Accident Prevention; Alcohol Education; *Drinking; *Males; Motor Vehicles; Question Answer Interviews; Questionnaires; Rehabilitation; Research; Safety Education; Surveys; *Traffic Accidents; Traffic Safety; *Young Adults

ABSTRACT

Past research relevant to the problem and possible countermeasures are discussed as the basis for the survey. Face-to-face interviews were conducted with male New York State drivers. These groups, each containing young and middle aged drivers were sampled as follows: (1) random sample of the general population of licensed drivers, (2) drivers recently involved in an 8 p.m. to 6 a.m. injury producing motor vehicle crash, and (3) drivers recently convicted on an alcohol driving offense. The results indicated that 14 percent of the young drivers in the general population as compared with only 5 percent of the middle aged drivers reported having had an alcohol related accident within the past three years. Driving after drinking was common among young people (about three times per month) and drinking frequency appeared consistent across young and middle aged driver populations. Young driver alcohol crash countermeasure and future research recommendations made are: late-night driving and speed-limit restriction, lowered absolute Blood Alcohol Concentration limit, public education for awareness of drinking-driving and disturbed behavior, driver rehabilitation, and mandatory alcohol safety interlock systems for convicted offenders. A five-page reference list and appended questionnaire form are included. (NTIS)

DOT HS-801 344

IDENTIFICATION OF COUNTERMEASURES FOR THE YOUTH CRASH PROBLEM RELATED TO ALCOHOL

Contract No. DOT-HS-099-3-747
January 1975
Final Report

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

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TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS-801 344		

4. Title and Subtitle	5. Report Date
Identification of Countermeasures for the Youth Crash Problem Related to Alcohol	January 1975
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
David F. Preusser; John F. Oates, Jr.; Marlene S. Orban	ED-74-12

9. Performing Organization Name and Address	10. Work Unit No.
Dunlap and Associates, Inc. One Parkland Drive Darien, Connecticut 06611	11. Contract or Grant No. DOT-HS-099-3-747
	13. Type of Report and Period Covered Final June, 1973 Sept., 1974
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

Face-to-face interviews were conducted with male New York State drivers. These groups, each containing young (16-24 years) and middle aged (35-49 years) drivers were sampled as follows: 1) random sample of the general population of licensed drivers (N=443); 2) drivers recently involved in an 8 p.m. to 6 a.m. injury producing motor vehicle crash (N=288); and 3) drivers recently convicted on an alcohol driving offense (N=105). The results indicated that 14% of the young drivers in the general population as compared with only 5% of the middle aged drivers reported having had an alcohol related accident within the past 3 years. Alcohol related crashes for young drivers as compared to non-alcohol related crashes tended to more often involve greater vehicle speeds prior to the crash and the use of drugs other than alcohol as well as being late night, single vehicle events. Driving after drinking was common among young people (about 3 times per month) and drinking frequency appeared consistent across young and middle aged driver populations. Young people, and especially young people involved in an alcohol related driving event, more often perceived the drinking driver as a brave, independent, popular individual. Young driver alcohol crash countermeasure and future research recommendations are made in the areas of driving restrictions, speeding statutes, public information and rehabilitation.

17. Key Words	18. Distribution Statement
Alcohol Driver Survey Traffic Safety Youth Countermeasures	Document is available to the public through the public through the National Technical Information Service, Springfield, Virginia 22151

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	240	

Form DOT F 1700.7 (8-69)

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ACKNOWLEDGEMENTS

The authors wish to express their gratitude to those individuals and organizations who assisted in the performance of this research. Michael Perel, Contract Technical Manager, and Dr. Monroe Snyder both of the National Highway Traffic Safety Administration, provided guidance and support throughout the study. Dean Babst of the New York State Drug Abuse Control Commission and Richard Zylman of the Center of Alcohol Studies provided insight into the nature of the problem and aided in formulating the questionnaire.

Special thanks are due John O. Moore, Director, and Barbara Baciewicz of the Office of Safety Program Coordination, New York State Department of Motor Vehicles who were instrumental in establishing the procedures by which the driver sample was drawn. Charles Bostick, Director of Research, A. Perlman, Director of Accident Reports Processing, C. Thayer, Director of Data Preparation and Zachary Zambie, Associate Computer Programmer all of the New York State Department of Motor Vehicles provided valuable guidance and assistance in the conduct of sampling. The authors also wish to thank Dr. Basil T. Scott, Administrative Director, New York State Department of Motor Vehicles for his support of this project. John Donelon, Bureau Chief, and Russell Sloan, Associate Director, both of the Missouri Department of Revenue also aided in driver sampling.

Joseph Fucigna, President, Eastern Division, was the responsible officer for Dunlap and Associates, Inc., on this project. Richard Blomberg, Vice President, Eastern Division, provided help in the area of data management and computer programming. Other Dunlap and Associates, Inc., staff members who aided in the conduct of this study were Carolee Fucigna and Carol Preusser who were responsible for coding questionnaires. Of course, much of the success of this project was the direct result of the diligence, perserverance and innovation of the numerous interviewers. Their time and effort as well as the time and cooperation of the many drivers interviewed was greatly appreciated.

SUMMARY

The objectives of this research effort were to examine the youth-motor-vehicle-crash problem as it relates to alcohol and recommend countermeasures as indicated. These objectives were restated into the following three basic research questions:

1. Is there a youth-alcohol-crash problem?

If yes:

2. What are the characteristics of this problem?

3. Can countermeasures be developed that address these characteristics?

In answering these questions, the first task was to review the existing literature relative to youthful drinking, youthful driving and youthful drinking-driving. This was followed by a survey of young drivers aged 16-24 with appropriate comparison or control groups. Finally, all data thus obtained was analyzed and potential countermeasures were recommended.

The literature review indicated that light to moderate use of alcohol is the norm for young people. Both total abstention and very frequent heavy drinking are atypical occurrences. Concerning driving, the literature indicates that young drivers are overrepresented in crashes relative to their proportion of the driving population. Young drivers also are more often convicted of speeding related violations than are older drivers. Concerning the joint occurrence of driving and drinking, it was found that young drivers are overrepresented among fatally injured drivers who had been drinking. The extent of this overrepresentation is approximately 100%, again with respect to the young driver proportion of the total population of licensed drivers. Fatally injured young drivers typically exhibit lower BAC's (blood alcohol concentrations) than do middle aged fatally injured drivers. Also, low to moderate BAC (.01% - .09%) substantially increases the likelihood of involvement in non-fatal crashes for young drivers but not for middle aged drivers. Drinking and driving is primarily a male driver problem regardless of age.

The survey of young drivers was conducted in New York State. The sample consisted of male drivers aged 16-24 with a comparison or control group aged 35-49. Drivers living in Suffolk, Nassau, Queens, Kings (Brooklyn), New York (Manhattan) and Richmond (Staten Island) counties were excluded from the sample since the Nassau County Alcohol Safety Action Project which ran from 1971 to 1973 may have influenced their driving or attitudes. Thus, the sample consisted of drivers living from the Bronx north to the Canadian border, and west to Lake Erie. Within the total sample, there were

three sampling groups, each containing young and middle aged drivers.

- Random sample of the general driving population (N = 443)
- Drivers recently involved in a night injury producing crash (N = 288)
- Drivers recently convicted of Driving While Intoxicated or Driving While Ability Impaired--Alcohol (N = 105)

The survey was conducted through face-to-face interviews each lasting approximately 45 minutes.

The results indicated that there is a youth alcohol crash problem. Approximately one young driver in seven (13.8%) from the general population sample reported having had an alcohol related crash within the past three and one half years (i.e., a crash in which he had consumed an alcoholic beverage within four hours prior to the event). This compared with only 5.5% of the middle aged general population drivers. Comparisons between the young driver alcohol versus non-alcohol related crashes indicated that the alcohol crash more often involved:

- Exceeding the posted speed limit
- Weekend and late night time periods
- A single vehicle as opposed to two or more vehicles or pedestrians
- The presence of passengers
- The use of drugs other than alcohol

The results also indicated that young and middle aged drivers from the general population are virtually identical with respect to how often they drink, how much they drink and how often they drive after drinking. However, young drivers are more likely to:

- Exceed the posted speed
- Have a positive attitude toward drinking-driving
- Have recently driven in excess of 100 mph
- Use drugs
- Allow personal/emotional problems to influence driving
- Fear loss of their driving privilege

- Avoid wearing seat belts

These characteristics were most prevalent among young drivers who were also frequent drinkers. However, they were not necessarily more prevalent among middle-aged drivers who were frequent drinkers.

Based upon these results, it is recommended that further research and development be conducted to implement countermeasures in the following areas:

- Lower nighttime speed limits
- Lower absolute limit of Blood Alcohol Concentration for newly licensed drivers (perhaps .05%)
- Legislation to facilitate enforcement of youthful alcohol related traffic offenses (specifically, it is recommended that speeding violations occurring when the driver has had anything to drink should carry sharply increased penalties)
- Restriction of driving by newly licensed drivers during critical time periods (late night or late night on weekends)
- Public education to modify the positive attitude young drivers have toward "drinking drivers" (this could take the form of the Lackland Countermeasure Experiment whereby authorities publicize that drinking driving is deviant behavior and the offendor may be subjected to a psychiatric evaluation)
- Public education to inform young drivers of the penalties associated with drinking driving convictions and factors affecting intoxication and impairment

Further, work should be conducted aimed at limiting the recurrence of drinking driving events among young drivers. This may take the form of an Alcohol Safety Interlock System installed in the vehicles of convicted drinking drivers. Also, a young driver oriented rehabilitation program should be developed. This program would have to consider the problems of speed, the fact that the young driver's vehicle often serves as an extension of his own personality, the synergistic effects of small amounts of alcohol with personal and driving characteristics and the young driver's attitude toward drinking and driving.

ADDENDUM

Based on their analysis of data pertaining to (1) young/inexperienced drivers; (2) alcohol consumption (including low to moderate levels); and (3) speed (in excess of posted limits), the contractor has inferred that the combination of these three factors is a particular problem towards which countermeasure action should be directed. However, data were not available on these three problem characteristics in combination, so the analysis was unable to demonstrate the combined contribution of these factors to accident causation. The contractor's conclusion, therefore, is based on indirect evidence and must be considered suggestive rather than firm. Present plans are to pursue this further by obtaining direct data on the frequency of these problem characteristics in combination.

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PART I

REVIEW OF THE LITERATURE

INTRODUCTION

The objective of Part I of this report is to review past research relevant to the youth alcohol crash problem. This Part is organized into four major sections. The first section looks at the drinking practices of youth and the second reviews the literature concerning youthful driving. In the third section, the joint occurrence of drinking and driving by youth is examined. The fourth section reviews possible countermeasure approaches, examines data relevant to each, and attempts to make a preliminary judgment as to each countermeasure's potential applicability.

It will be seen that the problems of drinking and driving by young people are very real. Yet, there is still much to be learned and the available research has found it difficult to keep pace with a changing world. The remaining two parts of this report will present the findings from a survey of young drivers and recommend countermeasures that can be expected to help alleviate the youth alcohol crash problem.

I. YOUTHFUL DRINKING PRACTICES

The consumption of alcoholic beverages is an accepted part of American life and estimates suggest that its use is steadily increasing. In a nationwide survey in 1965, based on a sample of 2,746 subjects age 21 and older, Cahalan et al. (1969) indicated that 68% of American adults drink at least occasionally. Of the drinkers, 56% were classified as infrequent to moderate and 12% were classed as heavy drinkers. Of males, 77% drank at least occasionally; 21% were classed as heavy drinkers. Male abstainers were found to be in the minority at all age levels; the majority, up to age 65, drank at least once per month. The highest proportions of heavy drinkers were found among men aged 30-34 and 45-49 (30% of both groups). In most social status groups, it was found that a much higher proportion of men and younger people drink than do women and older people.

Clearly, drinking at least occasionally is the established norm. The following paragraphs will examine the characteristics of American drinking as they relate to young people. It will be shown that regular drinking begins for most people in their mid-teens and drinking increases rapidly through the early twenties. Much of this drinking is done in bars and restaurants, although a significant amount of moderate drinking occurs in the home with parental approval. While the reasons for drinking are varied, the reasons for problem drinking are often associated with deep-seated personality problems. Drinking is more prevalent in urban areas and is correlated with a variety of background and biographical variables. Succeeding sections of this report will relate these drinking characteristics to driving and possible countermeasure approaches.

A. Beginning to Drink

Teenage alcohol use is also relatively widespread. Previous studies have indicated that the great majority of teenagers will have experimented with alcohol prior to graduation. Surveys have indicated that 50-85% of high school students (depending on geographical area) respond that they drink at least occasionally (NIMH, 1970). In a study of institutionalized and non-institutionalized youths from various types of communities in New Hampshire in 1964, Mackay et al. (1967) found that only 14% of the "delinquents" and 28.5% of the "students" had not drunk anything. In a study by Demone (1972), 3,500 male junior and senior high school students from the Boston area were given questionnaires during the early to mid-1960s. It was stated that it is likely that half of the abstainers (those who never used alcohol) will explore alcohol at some later date. The study found abstinence to be less common than previously reported in other studies concerning teenage drinking. By 18 years of age, only 12% of the subjects reported being abstainers.

Surveys have indicated that the average American is likely to first taste

alcohol, usually in the form of an experimental sip, by the age of 10 years (NIMH, 1970). Disregarding small "tastes" of alcoholic beverages when younger, it was found by Cahalan et al. (1969) that more than half of the drinkers began before the age of 21. More men (21%) than women (11%) and more heavy drinking men (31%) than other groups started drinking before age 18. Detailed analyses by age revealed that one-third of male drinkers now aged 21-29 recalled starting to drink before age 18 compared to only 19% of those age 50 and older. A similar pattern was found for women. If memories of both age groups are equally reliable, these data suggest that people are now drinking at an earlier age than they were a generation ago.

Findings based on five studies involving 8,000 high school students within the last 10 years (NIMH, 1970) in New York, Wisconsin, Michigan, Utah and Kansas show that the average age at which the students had their first drink was 13-14, although they may have "tasted" before. First experience is likely to be at home with parents, and beer was the most commonly used beverage. Mackay et al. (1967) studied institutionalized and non-institutionalized youth and found that the average age of first drink was 13 for delinquents and 12 for students. Over half of the students had their first drink at home with adult supervision. However, only 20% of the delinquents had their first drink in the presence of an adult. The "most popular" first drink for both groups was beer. Jessor et al. (1970) analyzed data from 79 returned mail questionnaires from young adults of Italian descent in Boston. They found that the first drink was typically beer and that regular drinking typically began at age 17.7 years.

In summary, teenage alcohol use is relatively widespread although the quantities consumed tend to be moderate. The number of users steadily increases from age 14-18. Data indicate a general trend in which a direct relationship appears between advancing age and the increased use and noticeable effects of alcohol. Most teenagers claimed parental approval of their drinking, particularly at home. Incidence seems unaffected by prohibitive laws. These surveys disclosed a small percentage of problem drinkers (2-7%). The main reasons for the first drink as reported by Mackay et al. (1967) were listed for both delinquents and students as curiosity, peer influence and celebration of an event.

B. Where Drinking Occurs

Cahalan et al. (1969) found that those who drank at least once per month drank less often in restaurants and bars than at friends' or their own homes. Wine or beer was drunk by higher proportions at home than elsewhere; spirits were drunk by about equal proportions at friends' homes and at their own homes. Relatively higher proportions of older persons (40 years and older) drank most often at home. Relatively higher proportions of younger persons (21-29 years) drank in restaurants or bars. Among men, especially younger

men, relatively more of the higher ISP (Index of Social Position) groups said they more often drank wine or beer at home and relatively fewer at restaurants or bars. Young men (21-39 years) in the lower ISP groups were more likely to report drinking wine or beer at friends' homes. Young men (21-39 years) showed no particular difference by ISP as to where they drank spirits most often. Generally, the younger male drinkers drank to a greater extent than the older men, when with people from work or close friends; and to a lesser estent with members of their immediate families.

Mackay et al. (1967) found that generally, the most frequent drinking place for the student is in their home (76.5%) or friends' homes (40.2%) followed by cars and alleys (25.6%) and bars, taverns, restaurants (10.7%). For institutionalized delinquents, the most frequent places are their friends' homes (76.2%), cars and alleys (74.1%) followed by their own home (61.9%) and bars, taverns or restaurants (41.8%). Evidence of "serious drinking" behavior was detected more often among the delinquents. Almost 60% reported solitary drinking experiences and a significant number drank alone with some frequency. Only one-quarter of the students reported this behavior and for most it occurred only once or twice.

C. Reasons for Drinking

Drinking practices reflect the practices of parents, significant others, and variables such as age, sex, ethnicity, geographic region, religion and social class. Cahalan, et al. (1969) hypothesized that reasons for drinking can be divided into two types; one as a social catalyst and the other as a drug. Other studies have also recognized the twofold function of alcohol. (Findings by Riley et al. (1946) showed that "social" reasons were more likely to be reported by women, younger persons and less frequent drinkers. "Individual" reasons were more often reported by men, older persons and more frequent drinkers.) Younger men and women were more likely than older persons to mention celebrations, sociability and taste as important reasons for drinking. More younger men mentioned that they drank to be "polite". Drinking because the "people I know" drink tended to decrease with age. A very high proportion (68%) of young men in the highest ISP group said that relaxation was an important reason. The percentage of heavy "escape-drinkers" was highest among younger men (21-39) of the lowest ISP group, but decreased with age in the lowest ISP group but not in the higher groups. Jessor and Jessor (undated) found that the male and female high school "problem drinker" drank more for positive social reasons ("to have a good time") and for personal effects reasons ("to forget I'm not the kind of person I want to be") than non-problem drinkers.

Important reasons for students' drinking, reported by Mackay et al. (1967) were because they liked the taste (38.4%); peer influences (23.2%) and to feel better when sad (16.2%). Peer influence was the main reason given by delinquents (51.1%); because they liked the taste (50.4%) was next; followed by to make them feel better when sad (46.1%); because of feeling angry (44.6%);

to help to forget (41.8%) and because of feeling lonely (33.8%). While both groups gave several similar reasons for drinking, the delinquents drank for tension relief much more frequently than did the students.

D. Geographical Differences

There are considerable regional differences in drinking practices. Cahalan et al. (1969) found the highest proportions of both drinkers and heavy drinkers in the middle-Atlantic states (83%), New England (79%), Pacific (73%) and East North Central (75%) areas, all of which are relatively urban in character. The lowest proportions of drinkers occurred in the East South Central states (35%) followed by other southern areas and the Mountain states. The southern and mountain areas are less urban in character. Also, the more conservative Protestant religions are prevalent in these areas. Another geographic variable affecting rates of drinking are local control laws. Areas with liquor control laws have relatively high proportions of abstainers. This may be due to the effect of the laws or it may be due to the fact that areas with more abstainers tend to pass liquor control laws. However, of those who drink, the proportion of heavy drinkers remains about the same. Degree of urbanization is an extremely important factor. There are proportionately more drinkers in large cities than in smaller communities. Suburban areas have the highest rate of total drinkers but among the lowest rate of heavy drinkers. The largest cities have the highest rate of heavy drinkers. Nonfarm and farm rural areas generally showed relatively low rates of both drinking and heavy drinking. For both sexes, the highest proportion of heavy drinkers were found in the age group 21-44, of lower social status and in highly urban areas. The highest proportion of abstainers and infrequent drinkers was in the 45 and older age group, lower ISP and lower urbanized areas. Results of an analysis of movement from one size locality to another indicate that there is a tendency for a person to conform to the prevailing drinking customs. In other words, an individual moving from a relatively "wet" area to a relatively "dry" area can be expected to decrease his drinking (or vice versa).

Demone (1972) found more excessive drinking among adolescents in an urban-working class community. He found more abstinence and less excessive drinking in a higher socio-economic "bedroom town". A suburban community containing both white collar and working classes was found to have the lowest proportion of excessive drinking in his study.

Wechsler and Thum (undated) in a questionnaire study of teenagers, found heavy alcohol use was reported much more frequently in a small semi-industrial city than in a residential town.

E. Background and Biographical Variables

Other variables that affect rates of drinking are race, ethnic background,

religious affiliation and social position. Cahalan et al. (1969) found that White and Negro men varied little with rates of drinking. However, ethnic background apparently plays an important part in determining drinking habits. In general, first generation Italians in the United States drink very frequently but have extremely low rates of problem drinking or alcoholism. Subsequent generation American-Italians have higher rates of heavy drinking. Jews tend to have low levels of alcoholism and the Irish have relatively high rates.

Native versus foreign born and father's country of origin are also factors in drinking behavior. Those respondents who were foreign-born were less likely than the native-born to be abstainers and more likely to be moderate drinkers. Foreign-born drinkers were also less likely to be heavy drinkers. More of those with foreign-born fathers tended to drink (80%) than did those with native-born fathers (64%). However, the two groups were about equal in proportions of heavy drinkers among drinkers.

There is a definite association between religion and both drinking and heavy drinking, even when national identity group is held constant. Findings show (Cahalan et al., 1969) that Jews and Episcopalians had the lowest rate of abstainers (8% and 9%), however, Jews had a relatively low rate of heavy drinkers among drinkers (11%). Conservative Protestants were consistently higher in proportion of abstainers (48%) than liberal Protestants (20%). They also had relatively low rates of heavy drinking. Catholics had relatively high proportions of both drinkers and heavy drinkers (83%). Those who reported never going to church had a higher rate of heavy drinkers (22%) than those who went weekly (10%).

Wechsler and Thum (undated) found in a sample of teenagers from a semi-industrial city, that the teenage heavy drinkers were least likely to define themselves as religious. However, teenagers in a residential town sample did not differ systematically in drinking behavior as a function of their religious beliefs.

Investigators have found that factors such as age, sex, region, social status and similar variables are significant in the drinking pattern of most teenagers. A predominant factor, though, is the drinking behavior of the significant adult in their lives. Although there are regional differences, it seems true that children who are users tend to have parents who use, and that abstaining youngsters tend to have abstaining parents (Mackay et al., 1967). Cahalan et al. (1969) found that larger proportions of younger persons and those of higher social status had both frequent drinking parents and parental approval. Parental permissiveness was generally correlated with a higher proportion of drinkers. Among males, frequent drinking on the part of the father was found to be highly correlated with later heavy drinking on the part of the son. However, it was suggested that the mother's examples and attitudes may be even more influential than those of fathers.

Mackay et al. (1967) found that two-thirds of the institutionalized delinquents in their study reported their parents would not condone drinking at home; 90% said their parents would not allow drinking away from home. Yet, over 60% of the delinquents reported drinking more than their parents knew about. Only about 4% reported drinking only at home; only about 6% reported that their parents knew how much they drink. Over half of the students reported that their parents allowed some degree of drinking at home; about 25% of the students reported drinking only at home; about 14% reported that their parents knew how much they drink and 20% reported drinking more than their parents knew about.

In a study of peer influence on drinking, Alexander and Campbell (1967) reported that the frequency of alcohol use by drinkers was directly related to the amount of social support by parents and peers. The percentage of adolescents who drank varied from 12% among those whose parents were against drinking and whose best friends abstained to 89% among those whose parents were not opposed and whose two best friends used alcohol. Eight percent of those who did not drink with parents or peers used alcohol once per week; 43% of those who did drink with parents and peers used alcohol once per week. They found that the behavior of an adolescent's friends has importance in determining whether or not he will begin drinking and also influences various aspects of his behavior and attitudes toward drinking per se. In short, these results demonstrate that adolescent drinking is social behavior that is intimately linked with the behavior of peers. The following hypotheses were supported: the proportion of drinkers increased with each increase in the number of friends who drink; the more drinking friends a drinker has the more likely he is to use alcohol more frequently. The study confirmed that primary sources of pressures to drink and social support for drinking are found within the adolescent society and that these pressures affect the behavior of both drinkers and abstainers.

F. Personality Variables

Personality correlates of drinking were explored by Cahalan et al. (1969). Some of the findings indicated that higher proportions of heavy drinkers tended to report having had a good previous year than abstainers. However, fewer reported being very happily married. Heavy drinkers voiced only a slightly lower level of satisfaction in meeting their life goals than light or nondrinkers. The heavy drinkers laid greater stress on the goals of family life and friends and desire for emotional security and happiness. There was a strong relationship between drinking and cigarette smoking (oral activities). Heavy drinkers were more likely to smoke more than a pack a day and the abstainers least likely. Larger proportions of heavier drinkers than others reported having a drink to be helpful in relieving depression or nervousness (71% in both men and women). Both having a drink and smoking were considered helpful by relatively high proportions in New England, Middle Atlantic and Pacific regions. Southeastern states

emphasized pill-taking and churchgoing. In general, younger people, male and female, with higher scores on "impulsivity" had a higher proportion of heavy drinkers and a lower proportion of abstainers and infrequent drinkers. Also, heavy drinkers tended to exhibit greater levels of "alienation".

Zucker (1967) in his study of sex-role identity patterns and the drinking behavior of adolescents found that data supported the theory that heavier drinking boys display a more masculine sex-role identification pattern on the face valid masculinity-feminity (Fe) index (Gough Femininity Scale). There was no difference between the moderate drinker and nondrinker. Nondrinkers Fe scores were almost identical to heavy drinkers, suggesting that the nondrinker has a similar pattern to that of the heavy drinker. On the subtle measure of Fe, no relationships of sex-role pattern to drinking type was observed. The fact that differences were obtained on the more obvious measure of sex-role identity and not on the more subtle one suggests that the major characteristics differentiating heavier from lighter drinkers is one of sex-role facade. The difference is in conscious self-representation with heavier drinkers picturing themselves as more masculine.

Wechsler and Thum (undated) found that the group of relatively heavy teenage alcohol users was less likely to report feeling very close to their families, less likely to talk about drugs with either of their parents and more likely to feel that they have more in common with "hippies". They tend to identify more closely with the values of the youth culture than with the conventional standards of behavior and values. The heavier drinkers were somewhat less likely to define themselves as having plans to attend college and tended to receive lower grades in school. Those who used hard liquor and reported that they had been drunk were considerably more likely to have used illicit drugs or other psychoactive substances for nonmedical use. In a residential town, these teens included the highest proportion (32%) who rated themselves as having more personal problems than their classmates. Forty percent had received psychiatric or other professional help. The study found that drinkers, particularly the relatively heavy drinkers were more likely than abstainers to have been involved in various antisocial acts (e.g., cheating at school, shoplifting, property damage).

Barmack and Payne (1961) in their study of 138 young injury accident involved airmen found that the drinking-accident subjects had experienced more early family "trauma" (e.g., parental separation) than nondrinking-accident subjects or controls. The drinking accident subjects more often had a problem drinking parent(s), and more often lived alone. These findings are consistent with other studies, such as the Mackay et al. (1967) finding that over half of the delinquent children had parents who were separated.

Jessor et al. (1970) found that more frequent drunkenness among youth was related to greater alienation. Higher alcohol consumption was related

to lower expectations of goal attainment and lower internal control. It was suggested that problem drinking in the college student may reflect both a means of coping with expected academic failure and an assertion of independence. Both value for achievement and expectation for achievement are lower among problem drinkers. They place a greater value on independence and display a greater tolerance of deviance. In short, the problem drinker appeared less involved with conventional goals and more susceptible to "problem" behavior.

Demone (1972) found that the youthful pathological drinker tends to reject most formal adolescent activities and adult-sanctioned standards of behavior. The nondrinker, on the other hand, is inclined to emulate all the adult delineated models. Either type's interests are sufficiently different from those of the typical adolescent to separate him from the group. Excessive users are substantially different from other subjects in that they are; unhappy, have an inadequate home life, problem drinking parents are likely, they are active participants in antisocial acts, and do poorly in school. By 18 years of age, 7% of the sample were "pathological" drinkers. Emotional problems are likely. Their social system contains different norms, roles and sanctions than those of their peers. They reject adult imposed youth standards and prefer adult roles and privileges. They are removed from the mainstream of adolescent behavior.

Cahalan et al. (1972) found that all types of drinking problems were more prevalent among men in the youngest age group (21-24). Their "current overall problems" score (which includes all types of both major and minor events) was almost twice as high (40%) as any of the older groups. The incidence of drinking declined with age, as did heavy drinking. An inference from this is that there is a rapid decline in drinking problems after age 25 and perhaps the "seeds of longer-term serious problems with alcohol" are sown by one's drinking habits in the early 20s. This is consistent with the finding of Cahalan et al. (1969) that younger people (21-39 years) tend to drink larger quantities of alcohol sporadically while older people generally drink smaller amounts regularly.

In summary, the light moderate drinker represents the "real world" of today's adolescent; he is flanked on one side by the atypical abstainer or experimenter and on the other by the heavy or problem drinker. All three types of adolescent drinking behavior must be accommodated into any integrated program of countermeasures for the youth drinking/driving problem.

II. YOUTHFUL DRIVING

The highway safety literature has typically characterized young drivers as those under 25 years of age. Unfortunately, the only magical or mysterious transformation occurring upon one's twenty-fifth birthday is a significant reduction in auto insurance rates. Youthful drivers can be good drivers; they can also be very bad drivers. Further, beyond the age of 25, many individuals continue to drive in the same fashion as the worst young drivers and accumulate the same pattern of accident and conviction records. In a sense, the youth driving problem can be thought of as a set of interrelated symptoms. While much more prevalent among youth, it can easily continue well into middle age.

Kaestner (undated) examined the driving records of 904 licensed Oregon drivers involved in fatal accidents during 1961 and 1962. These records were compared with a random sample of Oregon drivers (N = 10,000). As expected, the fatal accident involved drivers were younger, had fewer years of driving experience, were males significantly more often, and had more prior accidents and convictions on their records. The surprising result was the "remarkable tendency" for speeding and noise-equipment violations to persist on the records of the older fatal accident involved males. These violation types are typically associated with young male drivers. Thus, it was concluded that many of these older males were "immature" and probably committing many of the same types of driving errors as their younger counterparts. In other words, the signs and symptoms of youthful driving had not ceased for these individuals at the age of 25.

The following paragraphs will take a brief look at the magnitude of the younger driver (16-24 years of age) problem and some of its characteristics. The conclusion will be that a definable problem does exist. Succeeding sections will attempt to relate this problem to alcohol consumption and examine alternative countermeasure approaches. Throughout this section, it will be assumed that the young driver problem is essentially a young male driver problem. The Kaestner work, and in fact most of the highway safety literature, is particularly clear on this point.

A. Magnitude of Young Driver Problem

The 1973 edition of Accident Facts shows that in 1972 young drivers (under 25) accounted for 21.6% of the licensed drivers in the country. Yet, they constituted 35.5% of drivers involved in fatal accidents and 36.5% in all accidents. Clearly young drivers pose a particularly large traffic safety problem. Further, these figures represent an increase from the 1971 figures which were 33.8% (fatal) and 35% (all) respectively.

While no one seriously suggests that young drivers are not overinvolved

in traffic accidents, the extent and nature of the overinvolvement remains an experimental issue. Measurement of this overinvolvement has taken three quite distinct methodological paths, each with its own problems, yet each highly suitable for obtaining certain types of answers. The first and most straightforward approach is to simply compare the number of accident involvements with the number of drivers. By this method, we have the figures presented above. Namely, young drivers constitute only 21.6% of the drivers (nationally) yet they are involved in 36.5% of the accidents. This represents an overinvolvement on the part of young drivers by a factor of 69%. In other words, they are involved in 69% more accidents than would be expected from their frequency in the driving population. The comparable figure for fatal accidents is 64%. Goldstein (1971) reviewed accident data for the period 1964-1970 and found youth overinvolvement rates of 63% for all accidents and 59% for fatal accidents.

This approach to accident involvement has been referred to as "absolute risk" by Coppin et al. (1965). They argue that regardless of annual mileage, percentage of night driving or any other variable, this measure provides a direct index of the driving liability or public risk posed by any segment of the driving population. As such, it is essentially the most appropriate measuring technique for the auto insurance industry and has also been used by licensing authorities. The point being that by itself absolute risk is a valuable statistic.

The central problem with absolute risk is that it does not take into account the amount and nature of the driving exposure. One cannot, for instance, conclude that an overinvolvement rate of 69% means that young drivers as a group are poorer drivers. While they do pose a greater absolute risk to society, this greater risk could just as easily have been generated by 69% more driving. To control for this problem, several investigators have examined accidents in terms of accidents per miles driven. The results from these kinds of analyses have typically shown that even after mileage adjustments, the young driver remains overinvolved. Pelz and Schuman (1971), for instance, compared male drivers aged 16-24 with male drivers aged 35-44. Their results showed that the older males accumulated more miles per year than did the younger males, yet had fewer accident involvements. Clearly, any correction on the basis of miles driven would increase the magnitude of the young driver overrepresentation. Other researchers have reached similar conclusions (see, e.g., Lauer, 1952; Burg, 1967).

The accidents per mile technique, unlike the absolute risk technique, attempts to answer questions concerning the quality of driver performance. Essentially, it assumes that people who drive more miles should have more accident involvements. There are, however, other exposure variables beyond simple mileage that have an impact on accident rates. Night driving, for instance, is generally considered more hazardous than driving during daylight hours. Road features also influence the extent to which the driver is

exposed to risk. Since the life style and behavior patterns of youth differ from middle aged individuals, it is quite likely that simple mileage estimates will not fully equate young and old drivers in terms of exposure to risk.

Campbell (1964) presented findings that suggest that there may, in fact, be radical differences in the characteristic of youth exposure versus the exposure of older drivers. He analyzed data from 32,387 injury accidents. The results showed that young drivers (aged 25 or less) had a higher percentage of their accidents on weekends and during the night hours. The largest differences appeared in the day versus night findings.

Controlling for exposure to risk, as distinct from simple exposure in terms of mileage, has been attempted both statistically and experimentally. Pelz and Schumann (1971), for instance, report on one such statistical technique termed the Multiple Classification Analysis. This is a multiple regression technique that generates weights for a variety of exposure variables such as percent night driving, number of trips, hours driving, etc., and adjusts the accident data accordingly. The problem, of course, is to ensure that all of the relevant exposure variables are included in the analysis and that there is sufficient data of sufficient quality to obtain reliable answers. Experimental methods have employed the roadside interview of similarly exposed, yet non-involved drivers, as a control group for comparison with the accident involved drivers. The concept here is that drivers passing an accident scene at the same time of day, same day of week are exposed to same road characteristics to the same degree as the accident involved drivers. Thus, experimental control of exposure can be directly obtained.

McCarroll and Haddon (1962) compared 43 fatally injured drivers with 258 non-involved drivers passing the same accident site (6 non-involved drivers per site) in the same direction, during the same time of day and day of week. While this was a landmark study concerning alcohol involvement in fatal crashes, no difference was found between the ages of the fatally injured drivers versus the non-involved drivers. The sample size, however, was small. The most comprehensive study of this type was done by Borkenstein et al. (1964). They gathered data for over 9,000 accident involved drivers and over 7,800 non-involved yet similarly exposed drivers. Results from this massive effort with respect to young drivers have recently been presented by Zylman (1973). The first analysis conducted by Zylman involved the absolute risk technique discussed above. It showed that young drivers (15-24) were overinvolved by a factor of 80%. However, when comparisons with similarly exposed non-involved drivers were made, the overinvolvement rate dropped to 49%. Thus, there is some evidence to suggest that young drivers drive at more hazardous times and places than older drivers. Nevertheless, they are still overinvolved in accidents beyond what could be expected from exposure variables and must be considered more dangerous drivers.

In summary, the young driver is overinvolved in accidents. The most

recent figures show that young drivers are involved in 69% more accidents than would be expected from their frequency in the total driving population. This figure is up from a 63% average in the late 1960s. When this accident data is controlled for miles driven, the young driver (especially the very young driver) tends to look worse. Greater control over exposure variables can be gained with roadside interviews of non-involved drivers. Although a very "conservative" experimental technique, the most complete data available still show a youth overinvolvement rate of 49%. Clearly, regardless of measurement technique, the young driver is a significant safety problem.

B. Personality and Background Characteristics of the Accident Involved Youthful Driver

Several studies have attempted to differentiate between the accident involved young driver and the accident free young (and old) driver. While no attempt shall be made here to summarize all of these findings, the more recent and most relevant data will be referenced. More complete reviews of this literature can be found in Harrington (1971) and Waller (1971). This literature displays a remarkable degree of internal consistency and provides a relatively clear picture of the problem. Simply, these young people "drive as they live". A variety of deviant or delinquent social, behavioral and personality characteristics have been shown to be related to poor driving records. Whereas, desirable or valued characteristics are typically related to good driving skills.

Beamish and Malfetti (1962) studied 84, 16-19 year old males who each had at least two traffic violations. These subjects were compared with 186 subjects who had not incurred a traffic violation. The results from a series of psychological tests showed that the traffic violators scored lower on the variables "emotional stability", "objectivity", "mood", and "conformity". They also rated their parents as less "politically active". There was also evidence that the violators scored higher on the MMPI Psychopathic Deviance scale. Earlier work (Brown and Berdie, 1960) with a larger sample found a significant relationship with this scale and both accidents and convictions among male college students.

Schuster (1971) compared young problem drivers with young average drivers. He found that the problem drivers scored lower on a driver attitude scale, and lower on "sociability".

Several studies have related poor driving records to poor academic performance. Carlson and Klein (1970) examined the driving records, academic performance and police contacts for 8,094 male undergraduates. The results showed that traffic convictions were related to poor academic performance. Further, regardless of absolute academic performance, underachievement was a key variable in this relationship. The number of convictions on an undergraduate's record was positively correlated with the number of convic-

tions on his father's record, and the number of times the undergraduate violated other (non-traffic) laws. However, as a group, the undergraduates had better driving records (accidents and violations) than young drivers in the general population.

Kraus et al. (1970) interviewed 205 accident involved young drivers and 205 matched controls. This Canadian study identified 4 "risk factors" each of which was found significantly more often among the accident group than among the control group. The factors were:

- Failed one or more grades in or before grade 8 or had been in a vocational high school course.
- Became a regular cigarette smoker at or before age 16.
- Had first full-time employment exclusive of school vacation time at or before age 17 and before obtaining a driving license.
- Had been charged with a criminal offense.

Pelz and Schumann (1971) interviewed nearly 1700 young men concerning various aspects of their driving, personality and background. Analysis showed that several variables were related to problem driving. High levels of "hostility", (e.g., feelings of anger, peer pressure, etc.) were related to increased crash and violation (to include warnings) involvements. Those who had left school were more involved in crashes and violations. Driving motivation was also an important factor. Variables such as "driving after argument", "distracted driving", "escape driving" and "competitive driving" were significantly related to both crashes and violations. In general, these results showed that many forms of deviance or maladjustment in youth were related to problem driving.

Perhaps the most extensive study of young drivers is that of Harrington (1971). Driver records for 13,915 young people in five California counties were analyzed. This data was supplemented by school records and some interviews. The results were in general agreement with previous research, and expanded several known relationships with the larger data base. Significant correlations were obtained between accidents (and convictions) and several biographical, background, etc., variables. Poor school adjustment, poor academic achievement and cigarette consumption were all related to increased accidents. A teacher rating of "citizenship" was the best predictor (i.e., highest correlation) with driving record. This variable can be thought of as a composite of social responsibility, personality and acceptance of established norms. In short, those young people who were least deviant, least delinquent, generated the best driving records.

A great deal of literature beyond what has been cited here bears directly

on the characteristics of the young problem driver. It shows that several more personality and background variables are related to problem driving. These variables, as the ones cited above, all tend to depict the young problem driver as somehow out of the ideal mold or stereotype of the well adjusted young adult. Of course, correlation does not necessarily mean causation and thus this body of literature does not tell us how to solve the problem. The only inference we can draw is that better socialization or generally improved mental health of young people would probably be good for highway safety.

Many of the studies cited had as their basic purpose for conducting the research the pre-identification of the young problem driver. While most uncovered statistically significant personality/background and driving correlations, few of these correlations were of a level to be of practical significance to safety authorities. Harrington (1971) for instance found a multiple correlation between "biographical" variables and accidents of only .25 for males. Generally speaking, the best predictor of future driving remains prior driving. In other words, the newly licensed young driver must first become a problem driver before he can be identified and helped. Further, some seriously maladjusted youth may be identified through other agencies (e.g., police records, mental health records). However, for the present, safety authorities must either apply youthful countermeasures on a broad scale or wait until the young driver has acquired a poor safety record.

C. Characteristics of Youthful Driving

The one overriding characteristic of young male driving is excessive speed and associated recklessness/risk-taking. The young male has been characterized as using his driving as a means of satisfying his needs for power, excitement and general acting out of repressed impulses and frustrations. The automobile, for many young men, serves a much broader function than simply transportation. It is this broader role which makes the young driver a unique highway safety target audience, and adds a great deal of complexity to traditional countermeasure techniques.

In 1969, the New York State Department of Motor Vehicles drew a sample of nearly 1 million driver abstracts from their computerized files. As shown in Table I, a total of 72,455 abstracts were for males aged 20-24. These abstracts contained 33,499 convictions for speeding. This is nearly one conviction for every two young male drivers. The nearest other group was the 25-29 year olds (29,893 convictions for 68,104 drivers). The data on a New York State driver abstract covers a period of three to four years. In this case, 1966 to mid-1969. Thus, it is not surprising that 16-19 year olds had not accumulated many convictions, since most of them had been driving for only one year. Nevertheless, the conclusion is clear--excessive speed is a major problem among young drivers.

Number of speeding convictions by itself, however, does not necessarily

Table I

Distribution of Convictions for Speeding
by Age from a Sample of 980,860
New York State Drivers for the Period 1966-mid 1969

Age	Sex	No. of Drivers	No. of Speeding Convictions	Convictions Per Driver
16-19	Male	28,912	3,399	.12*
	Female	18,486	431	.02
20-24	Male	72,455	33,499	.46
	Female	52,445	6,195	.12
25-29	Male	68,104	29,893	.44
	Female	50,783	5,183	.10
30-34	Male	56,909	19,154	.34
	Female	40,720	3,082	.08
35-39	Male	53,747	14,361	.27
	Female	38,716	2,777	.07
40-44	Male	57,781	13,748	.24
	Female	41,875	3,033	.07
45-49	Male	56,860	12,200	.21
	Female	40,607	2,815	.07
50-54	Male	49,967	9,103	.18
	Female	35,076	2,031	.06
55-59	Male	44,720	6,581	.15
	Female	27,892	1,224	.04
60-64	Male	38,623	4,465	.12
	Female	20,431	688	.03

*Spurious, since these drivers were not on the road for the full 3-1/2 years.

Table I (Continued)

Distribution of Convictions for Speeding
by Age from a Sample of 980,860
New York State Drivers for the Period 1966-mid 1969

Age	Sex	No. of Drivers	No. of Speeding Convictions	Convictions Per Driver
65-69	Male	28,442	2,276	.08
	Female	12,546	326	.03
70-74	Male	18,532	1,019	.05
	Female	7,528	154	.02
75 +	Male	14,128	450	.03
	Female	4,575	57	.01

mean that speed is a major factor in youth crashes. Data on this aspect of the problem are available from several sources. In general, it can be said that youth crash involvements more often are associated with greater speed prior to the crash. The National Safety Council (1964), for instance, reported on 1956 crash data for drivers judged to be responsible from Vermont. These findings based on 10,678 crashes showed that the modal speed prior to the crash for drivers 20 years of age or less was 31-40 miles per hour. For drivers 21-34 years of age, the modal speed was 21-30 miles per hour and for drivers 35-44 years of age the modal speed was 11-20 miles per hour. Older drivers, 45 years of age or more, had a modal speed of 0-10 miles per hour. Data from California for 1958 also shown in this National Safety Council (1964) report, indicates that young drivers (20-24 years of age) are more often at fault in a crash due to speed than any other age group.

In summary, this section of the report has taken a brief look at youthful driving. It was concluded that young drivers are overinvolved in accidents regardless of any corrections for differential exposure. Further, those young drivers who are in some way maladjusted, alienated or otherwise deviate from established behavioral or emotional norms tend to have the poorer driving records. And lastly, problem driving among young people is typically characterized by excessive speed and associated risk-taking. The young driver has been defined as being under the age of 25. However, as the work of Kaestner referenced at the beginning of this section has shown, "youthful" problem driving may continue well into middle age.

III. DRINKING AND DRIVING AMONG YOUTH

The first section of this report dealt with the drinking habits of young people, the second with their driving. Enough young people have drinking problems and certainly enough young people have driving problems to suggest that the joint occurrence of drinking and driving deserves considerable attention. This section will examine the extent to which young people drink and drive, the magnitude of the problem and its characteristics.

A. Frequency of Drinking/Driving Among Youth

Data concerning drinking driving among youth has been obtained under at least three different experimental techniques. The most obvious is, of course, to simply review accident and violation records. However, while this technique provides information on driving problems associated with alcohol, it is not really suited for providing information on the absolute number who drink and drive. It does not, for instance, provide information on the number who drink and drive yet do not have associated accidents or convictions. Two other techniques, however, do attempt to assess the problem more directly. The first is the interview technique.

Wolfe (1971) interviewed 504 residents of the Denver, Colorado area aged 16 and older. He found in this household survey, that 26% of those aged 16-20 and 7% of those aged 21-30 did not drive. Another 21% (aged 16-20) and 9% (aged 21-30) drove, but abstained from alcohol. Thus 53% of the 16-20 age group and 84% of the 21-30 age group were potential drinker drivers. Of these, 48% of 16-20 year olds and 64% of the 21-30 year olds did report at least some driving after drinking. In terms of the total sample (i.e., including non-drinkers and non-drivers), 26% of the 16-20 year olds and 54% of the 21-30 year olds did report driving after drinking. In the 31-64 age group, 50% of the people interviewed reported driving after drinking. These figures suggest that the very young driver is underrepresented in the total drinking driver population. However, those aged 21-30 are, if anything, overrepresented and further analysis shows that they contribute more than their share of those reporting "frequent drunk driving".

Similar data is available from a household survey conducted by Gerstel et al. (1970). They interviewed 1,439 people in Mecklenburg County, North Carolina (Charlotte area). The results showed that males tended to drink more and drive more than females. People from urbanized areas drank more than people from rural areas, however, the overall level of drinking was lower than that found in the Denver area (fully 51% of the sample reported being abstainers). Males in the 16-29 age group reported the greatest amount of drinking (4 or more drinks) and driving than males in the other age groups. Depending on interview technique, it was estimated that between 20% and 30% of the males aged 16-29 who drive and drink were on the road above .10% BAC

during the past year. Both the Mecklenburg study and the Denver study point to the fact that drinking and driving cuts across all levels of socioeconomic status. In fact, in Mecklenburg, drinking and driving was most prevalent among college graduates followed by high school graduates followed by those with less than a high school education.

The most direct technique used to assess the amount of drinking driving is to actually stop motorists on the road and test for alcohol. Relatively few studies of this type have actually been conducted, and the data which is available are not based on samples of the entire driver population. Thus, they do not provide definitive answers. Nevertheless, a great deal can be learned from the available research.

The usual sampling plan for studies of this type is to stop motorists passing an accident site at the same time of day, same day of week during which a previous accident has occurred. In other words, this technique looks at the population at risk at specific places, at specific times of day, days of week. It does not attempt to assess the entire driving population.

The largest and probably best known research using this technique is that of Borkenstein et al. (1964). The results from this Grand Rapids, Michigan study for male drivers stopped at random (same time of day, day of week) at previous accident sites are shown in Table II. These results show that 12% of the males had been drinking and 16% of the drinking males were under 25 years of age. This appears to be a slight underepresentation of young males in the male drinking driver population since during the period covered young drivers (male and female) accounted for approximately 19% of the licensed drivers in Michigan (see Zylman, 1973). Further, while young males accounted for only 16% of drinking drivers, they accounted for 23% of the non-drinking drivers. These figures also show that the young drinking driving male tends to show lower BACs than the older drinking driving male.

Unfortunately, these overall figures do not present the entire picture from the Grand Rapids data. First, while young drivers as a group may be underrepresented among drinking drivers, the bulk of this difference is accounted for in the under 20 age group. The 20-24 year olds appear to be drinking and driving at a rate equivalent to the older males. Second, analysis of this data by times of day yields some important differences. Zylman (1973) presented data from the Grand Rapids study for all drivers (male and female) stopped at random during the 9 p.m. to 12 midnight time period. These results showed that 17% of the drivers had been drinking and fully 22% of these were in the under 25 age group. This increase in young drinking drivers was due mainly to a large increase in the total number of young drivers. During this time period, 40% of the drivers stopped were under 25 years of age.

While the Grand Rapids data is quite extensive, it is also several years old. More recently, Waller et al. (1972) randomly stopped drivers in

Table II

Summary of Roadside BAC Data for Male Controls from Grand Rapids Study

(Borkenstein et al 1964)

Age	BAC .00%	.01 - .04%	.05 - .09%	.10 + %	Total % Drinking
Under 20	8.58% *	.30%	.08%	.00%	.38%
20-24	11.74%	1.19%	.34%	.10%	1.63%
25 +	66.68%	7.02%	2.43%	.91%	10.36%
Total	87.00%	8.51%	2.85%	1.01%	12.37%

*Entries are percentage of more than 5,000 male drivers falling in specified BAC and age interval.

Vermont. Data were collected between 11 p.m. and 2 a.m. on Thursdays, Fridays and Saturdays. A total of 14 sites were used, each chosen from prior DWI arrest and alcohol crash patterns so as to maximize the number of drinking drivers among those randomly stopped. The results of this research are shown in Table III. They show that 32% of the drivers stopped had been drinking and 41% of these were under 25 years of age. As in the Grand Rapids data, young drinking drivers tended to have lower BACs than older drinking drivers and the 20-24 age group had more drinking drivers than the under 20 group.

The roadside interviews attempt to examine all levels of BAC from .00% to fully intoxicated. Another way of approaching this problem, however, is through arrest data. Arrests have the feature of chemical test data, but by and large involve only those drivers who have consumed enough alcohol to be charged with driving while intoxicated. Further, there is no pre-defined sampling plan for arrests and each arrest is dependent on the judgment of the arresting officer and the discretionary and other factors affecting this judgment. Nevertheless, this data can be of some interest.

Ulmer and Preusser (1973) examined BAC data by age for all alcohol related traffic arrests in Nassau County, New York during 1972. Their results are shown in Table IV. It can be seen in this table that the largest single age category was the 20-24 year olds while at the same time the 15-19 year olds were apparently underrepresented. Further, the BACs for these young drivers tended to be lower than for the older drivers. Both of these findings are quite consistent with the roadside data presented above.

B. Drinking/Driving and Non-Fatal Crashes

Alcohol involvement in non-fatal crashes is particularly difficult to determine. Some studies rely on the investigating officer's judgment, some on interviews of involved drivers. Chemical testing of drivers at the time of the accident typically occurs only when an arrest on an alcohol charge is made. An important exception to this is the Grand Rapids study which did test accident involved drivers at the accident scene regardless of arrest.

There are several studies in the literature which show that young drivers who drink are more likely to be involved in traffic accidents. Harrington (1971) asked 9,391 young California drivers aged 16-19 to rate their personal drinking habits as compared with their peers. The driving records for each of these subjects were obtained and compared with this self-reported measure of drinking behavior. The results, presented in Table V, clearly show that self-report of heavier drinking is related to both more accident involvements and traffic convictions. However, this is not necessarily a causal relationship since heavier drinking could be associated with exposure variables. Parenthetically, this table also shows that males rate themselves as heavier drinkers more often than females and males have more traffic involvements.

Table III

Summary of Roadside Data for Drivers Stopped Between 11 P.M. and 2 A.M. Thursday, Friday or Saturday Nights from Vermont Study (Waller et al., 1972)

	BAC				
Age	Under .02%	.02 - .04%	.050 - .099%	.10 + %	Total % Drinking
Under 20	17.24%*	2.30%	1.15%	.19%	3.64%
20-24	16.48%	4.98%	3.07%	1.34%	9.39%
25+	34.48%	8.43%	6.90%	3.45%	18.78%
Total	68.20%	15.71%	11.12%	4.98%	31.81%

*Entries are percentage of drivers (N=522) falling in specified BAC and age interval, under .02% BAC assumed not to have been drinking.

Table IV

Age by BAC for All Alcohol Related Traffic Arrests

in Nassau County, N.Y., During 1972*

(Ulmer and Preusser, 1973)

BAC	AGE										
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
	N=202	465	411	410	381	397	430	325	205	110	64
.05-.09	6.9	4.3	2.4	2.4	1.6	1.5	2.6	1.8	2.0	2.7	0
.10-.14	34.2	28.8	15.1	12.9	12.9	14.9	15.8	12.6	8.8	14.5	15.6
.15-.19	46.5	38.7	36.5	32.7	34.1	27.7	29.3	36.3	34.6	39.1	48.4
.20-.24	9.4	21.3	28.2	31.5	29.4	30.0	28.4	30.2	35.6	29.1	25.0
.25-up	3.0	6.9	17.8	20.5	22.0	25.9	24.0	19.1	19.0	14.5	10.9

*Entries are percentages based on column totals.

$\chi^2 = 2927.3$, d.f. = 40, $p < .01$

Table V

Mean Accidents and Traffic Convictions by
Personal Assessment of Drinking Habits
for 9,391 California Drivers Aged 16-19
(Harrington, 1971)

Sex and item	Drinking rating					
	Never drinks	Much less average	Little less average	Average	Little more average	Much more average
Male:						
No. of subjects	1,280	1,577	731	1,030	324	73
Accidents*	0.611	0.638	0.644	0.668	0.651	0.863
Convictions*	2.760	2.889	3.060	3.158	3.151	4.000
Female:						
No. of subjects	1,462	1,759	541	521	90	3
Accidents*	0.290	0.352	0.338	0.399	0.444	0.333
Convictions*	0.673	0.797	0.791	0.976	1.300	2.333

*Entries are mean events per driver

In other words, as previously cited research has shown, the drinking driving problem tends to be a male problem.

Another study using essentially the same approach is that of Barmack and Payne (1961). They investigated 138 airmen (mean age was 23 years) who had injury-producing off-duty motor vehicle accidents and compared them with a control group who did not have injury-producing accidents. The results showed that the incidence of self-reported heavy drinking and driving was twice as great in the accident group as in the control group.

Pelz and Schuman (1973) were able to carry this technique further than previous investigators. They interviewed nearly 1700 young men in Southeastern Michigan and, as in previous research, found that heavier drinking was related to increased accident and motor vehicle violation (to include warnings) rates. The key aspect of their research, however, was that they were able to separate that subgroup of young men who were either strongly "hostile" or strongly "alienated" or both from the entire sample. The results showed that:

> "At each age level between 16 and 24, members of this subgroup ("hostile" and/or "alienated") were more likely to drink, or to drink heavily, than the remainder. Among them, furthermore, the rate of crashes and especially of violation-plus-warnings rose steadily with increased frequency and amount of drinking. Among the remainder who were neither hostile nor alienated, however, drinking behavior showed little relationship to driving infractions." (p. 2)

This result clearly suggests that there is a strong interaction between drinking, driving and personality factors among young people. Or, in somewhat different terms, drinking and driving can only be fully understood when one knows who is drinking and driving.

The most direct evidence available on the youth crash alcohol problem comes from the previously cited Grand Rapids study of Borkenstein et al. (1964). Data for control subjects in this study were given earlier. This section will look at the accident or experimental subjects, 5,988 of whom were tested for alcohol close in time to the actual crash. The results for the male accident subjects are shown in Table VI. It can be seen from this table that nearly 19% of the accident involved drivers had been drinking. Of these, 24% were under 25 years of age. Based on an estimate of the total number of licensed drivers in Michigan at that time, this figure represents a slight overrepresentation of young people in the alcohol crash population. Most of this overrepresentation appears to be coming from the 20-24 age group. Also from the table, it can be seen that the young drivers are greatly overrepresented in the sober crash population. In fact, fully 37% of the non-drinking drivers were under 25 in this study (see also Zylman, 1973).

Table VI also shows the distribution of BACs for these drivers. These

Table VI

Summary of BAC Data by Age for Accident Involved Male Drivers from Grand Rapids Study (Borkenstein et al., 1964)

AGE	BAC .00%	.01-.04%	.05-.09%	.10+%	Total % Drinking
Under 20	15.69*	.90	.39	.19	1.48
20-24	14.28	1.35	.62	.96	2.93
25+	51.32	5.24	3.08	5.96	14.28
TOTAL	81.29	7.49	4.09	7.11	18.69

*Entries are percentage of the more than 4,600 male accident involved drivers falling in specified BAC and age interval.

results are perhaps the most interesting. They show that older drivers had 47% of their alcohol related accidents when they were at .10% BAC or more. The 20-24 age group had only 33% of their alcohol related accidents at these high levels, and surprisingly, the comparable figure for the under 20 age group was only 13%. In other words, age appears to be highly correlated with BAC in the alcohol crash population.

Using the BAC data from the accident subjects and the control subjects, the investigators were able to calculate what they termed an "accident vulnerability ratio". Essentially, it is the ratio of accident drivers to control drivers for each age group at each BAC level. An accident vulnerability ratio, or A-VR, of 1.0 says that there are no more or less accident drivers than control drivers in that age and BAC category. A-VRs less than 1.0 indicate that there were fewer accident drivers and A-VRs greater than 1.0 indicate that there were more. For instance, an A-VR of 5.0 indicates that there were five times as many accident drivers than control drivers within that specified age and BAC interval. Or, in other words, an A-VR of 5.0 suggests that these drivers are five times more vulnerable to an accident than the general population of drivers on the same road at the same time of day, day of week. The sampling distribution of this ratio has not been studied and thus parametric tests of statistical significance are not possible. Nevertheless, this ratio can prove highly instructive.

Figure 1 shows the accident vulnerability ratio plotted by age for several BAC intervals. Looking first at the .00% BAC curve (i.e., non-drinking) it can be seen that young drivers (and old drivers) are more vulnerable to an accident than are the middle aged drivers. The fully "intoxicated" drivers (.10+% BAC curve) are all much more vulnerable to an accident than the non-drinking drivers although the shape of the curve is essentially the same. That is, the most serious effects are with the young and old. The two middle BAC curves (.01 - .04% BAC and .05 - .09% BAC) are by far the most interesting. The first, .01 - .04% BAC, shows that very young drivers are far more vulnerable to an accident (A-VR - 7.33 for under 18; A-VR - 2.29 for 18 and 19) at this level of alcohol consumption while the middle aged drivers may actually be less vulnerable (A-VR ranges .56 - .71 for age categories 35-69). The same pattern, although not quite as dramatic, can be seen in the .05 - .09% BAC curve. Clearly, the young driver and especially the very young driver is having trouble controlling even the lowest levels of alcohol consumption. Carlson (1972) has come to essentially similar conclusions with more recent data. He attributes the difference to driver inexperience, both in drinking and in driving.

C. Drinking/Driving and Fatal Crashes

Alcohol involvement in fatal crashes is far easier to determine than in non-fatal crashes. Many jurisdictions in the United States as elsewhere have for several years been testing fatally injured drivers for evidence of alcohol

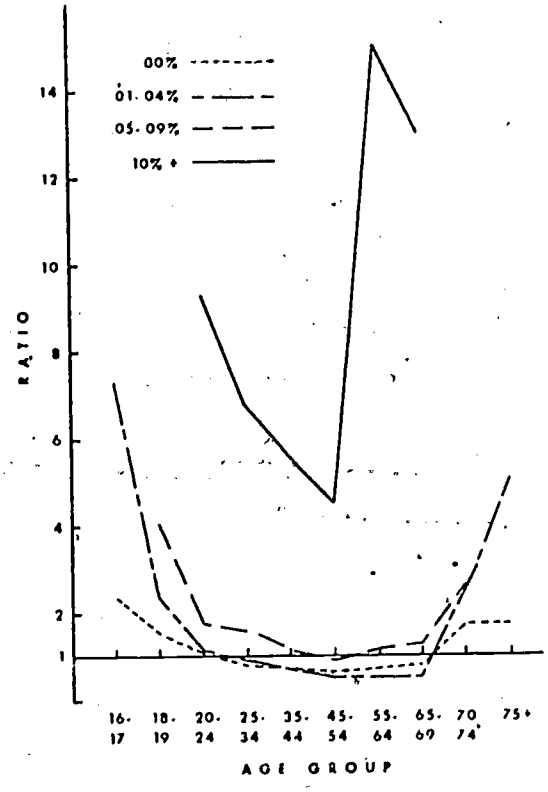

Figure 1. Accident vulnerability ratio by BAC and age group (male only) from Zylman, 1973

in their blood. This work is typically done by the State or County Medical Examiner as part of a routine autopsy on highway deaths. This kind of information can be used in two different ways. First, it can be used to estimate the extent of alcohol involvement, by age, in fatal crashes. This can be done both in terms of alcohol involvement versus no alcohol involvement and in terms of alcohol involvement versus the driving population. Second, this data can be used to estimate the BACs of the fatally injured drivers who had been drinking. The results show that:

- Young drivers are overrepresented among fatally injured drivers who had been drinking
- Percent alcohol involvement for fatally injured young drivers is high and is especially high in the 20-24 age group
- BACs for fatally injured young drivers tend to be lower than for middle aged drivers

These results generally parallel the results presented earlier for non-fatal crashes. However, there is a general tendency for the alcohol-related fatal data to show a larger overrepresentation of young drivers. This could be due to any or all of several factors. First, the fatal data is more recent than the Borkenstein et al. (1964) results and could be reflecting a general increase in drinking and driving among young people. Second, methodological problems could be involved. Specifically, it is known that middle aged drivers have proportionately more multiple vehicle fatal crashes than young drivers (see, e.g., Rosenberg, 1973). In a multiple crash, any one of several people could be fatally injured, not just the drinking driver. Thus the data may not fully reflect the number of alcohol-related fatal accidents involving middle aged drivers, since evidence of drinking is typically obtained only if the driver himself has died. The third possibility is that young drivers, prone to speeding and reckless driving, tend to have more serious alcohol crashes. In any event, the data do show a serious problem with alcohol-related fatals among young drivers.

Table VII shows the distribution of fatally injured drivers in Nassau County, New York for the period 1967-1971. There are two important aspects of the data shown in this table. First, the estimated percent of alcohol involvement for fatally injured young drivers in Nassau County is 59% for the under 19 age category and 64% for the 20-24 age category. These estimates were obtained by taking the number with positive blood alcohol concentrations and dividing by the total number tested. They indicate that more than half of these young drivers had been drinking prior to their crash. This is quite comparable with data from the middle age drivers. It is only in the 60 or older categories where alcohol involvement drops markedly.

The second aspect of the table data, though, is more important. Simply,

Table VII

Distribution of Fatally Injured Drivers in Nassau County 1967-1971* by Age and Presence of Alcohol**

Age	Autopsy Findings Blood Alcohol: Positive Tox	Zero Tox	No Test	Total	Estimated Percent Alcohol Involvement
19 or less	23	16	1	40	59%
20-24	38	21	10	69	64%
25-29	26	12	2	40	68%
30-34	16	6	4	26	73%
35-39	18	10	5	33	64%
40-44	10	12	8	30	45%
45-49	17	15	6	38	53%
50-54	12	15	7	34	44%
55-59	8	11	4	23	42%
60-64	4	14	7	25	22%
65-69	2	6	3	11	25%
70 or more	2	7	8	17	22%

Postive Tox - Had been drinking prior to crash

Zero Tox - Had not been drinking

No Test - Under fourteen years of age or survived more than 24 hours

* 1972 not included because of possible biasing effects due to the presence of the ASAP.

** Adapted from data collected as part of the Dunlap and Associates, Inc. evaluation of the Nassau County Alcohol Safety Action Project.

the absolute number of confirmed alcohol involved (i.e., positive test result for alcohol), fatally injured drivers was 23 in the 19 and under age group and 38 in the 20-24 group. This means that 13% of all drivers killed were 19 or younger and 22% were 20 to 24 years of age. Statewide, only 7% of the licensed male drivers are 19 or younger, and only 12% are 20-24.* In short, it appears that young drivers are overrepresented by a factor of nearly two based on licensing data.

One possible biasing factor in this analysis is that there may be many more young people and perhaps young drivers than appear on the state license files. However, the population data for the Nassau-Suffolk region (Suffolk is a neighboring, less populated, New York State County) suggest that this is not the case. On the contrary, in the Nassau-Suffolk region, there is a drop in population from about the age of 19 until the age of 35. This may be seen in Figure 2 which has been taken from the 1970 U.S. Census.

Other work validates and extends the Nassau findings. These data, collected as part of the evaluation of the New Hampshire Alcohol Safety Action Project, are shown in Table VIII. The age breakdown is in terms of under 25, and 25 or over. The percentage of alcohol involvement for the fatally injured drivers was estimated in the same fashion as with the Nassau data. The results were that for the three year period, 1969-1971, an estimated 62% of these fatally injured young drivers had been drinking. This figure is virtually identical to the Nassau data. The absolute number of young drivers, however, is higher. The number of confirmed alcohol involved fatally injured drivers was 54 in the under 25 age group and 89 for the 25 and older group. Therefore, 38% of these "had been drinking" drivers were under 25 years old. Yet only 18% of the licensed drivers (as well as male licensed drivers) in New Hampshire are under 25.**

In Nassau County, the young driver was overrepresented among fatally injured, alcohol involved, drivers by a factor of nearly two. In New Hampshire, the factor is slightly more than two. In other words, the "absolute risk" of a young driver becoming an alcohol-related fatally injured driver is twice as great as the absolute risk in the remainder of the driving population. The data used to estimate these factors were based on autopsy reports and number of licensed drivers. Estimated percent alcohol involvement for fatally injured young drivers was virtually identical (about 62%) in both regions. Parenthetically, it should be noted that in Nassau, 93% of the fatally injured drivers who had been drinking were male.

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*Data provided by the New York State Department of Motor Vehicles.

**Data provided by the New Hampshire Department of Motor Vehicles.

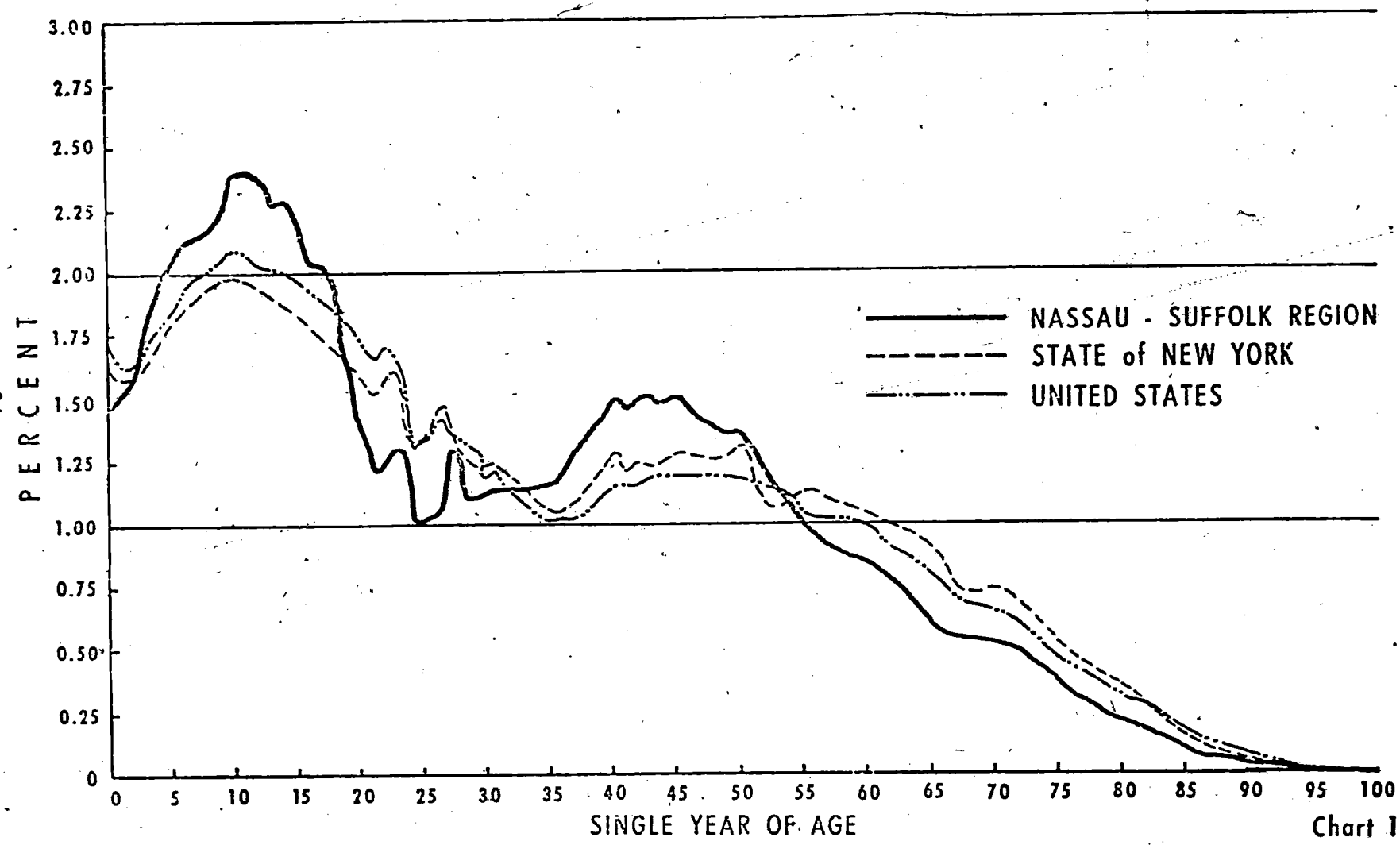

Figure 2. Percent of population by single year of age (from 1970 Census)

Table VIII

Distribution of Fatally Injured Drivers in New Hampshire 1969-1971* by Age and Presence of Alcohol**

Age	Autopsy Findings Blood Alcohol: Positive Tox	Zero Tox	No Test	Total	Estimated Percent Alcohol Involved
Less than 25	54	33	38	125	62%
25 and older	89	46	50	185	66%

Positive Tox - Had been drinking prior to crash

Zero Tox - Had not been drinking

No Test - Similar to Nassau, but varies on a County by County basis.

* 1972 not included because of possible biasing effects caused by the presence of the ASAP.

**Adapted from data collected as part of the Dunlap and Associates, Inc. evaluation of the New Hampshire Alcohol Safety Action Project.

Similar kinds of data are available fron other jurisdictions. The Suffolk County (New York) Traffic Safety Board (1972) published data on fatally injured drivers for the five-year period 1966-1970. The results showed that 57.1% of the fatally injured drivers aged 20 and under who were tested for alcohol, and 67% of the 21-29 years age group had been drinking. Data from the State of Washington for the year 1970 shows that 40% of the fatally injured drivers who had been drinking were under 25, again an overrepresentation of young drivers by a factor of roughly two.

Thus far, the data presented has not shown the BACs of these fatally injured drivers. For Nassau County, mean BAC by age for fatally injured drivers who had been drinking can be seen in Table IX. This table covers the period 1967-1970. It can be seen from this table that younger fatally injured drivers who had been drinking tended to have lower BACs than middle aged drivers.

Some fatally injured driver BAC data are also available from other parts of the country. Baker and Spitz (1970), for instance, analyzed BAC data for 328 drivers who died within 6 hours of a crash in Baltimore, Maryland from 1964-1968. They found that 40% of the under 20 year old drivers had BACs greater than or equal to .10% wt./vol. whereas 59% of the 20-24 year old drivers and 57% of the 25-29 year old drivers had BACs of .10% or more. Waller (1972) analyzed BAC data for fatally injured drivers who died within 6 hours of a crash in Alameda and Sacramento Counties, California during "January through March and October through December, from 1960-1971". His results for drivers who had been drinking are summarized below:

	Blood Alcohol Concentration	
Age	Less than .10%	.10% or More
15-19	10	6
20-59	20	144
≥ 60	4	25

These data clearly show that the young drivers, 15-19 years old, had lower BACs than the older drivers.

Rosenberg (1973) examined BAC data for 1,154 fatally injured white male drivers in Wisconsin (excluding Milwaukee County) during the period February, 1968-April, 1971. The crashes were divided into; single car-day, single car-night, double car-day and double car-night. Mean BAC for all drivers (includes those who had not been drinking) was higher in

Table IX

Mean Blood Alcohol Concentration by Age for Fatally Injured Drivers Who Had Been Drinking in Nassau County 1967-1970

Age	Mean Blood Alcohol Concentration (Autopsy Findings) Baseline 1967-70
15-19	.11
20-24	.14
25-29	.13
30-34	.16
35-39	.14
40-44	.18
45-49	.18
50-54	.17
55-59	.14
60-64	.11
65-69	.17
70 +	.03

single car crashes and in night crashes. Mean BAC in every crash category was lower for young drivers than for middle aged drivers.

Table X summarizes the findings presented in this section on an entirely different set of data. The data came from the Minnesota Department of Public Safety and cover the period 1969-1970. First, as can be seen from the table, 291 of the 510 fatally injured drivers who were tested during this period had been drinking. A total of 120, or 41%, were under 25 years of age. This figure is quite similar to that found in Nassau County, New York, Washington State, etc. Second, percent alcohol involvement is highest in the 20-24 age group. And lastly, the distribution shows that young drivers tend to have lower BACs than older drivers.

D. Speed and Alcohol in Crashes

It has been shown that young fatally injured drivers tend to have lower BACs than older drivers. Further, in non-fatal crashes, very young drivers were shown to be as much as seven times more accident vulnerable in the low BAC ranges while middle aged drivers in the same BAC ranges may actually be less vulnerable to an accident. The general explanation offered for both of these results is that the young driver does not have enough driving or drinking experience to control these lower levels of impairment. This explanation has a great deal of face validity, and is probably essentially correct. However, it is felt that the concept "experience" may be an oversimplification of the underlying causes leading to a youthful alcohol-related crash.

Two previously cited studies are particularly relevant to isolating these causes. First, Pelz and Schuman (1973) showed that drinking behavior was related to accidents only for those young men who were "hostile" or "alienated". Second, Kaestner (undated) showed that the driving records of middle aged fatally injured drivers were similar to the records of the young fatally injured drivers. He hypothesized that driver immaturity was a key factor in fatal accidents. Thus, it is felt that positive personality development, or maturity, may be a key component of the "experience" required to control these lower levels of alcohol. In order to "control" alcohol impairment, the driver must first recognize the need for control and then decide to exercise it. In other words, the driver must actively compensate for any impairment in his performance caused by alcohol. Unfortunately, the very nature of alcohol and a typical reason for its consumption is to obtain a release from inhibitions, strictures and normalized behavior. In other words, for many it provides a release from controls. This should pose particular problems for the young and/or immature driver.

The available data on alcohol crashes does not allow for a determination of exactly how important this release from control actually is, or even if it actually occurs. The data do, however, provide an interesting picture of

Table X

Fatally Injured Drivers by Level of Intoxication and Age for the Period 1969-1970 in Minnesota*

Age	Total Tested	BAC .01-.09%	BAC .10-.14%	BAC .15-.24%	BAC .25+%	Total Positive	Estimated Percent Alcohol Involved
0-20	108	15	14	23	3	55	51%
21-24	86	7	14	38	6	65	76%
25-34	96	8	9	33	16	66	69%
35-44	52	2	4	14	10	30	58%
45-54	68	3	6	18	10	37	54%
55-64	52	5	3	10	4	22	42%
65+	48	6	1	6	3	16	33%
TOTAL	510					291	57%

*Adapted from The Drinking Driver, 1970 and 1971.

the alcohol crash which is consistent with at least two hypotheses including release from control. Pollack (1969) compared police estimated speed immediately prior to a crash for 446 fatally injured drivers who had been drinking and 375 fatally injured drivers who had not been drinking. The results showed that the drinking drivers were generally traveling at much faster speeds prior to the crash than the nondrinking drivers. For the drinking drivers, 31% were traveling at speeds in excess of 60 miles per hour, whereas only 14% of the nondrinking drivers were traveling at these speeds.

Research cited earlier showed that young drivers are more prone to speeding violations than older drivers. Filkins et al. (1970) showed that the young fatally injured driver (25 years or less) was typically traveling faster prior to the crash than the older fatally injured driver. Further, this research also showed that high driver BACs were strongly correlated with high speeds prior to a fatal crash. The Filkins study also includes an examination of the driving records of 1,247 institutionalized alcoholics. Mean number of accidents was .65 per driver in this sample. However, mean number of accidents for drivers who had one or more speeding convictions was 1.13 per driver and mean number of accidents for drivers who had both speeding and drinking driving convictions was 1.84 per driver.

Barmack and Payne (1961) investigated off-duty injury producing motor vehicle accidents for 138 airmen stationed at Lackland Air Force Base, Texas. The results showed that 89 (65%) of these 138 accidents occurred after these airmen had been drinking (interview self-report of drinking). Single and multiple vehicle accidents were each separated into "had been drinking" versus "had not been drinking". As expected, the alcohol involved accidents (i.e., driver had been drinking) tended to be single vehicle. The data were further separated on the basis of the investigating officer's assessment of the speed of the subject vehicle immediately prior to the crash. The categories were "excessive (speed)" and "not excessive (speed)". The results showed that the single vehicle, had not been drinking, accidents involved excessive speed significantly more often than any other type. These results are tabulated below:

	Single Vehicle		Multiple Vehicle	
Speed	Driver Drinking (N=59)	Driver Not Drinking (N=18)	Driver Drinking (N=30)	Driver Not Drinking (N=31)
Excessive	66.3%	38.9%	33.3%	25.8%
Not Excessive	33.7%	61.1%	66.7%	74.2%

The average age of the airmen in this study was between 23 and 24 years.

A more recent study, White and Clayton (1972), also provides information concerning the alcohol/speed relationship in the young driver. This information comes from data collected in North Carolina during 1966, 1968 and the first half of 1969. The investigators were interested in the relationship between driver injury and whether or not the driver had been drinking. In order to appropriately handle the driver injury-no injury variable, these investigators found it necessary to separate the data by driver age and estimated subject vehicle speed. Thus, it is possible to determine from this data, speed by age by had been drinking irrespective of any resulting injury. The results of this re-tabulation are shown in Table XI. All data were obtained by these investigators from the North Carolina Traffic Accident Data File maintained by the North Carolina Department of Motor Vehicles and met the conditions specified on the bottom of Table XI.

Several aspects of this data are important for the current purposes. First, the estimated speed prior to an accident was greater for young drivers than for old drivers. This was true regardless of police estimate of had been drinking prior to the accident. Second, for all drivers, the estimated speed prior to the accident averaged much more for the had been drinking accidents than the had not been drinking accidents. Third, the interaction of excessive speed (posted speed limits were only 50-60 mph) and alcohol is most pronounced in the young driver. Overall, 47% of all accidents involved young drivers and 40% of the had been drinking accidents involved young drivers. However, these young drivers were involved in fully 55% of the had been drinking accidents with estimated speeds of 70+ mph.

These findings lead to two possible interpretations. Either; 1) drivers who had been drinking drive faster (consistent with release from control hypothesis), or 2) the probability of having an accident after drinking goes up exponentially with speed when compared with the probability of having an accident after not drinking. Regardless of interpretation, however, the fact remains that the young driver, alcohol involved, accident very often involves "excessive" speed.

Table XI

Speed Prior to Crash, Driver Age and Alcohol Involvement*

Had Been Drinking

Age	Estimated Speed Prior to Crash 30-39 mph	50-59 mph	70 + mph
19 or younger	52	331	404
20-24	108	801	898
25-54	506	1,990	1,009
55 or older	91	148	27

Had Not Been Drinking

Age	Estimated Speed Prior to Crash 30-39 mph	50-59 mph	70 + mph
19 or younger	1,089	3,923	922
20-24	979	3,712	633
25-54	2,906	7,365	343
55 or older	927	1,298	17

Crashes occurred in North Carolina during 1966, 1968 and the first half of 1969 and:

Weather - clear or cloudy
Road Surface - dry
Highway Classification - U. S., N. C. or rural paved
Posted Speed - 50, 55 or 60 mph
Sex of Driver - Male
Estimated Speed - 30-39, 50-59, or ≥ 70 mph (prior to accident)

*Adapted from: White, S. B. and Clayton, C. A. Some effects of alcohol, age of driver and estimated speed on the likelihood of driver injury. Accid. Anal. & Prev., 1972, 4, 59-66.

IV. COUNTERMEASURE AREAS

The preceding sections have discussed the results of the literature review relative to young-drinking-driving per se. Evidence has been presented to show that this is, indeed, a problem of sizable proportions. Furthermore, studies have been cited that indicate that this problem possesses characteristics distinguishing it from the (generally adult) "problem" drinking/driving phenomenon. These characteristics suggest that certain countermeasures that have been applied to combat "problem" drinking/driving might not prove effective against the young-drinker-driver; on the other hand, they raise the possibility of adopting certain new approaches that focus directly on these special characteristics. In this section, a wide variety of countermeasure concepts are discussed, followed by a review of relevant literature that may shed light on their potential effectiveness. The concepts developed in this section were used to structure the data gathering effort detailed in Part II of this report.

A. Discussion of Countermeasure Concepts

In order to identify techniques that might prove useful to combat a particular undesirable phenomenon, it is worthwhile to study the elements involved in the development and maintenance of that phenomenon. Figure 3 represents a simplified time-line diagram attempting to describe young-drinking-driving. It commences with the acquisition of the driving privilege (or its illegal usurpation), typically taking place at a relatively young age. This is generally followed slightly in time by the commencement of the drinking privilege. Both privileges are then exercised in varying degrees, and habits formed. During this period, the young driver population subdivides into those who combine drinking and driving and those who do not. This subdivision is not entirely stable, at least initially, and particular individuals may shift from one category to another one or more times. The subpopulation engaging in drinking and driving represents the problem under study. They will continue to expose themselves and others to accident involvement until such time as they modify their behavior or manifest themselves to authorities equipped to successfully deter their reoffense.

The ultimate purpose of any countermeasure one might apply to the young-drinking-driving problem is to affect the flow through the diagram and increase the percentage of the population entering the block labeled "do not contribute to problem". Each element in the diagram constitutes a potential intervention area, where countermeasures may be applied to induce the desired flow. This subsection discusses intervention schemes that, as a group, address all elements shown in the diagram.

1. Countermeasures Involving Restriction of Driving

One approach to combating the young drinking driver problem

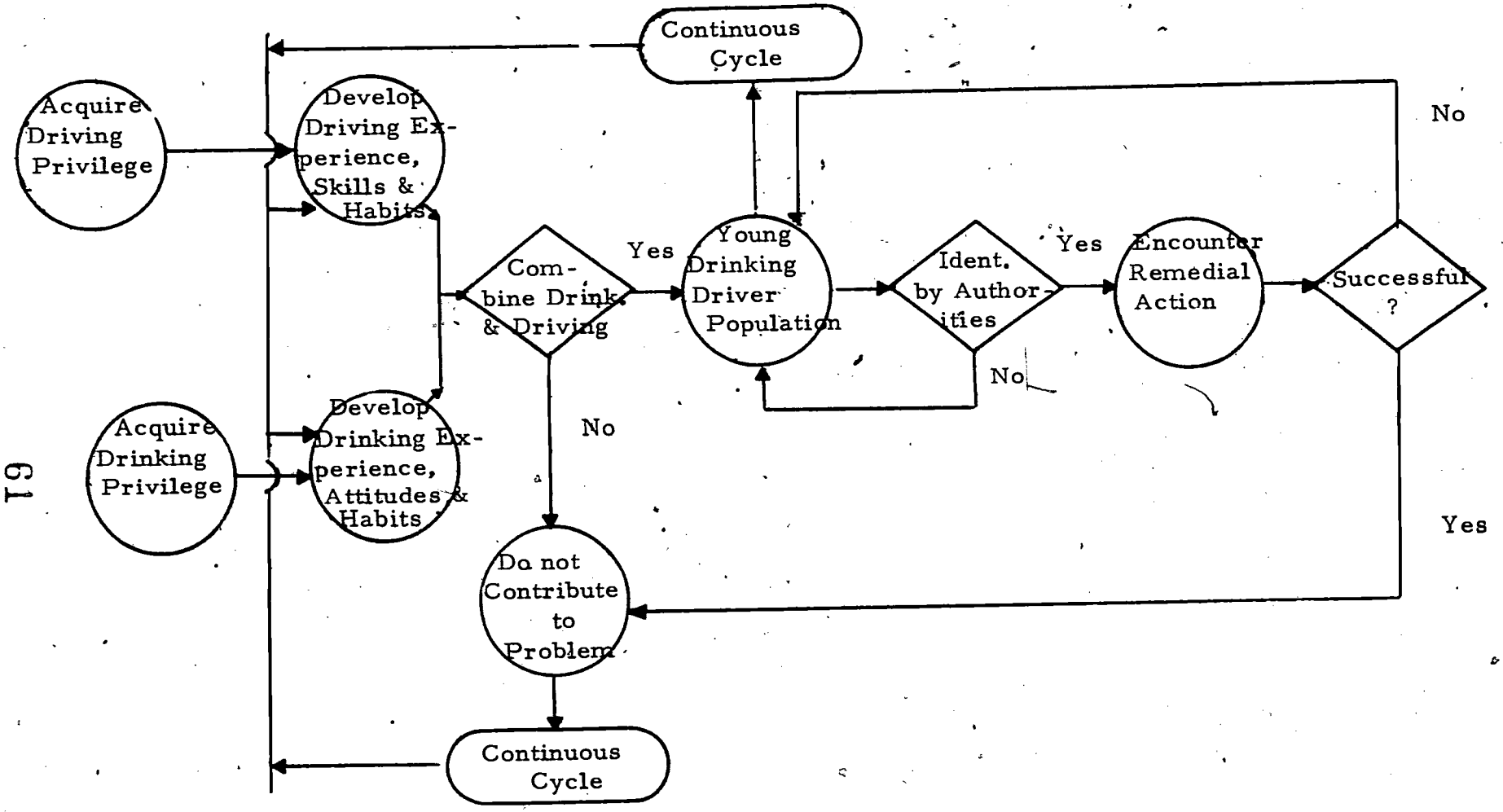

Figure 3. Drinking/Driving Behavior Time-line

would be to restrict, in one or another fashion, his driving privilege. This paragraph discusses restriction of driving per se, without direct consideration of drinking-driving. Potential countermeasures of this type are listed and discussed below.

a. Increase the Minimum Legal Driving Age

This countermeasure would attempt to reduce the involvement of youth in highway crashes by the simple expedient of keeping a segment of the present young driver population off the road. In fact, several states and localities presently or formerly have established a relatively strict legal driving age (e.g., 19 in New York City). The question posed for consideration is whether this strict approach should be adopted on a national basis.

Few, if any, studies have been conducted on the effects of varying legal age requirements on traffic safety. However, the following observations may shed some light on the potential effectiveness and feasibility of this countermeasure:

- Public support for increasing the driving age requirement likely would prove difficult to obtain, in view of the current legal and attitudinal environment. For example, several states recently have reduced the age of majority from 21 to 18. Thus, there is a trend toward extension, rather than restriction, of the rights and privileges of youth.

- Assuming, then, that the maximum increase could be to age 18, this countermeasure might have little direct effect upon the young drinking driver problem. Available data (e.g., Borkenstein, et al., 1964) indicates that alcohol becomes a noticeable causal factor in crashes only at age 18 or higher, and does not have a degree of influence comparable to that seen among adult drivers until age 20 or more. Thus, the elimination of 16 and 17 year old drivers would not seem to bear upon the problem in question.

- Conceivably, this countermeasure could have a deleterious effect upon the problem. Its effect would be to eliminate a relatively alcohol-free period of drinking experience. At age 18, the youth would then simultaneously begin his experimentation with cars and alcohol, a situation that could hardly be expected to enhance highway safety in so far as experience is an important variable.

In view of these considerations, increasing the legal driving age does not appear to offer a great deal of promise as a young-drinking-driver countermeasure. Further, the work of Pelz and Schuman (1971) and Harrington (1971), among others, does not support a raising of the driving age to 18 years.

b. Establish a Probationary License Period

A less severe driving restriction countermeasure could involve granting limited driving privilege to newly licensed drivers. For example, during the first year or two of his license, the individual could be restricted to operate only certain types of vehicles, required to refrain from driving during particular time periods, subjected to increased penalties (e.g., mandatory revocation) for moving vehicle violations, etc. Such a countermeasure, of course, primarily would focus on young drivers. However, since it presumably would apply to any newly licensed individual regardless of age, it might avoid legal difficulties associated with the application of legal sanctions to youth. The purpose of this countermeasure would be to allow the individual to acquire driving experience and skills while controlling his exposure to high-risk situations (e.g., nighttime--and possibly alcohol-involved--driving).

Again, although some states now issue probationary licenses subject to various restrictions, little data are available that might indicate the potential effectiveness of this approach. It, too, would tend to affect young drivers primarily during the relatively alcohol-free period of their driving history. However, it is probably worthy of further consideration during the present study.

c. Restrict Vehicle Speed

A considerable body of data indicates that the young-drinking-driver problem is to a large extent a drinking/speeding problem. Countermeasures aimed at reducing vehicular speed might thus be of interest in the present study. These could include two distinct approaches:

- Establishment and strict enforcement of speeding statutes--most localities presently recognize and respond to the desirability of this action, and law enforcement agencies devote a considerable portion of their effort to it. Nevertheless, the probability that a speeder will be apprehended remains relatively low.

- Automatic restriction of speed--"governors" that absolutely prevent the vehicle from attaining particular speeds or warning systems that activate when

such speeds are attained typify another countermeasure of this type. Their use presents certain practical problems, e.g., speed limits vary from state to state. Also, they would not limit speeds that are excessive relative to conditions of the road, but only those above a certain maximum limit.

Countermeasures of this type apply to all drivers, not merely the young. However, their impact on the drinking-driving problem may be greatest among youthful offenders.

2. Countermeasures Involving Restriction of Drinking

Conceptually, at least, the young-drinker-driver problem could also be attacked by limiting his drinking privilege, divorced from any connection with his driving. This paragraph discusses two approaches that could be taken in this context.

a. Increase the Minimum Legal Drinking Age

This highly restrictive countermeasure would seek to enforce prohibition among the young. From a legal standpoint, it would not appear possible to establish a minimum drinking age that exceeds the age of majority. While majority rights are granted at age 21, in most states, there is a recent trend toward lowering this to 18. Thus, the feasibility of this countermeasure is open to serious question.

Several states have recently lowered the legal minimum drinking age from 21 years to 18 years, and investigators have examined the effects. Zylman (1974) examined fatal crashes for 18 and 19 year old drivers in Michigan following the change in the law. He concluded that changes in fatal crash involvement for this group merely reflected year to year variation and not an effect of the changed drinking laws. Williams et al. (undated) examined fatal crash data from Ontario, Michigan and Wisconsin, all of which have recently lowered their minimum drinking ages. This data, when compared with neighboring states not lowering the drinking age shows that 18-20 year olds did not have significantly higher fatal crash rates following the change in the law. However, the 18-20 year olds did have an increased rate of single vehicle fatal crashes and night fatal crashes. Both of these findings were taken to indicate an increase in the drinking driving problem for this age group. The 15-17 year olds showed the same pattern of results, though to a lesser degree. The authors estimated that the change in the drinking law resulted in approximately three more fatal crashes per 100,000 15-20 year olds in the population for the first year following the change. Douglas et al. (1974) examined crash rates in Michigan, Vermont and Maine following changes in the drinking law and compared these rates to states not lowering the minimum age.

They concluded that alcohol involved crashes for 18-20 year old drivers had increased in Michigan, remained the same in Vermont and probably increased in Maine. Thus, the evidence regarding the legal minimum drinking age, while not conclusive, does indicate that the recent trend toward lowering the age will have and has had a negative influence on alcohol related crash involvements.

b. Establish "Partial" Prohibition for Young Drivers

This countermeasure would be analagous to the probationary driver's license discussed previously. It would apply to individuals younger than the age of majority, and would regulate their drinking relative to such factors as:

- The types of beverages they could be served (e.g., "3.2" beer)
- The qunatity they could be served at any one time
- The drinking hours they are permitted

Apart from obvious difficulties associated with enforcement of such restrictions, it should be observed that they would probably permit attainment of the moderate blood alcohol concentrations (0.03 to 0.06%) typical of young crash-involved drinking drivers. Thus, even if rigorously enforced, this countermeasure might not have an appreciable impact upon the problem.

3. Restriction of Driving-After-Drinking

In this context, we begin to discuss countermeasures that directly address the young-drinker-driver problem. Here, the emphasis is not on restricting youthful driving or drinking per se, but rather their simultaneous occurrence. These fall into three general categories: Self-Regulation; Punitive Deterrents; Automatic Regulation.

Class One: Countermeasures Seeking Self-Regulation

a. Youth-Oriented Mass Media Public Education

Public education as a drinking-driving countermeasure currently is being widely applied through the efforts of the ASAPs and other public and private organizations. These campaigns generally focus on the "problem drinker", an individual expected to exhibit relatively high BAC (0.15% or greater) and other indications of gross abuse of alcohol. As such, they tend to miss the young-drinker-drivers, relatively few of whom are "problem drinkers" in the generally accepted sense. It thus appears that the application of this type of countermeasure to the problem under study

requires a specially designed P.E. program, oriented directly toward the young driver and employing his media. Among other issues, such campaigns could stress:

- The deleterious effects of even modest amounts of alcohol on driving capability
- The huge increase in risk when alcohol is combined with speeding/reckless driving
- The fact that drinking-driving typifies disturbed, rather than brave, or masculine, behavior
- The penalties one can encounter for drinking-driving (loss of license, fine, etc.)

There is some evidence that this type of program can prove quite effective. In the Lackland Accident Countermeasure Experiment, a public education program (focusing on the last two issues listed above) was applied to the predominantly young driver population at Lackland AFB. Coupled with stepped-up on-base traffic enforcement, it produced a significant reduction in accidents, as compared with both the pre-experimental period and a similar control base (Randolph AFB).

b. Speaker's Bureau Program

This countermeasure would augment the mass media public education discussed above. It would involve the formation of a well-trained, informative cadre of instructors available to speak at club meetings, school functions, etc. Such a program would offer the following advantages:

- Provides more concentrated, personal education than can be offered through mass media
- Can enlist recognized opinion leaders to help overcome peer pressure
- Can take advantage of the typical youth's interest in automobiles and driving

The Speaker's Bureau can be thought of as an intense or concentrated form of public education. While these programs have not been fully evaluated by themselves, their effects would probably be similar to the effects of public education efforts.

c. Special Driver Education Curricula

A formal program of classroom instruction in alcohol/traffic

safety offers another countermeasure seeking self-regulation of drinking driving. Such programs could be designed as independent courses, as a portion of a standard driver's education program, or both. Their aims would be similar to those of the public education and speaker's bureau programs mentioned above, although they would attempt to treat the relevant issues in great detail.

To enhance the effectiveness of this countermeasure, successful completion of such a course could be made mandatory for all license applicants. In addition, implementation of the countermeasure should be coupled with addition of alcohol/traffic safety questions to the driver's license examination. Driver education programs, in general, have not always been shown to be effective. It remains to be seen whether specialized programs can impact on alcohol and driving.

d. Dissemination of "Self-Test" Instruments

Another countermeasure of this type could be to provide the driving public with "self-test" devices to enable them to determine their BACs before driving. Such devices could include special purpose slide rules or charts, qualitative ("balloon"-type) screening devices, or conceivably even quantitative, portable instruments of the Alcohol Screening Device (ASD) class. Certain of these e.g., the slide rules or ASDs, might be permanently installed in the vehicle. It is felt that the critical variable in the effectiveness of this class of countermeasures is whether or not the individual would refrain from driving even if he knew that he was legally intoxicated. Evidence on this aspect of the problem is currently not available.

e. Provide Alternatives to Driving-After-Drinking

In the general area of self-regulatory countermeasures, attempts could also be made to provide alternatives to driving after drinking. Even if an individual desires to avoid this high risk situation, he may be forced into it if other means of transportation cannot be found. Alternatives that might be provided include:

- "dial-a-ride" services--volunteers might be recruited to provide free transportation home to individuals who have been drinking. If possible, provisions could be made to return the individual's own vehicle home as well.

- public transportation--countermeasure programs could wholly or partially subsidize taxi or bus fares to encourage intoxicated individuals to refrain from driving.

Programs of this nature, though not specific to young drivers, have been tried. However, the results have not been encouraging due to the fact that the service is difficult to implement and maintain (see, e.g., Nassau County, 1971).

Class Two: Countermeasures Involving Punitive Deterrents

f. New Legislation

Mention has already been made of the fact that the young-drinking-driving problem is to a large extent the combination of "risky" driving (speeding, reckless driving, etc.) and relatively moderate BAC. Existing traffic ordinances do not address this interface, but rather treat DWI and other moving vehicle violations separately. Because the young drinker driver rarely exhibits BAC at or above the statutory limit for DWI, the penalties he encounters (if any) are relatively lenient.

In recognition of this situation, a possible deterrent countermeasure could be to establish a new statute, loosely termed here as "Speeding After Drinking" which makes it a separate offense to commit a moving vehicle violation while exhibiting BAC of (for example) 0.05% or more. Such statute would not, of course, apply only to young drivers. However, it specifically addresses a key element of the problem under study, and so can properly be considered a young-drinking-driving countermeasure.

The immediate purposes of this countermeasure would be as follows:

- To reify in the law society's proper concern over the combination of alcohol and "risky" driving;
- To provide penalties to specifically deter the driving public (and especially its younger members) from practicing this combination;
- To identify, through convictions under this statute, the young drinking driver for application of various "follow-up" countermeasures (discussed subsequently).

At least two problem areas are immediately apparent for this countermeasure. First, it could prove quite difficult to enforce. An officer stopping a motorist for a moving vehicle violation (say, speeding) would have to determine if that was the only offense committed or if the "dangerous Driving" statute applies. Since it is generally conceded that it is difficult to determine if a driver is legally intoxicated (BAC above 0.10%), it should be even harder to judge whether his BAC exceeds 0.05%. To surmount this problem, accurate, portable breath screening devices--to be used when the officer has reason to

believe the suspect has been drinking--might be employed. The second problem area deals with subsequent disposition of a case. "Plea bargaining" is already a common phenomenon in DWI cases. We can therefore expect perhaps an even greater incidence of charge reductions under such new statute, since the suspects generally will be only slightly impaired by alcohol. If this countermeasure is to be effective, steps should be taken to reduce the tendency toward "plea bargaining".

g. Special Enforcement

If traffic ordinances are to effectively deter "risky" driving, there must be a reasonable likelihood that violators will be apprehended. An experience of repeated violation without apprehension can be a stimulus that reinforces a driver's deviant behavior. A program of special, or concentrated, enforcement represents one countermeasure that could be applied to increase the probability of apprehension.

Through the ASAPs, special enforcement patrols presently are in operation in a number of localities. The officers serving in these squads are specially trained in alcohol/traffic safety and the relevant statutes, and their primary duty is the enforcement of those statutes. Thus, they are well prepared to detect a potentially intoxicated driver, to determine whether reasonable grounds for arrest exist in "marginal" cases, and to rigorously enforce the laws. Evaluation of these special enforcement efforts clearly shows that these patrols can increase arrests on drinking driving charges (see, e.g., Ulmer et al., 1973). However, the impact of these arrests on highway safety is not known.

h. Special Prosecutors

Analagous to the use of special enforcement patrols to facilitate apprehension of the young-drinker-driver would be the employment of special prosecutors to ensure that he does not erroneously escape conviction. One factor inducing a willingness to "plea bargain" in traffic cases is the normal prosecutor's extensive caseload, which often includes matters that he (perhaps properly) considers more important than a DWI conviction. Special prosecutors, thoroughly trained in alcohol/traffic safety and assigned only or primarily to such cases, could eliminate that factor. From the standpoint of deterrence, the net effect would be to increase the likelihood that an offender, once apprehended, will be convicted. While this countermeasure has been tried, it has not been fully evaluated from a safety standpoint.

Class Three: Countermeasures Involving Automatic Restriction of Drinking-Driving

i. Alcohol Safety Interlock Systems (ASIS)

The ASIS concept represents another countermeasure that

focuses directly on restriction of drinking-driving. It differs from those discussed above in that it seeks to render the vehicle inoperable by an intoxicated motorist rather than to motivate the motorist to refrain from intoxication. As such, it is attractive in that, theoretically, its effectiveness is not dependent upon the attitude or behavior of the affected driver. Also, recent laboratory and field tests indicate that several prototype ASIS units offer an attractive ability to discriminate between sober and intoxicated individuals (Oates and McCay, 1972; Oates, 1973).

ASIS devices fall into one of two categories, i.e., those that formulate a drive/don't drive decision on the basis of a chemical measurement (breath test) of BAC and those that do so by assessing an individual's psychomotor performance. Either type could be suitable as a countermeasure. However, certain considerations discussed below indicate that they may be less effective against the young-drinking-driver than against "problem" drinkers:

- A Performance ASIS, which detects impairment, might not be able to distinguish between a totally sober individual and one with a moderate BAC (e.g., 0.05%). Thus, it might fail to properly restrict a substantial proportion of young-drinking-drivers.

- A breath test ASIS permits any arbitrary BAC to be designated as the "cut-off", i.e., individuals whose BACs exceed the selected value would be prohibited from driving. However, legal difficulties might prevent a cut-off below 0.10%, the prevailing statutory limit for DWI. Again, many young-drinker-drivers would remain unaffected.

Nevertheless, continued consideration is deserved of the ASIS concept. Additional research and development could produce a performance ASIS sufficiently sensitive to the low-to-moderage range of BAC. Alternatively, a breath test system with a relatively low cut-off could be coupled with reduced automobile insurance premiums or other incentives to enhance its acceptability. The low cut-off might also be used in connection with the probationary license discussed above.

4. Countermeasures Dealing with Remedial Actions

All of the countermeasure concepts discussed above seek to prevent the initiation of drinking-driving among the driver population. Additional avenues of approach may be taken that apply specifically to youthful offenders who have been identified through traffic accident and/or violation involvement. Such measures, discussed below, seek to prevent

reoffense among this special sub-population.

a. Driver Reeducation Course

Formal driver reeducation, or rehabilitation, programs presently are being conducted in numerous localities to combat the alcohol/traffic safety problem among prior offenders. The standard method of entry into such programs is via conviction for DWI or equivalent charges. As such, many of the program enrollees are "problem" drinkers. The programs seek, via didactic instruction, group therapeutic techniques, etc., to induce behavioral changes among the enrollees and the abandonment of their deviant driving. Typically, the enrollee is allowed to retain his (perhaps restricted) driving privilege--which would otherwise be revoked--if he attends, and abides by the rules of, the program.

This type of countermeasure might also be applicable to the young-drinking-driver problem. However, the mere inclusion of young offenders into existing "problem" drinker-oriented programs would not necessarily be the best application of this countermeasure. The characteristic differences between the "young" and "problem" drinker-drivers could produce markedly heterogeneous enrollee groups that could diminish the effectiveness of the existing programs. A better approach might be to design new driver reeducation courses aimed specifically at the young offender.

In order to implement a countermeasure of this type for the young offender, it would be necessary to define the criteria by which individuals would be selected for program enrollment. Of the entire population of alcohol/traffic offenders, some undoubtedly would be suited to this program, others to "problem" drinker-oriented rehabilitation, and perhaps some to neither. However, a selection criterion based solely on the offenders' age undoubtedly would not prove adequate in all cases, and in fact, might not be legally appropriate. As an alternative approach, a thorough presentence investigation, perhaps including a psychological examination, should be conducted for each offender. The purpose of this would be to determine the nature of his drinking-driving problem and then to assign him to the appropriate reeducation program. Unfortunately, evaluations of existing problem drinker oriented reeducation and rehabilitation programs have shown little effectiveness (see, e.g., Preusser et al., 1973).

b. Special Surveillance and Follow-Up

The conviction of an alcohol/traffic offender and the penalties (license suspension, etc.) or other countermeasures (driver reeducation, etc.) applied at that time are expected to deter reoffense. Regardless of the initial extent of this deterrence, it is likely to diminish as time elapses if no further action is taken. This suggests the potential desirability of

countermeasures designed to "remind" the offender of his conviction and his continued surveillance by the authorities. Many specific countermeasures of this type could be constructed, several of which are discussed below.

(1) Short-term license renewals

A convicted alcohol/traffic offender, upon reinstatement of his driving privilege, could be issued a short-term license, with renewal required, for example, every six months. This could be coupled with a requirement to apply for renewal through a personal interview with the DMV, during which the applicant's recent driving record would be scrutinized.

(2) Follow-up letters

An essentially constant check on the records of convicted alcohol/traffic offenders would permit "warning letters" to be sent upon subsequent commission of minor violations (i.e., those not requiring license suspensions). Data exist which indicate that this approach can produce beneficial effects, at least on a short-term basis (e.g., Kaestner, et al., Oregon Study). The same system could permit "congratulatory letters" to be sent if the driver's record remains unblemished for a specified period.

(3) Coded registration plates

Vehicles owned or operated by convicted alcohol/traffic offenders could be required to bear specially-coded registration plates signifying the driver's status. Traffic authorities would then be alerted to the fact that driver was a previous offender and thus merits careful scrutiny. Although this countermeasure faces constitutional questions involving invasion of privacy, it probably deserves further attention.

The net effect of countermeasures of the types discussed above would be to show the offender that his actions are being carefully monitored by the Enforcement Agencies, and that he has a reduced likelihood of escaping detection should he reoffend. These approaches would not focus on the young-drinking-driver per se. However, it seems reasonable to hypothesize that they would have a greater impact upon the typical member of that group than on his "problem" drinker counterpart.

c. Punitive Measures

Probably the earliest and most widely applied countermeasure involves the application of punishment for alcohol/traffic convictions. Nevertheless, new approaches are still possible in this area. Such punishments have generally consisted of fines and/or license suspension/revocations. Unfortunately a recent evaluation of such deterrents in Denver, Colorado suggests that they do not improve subsequent driving (Blumenthal, et al. 1973).

The effects of punishment on young drivers, however, is not known. They could be made more severe, for example, by providing for jail sentences, impounding of vehicles, loss of insurability, etc., in an attempt to increase both their deterrent effect and the likelihood that they will succeed in keeping convicted offenders off the road. Alternatively, punitive measures could be established that impart less than total revocation of the driving privilege. This might include selective application to convicted offenders of the probationary license period and its attendant restrictions (discussed in paragraph A) and/or mandatory installation of ASIS in vehicles operated by such individuals.

B. Review of Relevant Literature

Although nearly all of the countermeasure concepts discussed above have been applied in the past, relatively few have been subjected to rigorous evaluation. Nevertheless, evaluation results have been presented above where they are appropriate. This section presents, in greater detail, the findings of a few evaluative efforts that appear particularly relevant to the current problem.

1. Public Education

Barmark and Payne (1961) successfully applied public education to reduce drinking-driving accidents among a predominantly youthful population. An intensified public education campaign against drinking-driving was conduced at Lackland AFB during the period from 3 November 1958 to 2 November 1959. The primary aim of the program was "to undercut the favorable image that many young adults have toward 'tanking up and taking off' in a car". The program sought to convey the perception of such action as disturbed or "sick" behavior, rather than as courageous or masculine. The program also included psychiatric examination of any airman involved in a traffic accident producing a lost-time-injury. The program produced an accident rate reduction of roughly 50%, as compared with both a pre-experimental time period and a control base (Randolph AFB).

2. Warning Letters

McBride and Peck (1970) found that warning letters significantly reduced accident involvement among "negligent" drivers. From November 1966 through January 1967, 18,000 "negligent" drivers in California received a warning letter from the DMV. These letters were designed to convey varying levels of "threat" and "intimacy". A control group of similar drivers was also selected; its members received no such letter. Over a relatively short subsequent time period (approximately 7 months), individuals receiving "low threat" letters had significantly fewer accidents than did the controls. "High threat" letters did not produce a similar effect, nor was the degree of "intimacy" significantly related to accident

involvement. The significance of the "low threat" letter disappeared, relative to accident involvement, subsequent to seven months. None of the letters appeared to have a significant effect on traffic violations.

Ben-David et al. (1970) found warning letters induced a significant short-term decrease in the incidence of one specific violation (failure to observe a stop sign) among a sample of Israeli drivers. The individuals receiving these letters had been observed, but not apprehended for, committing the offense in question.

Kaestner et al. (1967) found that certain types of warning letters, i.e., those that are "personalized" and carry a "low" threat content, significantly reduced subsequent traffic "involvement" (accidents and/or violations) among a sample of Oregon drivers. The significance of the effect was shown in comparison with both a control group (no letter) and a group receiving a standard impersonal letter. Further, this effect appeared to continue for at least a one year period.

Of particular interest is the fact that Kaestner found that the program's success was primarily attributable to the improvement of drivers under 25 years old. This was particularly evident among those who received a "soft sell", or encouraging, letter rather than one of greater threat content.

3. Driver Improvement Clinics

Henderson and Kole (1967) conducted an evaluation of New Jersey Driver Improvement Clinics. The study included 5,973 experimental subjects, and 3,573 controls (the latter were not exposed to the clinics). Both experimentals and controls were subdivided into three categories: I - drivers over 60 years of age and involved in one accident; II - drivers with two or more reportable accidents in any 12 month period; III - drivers in fatal accidents. The clinic treatment consisted primarily of an initial interview and law knowledge examination, a battery of psychophysical (and voluntary psychological) tests, and a closing interview in which the driver's record was related to limitations disclosed in his psychophysical tests.

Results indicated that, over a fairly lengthy subsequent time period (approximately 50 months) experimentals tended to have significantly fewer accidents and violations than did controls. However, this was not true in all categories. For example, there was no significant difference between experimentals and controls who had been involved in a fatal accident (Category III). Also, young experimentals and controls showed no significant difference.

Kaestner and Syring (1967) designed and evaluated a brief driver improvement interview. The study involved 1,320 male drivers in Oregon,

half of whom were assigned to the experimental group and half to the control group. All exhibited driving records (accident/violation histories) that warranted departmental action.

The interview consisted of a review of Oregon traffic laws, a detailed inquiry into the circumstances surrounding each of the interviewee's record entries during the previous year, the presentation of data on the records of typical drivers in the interviewee's age group, and a final review of findings. Results indicated the experimental group was significantly "better" than the control group, relative to the following measures:

> (1). Significantly more interviewees than controls drove a full year without a traffic entry; (2) interviewees drove a significantly longer period before committing a violation than did controls; (3) interviewees had significantly fewer accidents and violations.

It should be noted that individuals with records of DWI and/or multiple reckless driving charges (a typical "bargain" plea for DWI) had been excluded from the study. The purpose for this is not expressly stated in the report, although the experimenters mention that they consider alcoholic drivers "basically as problem people, not problem drivers particularly".

Scott and Greenberg (undated) studied the differential effects of punitive measures and a driver improvement clinic on the subsequent records of problem drivers. Half of their sample were assigned, in groups, to the clinic, where they were given lectures on safe driving techniques, shown films on the consequences of poor driving, brought up to date on driving laws, and participated in group discussions. The remaining subjects underwent a formal hearing before a judge or referee, during which punishment was levied in the form of probation or suspension/revocation of license. The total usable data base was 238 subjects, a figure much lower, due to several data collection problems, than the sample originally sought.

The investigators found that little or no difference was evident between these two treatments in terms of their effects on the subsequent behavior of the subjects. Also, neither treatment appeared "to have as much positive effect as might be hoped for". Specifically, neither treatment appeared to effect a reduction in accident rate.

Preusser et al. (1973) evaluated a driver rehabilitation program conducted in Nassau County, New York from 1971 through June of 1973. Drivers convicted of an alcohol driving offense (DWI or DWAI) were randomly assigned to treatment (i.e., invited to attend the rehabilitation program) and control groups. A total of 2,805 drivers were invited to attend the program and 2,660 were not invited. The results showed that

subsequent convictions for alcohol driving offenses (DWI and DWAI) were the same for both groups. Subsequent accident involvements were higher for invited drivers, though this result was an artifact due to the fact that invited drivers who participated in the program did not undergo license suspension while non-invited drivers lost their licenses for 60 days or more. Subsequent convictions for non-alcohol driving offenses were the same for both groups. Thus, this driver rehabilitation effort was not successful.

Preusser et al. (1973) also presented data with respect to age of the invited drivers. First, it was found that the invited drivers were older than arrested drivers. They attributed this to the fact that young drivers exhibit lower BACs at arrest (see Table IV) and thus more often plea bargain to a lesser charge. It was also found that even when in the program, the young driver (24 years or less) dropped out (i.e., did not graduate) significantly more often than older drivers. Also, young drivers had more subsequent convictions for non-alcohol driving offenses than older drivers.

4. Punitive Measures

Kleinknecht (1969) studied the differential effects of alternate punitive measures, some of which involved less-than-total restriction of driving privilege. An experimental group (E) of problem drivers was restricted to drive only between the hours of 6 a.m. and 6 p.m., Monday through Friday. They were allotted additional blocks of driving time every two weeks, regaining their full privilege after a 3 month period. However, receipt of a citation of commission of an accident during this period led to being placed back at the beginning of the program or suspension of license or other appropriate penalty. A second group (C1) experienced these same restrictions, except that no punishment was applied for violations. A third group (C2) was shown a safe driving film and released without restriction. A fourth group (C3) consisted of problem drivers for whom regular procedures were in effect (i.e., license suspension, probation, driver improvement interview, etc.). These groups were compared relative to such variables as: (1) number of subjects receiving citations or involved in accidents, (2) mean number of record entries per subject, (3) mean time to first record entry.

Results showed that groups C1, C2 and C3, when combined, did not differ significantly from E on any of the above variables. Groups C1 and C2, when combined, differed significantly from E relative to mean time to first record entry for the first three months after initiation of the program, and relative to mean number of entries for the first month. After that period, no differences were significant.

Klein and Waller (1970) in discussing punitive deterrents to deviant

driving point out that the relative leniency of penalties for traffic violations and the laxity with which the statutes are enforced indicate that our society does not rank traffic violations as serious offenses. Until this attitude changes, the effectiveness of such measures can be seriously questioned.

In summary, a host of countermeasure concepts exist for potential application to the young-drinking-driver problem. As a group, they address all steps in the causal chain leading to the development of the target population, and they include time-honored methods as well as relatively innovative approaches. While certain of these concepts have been evaluated (with mixed results), most have yet to be subjected to the rigorous scrutiny necessary to gauge their effectiveness. Part II of this report attempts to provide the data required to choose between these concepts and actually structure specific countermeasures. Part III provides the specific recommendations as to which countermeasures can be expected to help alleviate the youth crash problem related to alcohol. Further, Part III attempts to outline the developmental steps which would be required prior to acutal countermeasure implementation.

PART II

SURVEY OF YOUNG DRIVERS

INTRODUCTION

The literature reviewed in Part I above disclosed the general needs to be addressed in the present research. First, previous studies have suggested the nature of the problem, relative to its three major components: the characteristics of youthful drinking, youthful driving, and their joint occurrence. Second, they have outlined general areas in which solutions to the problem might be developed. From these findings, general hypotheses or research topics were generated to provide specific direction to this study. These general hypotheses are listed below. Subsequent sections describe the research method that was adopted to test the hypotheses, the data that was obtained, and the conclusions that were reached.

A. Hypotheses Concerning the Nature of the Problem

Light-to-moderate use of alcohol is the norm for young American males--Among young men there are relatively fewer "heavy" drinkers, and relatively fewer abstainers, than among the total population.

Peer Pressure is a key motivation for alcohol use among youths--Particularly for the more frequent drinkers and for "delinquent" youths.

Youths are relatively poor judges of their own state of intoxication--Young drivers tend to overestimate their alcohol consumption "limits" and are less aware of the impairing effects of alcohol.

Young drivers are substantially overinvolved in highway accidents--Overrepresentation by 60-70% in all accidents characterizes the young driver problem.

Young drivers more often engage in "risky" driving--Particularly, speeding; further, alcohol seems to catalyze risky driving among youths.

Young drivers engage in drinking-driving at a rate comparable to older drivers, but the young drinking-driver tends to exhibit a lower BAC--While the incidence of drinking-driving is nearly identical among youths and older motorists, fewer young drivers are found to exceed the statutory limit of BAC.

Young drivers take a more tolerant view of "drinking driving"--Such behavior is often perceived as "brave" or "masculine", and less often as "disturbed", by youths.

Young drivers are generally unaware of the causative role of alcohol in highway accidents--They underestimate the proportion of accidents attributable to alcohol by a substantial margin; they are also less aware of the

degradation in driving performance that occurs after drinking.

Personality and life style factors contribute heavily to the youth alcohol crash--The personal characteristics of young drinking-drivers interact strongly with their amount of drinking, driving performance, and crash involvement.

B. Hypotheses Concerning Solutions to the Problem

High risk young drivers can be identified--Young drivers who are particularly susceptible to alcohol-involved crashes are sufficiently different from the total young driver population to allow for their prior identification on the basis of personality or background variables.

Restriction of the driving privilege to reduce exposure to circumstances likely to produce drinking-driving would be practical for newly licensed drivers--Older drivers should favor, and young drivers at least not totally oppose, restrictions of nighttime, weekend, freeway, etc., driving by young motorists.

Strict enforcement of speeding statutes would be a beneficial and acceptable approach to the youthful drinking-driving problem--Reduction of the "risky" driving associated with youthful drinking-driving should have a major impact on alcohol-related accident rates.

Restriction of drinking per se would be neither acceptable nor practical--The use of alcohol is a well established practice among young people, most of whom can be conceded to use the drug wisely.

A youth-oriented public education program would produce substantial benefit--By properly informing youths of the nature and magnitude of the drinking-driving problem, much of their maladaptive behavior will be corrected.

Youths would accept alternatives to driving-after-drinking--The ability to provide and publicize such alternatives, however, is a necessary prerequisite.

Youths would accept stronger restrictions of drinking-driving--Specifically, they would favor lower presumptive limits.

Youths would support installation of Alcohol Safety Interlock Systems--However, such systems might not be sensitive to the relatively low levels of impairment characteristic of young drinking drivers.

Youths would not favor increased penalties for drinking-driving--Neither would such increased penalties add appreciably to the deterrent effects

of current penalties.

As shown in Part I of this report, many of these hypotheses have been addressed in previous research. Others have not and thus need greater development in the current effort. Together, they represent the areas of primary concern in developing youth oriented alcohol countermeasures. Succeeding sections will discuss the collection of data bearing on these areas, the analysis of this data and conclusions.

I. RESEARCH METHOD

In order to address the research needs outlined in subsection A above, a survey plan was developed during the initial period of the study. Development of this plan commenced with the identification of data requirements, i.e., specific items of information necessary to test the research hypotheses/areas and verify findings and trends disclosed in the literature. Once these requirements were known, attention turned to the procedures required for data collection and analysis. This section summarizes these initial efforts, and is intended to familiarize the reader with the fundamental data from which conclusions are drawn, the instruments and procedures through which this data was obtained, and the approaches taken in analyzing and interpreting this data.

A. Data Requirements and Questionnaire Development

As suggested above, data requirements emanated from the research hypotheses to be addressed in the study and fron findings reported in previous research. Examination of both sources disclosed three key questions:

- What are the characteristics of young drinking-drivers? In particular, what characteristics distinguish individuals who manifest alcohol-related driving problems from those who do not?
- What are the characteristics of alcohol-related driving incidents (crashes and violations) involving young drivers? How do these differ from their alcohol-free incidents or from alcohol-related incidents involving older drivers?
- What are the expected benefits and drawbacks of potential countermeasures for the youthful-drinking-driving problem?

Identification of data requirements began by exploring the information necessary to answer these questions and the specific research questions posed in the previous section. Results of this effort may be sketched as follows:

1. Requirements for Descriptive and Background Data on Driver Characteristics

The literature disclosed a variety of personal background variables that correlate with driving behavior, and such variables were felt to warrant attention in this study. More importantly, there was a need to describe those individuals involved in alcohol-related traffic events (crashes and arrests) versus those who are not. Thus, the following descriptive information was to be obtained on each survey respondent:

a. General Descriptors

Age
Race
Marital status
Current education status
Highest grade completed
Employment status
Occupation
Criminal record (if any)

b. Driving History/Behavior

Years of driving experience
Miles driven annually
Day versus night driving exposure
Driver education completed, for "basic" and "remedial" courses
Number of motor vehicle accidents
Number of citations for motor vehicle violations
Respondent's assessment of his driving characteristics
Frequency of use of seat or lap belts

c. Drinking Behavior

Status of alcohol use (currently drinks, never drank, previously drank)
Preferred beverage
Quantity typically consumed
Frequency of drinking, for various times of day
Frequency of "heavier-than-usual" drinking
Peer influence on alcohol usage

d. Drug Usage

Status (uses, does not use) of use for various types of drugs (amphetamines, barbiturates, marijuana, narcotics, etc.)
Acquaintance with individuals who use such drugs
Relationship between drug usage and driving

e. Drinking/Driving Behavior

Frequency of drinking/driving
Miles driven during most recent drinking/driving incident
Quantity consumed prior to most recent drinking/driving incident
Quantity respondent believes he can consume and still drive well
Driving effects noticed during typical drinking/driving incidents
Attitude toward drinking drivers

f. Personality Characteristics

Hostility
Alienation
Impulsivity

2. Requirements for Data on Motor Vehicle Crashes and Violations

The literature also indicates that the frequency of alcohol involvement varies from one type of crash to another. Comparison of the situations and circumstances surrounding alcohol-related crashes versus non-alcohol-related crashes was felt to require the following data.

a. Time Factors

Month and year
Day of week
Time of day

b. Classifications

Reported versus unreported
Type (pedestrian, fixed object, ran off road, etc.)
Result (fatality, injury, property damage)
Location (state)

c. Alcohol/Drug Involvement

Type(s) of beverage consumed prior to crash
Number of drinks consumed prior to crash
Use of various drugs prior to crash

d. Speeding Involvement

Actual speed prior to crash
Posted speed limit at crash location
Reason for exceeding limit (if applicable)

e. Trip Characteristics

Purpose of trip
Number of passengers in respondent's vehicle
Time on road prior to crash

f. Citation/Arrest Incidental to Crash

Each violation for which respondent was cited or arrested

g. Evasive Action Attempted

Braking or other attempts by respondent to avoid crash

Alcohol may also be involved in the moving vehicle violations for which young drivers are cited or arrested. Data similar to that listed above thus was felt to be required to enable comparison between alcohol-related and non-alcohol-related violations.

3. Requirements for Data Specific to Potential Countermeasures

The hypotheses concerning potential countermeasures that were discussed previously suggest that intervention into the youth-alcohol-crash problem can be made on four broad fronts.

- Restriction of Driving, i.e., modification of the driving privilege and/or strict enforcement of vehicle and traffic laws to reduce exposure to the times, places, or circumstances most typically associated with youthful drinking-driving.

- Restriction of Drinking, i.e., attempts to control the quantity and frequency of alcohol usage per se. If alcohol consumption could be decreased, a corresponding reduction in the frequency of drinking driving should result.

- Restriction of Drinking-Driving, i.e., approaches directly focusing on the problem at hand. These might include educational campaigns to improve knowledge of drinking-driving risks, strict enforcement of laws governing the offense, installation of interlock devices to preclude driving after ("heavy") drinking, and provision of alternatives to driving for individuals who have been drinking.

- Remedial Actions, i.e., countermeasures that would seek to modify the behavior of individuals who have manifested drinking-driving problems, through citations, crash involvement, or in other ways.

For each of these areas, data was required that would disclose the need for that class of countermeasure, the impact it might have on the youth-alcohol-crash problem, and the extent to which it might be acceptable to the driving population of interest. This data included:

a. Time distributions of driving exposure and crashes

Temporal restrictions on youthful driving might be practical,

but it is first necessary to determine what time periods produce the highest crash frequency and how much of the total driving exposure would be eliminated by restricting driving during those periods.

b. Attitudes toward factors influencing driving behavior

Special attention should be devoted to the deterrent effects of police enforcement of moving vehicle violations and the penalties imposed for conviction on such violations. Other factors that may produce deterrence, e.g., parental influence and "safety consciousness", should also be addressed.

c. Distributions of alcohol consumption quantity and frequency

Restrictions of the purchase/consumption of alcoholic beverages by young drinkers must be considered relative to their current consumption practices. Also, attitudes toward factors that influence moderate use of alcohol require exploration.

d. Knowledge of the relationship between alcohol and traffic safety

Young drivers may require better information in such areas as the causal role of alcohol in highway crashes, the alcohol consumption quantities associated with legal impairment, situational factors that can affect the intoxicating effects of a given amount of alcohol, etc. Lack of knowledge in such areas may be one of the causes of the high incidence of drinking-driving among youths. To assess this, their current state of knowledge must be measured.

e. Attitude toward alternatives to drinking-driving

Provision of alternate means of transportation to young motorists who have been drinking might deter alcohol-related traffic incidents. But, the acceptability of such alternatives must first be gauged.

f. Attitude toward restrictions of drinking-driving

Establishment of lowered presumptive BAC limits for young drinking-drivers, increased penalties for this offense, installation of alcohol safety interlock systems, etc., might be a valuable means of combating the problem. Again, attitudes of support or opposition to these restrictions re-

quire measurement.

In general, then, data requirements associated with potential countermeasures focus on the behavior of the survey population relative to driving, drinking, and drinking-driving and their attitudes toward intervention into these practices.

Once the above data requirements were identified, questionnaire development commenced. The final product of this task is shown in Appendix A. Specific data items contained in the questionnaire can be described briefly as follows.

Subject Identification and General Background Data

Basic identifiers of the subject (name, address, date of birth) were obtained from the traffic record systems and recorded on the questionnaire prior to the interview. Subject's race was observed by the interviewer and was recorded at the completion of the interview. Marital status, body weight, and duration of residence in the state were ascertained through the first three questions of the questionnaire.

Driving History and Driving Behavior

Questions 4 through 10 dealt with the subject's driving experience, annual mileage exposure, use of safety belts, attitude toward factors affecting "safe" driving, and driver education background. Questions 39 through 41, and 54 through 56, addressed his typical driving behavior and knowledge of factors affecting motor vehicle accidents.

Drinking and Drug Use Behavior

Questions 43 through 50 dealt with the subject's use of alcohol, his preferred beverage, typical consumption quantity and frequency, and frequency of "heavy" drinking. Question 61 examined his knowledge of factors affecting alcohol impairment/intoxication. Questions 76 and 77 dealt with his drug usage and that of his acquaintances.

Drinking-Driving Behavior

Questions 51 through 53 addressed the subject's drinking-driving frequency and experience. Questions 57 through 60 focused on his knowledge of and attitude toward the laws governing drinking-driving, and question 62 provided a measure of his attitude toward drinking-drivers. Question 69 addressed his attitude toward alternatives to drinking-driving, and questions 70 and 71 examined his opinions toward vehicle safety systems to deter speeding and drinking-driving.

Crash-Involvement and Violation-Involvement Histories

Questions 11 through 29 examined the subject's accident record and the details of recent crashes in which he had been involved as a driver. Such data was acquired on up to four (4) accidents for each subject, to ensure an adequate sample size and inclusion of both alcohol-related and non-alcohol-related crashes. Questions 30 through 38 provided similar data on his recent (accident-free) citations for moving vehicle violations.

Personality Scales

Questions 78 through 92 examined the subject's personality characteristics relative to hostility, alienation, and impulsivity.

Media Exposure

Questions 64 through 68 dealt with the subject's exposure to media and forums that might be utilized for drinking-driving public education programs.

The questionnaire was pre-tested for clarity and ease of implementation, using a sample of roughly 15 young licensed drivers as pre-test subjects. Appropriate modifications were made to the specific wording of questions, and mass-production of questionnaires commenced.

The questionnaire was intended to serve as the primary source of data to be assessed in this study. However, as a secondary source, driver abstracts were obtained from the traffic records system on every candidate subject. These were intended to serve three basic purposes:

- To ascertain the degree to which the licensing agencies have acquired key items of information on the drivers, i.e., to determine whether a young driver's alcohol-driving problems can be infered from his driving record.
- To increase the sample size for certain items of data.
- To determine whether there are any systematic and/or significant differences in the driving records of subjects who refused or were unable to participate in the survey as compared to those for whom questionnaires were completed.

B. Sampling Plan

1. Groups to be Considered

Any drinking-driving countermeasures program must consider at least two types of individuals. First, there are those who have an already

demonstrated alcohol driving problem (i.e., convicted DWI offenders); the other group consists of the potential offenders. In other words, a countermeasure program should consider both rehabilitation and prevention. Of the two, prevention is obviously the more desirable. However, it is unlikely that any prevention countermeasure or set of countermeasures will be 100% effective. Thus, consideration must be given to the rehabilitation side of the problem.

In addition to rehabilitation and prevention, the literature review highlighted the fact that strictly speaking, many youthful drinking drivers fall neither into the demonstrated nor potential problem categories. These individuals do drink and drive yet do not exceed the presumptive BAC limits. Unfortunately, unlike middle aged drivers, these youthful moderate drinkers are greatly overinvolved in accidents. Available data suggests that they may, in fact, constitute the majority of the youthful drinking driving problem. Regardless, it is clear that this group should receive serious consideration during countermeasure development.

Thus, there are three groups of young drivers to which countermeasures should be addressed. The first is the potential problem group. These individuals have not been convicted of an alcohol related traffic offense nor has alcohol been a factor in any of their accident involvements. The problem here is to ensure that they do not develop drinking driving problems. The second group of young drivers can be thought of as the non-identified problem group. For these individuals, alcohol has been a factor in accident involvements yet they have not been convicted on an alcohol charge. Their behavior is often characterized by moderate drinking at least when compared with middle aged drinking drivers. The role of alcohol in their accidents is, as yet, unclear. The literature suggests that their problem is not alcohol alone, but the interaction of alcohol with personality, life style, driving behavior, situational and/or other factors. The third group consists of the identified problem group. These individuals have been convicted of an alcohol-related driving offense and are thus known to highway safety authorities as having a drinking driving problem.

Unfortunately, for sampling purposes, only the third group actually exists as such within driver records systems. These would be the individuals who have been convicted of a drinking-driving offense. Thus, since direct access to the populations of interest was precluded, an alternate sample design was adopted that included slightly different--though accessible--groups of respondents. These alternate groups were of interest in their own right, and were considered good approximators of the three groups listed above. These groups consisted of:

a. Random samples of "general population" drivers from four age categories: 16-18, 19-21, 22-24 and 35-49

b. Random samples, for the same age categories as above, of drivers involved in nighttime, injury-producing accidents

c. Random sample of drivers convicted of a drinking-driving offense

The first of these contained members of all three populations of interest (potential, non-identified and identified problem groups), represented in close approximation to their actual percentages among all drivers of that age category. The third group, of course, consists solely of identified problem drivers. The second group is perhaps the most interesting. The type of event employed as the selection criterion was expected to produce a high percentage of drinking drivers (most studies have shown 40% or more of drivers involved in that type of accident had been drinking), a majority of whom neither have a prior conviction for DWI nor exhibit BAC above the presumptive limit at the time of the accident. As shown in succeeding sections, this sampling procedure did produce drivers in the non-identified problem category.

2. Sample Selection

The actual sampling of drivers was conducted through the New York State Department of Motor Vehicles. All drivers selected held a New York State driver's license, though for some, this license was currently under suspension or revocation. All drivers selected were male. Males clearly constitute the bulk of the drinking driving problem and it was felt that the inclusion of female subjects would unnecessarily dilute the data. Certain regions of southern New York State were excluded from the sample. Specifically, the Nassau County Alcohol Safety Action Project (ASAP) had been operating on Long Island for the three years prior to the conduct of this study. It was, therefore, felt that areas in and around Nassau should be excluded due to the fact that the ASAP could produce an unknown amount of bias on several variables. The following counties were thus excluded:

Nassau
Suffolk
Queens
Kings (Brooklyn)
New York (Manhattan)
Richmond (Staten Island)

Manhattan and Staten Island do not border Nassau County. However, they are close to Nassau County and it was further felt that the driving conditions in these areas, especially Manhattan, are sufficiently unique to warrant their exclusion on this basis alone. Thus, the sample area consisted of New York

State from the Bronx north.

The random sample of drivers was drawn through the master driver license file for New York State. The first step in this procedure was to establish four sets of random numbers. The sets corresponded to the four groups of drivers (i.e., 16-18 years, 19-21, 22-24 and 35-49). Each set contained 600 numbers with a possible range of one to the estimated total number of male drivers in the sample region (i.e., Bronx and north). The master license file for New York State was then processed. Each record on this file was checked to determine if it was for a male driver from the sample region with a date of birth falling within one of the appropriate age ranges. If so, the record was assigned to the appropriate group and numbered. The first record falling into a given group was given the number one and so on. This number was then checked against the set of random numbers for that group. The record (i.e., driver abstract) was printed if the numbers matched and the individual held a New York State driver's license even though this license may have been under suspension or revocation. All printed records or abstracts were forwarded to Dunlap and Associates, Inc., for further processing.

The sample of accident involved drivers was drawn through the Accident Reports Processing Division. Each accident report received by this Division from March, 1974 to June 1974 was reviewed with respect to the sampling criteria. All drivers were sampled when the following conditions were met.

a. Male driver

b. Injury (of any kind) producing accident

c. Accident occurred between the hours of 8 p.m. and 6 a.m.

d. Driver was New York State resident excluding residents of Suffolk, Nassau, Queens, Kings (Brooklyn), New York (Manhattan) and Richmond (Staten Island) counties

e. Driver year of birth fell into one of the following categories:

Group 1 - 1955, '56, '57
Group 2 - 1952, '53, '54
Group 3 - 1949, '50, '51
Group 4 - 1924 through 1938

Accident reports are processed in New York State approximately one month following the date of the accident. Thus, the actual accidents leading to the sample of drivers occurred from January 1974 to May 1974 with a few accidents occurring in late 1973. This procedure had the disadvantage of

biasing the sample toward Winter and Spring events. However, it was felt that this disadvantage was far outweighed by the fact that the most recent events were being sampled. Thus, the event should be well remembered by the subject during his interview. The names of all of the drivers thus sampled were processed against the master license file. In this way, a New York State driver abstract was obtained for each. Sampling was completed in each group when the target sample size was met. Arrangements were also made with officials of Missouri to draw a similar sample of accident involved drivers from that state. However, as the study progressed, it became clear that the number of reported accidents in Missouri meeting the sampling criteria was not sufficient to generate an adequate sample size within the available time. Thus, Missouri was dropped as a study site.

The sample of drivers convicted of a drinking driving offense was drawn through the Data Preparation Unit. This unit receives, and prepares for entry into the master license file, all "conviction certificates" from New York State courts. These certificates indicate those drivers who have been convicted of a traffic offense, the date of the offense and the charge. Each certificate received by this unit from March 1974 to May 1974 was screened for the following sample criteria:

a. Male driver

b. Convicted of DWI (driving while intoxicated) or the lesser charge, DWAI (driving while ability impaired--alcohol)

c. Driver was New York State resident excluding residents of Suffolk, Nassau, Queens, Kings (Brooklyn), New York (Manhattan) and Richmond (Staten Island) counties

d. Driver year of birth fell into one of the following categories:

Group 1 - 1949 through 1957
Group 2 - 1924 through 1938

Once again, the events leading to a driver's being sampled were the most recent events available so as to limit forgetting on the part of the subjects. The majority occurred between November 1973 and March 1974, with actual court convictions occurring between January 1974 and April 1974. Only two age categories were used since a smaller sample size was sought. The names of the drivers thus obtained were processed against the master license file such that a driver abstract (i.e., record) was obtained for each driver entering the sample.

Thus, there were 10 groups of drivers in the overall sampling plan. Four of these, distinguished by driver age, were randomly drawn from the total license population. The next four groups, again distinguished

by age, consisted of drivers who recently had an injury producing motor vehicle accident between the hours of 8 p.m. and 6 a.m. The last two groups consisted of drivers recently convicted of an alcohol driving offense. Target sample sizes for completed interviews were originally set at 100 each for the general population and accident groups and 150 (16-24 year olds) and 50 (35-49 year olds) for the convicted alcohol driving groups. The number of driver abstracts drawn from the New York files was designed to achieve these sample sizes. However, the initial experience in the field indicated that the potential respondents were somewhat more difficult to locate and interview than originally expected. This was particularly true for older subjects and subjects from the general population groups. Older subjects more often worked, were otherwise unavailable, or were not interested in participating. The problem in the general population was that the addresses provided by the Department of Motor Vehicles often were not current. Older drivers, for instance, may not have had an entry on their license file for two or three years. They tend to have fewer accidents and violations and tend to have held their license longer.

Additional drivers were added to the general population groups to correct the problems mentioned above. Originally, only 200 of the approximately 600 drivers drawn in each of the general population groups were randomly selected as potential respondents. The remaining 400 drivers (approximately) were held aside. The additional drivers were randomly drawn from these remaining general population drivers. A total of 150 drivers were thus added to the 16-18 year old and 19-21 year old groups. The 22-24 year old group was augmented by 175 drivers and 200 drivers were added to the 35-49 year old group. Table XII shows the total number of drivers sampled for each of the 10 groups. It will be noticed that the general population groups are slightly below the full 350, 350, 375 and 400 respectively, drivers sampled. This occurred because a small number of drivers were subsequently lost from each of the ten groups due to a variety of causes. Two drivers, for instance, were subseqeuntly found to be females though their driver record indicated that they were males. The majority lost, however, were for drivers from small towns in the excluded areas of the state (primarily Nassau and Suffolk counties) with no zip code or county code on their driver record. The exact location of these drivers was not determined until just prior to the assignment of subjects to interviews. They were, thus, excluded after sampling was completed.

C. Data Collection

1. Recruitment and Training of Interviewers

The number of interviewers recruited for this study was based on the population density figures for each county throughout the state of New York excluding Suffolk, Nassau, Queens, Kings (Brooklyn), Richmond (Staten Island) and New York (Manhattan). These figures determined the

Table XII

Sample Size by Group

Group Type	Age as of 12-31-73	How Drawn	Group Label	N
General Population	16-18	Random draw from N. Y. license file	GP-16	350
"	19-21	"	GP-19	349
"	22-24	"	GP-22	371
"	35-49	"	GP-35	398
Accident Involved	16-18	Involved in recent 8 p.m.-6 a.m. injury accident	A-16	211
"	19-21	"	A-19	231
"	22-24	"	A-22	231
"	35-49	"	A-35	217
Convicted Drinking/Driving	16-24	Recent conviction for DWI or DWAI	D-16	295
"	35-49	"	D-35	138
		TOTAL		2,791

Note: All drivers were male, New York State residents excluding residents of Nassau, Suffolk, Queens, Brooklyn, Manhattan and Staten Island

number of interviewers needed for the various areas in the state. For example, approximately 28.1 percent of the state's population is in Westchester, Rockland and the Bronx (part of the New York Standard Metropolitan Statistical Areas, SMSA). Thus, the target sample size in this area was 281 based on a total number of 1000 completed interviews. On the basis of assigning roughly 25 subjects to each interviewer, it was determined that approximately 11 interviewers would be needed for interviewing in these areas. Other, more densely populated areas, such as Albany-Schenectady-Troy, Rochester, Syracuse and Buffalo, also required a large number of interviewers. These areas and Utica-Rome and Binghamton are also SMSAs in the State of New York. The areas outside these SMSAs consist of cities, towns and villages of various sizes. Several interviewers were also recruited and trained in these outlying areas.

Contacts were made with the chairmen of psychology and sociology departments of various colleges and universities to elicit their help in interviewer recruitment. Interested male students were requested to provide their name, address, telephone, age, college status, and a brief resume describing their prior experience in interviewing, counseling, community work, etc. Interviewers were then selected and training and orientation sessions were scheduled.

Training of interviewers took place in the following areas: Albany, Buffalo, Poughkeepsie, Rochester and Syracuse, New York and Darien, Connecticut. Each training session was of approximately four hours duration and consisted of an introduction, procedures for contacting subjects, training in the use of the questionnaire, practice with the questionnaire and a discussion period.

The brief introduction consisted of background and general information about the study and its objectives. Instructions were then given on procedures for contacting subjects. Interviewers were informed that each subject would be guaranteed complete confidentiality for all his responses. They were instructed not to discuss any responses with anyone other than an employee from Dunlap and Associates, Inc., and not to reproduce any data or information collected. The list of potential respondents given to each interviewer usually consisted of 20 to 30 names, with addresses and subjects' ages. The interviewers were informed that they were expected to find the potential respondent's telephone number and call to arrange for an appointment. If no telephone number was available, the interviewer was instructed to contact the individual directly by traveling to his place of residence. A minimum of three attempts was to be made to contact each respondent either by phone or visits. Interviewers were told to fill in the reasons for noncompletion for those not interviewed on their list of potential respondents. They were instructed to mail the questionnaires to Dunlap and Associates, Inc., and were told that upon receipt, a check for $5.00 would be forwarded to each respondent. Interviewers were informed that their pay-

ment would be based on the number of completed questionnaires and that an incentive payment would be included after completion of 50 percent of their list.

Training in the use of the questionnaire was accomplished by examining each question individually. The types of information desired were explained when necessary. Interviewers were then separated into pairs to allow them to give the interview to each other. This afforded practice and provided a deeper understanding of the questionnaire. A discussion period ensued in which questions were answered, problems were identified, and advice was given on how to deal with potential problem situations.

Occasionally, it became necessary to train an interviewer after the training/orientation sessions were held. This situation was handled by training the interviewer by telephone. A package of interviews, response cards and general procedures was sent to the interviewer. Generally, training procedures were the same as for the major training/orientation session and consisted of a brief introduction, procedures, detailed examination of the questionnaire and a discussion period. Interviewers were instructed to practice by giving the interview to a family member or friend and to notify us if there were any questions. This method of training interviewers was found to be quite satisfactory.

2. Assignment of Subjects to Interviewers

Twenty to 30 names of potential respondents, their addresses and ages, were contained in each interviewer's respondent list. Generally, it was attempted to assign to an interviewer those potential respondents who were in a 25 to 50 mile radius of his residence. Interviewers did, on occasion, travel to outlying areas.

Letters were sent to potential respondents well in advance of the interviewer's contact. The letter served to introduce Dunlap and Associates, Inc., and tell them for whom the study was being performed. It provided a brief explanation of the study and insured confidentiality of responses. It informed them that an interviewer would be contacting them. It mentioned the $5.00 compensation and asked for their cooperation. This letter appears in Appendix B.

A total of 869 questionnaires were received and processed. Upon receipt of completed questionnaires, payment was promptly made to both respondents and interviewers. Unit numbers were assigned to each questionnaire. It, along with its corresponding Driver Abstract (record), was then coded and keypunched. A total of 33 questionnaires were excluded from data analysis. The reasons for exclusion and number of questionnaires involved were as follows:

14 - received at Dunlap and Associates, Inc., too late for inclusion in the data base

14 - received from Missouri prior to terminating the Missouri sample

2 - interviewed John Doe, Sr. by mistake, should have interviewed John Doe, Jr.

2 - driver was found to be female, though listed as male on driver record

1 - interview terminated by respondent prior to completion

Thus the final data base consisted of 836 interviewed subjects.

Several rural areas of the state were not covered by a ready group of interviewers due to the low target sample in each of those areas. Therefore, interviewers from the nearest city areas were asked to take overnight trips lasting from one to twelve days to collect interviews in these sparsely populated places. They were reimbursed for their travel, motel and food. Collection of interview data commenced on April 11, 1974, and terminated on August 26, 1974.

D. Characteristics of the Sampling Region

1. Applicable New York Vehicle and Traffic Laws

New York has two laws regarding driving while under the influence of alcohol. One prohibits driving while in an intoxicated condition and the other bans driving by a person whose ability is impaired by the consumption of alcohol. The traffic laws regarding driving while intoxicated state that no person shall operate a motor vehicle while he has .10 percent or more weight of alcohol in his blood as shown by chemical analysis of blood, breath, urine or saliva. The penalties for a first such conviction can include imprisonment for up to one year and/or a fine of not more than $500; license revocation and possible revocation of the certificate of registration. A second, or subsequent conviction within ten years is a felony and is punishable by imprisonment for not less than sixty days nor more than two years and/or a fine of not less than $200 and not more than $2,000.

Evidence that there was more than .07 percent but less than .10 percent by weight of alcohol in his blood is prima facie evidence that the person was not in an intoxicated condition, but it is prima facie evidence that the ability of the person to operate a motor vehicle was "impaired" by the consumption of alcohol. Penalties include license suspension and possible suspension of the certificate of registration for a period of sixty days for a first conviction and for 120 days for a second violation committed within a three year period. The person may be punished by a fine and/or imprisonment of no more than $50 ($100 if misdemeanor) and 15 days (30 if misdemeanor) for a first offense; up to $100 ($200 if misdemeanor) and 45 days (90 if misdemeanor) for a second conviction within 18 months; and up to $250 ($500 if misdemeanor) and

90 days (180 if misdemeanor) and license revocation upon a third or subsequent conviction within 18 months of the first conviction.

The New York traffic laws provide that evidence that there was .05 percent or less by weight of alcohol in the tested person's blood is prima facie evidence that the ability to operate a motor vehicle was not impaired by the consumption of alcohol and that the person was not in an intoxicated condition.

The Implied Consent law in New York states that any person who operates a motor vehicle in the state is deemed to have given his consent to a chemical test of his breath, blood, urine or saliva for the purpose of determining the alcoholic or drug content of his blood. The test must be administered at the direction of a police officer having reasonable grounds to believe the person to have been driving while under the influence of alcohol or drugs, within two hours after the person has been arrested for any such violation and within two hours of a breath test which indicates that alcohol has been consumed. If the person refuses to submit to the chemical test, the test will not be given and a report of the refusal will be forwarded to the commissioner within 72 hours by the police officer under whose direction the test was requested. The person's license or permit and any non-resident operating privilege will be revoked, provided the commissioner grants the person the opportunity to be heard, unless the opportunity is waived by the person.

Regarding accident reporting, the New York vehicle and traffic laws state that every person operating a motor vehicle which is in any manner involved in an accident anywhere within the state, in which there is injury or death, or in which there is damage to the property of any one person, including himself, in excess of $200 shall within 10 days report the matter in writing to the commissioner of motor vehicles. If the operator is physically incapable of making such a report and there was another participant in the accident not incapacitated, this participant shall make the report within ten days. If the operator is unable to make the report, the owner of the motor vehicle, not involved in the accident or incapacitated shall within 10 days after he learns of the accident report the matter to the commissioner. Failure to report an accident or failure to give correctly the information required is a misdemeanor and constitutes a ground for suspension or revocation of the license or registration or both of the person failing to make such reports. In addition, the commissioner may temporarily suspend the driver's license or permit and/or certificate of registration of the motor vehicle involved in the accident of the person failing to report an accident until the report has been filed.

2. Relevant Demographic Characteristics

Some of the demographic variables related to drinking behavior are discussed below. It will be seen from the figures presented that the state of New York closely resembles the nation as a whole with respect to many of these characteristics.

It is pointed out in American Drinking Practices by Cahalan, Cisin and Crossley (1969) that the urban-rural breakdown is one of the most important variables in determining number of drinkers. Of the total United States (U.S.) population of 203,211,926 (Census, 1970), 73.5 percent live in census defined urban areas and 26.5 percent in census defined rural areas. The sampling region in New York State (which excludes Nassau, Suffolk, Queens, Richmond, Kings and New York counties), nearly duplicates these percentages, being 73 percent urban and 27 percent rural. Although the population per square mile of land area of the entire state is 381.3, the figure for the sampling region is 20, much more like that for the nation; 57.5 per square mile.

In reference to certain of the variables, it was not possible to separate the sampling region from the entire state. In this case, demographic data is presented for the entire state. It should be noted that the excluded counties, Long Island and most of New York City, are different from the rest of the state in many respects. Thus, the data presented here are only partially reflective of the sampling region. The first data item examined was the age distribution for both sexes. For the nation, 34.3 percent of the population are under 18 years of age. The figure is 32 percent for New York State. Fifty five and nine tenths percent of the U.S. population is between 18 and 64; 57.2 percent of the New York State population is in this age range. Finally, 9.9 percent of the U.S. population and 10.8 percent of the New York State population are 65 or over. Of those 18 and older, 47.5 percent of the U.S. and 46.3 percent of the New York State population are males. These distributions of age and sex are quite similar.

The median age for males in the U.S. is not much different from that of New York State. The median age for U.S. males is 26.8 and for New York State males it is 28.9. The median age for U.S. males in urban areas is 26.7 and for urban New York State males it is 29.3. The median ages are even more similar in the rural areas. For rural U.S. males the median age is 27.2, for rural New York males it is 26.7.

Regarding marital status, of the U.S. males aged 14 and older, 28.6 percent are single; 65.8 percent are married and 6.7 percent are widowed or divorced. The New York State figures are comparable: 30.1 percent are single, 64.7 percent are married, and 5.2 percent are widowed or divorced.

The median income for families is generally only slightly higher in the State of New York than the nation as a while. For all races, the U.S. figure is $9,590; the New York State figure is $10,617. For whites, the U.S. figure is $10,236, the New York State figure is $11,034. For blacks, the median U.S. income is $6,279, and the New York figure is $7,297. For other races, the U.S. figure is $6,516, whereas the New York figure is $5,698. The median money income of unrelated individuals for the U.S. and New York State are also quite similar. The U.S. and New York figures are, respectively, for all races, $3,137 and $3,231; for whites, $3,283 and $3,224; for blacks, $2,117 and $3,280; and for other races, $2,243 and $3,058.

Ethnic background is important in determining life patterns including drinking habits. Ninety five percent of the U.S. population and 88 percent of the entire New York State population are native born. Cahalan, et al., found that the foreign born were less likely to be abstainers and more likely to be light to moderate drinkers. The leading countries of origin of the 5 percent foreign born in the U.S. are Italy, Germany and Canada. The leading countries of origin of the approximately 12 percent of the New York State foreign born are Italy, other American, Germany, Poland, U.S.S.R. The leading ethnic backgrounds for those in the U.S. of foreign or mixed parentage are: English (including Scotch and Welsh), German, Irish, Spanish, Italian, Polish and Russian. Ethnicity is quite similar in the State of New York: Italian, Russian, Polish, German, Irish, English and Canadian. Over a million people in the State are of Spanish origin or descent.

From examining the characteristics discussed briefly above, it can be seen that the State of New York is a fairly representative sample of the nation as a whole in reference to the important urban/rural variable as well as to the various other demographic characteristics. However, it should be noted that this is general population data, not driver population data.

II. RESULTS, DRIVER RECORD DATA

The New York State Master license file contains information on driving events for each driver in the state. Each accident and each conviction for a traffic violation with the date of the event is contained in the file. Accidents are categorized according to accident resultant. They are shown on the file as:

- Property damage (only)
- Injury (of any kind)
- Fatality

Violations are shown with reference to the specific violation upon which a conviction was obtained. For the purposes of this analysis, the following violation categories were used:

- Speed (all violations involving driving too fast including "speeding", "speed not reasonably prudent", etc.)
- Following too closely
- Disobeyed traffic device
- Reckless driving
- Improper turn
- Defective equipment
- Improper documents (i.e., license, registration)
- DWI (driving while intoxicated)
- DWAI (lesser included charge, driving while ability impaired--alcohol)
- Refuse chemical test (i.e., implied consent)
- Other

Each driver record, or abstract, also contains information on license suspensions and license revocations. Thus, all of the above information was available for the 2,791 potential respondents in this study. The following paragraphs will present the analyses conducted on these driver records. Obviously, not all of these potential respondents were interviewed in the current study. Nevertheless, their driver record data was available and

was examined. The next section of this report will compare these overall records with the records of those individuals who were interviewed.

Table XIII presents the age distribution for the 2,791 potential respondents. This data indicates that fewer 16 year olds were sampled in each of the young driver groups. This is particularly true in the D16 group. It is assumed from these results that many young people do not get a driver's license immediately upon attaining the age of 16. In fact, these figures indicate that 17 years is the more likely licensing age in New York.

Table XIV shows the distribution of potential respondents by group and location. Five location codes, or categories, were used to classify the sample. The first category was the Bronx. Bronx county was used as a separate location because there are differences in the traffic law from the Bronx to the remainder of the state. Specifically, in New York City, of which the Bronx is a part, all drivers must be 18 years old or older. A 16 or 17 year old may obtain a driver's license, but may not drive within the city limits until his 18th birthday. The second category was Westchester and Rockland counties. These are both in southern New York State. They were separated into a specific category since they are both largely suburban areas of the New York City metropolitan area. As such, they may differ from other parts of the state. The next category was upstate city. This included all cities in the sampling region outside Westchester, Rockland and the Bronx with a population in excess of 50,000 (as per 1970 U.S. Census). The cities were Albany, Schenectady, Troy, Utica, Rome, Syracuse, Rochester, Buffalo and Binghamton. The fourth category was upstate suburb which included all drivers within 30 miles of one of the upstate cities. The last category was for rural drivers. This is not the same as the rural category defined by the U.S. Census. Its use here is essentially as an "other" category designating those drivers who do not live in or around a city of 50,000 or more and are not from the southern areas covered in the first two categories. It includes drivers from smaller cities and towns (e.g., Ithaca, Elmira, Watertown, Jamestown, etc.) as well as drivers from census defined rural areas.

The results indicate that there is a statistically significant relationship between location and group ($\chi^2 = 139.17$, $p < .001$ with 36 d.f.'s). As expected, fewer very young drivers from the Bronx entered the sample of potential respondents. While 8.1% of the overall sample was from the Bronx, only 3.1% of the GP16, 4.3% of the A16 and 2.0% of the D16 groups were from the Bronx. Also, it appears that fewer D16 and D35 drivers were drawn from both the Bronx and Westchester and Rockland counties. This finding suggests that the DWI/DWAI arrest and/or conviction rate for these southern New York State counties is lower than in the northern counties of New York State, or that the incidence of drinking-driving in these counties differs from that of the remainder of the state.

Table XIII

Age Distribution by Sampling Group

Age (as of 12-31-73)	General Population				Night-Injury Accident Involved				DWI/DWAI Convicted	
	GP16 (16-18 years)	GP19 (19-21 years)	GP22 (22-24 years)	GP35 (35-49 years)	A16 (16-18 years)	A19 (19-21 years)	A22 (22-24 years)	A35 (35-49 years)	D16 (16-24 years)	D35 (35-49 years)
16	51				20				4	
17	132				68				6	
18	167				123				27	
19		110				89			38	
20		120				69			53	
21		119				73			50	
22			128				92		40	
23			119				73		38	
24			124				66		39	
35-39				150				70		49
40-44				130				79		42
45-49				118				68		47
TOTAL	350	349	371	398	211	231	231	217	295	138

Table XIV

Area of New York State by Sampling Group

	General Population				Night-Injury Accident Involved				DWI/DWAI Convicted		
	GP16 (16-18 years)	GP19 (19-21 years)	GP22 (22-24 years)	GP35 (35-49 years)	A16 (16-18 years)	A19 (19-21 years)	A22 (22-24 years)	A35 (35-49 years)	D16 (16-24 years)	D35 (35-49 years)	Total
Bronx	11 3.1%	30 8.6%	31 8.4%	56 14.1%	9 4.3%	18 7.8%	22 9.5%	39 18.0%	6 2.0%	3 2.2%	225 8.1%
Westchester and Rockland (southern New York)	52 14.9%	39 11.2%	39 10.5%	47 11.8%	25 11.8%	19 8.2%	22 9.5%	31 14.3%	21 7.1%	7 5.1%	302 10.8%
Upstate City	69 19.7%	70 20.1%	76 20.5%	77 19.3%	45 21.3%	59 25.5%	63 27.3%	46 21.2%	57 19.3%	28 20.3%	590 21.1%
Upstate Suburb	106 30.3%	93 26.6%	96 25.9%	93 23.4%	61 28.9%	69 29.9%	56 24.2%	55 25.3%	99 33.6%	33 23.9%	761 27.3%
Rural	112 32.0%	117 33.5%	129 34.8%	125 31.4%	71 33.6%	66 28.6%	68 29.4%	46 21.2%	112 38.0%	67 48.6%	913 32.7%
TOTAL	350 100%	349 100%	371 100%	398 100%	211 100%	231 100%	231 100%	217 100%	295 100%	138 100%	2,791 100%

A. Driving Record of the General Population

There were 1,468 male drivers in the combined general population sample. The driving record for each of these individuals was available. These records are summarized in Table XV. The data is broken down by event type and within specific types the results are shown both for calender 1973 alone and for the combined years 1971, 1972 and 1973. Many of the younger drivers have not been licensed for the full 1971-1973 period; thus for these individuals the most appropriate comparison is to look at 1973 separately.

The first category presented in Table XV is Property Damage accidents. These are highway crashes that did not involve any personal injury but did involve property damage in excess of $200. They may have been reported to the New York State Department of Motor Vehicles by the involved driver(s), police or both. The results show that 4.0% of the GP16, 4.8% of GP19 and 2.7% of the GP22 drivers were involved in at least one of these events during 1973. The comparable figure for the GP35 group was only 2.0%. In other words, the young drivers were involved in nearly twice as many property damage accidents as the older drivers during 1973. The results were similar with respect to injury producing accidents. These are crashes in which an injury of any kind to any party was reported. The results show that while only 2.5% of the older drivers (GP35) were involved in one or more injury accidents, 4.9% of the GP16, 5.4% of the GP19 and 4.0% of the GP22 groups were involved in this king of a crash. Again, an overrepresentation of young drivers by a factor of nearly two. Among young drivers, the GP22 group had the fewest involvements for both types of crashes during 1973. This suggests that the under 21 group is the most dangerous though all groups pose a greater safety hazard than the 35-49 year old drivers.

The next category examined was convictions for speeding related violations. Here, the young drivers were greatly overrepresented. The results show that 7.7% of the GP16, 12.0% of the GP19 and 10.0% of the GP22 groups were convicted of one or more speeding violations during 1973. This compares with only 3.0% of the GP35 group. Convictions for traffic device related violations (e.g., ran red light, stop sign violation, etc.) were also higher in the young groups. The results showed that 4.0% of the GP16, 3.4% of the GP19 and 5.9% of the GP22 groups were involved in these events during 1973, as compared with 2.0% of the GP35 group. Young drivers were also overinvolved with respect to convictions for improper documents (e.g., no license, improper registration, etc.). The results showed that 4.6% of the GP16, 4.0% of the GP19 and 1.3% of the GP22 groups were involved in this event type during 1973, as compared with only .5% of the GP35 group. The largest problem is with the very young drivers and typically involves driving without a license. The next category was drinking driving violations. It included DWI (driving while

Table XV
Percent Involved Drivers by Driver Record Event Type
for the General Population Sample

Event	Year(s)	GP16 (16-18 yrs.) N=350	GP19 (19-21 yrs.) N-349	GP22 (22-24 yrs.) N=371	GP35 (35-49 yrs.) N=348
Accidents					
Property Damage	1973	4.0%*	4.8%	2.7%	2.0%
	'71, '72, '73	6.2%	11.7%	7.8%	6.8%
Injury Accident	1973	4.9%	5.4%	4.0%	2.5%
	'71, '72, '73	5.7%	13.8%	12.4%	10.3%
Convictions**					
Speeding	1973	7.7%	12.0%	10.0%	3.0%
	'71, '72, '73	9.7%	27.5%	26.4%	10.0%
Traffic Device	1973	4.0%	3.4%	5.9%	2.0%
	'71, '72, '73	5.1%	10.9%	13.7%	3.8%
Improper Documents	1973	4.6%	4.0%	1.3%	.5%
	'71, '72, '73	6.9%	9.5%	4.9%	1.5%
DWI/DWAI	1973	.3%	.9%	.5%	1.0%
	'71, '72, '73	.6%	1.7%	2.2%	3.0%
Total Conviction Involved Drivers	'71, '72, '73	19.1%	41.8%	40.2%	19.3%
License Suspension	1973	2.6%	3.7%	2.4%	.8%
	'71, '72, '73	3.7%	9.7%	5.1%	3.0%
License Revocation	1973	.3%	2.3%	1.9%	.8%
	'71, '72, '73	.3%	4.6%	3.5%	2.3%

*Entries are percentage of drivers who have had at least one of the events listed.

**Conviction data is by date of violation, not date of conviction on this and succeeding tables.

intoxicated), DWAI (driving while ability impaired--alcohol) and refusal of chemical test (implied consent). However, no driver in the sample had an entry on his record for a chemical test refusal. Thus, the results shown are only for DWI and DWAI. They indicate that only 1% of the GP35 group was convicted of DWI or DWAI during 1973. In the young age groups, the percentages were even lower; .3%, .9%, and .5% for the three groups, respectively. Analyses were also conducted with respect to several other conviction types (e.g., improper turn and equipment violations). However, in all cases the frequency of occurrence for these other events was too low to be meaningful. They were, nevertheless, summed to indicate the total conviction involved drivers also shown in Table XV.

The last two categories of driver record information analyzed concerned license suspensions and license revocations. The results showed that 2.6% of the GP16, 3.7% of the GP19 and 2.4% of the GP22 groups underwent license suspension during 1973 as compared with only .8% of the GP35 group. With respect to license revocations, .3% of the GP16, 2.3% of the GP19 and 1.9% of the GP22 groups had their licenses revoked during 1973, as compared with .8% of the GP35 group. The increase in suspensions and revocations for young drivers is merely a result of their poor driving records. Nevertheless, it is important to note that the most severe problems are again found in the under 21 age group.

B. Driving Record of Accident Sample

The driving records for the accident involved drivers are summarized in Table XVI. These drivers all have had a recent night (8 p.m. - 6 a.m.) injury producing motor vehicle accident. It was expected that their prior driving records would be poorer than the driving records for the general population. Simply, a prior history of accidents and convictions should increase the probability that a driver would have an injury producing accident and thus lead him to be included in the sample. The results clearly indicate that this was the case. In virtually every category, the accident groups of drivers registered more events than the comparable general population group. This was true for prior accidents (i.e., accidents in 1973 or the combined years 1971, 1972 and 1973), convictions and license suspensions. For some unknown reason, it was not true for license revocations. However, the number of revocations in both samples was quite low and this result is probably due to sampling fluctuation.

Overall, 8.5% of the young general population drivers (GP16, GP19 and GP22) were involved in at least one property damage accident during 1971, 1972 or 1973. This compares with 13.2% averaged across the young drivers in the accident sample (A16, A19 and A22). Concerning injury accidents, 10.7% of the young drivers in the general population sample had at least one of these events during 1971, 1972 or 1973 as compared with 16.3% of the young drivers in the accident sample. Total conviction involve-

Table XVI

Percent Involved Drivers by Driver Record Event Type
for the Night Injury Accident Involved Sample

Event	Year(s)	A16 (16-18 yrs.) N=211	A19 (19-21 yrs.) N=231	A22 (22-24 yrs.) N=231	A35 (35-49 yrs.) N=217
Accidents					
Property Damage	1973	4.3%*	7.4%	8.4%	4.1%
	'71, '72, '73	5.7%	18.2%	15.2%	14.3%
Injury Accident	1973**	4.7%	9.5%	9.1%	3.2%
	'71, '72, '73**	10.0%	21.2%	17.3%	16.1%
Convictions					
Speeding	1973	11.8%	16.4%	21.2%	7.8%
	'71, '72, '73	15.6%	40.3%	39.0%	17.5%
Traffic Devices	1973	8.1%	6.1%	8.7%	4.1%
	'71, '72, '73	10.0%	14.7%	18.2%	12.0%
Improper Documents	1973	9.5%	4.8%	3.5%	1.4%
	'71, '72, '73	13.3%	12.1%	10.0%	3.7%
DWI/DWAI	1973	.5%	2.2%	.9%	.9%
	'71, '72, '73	.9%	3.5%	3.5%	1.4%
Total Conviction Involved Drivers	'71, '72, '73	32.2%	54.5%	59.7%	35.5%
License Suspension	1973	7.6%	9.1%	2.6%	2.3%
	'71, '72, '73	10.0%	16.4%	8.2%	3.7%
License Revocation	1973	0.0%	2.2%	2.6%	0.0%
	'71, '72, '73	0.0%	3.9%	5.2%	0.0%

*Entries are number of drivers who have had at least one of the events listed.

**Entries are estimates excluding 15, 11, 16 and 12 drivers respectively whose sampled event occurred in late 1973.

ment was also compared between the two samples. The results showed that 33.8% of the young general population drivers had a traffic conviction during 1971, 1972 or 1973 as compared with 49.3% of the young drivers in the accident sample.

C. Comparison of GP and A Samples with the DWI/DWAI Sample

Driver record data was also available for the DWI/DWAI convicted sampling groups. There were 295 of these convicted drivers in the D16 group (16-24 years of age as of 12-31-73) and 138 in the D35 group (35-49 years of age). This represents somewhat fewer drivers than found in either the general population or the accident involved groups. Further, these driver records were biased due to the fact that many of the convictions upon which sampling was conducted occurred as a result of 1973 events. For instance, a late 1973 property damage accident could have led to a police investigation which could have led to an arrest for DWI and a 1974 conviction for DWI or DWAI. Nevertheless, there are still many valuable comparisons which can be conducted with this data.

Table XVII arrays the driving records for these drivers and drivers from the other sampling groups for the years 1971 and 1972. The GP16 and A16 groups have been excluded since very few D16 drivers fell within these young age ranges and since these young groups could not be expected to have very many 1971 and 1972 driving events. Parenthetically, it should be noted that the very fact that there were few 16-18 year old drivers in the D16 group is of some interest. It clearly demonstrates (as was shown in the general population and accident groups) that convictions for alcohol related driving offenses are relatively uncommon for 16-18 year old drivers. Use of only 1971 and 1972 driving events avoids any biases that may have been introduced by the sample selection strategy.

It can be seen from Table XVII that the driving records of the convicted DWI/DWAI groups tend to be worse than the records for both the other two samples. This is particularly true when comparing these two groups to the general population. First, concerning accidents, 26.4% of the D16 and 26.1% of the D35 groups were involved in motor vehicle accidents during 1971 or 1972. This is slightly higher than the rates found with the accident samples and nearly twice the rates found in the general population.

Table XVII also shows motor vehicle conviction involvements for 1971 and 1972. Fully 42.7% of the D16 group and 45.7% of the D35 group were convicted of at least one traffic violation during 1971 or 1972. Older drivers in the general population and accident samples exhibited much lower rates, as did to a certain extent, young drivers from the general population. Young drivers in the accident sample, however, exhibited conviction involvements at a rate comparable to that found in the two D groups. Not surprisingly, both D groups had many more prior DWI and DWAI conviction involved

Table XVII

Percent Involved Drivers by Event Type for DWI/DWAI Samples as Compared with the Accident and General Population Samples

Event	Years	DWI/DWAI Convicted D16 (16-24 yrs.) N=295	DWI/DWAI Convicted D35 (35-49 yrs.) N=138	General Population GP19 (19-21 yrs.) N=349	General Population GP22 (22-24 yrs.) N=371	General Population GP35 (35-49 yrs.) N=398	Night Injury Accident Involved A19 (19-21 yrs.) N=231	Night Injury Accident Involved A22 (22-24 yrs.) N=231	Night Injury Accident Involved A35 (35-49 yrs.) N=217
All accidents	'71, '72	26.4%*	26.1%	15.2%	14.3%	13.1%	23.4%	22.1%	25.3%
All convictions	'71, '72	42.7%	45.7%	30.7%	29.6%	13.3%	42.0%	41.6%	24.4%
DWI/DWAI Conviction Involved	'71, '72	9.8%	15.2%	.9%	1.6%	2.3%	1.3%	2.6%	.5%
Speed Related Conviction Involved	'71, '72	22.4%	19.6%	18.6%	19.1%	7.5%	29.0%	23.8%	11.5%

*Entry is percentage of drivers who have had at least one of the events listed within the time frame specified.

drivers than the remaining groups. Speeding convictions were also examined, and as shown in Table XVII, 22.4% of the D16 and 19.6% of the D35 groups had at least one speed related conviction during 1971 or 1972. These rates are comparable to the rates found for the other groups with the exception of the GP35 and A35 samples which exhibit markedly fewer speed conviction involved drivers.

Comparisons were made between the D16 drivers and drivers from the other groups with respect to each of the four event types shown in Table XVII. The basic analysis techniques was to apply the χ^2 test to the two by two tables resulting from involved, yes vs. no, and D16 vs. another group. The results showed that the D16 drivers did not differ significantly from the D35 drivers with respect to any of the four event types ($\chi^2 = .01$, N.S. with 1 d.f. for accidents; $\chi^2 = .33$, N.S. with 1 d.f. for convictions; $\chi^2 = 2.67$, N.S. with 1 d.f. for DWI/DWAI convictions; and $\chi^2 = .44$, N.S. with 1 d.f. for speed convictions). In short, the 1971-72 driving records for 1973-74 DWI/DWAI convicted drivers show little difference as a function of driver age.

The young DWI/DWAI sample of drivers (i.e., group D16) was also compared with the young drivers in the accident sample. For the purposes of this comparison, the groups A19 and A22 were summed. The results showed that the D16 group was not significantly different from the A19/A22 group with respect to accidents, conviction involvements or speeding conviction involvements during 1971 to 1972 ($\chi^2 = 1.35$, N.S. with 1 d.f. for accidents; $\chi^2 = .06$, N.S. with 1 d.f. for convictions; $\chi^2 = 1.61$, N.S. with 1 d.f. for speeding convictions). The two groups did, however, differ with respect to 1971-72 DWI/DWAI conviction involvements ($\chi^2 = 23.46$, $p < .001$ with 1 d.f.). Thus, except in regard to prior DWI and DWAI involvements, the D16 sample does not differ from the combined A19 and A22 samples. Both groups consist of drivers with continuing driving problems. The D16 group was also compared to the combined GP19 and GP22 group. The results showed no significant difference with respect to speeding tickets during 1971 and 1972 ($\chi^2 = 1.59$, N.S. with 1 d.f.). Apparently, excessive speed is not unique to the DWI/DWAI sample. However, the D16 and combined GP19 and GP22 samples did differ significantly with respect to every other event type. The D16 group had more accident involved drivers ($\chi^2 = 19.36$, $p < .001$ with 1 d.f.), more conviction involved drivers ($\chi^2 = 14.79$ $p < .001$ with 1 d.f.), and more DWI/DWAI conviction involved drivers ($\chi^2 = 42.75$ $p < .001$ with 1 d.f.) during the period 1971 to 1972 than the general population drivers of comparable age.

D. Relationship Between Speeding Convictions and Accident Involvements in the General Population

Throughout these analyses, it has typically been found that those groups with higher accident involvements have also had higher speeding conviction involvements. Table XVIII examines this relationship for the general popula-

Table XVIII

Relationship Between Speeding Convictions and Accidents in the General Population Sample

		Total Speeding Convictions 1971-1973		
		0	1	2 or more
Total Accidents 1971-1973	0	1009	156	37
	1	158	41	10
	2 or more	22	16	7
Total Injury Producing Accidents 1971-1973	0	1086	171	45
	1	96	35	3
	2 or more	7	7	6

tion drivers. The data shown represent all speed related convictions and all accidents for the GP16, GP19, GP22 and GP35 groups for the period 1971 to 1973. These results indicate that number of speeding convictions is significantly related to number of accidents ($\chi^2 = 45.86$, $p < .001$ with 4 d.f.). Those drivers with more speeding convictions also had more accidents. The same relationship is found when examining only the injury producing accidents ($\chi^2 = 65.5$, $p < .001$ with 4 d.f.).

III. RESULTS--QUESTIONNAIRE DATA

The questionnaire consisted of 92 questions, many of which had several parts. It was supplemented by six questions answered by the interviewer following the interview. These latter questions dealt with the subject's race, cooperation, honesty, housing and living arrangements and the number of other persons present during the interview. The length of the interview varied from 30 to 60 minutes, being largely a function of the number of accidents and violations reported by the subject. The results from the interview data will be presented below. This section will first compare the interviewed versus the non-interviewed subjects largely on the basis of driver record data. Background and demographic data will be presented followed by a complete description and analysis of reported accidents and convictions. Drinking frequency will be examined in relation to several variables, followed by an analysis of driving habits and attitudes. The remainder of this section will examine the subject's perception of the drinking driver and his knowledge of drinking driving. Some items in the questionnaire requested information that was strictly countermeasure specific. For instance, favor or oppose the installation of Alcohol Safety Interlock Devices in the vehicles of convicted drunken drivers. Data for these items will be covered in later sections of this report.

A. Comparison Between Interviewed and Non-Interviewed Subjects

Ideally, all 2,791 drivers whose driver records were drawn from the New York Master License File would have been interviewed in this study. However, as expected, the actual number of subjects interviewed was far short of this possible maximum. This section will examine the similarities and differences between the interviewed and non-interviewed subjects. It will also discuss some of the problems encountered when attempting to contact subjects and conduct the interview. In general, the interviewed subjects are a representative subset of all the potential respondents. However, there are differences which will be outlined below.

Table XIX shows the distribution by group for interviewed versus non-interviewed subjects. It can be seen from this table that a greater proportion of young as compared with old drivers were interviewed. Overall, 30% of the initial sample of 2,791 drivers were interviewed. However, fully 45% of the GP16 group and 43% of the A16 group were interviewed. Table XIX also presents some information concerning the reason why no interview was obtained from a subject. One reason was that a given subject was simply never assigned. This occurred more often in the general population groups since, as mentioned in Section B, several drivers were added to these groups after interviewing was begun. These unassigned drivers most often lived in rural areas of the state (51% of all unassigned). However, a substantial number (35% of all unassigned) lived in the Bronx where problems were encountered in hiring and retaining qualified inter-

Table XIX

Number Interviewed Versus Non-Interviewed by Group

	General Population				Night Injury Accident Involved				DWI/DWAI Conviction Involved	
	GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-24 yrs.)	D35 (35-49 yrs.)
Interviewed	157	126	87	73	91	77	62	58	79	26
Not interviewed	193	223	284	325	120	154	169	159	216	112
Total	350	349	371	398	211	231	231	217	295	138
% Interviewed	45%	36%	23%	18%	43%	33%	27%	27%	27%	19%
Reason for non-interview										
Subject unassigned to an interviewer	7%	6%	10%	12%	4%	4%	3%	4%	2%	3%
Letter returned (address unknown)	1%	6%	9%	15%	1%	3%	8%	7%	5%	10%
Subject refused interview	4%	5%	5%	8%	3%	5%	3%	5%	4%	8%
Subject not located or unable to contact	12%	24%	25%	25%	11%	16%	23%	13%	27%	33%
Reason unknown	31%	23%	28%	22%	38%	39%	36%	44%	35%	27%

viewers. The second reason for not obtaining an interview was an incorrect address resulting in the initial introductory letter to the subject being undelivered and returned to Dunlap and Associates, Inc. This was a particularly serious problem with the older general population drivers. These drivers are less likely to have traffic accidents or convictions which would automatically lead to an address update, and more likely to have held their license for several years, making the address on file several years old.

The next two categories were "interview refused" and "subject not located or unable to contact". Each interviewer was instructed to inform Dunlap and Associates, Inc., of the circumstances surrounding each failure to obtain an interview. However, the emphasis here was clearly placed on learning of any subjects who had moved to other areas of New York State where it might be possible to reassign that subject to another interviewer. Nevertheless, many interviewers reported complete information concerning the reason for not obtaining an interview. As shown in Table XIX, the primary reason was simply an inability to locate and/or contact the driver. Refusal rates were generally low overall, yet slightly higher in the older groups. It is felt that the "reason unknown" category would probably be distributed proportionately between interview refusal and unable to contact categories were more complete information available.

Interview completion rate also varied as a function of location. Only 10% of the potential respondents from the Bronx were actually interviewed. This compares with a 36% interview completion rate from the Westchester-Rockland area, 29% from the upstate cities (50,000 population or more), 30% from upstate suburbs (within 30 miles of upstate city) and 34% from the rural areas (all other areas). While 8% of the 2,791 potential respondents were from the Bronx, only 3% of those actually interviewed were from the Bronx. Thus, the set of interviewed subjects is biased against this New York State county. As discussed in section B, the Bronx respondents tended to be older and the rate of completed interviews was lower for older drivers. Also, problems were encountered in recruiting and retaining interviewers in this area. However, it should be noted that the distribution of interviewed subjects by group (GP16, GP19, etc.) did not differ significantly as a function of location ($\chi^2 = 41.5$, N.S. with 36 d.f.). As discussed in section B, this distribution was significantly different for the 2,791 potential respondents.

It was also possible to compare the interviewed subjects with those drivers who were sampled yet not interviewed on the basis of their respective driver records. The results of this comparison are shown in Table XX. The first event type analyzed was property damage accidents for the period 1971-1973. The results showed that 96 (11.5%) of the 836 interviewed subjects had at least one of these events as compared with 234 (12.0%) of the 1,955 non-interviewed subjects. This difference was not statistically significant ($\chi^2 = .13$, N.S. with 1 d.f. comparing interviewed vs. non-interviewed

Table XX

Comparison of Driver Records Between Interviewed and Non-Interviewed Subjects

Event		GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-24 yrs.)	D35 (35-49 yrs.)	Total (All Groups)
Property Damage Accident Involved Drivers 1971-73	Interviewed	3.8%	13.3%	11.5%	6.8%	4.4%	15.6%	17.7%	13.8%	21.5%*	19.2%*	11.5%
	Not Interviewed	7.8%	10.3%	6.7%	6.8%	6.7%	19.5%	14.2%	14.5%	20.4%*	23.2%*	12.0%
Injury Accident Involved Drivers 1971-73	Interviewed	5.1%	15.1%	12.6%	16.4%	7.6%	19.5%	23.4%	17.7%	27.8%*	34.6%*	14.2%
	Not Interviewed	6.2%	13.0%	12.3%	9.8%	10.8%	22.1%	17.2%	18.2%	30.6%*	25.0%*	15.5%
Speeding Conviction Involved Drivers 1971-73	Interviewed	7.6%	23.0%	25.3%	12.3%	14.3%	36.4%	41.9%	17.2%	35.4%	30.8%	22.1%
	Not Interviewed	11.4%	30.0%	26.8%	9.5%	16.7%	42.2%	37.9%	17.6%	39.8%	25.9%	25.0%
Conviction Involved Drivers 1971-73	Interviewed	17.2%	40.5%	36.8%	15.1%	27.5%	48.1%	56.5%	34.5%	31.6%**	50.0%**	33.0%
	Not Interviewed	20.7%	42.6%	41.2%	20.3%	35.8%	57.8%	60.9%	35.8%	46.8%**	44.6%**	38.9%

NOTE: Entries are percentage of drivers who have had at least one of the events listed.

* Biased in that some accidents led to the DWI/DWAI conviction upon which sampling was based. Bias should be equally operative in interviewed and non-interviewed groups.

** 1971 and 1972 events only, thus eliminating any bias caused by sample selection.

by had an event vs. did not have an event). The next event type examined was injury producing accidents. The results showed that 119 (14.2%) of the 836 interviewed subjects had at least one of these events as compared with 304 (15.5%) of the non-interviewed subjects. Again, this difference was not statistically significant ($\chi^2 = .79$, N.S. with 1 d.f.). However, with respect to both accident types, the non-interviewed subjects had more involved drivers than did the interviewed subjects.

The next two event categories examined involved motor vehicle violations. The first of these categories was speed related convictions. The results showed that 185 (22.1%) of the 836 interviewed drivers were convicted of speeding or a related charge during the period 1971 to 1973. This compares with 488 (25.0%) of the 1,955 non-interviewed drivers. While not statistically significant ($\chi^2 = 2.69$, N.S. with 1 d.f.), the results again are in the direction of fewer involved drivers in the interviewed group. The last category examined was all conviction involvements including speed related convictions. The results showed that 276 (33.0%) of the 836 interviewed drivers had one or more convictions for a motor vehicle violation during the period 1971 to 1973. In the non-interviewed group, 761 (38.9%) had at least one conviction. This difference was statistically significant ($\chi^2 = 8.77$, $p < .01$ with 1 d.f.). Therefore, it must be concluded that the interviewed subjects had somewhat better driving records overall than did the non-interviewed subjects. Further, as the results in Table XX show, this finding appears to be consistent across all sampling groups.

One interpretation of these results would be that subjects with poorer driving records are less willing to submit to questions concerning driving than are subjects with better driving records. However, as shown in Table XIX, the primary reason for not interviewing a subject as reported by the interviewers was failure to locate or contact the sampled driver and not interview refusal. It is possible, therefore, to hypothesize as an alternate interpretation that individuals with poor driving records tend to maintain more deviant life styles making them more difficult to contact. They may, for instance, change their place of residence more often, or may simply be less likely to be found at home. In any event, it may be assumed that the questionnaire or interview results to be presented below are based on a sample of drivers with slightly better driving records than the original set of 2,791 potential respondents.

B. Background and Descriptive Information

This section will discuss several data items related to the conduct of the interview and the personal and demographic characteristics of the subjects. Table XXI presents the results, by group, from the interviewer's supplement. These questions were answered by the interviewer following the interview. The first questions concerned the interviewer's opinion regarding the subject's level of cooperation. Overall, 88% of the subjects were rated good or very good. This ranged from a low of 73% in the D35

Table XXI

Percentage Distribution of Responses by Group for Interviewers Supplement

		General Population				Night Injury Accident Involved				DWI/DWAI Convicted	
		GP16 (16-18 yrs.) N=157	GP19 (19-21 yrs.) N=126	GP22 (22-24 yrs.) N=87	GP35 (35-49 yrs.) N=73	A16 (16-18 yrs.) N=91	A19 (19-21 yrs.) N=77	A22 (22-24 yrs.) N=62	A35 (35-49 yrs.) N=58	D16 (16-24 yrs.) N=79	D35 (35-49 yrs.) N=26
Subject Co-operation	Very good	54%*	56%	53%	64%	45%	52%	44%	47%	62%	42%
	Good	36%	34%	41%	26%	38%	30%	42%	41%	27%	31%
	Fair	6%	7%	5%	3%	14%	16%	11%	9%	10%	19%
	Poor	1%	1%	--	5%	1%	3%	3%	3%	1%	4%
Subject Honesty	Completely frank	46%	52%	49%	59%	38%	43%	47%	55%	51%	50%
	Generally frank	41%	40%	41%	30%	42%	45%	39%	31%	35%	31%
	Evasive	10%	6%	8%	7%	18%	8%	13%	9%	11%	4%
	Untruthful	--	1%	--	3%	2%	4%	2%	2%	3%	--
Housing Unit	Single family	87%	82%	70%	74%	84%	71%	68%	79%	68%	69%
	Two family	4%	9%	7%	10%	5%	9%	15%	10%	14%	12%
	Multiple	3%	6%	11%	7%	4%	16%	15%	5%	12%	19%
Living Arrangements	Home of parents	90%	75%	38%	1%	88%	66%	50%	2%	62%	8%
	Subject's home	3%	15%	46%	88%	4%	23%	37%	90%	25%	81%
Persons Present at Interview	None	79%	75%	66%	56%	67%	71%	71%	71%	77%	62%
	Parent	8%	6%	2%	1%	18%	6%	5%	2%	9%	4%
	Spouse	1%	7%	17%	32%	3%	6%	15%	17%	5%	27%

* Columns may total less than 100% due to responses in "other" categories not reported here.

group to a high of 94% in the GP22 group. The general population groups, on average, tended to exhibit better cooperation than the remaining groups. The second question concerned the interviewers' opinion regarding the subject's honesty in the interview. Overall, 87% of the subjects were felt to be completely or generally frank. This ranged from a high of 92% for the GP19 group to a low of 80% for the A16 group. Only 1% of the subjects were felt to be untruthful.

The next two questions dealt with the respondent's living accomodations. The first was concerned with the structure of the dwelling; single family, two family or multiple. There was a difference across the sampling groups in that the general population group tended to more often live in single family housing. The next question concerned the actual "living arrangements". The two most frequent responses were respondents own home and home of respondent's parent(s). The results were predictably age related. Young subjects tended to live with their parents, older subjects tended to live in their own home. The last question dealt with the number of other persons present at the interview. Interviewers were instructed to conduct the interview in private whenever possible. Overall, there were no other persons present for 71% of the interviews. The worst case was felt to be the situation where a parent was present. This was true for 7% of the interviews.

TableXXIIpresents a variety of background and descriptive information on the subjects. The first distribution shows marital status by group. Predictably, older subjects were more often married than younger subjects. The next distribution shows the race of the subject as judged by the interviewer. The sample of interviewed subjects was largely white. There appears to be an increase in minority group members in the "A" and "D" groups. However, this increase is merely suggestive of a trend and not statistically significant ($\chi^2 = 3.94$, N.S. with 2 d.f. for white vs. other by "GP", "A" and "D"). The next distribution shows the educational attainment of the various groups. Large differences exist between the groups as a function of age. For instance, of necessity, none of the 16-18 year old drivers in the sample have completed college. There are also differences across the "GP", "A" and "D" groups. Generally speaking, the DWI/DWAI convicted drivers are less educated than the night injury accident involved drivers who in turn are less educated than the general population. This result is directly reflected in the distribution of driver education. Young general population drivers are most likely to have had high school driver education followed by young accident involved drivers followed by young DWI/DWAI convicted drivers. It can also be seen that the older male drivers whether "GP", "A" or "D" have typically not had any driver education and only very rarely had high school driver education.

The next distribution shown in Table XXII indicates the percentage of drivers in each group who have had some form of remedial driver education. Overall, 12% of the subjects reported having some form of remedial

Table XXII

Background and Demographic Characteristics of Sampling Groups

Variables	Levels	General Population GP16 (16-18 yrs.) N=157	GP19 (19-21 yrs.) N=126	GP22 (22-24 yrs.) N=87	GP35 (35-49 yrs.) N=73	Night Injury Producing Accident Involved A16 (16-18 yrs.) N=91	A19 (19-21 yrs.) N=77	A22 (22-24 yrs.) N=62	A35 (35-49 yrs.) N=58	DWI/DWAI Convicted D16 (16-24 yrs.) N=79	D35 (35-49 yrs.) N=26
Marital Status	Married	2%	14%	43%	89%	4%	17%	31%	83%	19%	77%
	Never married	98%	85%	54%	4%	96%	83%	60%	14%	80%	4%
	Divorced, separated, widowed	--	1%	3%	7%	--	--	10%	3%	1%	19%
Race	White	96%	98%	99%	94%	99%	96%	95%	83%	96%	84%
	Negro	3%	1%	--	1%	1%	4%	5%	10%	4%	12%
	Latin-American and other	1%	2%	1%	4%	--	--	--	7%	--	4%
Highest Grade Completed	Less than 12	27%	3%	7%	21%	30%	13%	15%	31%	23%	46%
	12	50%	30%	31%	31%	52%	45%	31%	31%	51%	27%
	Some college	22%	53%	36%	17%	19%	34%	35%	21%	23%	12%
	College or more	--	13%	26%	31%	--	8%	19%	17%	4%	15%
Driver Education	None	34%	37%	30%	81%	30%	43%	32%	79%	49%	85%
	High School	64%	60%	68%	8%	65%	47%	60%	2%	51%	4%
	Commercial and other	2%	3%	2%	11%	5%	10%	8%	19%	--	12%
Had Remedial Driver Education		3%	9%	14%	5%	4%	17%	26%	5%	37%	23%
Ever Drink		99%	99%	99%	96%	97%	100%	100%	95%	100%	100%
Currently Drink		88%	91%	94%	88%	88%	95%	97%	78%	97%	81%
Currently full-time Student		70%	36%	11%	1%	46%	16%	6%	2%	14%	--

Table XXII (Continued)

Background and Demographic Characteristics of Sampling Groups

Variables	General Population				Night Injury Producing Accident Involved				DWI/DWAI Convicted	
	GP16 (16-18 yrs.) N=157	GP19 (19-21 yrs.) N=126	GP22 (22-24 yrs.) N=87	GP35 (35-49 yrs.) N=73	A16 (16-18 yrs.) N=91	A19 (19-21 yrs.) N=77	A22 (22-24 yrs.) N=62	A35 (35-49 yrs.) N=58	D16 (16-24 yrs.) N=79	D35 (35-49 yrs.) N=26
Currently Employed Full-time	48%	74%	80%	92%	63%	78%	90%	91%	75%	92%
Had Non-traffic Criminal Arrest	8%	10%	8%	4%	10%	17%	19%	7%	24%	8%
Total Reported Annual Mileage (Average)	8,451	10,138	15,695	14,525	10,493	14,822	18,487	17,478	15,782	14,862
Reported Annual Mileage Night Only (Average)	3,077	4,269	5,329	4,085	3,726	6,994	7,514	5,710	6,959	4,173

training. As expected, this training was least prevalent in the general population and most prevalent among the DWI/DWAI convicted. Also, as expected, young drivers have more often had this training than older drivers. The next two distributions deal with drinking behavior. While much more will be said concerning drinking in later sections of this report, it can be seen here that the vast majority of subjects in all groups have consumed alcoholic beverages at some time. Further, as the second distribution shows, a large majority of the subjects currently drink. Surprisingly, more young drivers reported current drinking than did older drivers. This was true for all three of the sampling groups. The next two distributions indicate those subjects who are currently full-time students and those who are currently employed full-time. Both distributions show a predictably strong relationship with age. Young drivers are more likely to be full-time students and the older drivers are more likely to be employed full-time. However, there are also differences with respect to sampling group. Young "GP's" are more likely to be students than are the young "A's" than are the young "D's". The next distribution shown presents data for non-traffic criminal arrests. These ranged from minor misdemeanors to criminal manslaughter. Overall, 11% of the sample reported being arrested for a non-traffic offense at some time during their life. Report of a criminal arrest was more frequent among young drivers and more frequent in the "A" and "D" groups.

The last two distributions shown in Table XXII indicate reported annual miles driven. Subjects were asked to indicate their annual mileage "prior to the current energy crisis". They were also asked to indicate the percent of this driving that was done at night. This percentage was then multiplied by reported total mileage to indicate their total night mileage. It can be seen from this data that there is a direct relationship between age and reported mileage both for all driving and night driving. The 16-18 year old drivers (GP16 and A16) are driving the least. Mileage increases rapidly, however, with the 22-24 year olds doing the most driving. The older drivers (35-49 years old) tend to drive somewhat less than the 22-24 year olds, yet more than the 16-18 year olds. It can also be seen that the "A" drivers drive more miles than the drivers in the remaining groups. Drivers were also asked to indicate the extent to which the "current energy crisis" has limited their driving. The results indicated that overall, 32% of the drivers indicated a reduction in daylight driving and 31% indicated a reduction in night driving. Reported reductions were essentially uniform across sampling groups. However, as of this writing, the gasoline shortage of the Winter and Spring of 1974 has largely passed and thus this data is no longer directly relevant.

Table XXIII shows the reported usage of drugs other than alcohol within the past 6 months for each of the sampling groups. Young drivers reported having used marijuana, hallucinogens and amphetamines far more frequently than older drivers. Surprisingly, drug usage among young drivers remained

Table XXIII

Reported Use of Drugs Other Than Alcohol

		General Population				Night Injury Accident Involved				DWI/DWAI Convicted	
		GP16 (16-18 yrs.) N=157	GP19 (19-21 yrs.) N=126	GP22 (22-24 yrs.) N=87	GP35 (35-49 yrs.) N=73	A16 (16-18 yrs.) N=91	A19 (19-21 yrs.) N=77	A22 (22-24 yrs.) N=62	A35 (35-49 yrs.) N=58	D16 (16-24 yrs.) N=79	D35 (35-49 yrs.) N=26
Personal Use Within Past 6 Months*	Amphetamines	6%	12%	10%	--	10%	12%	5%	2%	11%	8%
	Barbiturates	8%	13%	9%	15%	10%	9%	16%	7%	18%	4%
	Marijuana	38%	37%	29%	1%	37%	40%	34%	3%	49%	4%
	Hallucinogens	6%	8%	5%	--	5%	12%	2%	2%	10%	--
Friend or Acquaintance Used Within Past 6 Months	Amphetamines	32%	43%	37%	5%	38%	35%	16%	7%	39%	4%
	Barbiturates	31%	38%	39%	19%	29%	40%	31%	16%	38%	12%
	Marijuana	82%	79%	71%	18%	77%	74%	65%	12%	72%	12%
	Hallucinogens	29%	38%	25%	--	26%	31%	6%	2%	38%	--

* In addition to the drugs listed, 3% of all subjects reported using cocaine, 2% narcotics and less than 1% deliriants.

consistently high regardless of sampling group and was only slightly higher in the D16 group. Marijuana is clearly the most often used drug other than alcohol. Subjects were also asked to indicate whether any of their friends or acquaintances had used specific drugs within the past 6 months. The results indicate that even if the young driver does not himself use drugs other than alcohol, he probably has a friend who is at least using marijuana.

The purpose of this section of the results was to provide background and descriptive information concerning the subjects in each of the sampling groups. Several differences emerged both with respect to age and with respect to general population versus night injury accident involved versus DWI/DWAI convicted. In general, these results replicate many of the previous findings in the literature. The general population drivers tend to have the least deviant most socially desirable characteristics followed by the accident involved group followed by the DWI/DWAI convicted group. In short, it appears that the sampling procedure adopted for this study did produce three measurably distinct groups of drivers with different characteristics and different problems.

C. Accident and Violation Comparisons

In the course of the interviews, each subject was requested to provide descriptive information on motor vehicle accidents in which he had been involved as a driver. This data was sought from each subject for his four (4) most recent crashes occurring since January, 1971. Naturally, not all subjects had been involved in four or more crashes during this period, although many furnished data on at least one accident.

The data thus obtained was structured into four accident category files. These were:

The sampled crash--i.e., the nighttime injury producing accident which had led to selection of that subject. No members of the "GP" samples contributed to this file. "A" sample subjects contributed to this file if, during the course of the interview, they described an accident that corresponded to the driver record data on the sampled crash.* Two hundred of the 230 young "A" sample drivers (87%) and 46 of the 58 older "A" drivers (79%) supplied such data.

*Neither the interviewer nor the subject knew the details of the sampling procedure. Interviewers knew only the subject's name, address and date of birth. Subjects knew only that they were part of a random sample of drivers. This procedure was adopted to ensure that all subjects were approached and questioned in the same manner.

- The most recent alcohol-related (A/R) crash--subjects contributed to this file if they supplied data on a crash and indicated they had consumed any alcohol within 4 hours prior to this crash. It is important to note that the sampled crash was excluded from this file. For example, for some "A" and "D" subjects, the sampled crash was actually their most recent alcohol-related accident; but, they contributed to this file only if they reported another A/R crash. On this basis, 51 of the 370 young "GP" drivers (14%), 24 of the 230 young "A" drivers (10%), and 23 of the 79 young "D" drivers (29%) contributed to the most recent A/R crash file. However, only 4 of the 73 older "GP's"(5%), 2 of the 58 older "A's" (3%), and 5 of the 26 older "D's" (19%) contributed to this file. Thus, the file includes 98 young subjects, but only 11 older subjects.

- The most recent non-alcohol related crash--subjects contributed to this file if they supplied data on a crash and indicated they had not consumed alcohol within four hours prior to the crash. Again, the sampled crash was excluded from this file. One hundred-forty one of the young "GP's" (38%), 88 of the young "A's" (38%), and 35 of the young "D's" (44%) contributed to this file. So did 14 of the older "GP's" (19%), 16 of the older "A's" (28%), and 3 of the older "D's" (12%). Thus, the file includes 264 young subjects and 33 older subjects.

- The "other" crash--subjects contributed to this file if they supplied data on an additional crash which did not fall into one of the files described above. Thus, this file consists of the second or third A/R crash reported by subjects or the second or third non-A/R crash. That is, the most recent crash exclusive of the sampled, most recent A/R, and most recent non-A/R went into this file. The file includes 40 young "GP's" (11%), 34 young "A's" (15%), and 24 young "D's" (30%), and also 2 older "GP's" (3%), 3 older "A's" (5%), and 1 older "D" (4%). Thus, 98 young subjects and 6 older subjects contributed to the "other" crash file.

The interviews also addressed motor vehicle violations for which the subjects had been cited or arrested. This data was sought from each subject for his four (4) most recent accident-free violations (i.e., violations not associated with an accident) occurring since January, 1971. Again, most subjects reported at least one violation, although not all had been cited for four. This data was structured into a similar set of four files:

- The sampled violation--this file was composed of the reports of a subset of the "D" subjects, and included only DWI/DWAI arrests. A subject contributed to this file if (a) he reported on the violation which had led to his selection as a "D" subject, and (b) that violation was found to be accident-free. This was the case for 36 of the 79 young "D's" (46%) and 13 of the 26 older "D's" (50%).

- The most recent alcohol-related violation--subjects contributed to this file if they reported a citation or arrest on any accident-free traffic offense and indicated they had consumed alcohol within four hours prior to the offense. The sampled violation, of course, was excluded from this file. Contributing to this file were 38 of the 370 young "GP's" (10%), 23 of the 230 young "A's" (10%), and 24 of the 79 young "D's" (30%), and also 1 of the 73 older "GP's" (1%), none of the 58 older "A's", and 4 of the 26 older "D's" (15%). Thus, 85 young drivers, but only 5 older drivers, were included in this file.

- The most recent non-alcohol-related violation--subjects contributed to this file if they reported a citation or arrest for any accident-free traffic offense and indicated they had not consumed alcohol within four hours prior to the offense. Again, the sampled violation was excluded. Contributing to this file were 126 of the 370 young "GP's" (34%), 99 of the 230 young "A's" (43%), and 33 of the 79 young "D's" (42%), and also 10 of the 73 older "GP's" (14%), 16 of the 58 older "A's" (28%), and 8 of the 26 older "D's" (31%). Thus, 258 young subjects and 34 older subjects were included in this file.

- The "other" violation--subjects contributed to this file if they supplied data on an additional accident-free traffic offense which did not fall into one of the above files. This was the case for 56 young "GP's" (15%), 38 young "A's" (17%), and 16 young "D's" (20%), and also for 2 older "GP's" (3%), 2 older "A's" (3%), and 2 older "D's" (8%). Hence, the "other" violation file included 110 younger subjects, but only 6 older subjects.

In this section, comparisons are made of the data in these accident and violation files in an attempt to identify crash and violation characteristics that are associated with alcohol involvement. Ideally, one would wish to make all such comparisons for both young and older drivers. However, it is only in the sampled crash and sampled violation files that the age 35-49 group has sufficient representation to permit their inclusion. Thus, most of this discussion focuses solely on young driver events.

(1) Comparisons of A/R and Non-A/R Crashes Involving Young Drivers

Table XXIV lists the circumstantial characteristics of the A/R

Table XXIV

Young Subjects' Reported Accident Involvement

		A/R Accident			Non-A/R Accident		
		GP	A	D	GP	A	D
Year	71	6	4	4	15	11	3
	72	16	3	4	38	17	7
	73	14	13	9	41	34	19
	74	15	4	6	47	26	6
Reported to Officials	Yes	37	16	17	91	68	28
	No	13	7	6	50	20	7
Type	Ped/Other	20	9	9	94	68	28
	Single Veh.	30	12	14	42	24	16
Resultant	Property Damage Only	38	19	19	118	71	31
	Injury	12	3	4	20	16	3
Day of Week	M-Th.	16	4	8	71	52	19
	F-Sun.	32	19	14	67	33	14
Time of Day	0400-0959	4	3	3	16	15	4
	1000-1559	5	5	2	45	27	7
	1600-2159	10	4	4	55	29	12
	2200-0359	31	10	14	24	17	11
Speed Prior to Crash	< 20	13	5	4	72	41	17
	20-39	16	10	13	50	27	9
	40-59	13	4	3	18	16	7
	≥ 60	8	3	2	2	3	2
Posted Speed	< 20	2	0	1	5	4	2
	20-39	25	13	13	79	50	19
	40-59	18	8	4	38	21	10
	≥ 60	2	0	1	2	2	2
Exceeding Posted Speed	Yes	11	6	3	8	7	4
	No	36	15	16	116	70	29
Number of Passengers	0	20	11	9	70	53	17
	1	19	6	8	44	24	13
	≥2	11	6	6	27	11	5

Table XXIV (Continued)

Young Subjects' Reported Accident Involvement

		A/R Accident			Non A/R Accident		
		GP	A	D	GP	A	D
Drug Involvement	Yes	8	4	2	8	5	1
	No	42	19	21	133	83	34
Cited for Violation	Yes	14	8	9	11	10	6
	No	36	15	14	130	78	29

and non-A/R crashes involving young drivers. In each case, data is given separately for the "GP", "A", and "D" samples.*

As the first step in this analysis, the characteristics of A/R crashes were examined to determine whether they varied significantly among the survey population groups. A similar exploration was made of the non-A/R crashes. These examinations disclosed no significant differences among the young "GP", "A", and "D" samples for any of the A/R crash items in Table XXIV. Neither did these groups evidence any significant differences in their non-A/R accidents. Thus, sampling procedures had no appreciable impact on the specific circumstances associated with the crashes comprising the young driver A/R and non-A/R files.

The next step in this analysis focused on comparisons of the A/R and non-A/R crashes. Tests for differences in the characteristics of these crashes were performed on the total accident files (aggregated across the "GP", "A", and "D" subjects), and also on those crashes reported by "GP" subjects. Despite the lack of significant differences among the survey groups' crashes, it was felt that replication of the tests for the "GP" sample would enhance the validity of the results.

Referring to the crash characteristics enumerated in Table XXIV, A/R and non-A/R crashes were found to exhibit significant differences relative to:

(1) Accident Type ($\chi^2 = 21.84$, 1 d.f., $p < .001$ for the total sample, and $\chi^2 = 13.06$, 1 d.f., $p < .001$ for the "GP" sample). A/R crashes included proportionately more single-vehicle incidents, and fewer pedestrian/multiple vehicle accidents.

(2) Day of Week ($\chi^2 = 17.56$, 1 d.f., $p < .001$ for the total sample, and $\chi^2 = 4.69$, 1 d.f., $p < .05$ for the "GP" sample). Nearly 70% of A/R crashes occurred on Friday, Saturday, or Sunday, while this was true of only 45% of non-A/R crashes.

(3) Time of Day ($\chi^2 = 49.35$, 3 d.f., $p < .001$ for the total sample, and $\chi^2 = 36.89$, 3 d.f., $p < .001$ for the "GP" sample). 58% of A/R crashes occurred between 10:00 p.m. and 4:00 a.m., only 20% of non-A/R crashes took place during that period.

(4) Speed Prior to Crash ($\chi^2 = 29.32$, 3 d.f., $p < .001$ for the total sample, and $\chi^2 = 24.39$, 3 d.f., $p < .001$ for the "GP" sample). The A/R

*In this and other tables throughout this section, the total number of events reported may vary slightly from one characteristic of interest to another, owing to the fact that some subjects could not recall, or for other reasons failed to report, certain of the circumstances associated with the accidents and violations.

crash is much more likely to occur at relatively high speed. 35% of those accidents took place at 40 mph or more, while this was true of 18% of non-A/R crashes. Note, too, that there was no significant difference in the posted speed limits at the locations of A/R and non-A/R crashes ($\chi^2 = 1.14$, 3 d.f., N.S. for the total sample, and $\chi^2 = 2.25$, 3 d.f., N.S. for the "GP" sample). Further, proportionately more drivers in A/R crashes were found to be exceeding the posted speed limit than were observed in non-A/R crashes (23% versus 8%, respectively). This difference is also statistically significant ($\chi^2 = 13.14$, 1 d.f., $p < .001$ for the total sample and $\chi^2 = 9.92$, 1 d.f., $p < .005$ for the "GP" sample).

(5) Drug Involvement ($\chi^2 = 8.45$, 1 d.f., $p < .005$ for the total sample, and $\chi^2 = 5.13$, 1 d.f., $p < .05$ for the "GP" sample). In about 15% of the A/R crashes, the driver used some other drug (marijuana, amphetamines, hallucinogens, etc.) within four hours prior to the crash. This was true of 5% of the non-A/R crashes.

(6) Citation for Traffic Violation ($\chi^2 = 25.36$, 1 d.f., $p < .001$ for the total sample and $\chi^2 = 13.24$, 1 d.f., $p < .001$ for the "GP" sample). In 32% of the A/R crashes, the driver was cited for at least one traffic offense, while this occurred in only 10% of non-A/R crashes. However, some of this difference is attributable to the fact that 7 of the 31 individuals cited in A/R crashes were arrested for DWI/DWAI, which offense is of course precluded in the non-A/R crash.

None of the other characteristics listed in Table XXIV exhibited significantly different distributions in A/R crashes as compared to the non-A/R crash. In particular, the young drivers indicated that they reported (i.e., to the state DMV or other agency) both types of accidents with about equal frequency (73% of A/R crashes and 71% of non-A/R), that they usually had been on the road for less than one-half hour prior to the crash (about 70% of all cases), and that they had applied their brakes in an attempt to avoid the crash in the majority (60%) of cases. There also was no significant difference in the number of passengers present in the crash-involved vehicles, although passengers were present in somewhat more of the A/R crashes than the non-A/R events (58% and 47% of the cases, respectively).

(2) Comparisons of Sampled Crashes: Young Versus Old Drivers

Table XXV lists the characteristics of the sampled crashes (nighttime, injury-producing events) reported by the young and older driver groups. The first point to be noted is that appreciable proportions of these crashes were alcohol-related, at least to the extent that the driver reported consuming alcohol within 4 hours prior to the crash. This was the case for 82 of the 200 young drivers (41%), and for 14 of the 46 older drivers (30%). This degree of alcohol involvement did not differ significantly between the two age ranges ($\chi^2 = 1.75$, 1 d.f., N.S.).

Table XXV

Sampled Crash Characteristics

		Young Subjects	Older Subjects
Reported to Officials	Yes	196	45
	No	4	1
Type	Ped/Other	123	33
	Single Vehicle	77	13
Resultant	P.D.	121	21
	Injury	79	23
Day of Week	M-Th.	67	18
	F-Sun.	132	28
Time of Day	2400-0559	73	11
	0600-1259	10	1
	1300-1959	18	6
	2000-2359	99	28
Speed Prior to Crash	< 20	44	19
	20-39	89	20
	40-59	55	7
	≥ 60	8	0
Posted Speed	< 20	2	0
	20-39	95	22
	40-59	87	21
	≥ 60	1	1
Exceeding Posted Speed	Yes	25	1
	No	160	43
Number of Passengers	0	90	27
	1	62	11
	≥ 2	46	7
Reported Alcohol Related	Yes	82	14
	No	118	32
Drug Involvement	Yes	7	0
	No	193	46

Table XXV (Continued)

Sampled Crash Characteristics

		Young Subjects	Older Subjects
Cited for Violation	Yes	61	10
	No	138	35
Time on Road Prior to Accident	< 30	144	35
	30-59	29	8
	≥ 60	27	3
Brake to Avoid Crash	Yes	134	19
	No	62	26
Estimated BAC at time of Crash* (Includes only those who had been drinking)	≤ .02	45	6
	.03-.09	21	7
	≥ .10	16	1

*BAC measures used in this and succeeding tables were derived by adjusting the respondent's reported number of drinks in accordance with his body weight, and in accordance with an assumption that three (3) hours was spent consuming those drinks.

Perhaps the most obvious difference between the younger and older subjects in this file concerns the incidence of drug involvement in these crashes. Seven of the younger drivers (3.5%) reported they had consumed some drug other than alcohol within 4 hours prior to the crash; none of the older drivers reported doing so.

Statistically significant differences between the crash characteristics of the younger and older drivers may be listed as follows:

(1) Speed ($\chi^2 = 5.19$, 1 d.f., $p<.05$). 32% of the young drivers were travelling at 40 mph or more prior to their crashes; the corresponding figure for older drivers was 15%. However, there was no significant difference in the posted speed at their crash locations ($\chi^2 = 0.08$, 1 d.f., N.S.). Further, more young drivers (14% versus 2%) were found to be exceeding the posted speed prior to the crash.

(2) Braking to Avoid the Crash ($\chi^2 = 10.79$, 1 d.f.; $p<.005$). 68% of the young drivers, but only 42% of the older, reported they had applied their brakes in an effort to avoid the crash.

None of the other crash characteristics listed in Table XXV differed significantly between the young and older subjects. However, it may be worth noting that, of the young drivers who had been drinking, some 20% probably had a BAC of 0.10% or more at the time of the crash. This is true of about 7% of the older drivers who had been drinking. However, 55% of the young drinking drivers probably had a BAC no greater than 0.02%, while this is the case with 43% of middle aged drinking drivers. Other notable, but not statistically significant, differences may be listed as follows:

- Crash type--39% of the young driver sampled crashes were single vehicle events, as compared to 28% of those crashes involving middle aged drivers.

- Time of day--37% of the young driver crashes occurred between midnight and 6 a.m., as compared to 24% of the middle aged driver crashes.

- Passengers--at least one passenger was travelling with 55% of the young crash-involved drivers, while only about 40% of the middle aged drivers had a passenger in their vehicles.

It is of interest to note in passing that the young driver sampled crashes, although dividing nearly equally into alcohol-involved and non-alcohol-involved events, on the whole display characteristics quite similar to those of their A/R crashes. Conversely, the older driver sampled crashes, despite their fairly high proportion of alcohol-involved events, generally are more akin to the non-A/R crashes reported by young drivers.

(3) Characteristics of "Other" Young Driver Crashes

The "other" crash file was also examined for the young subjects, and the relevant data is listed in Table XXVI. As can be seen, this file primarily consists of non-alcohol related events: in 80 of the 98 cases, the subjects reported they had consumed no alcohol within four hours prior to the crash. Further, no significant difference was found between the "other" and non-alcohol related crash files for young subjects on any of the characteristics listed in Table XXVI.

(4) Comparisons of A/R and Non-A/R Violations Involving Young Drivers

Table XXVII lists the circumstantial characteristics of the A/R and non-A/R accident-free violations and presents their distributions for the young "GP", "A", and "D" samples. As was the case for the comparison of A/R and non-A/R crashes, the analysis commenced with exploration of the differences among these survey populations. Again, no significant differences among the "GP", "A", and "D" groups were found in either the A/R or non-A/R events.

When the two types of violations were compared, significant differences were found on two of the characteristics listed in Table XXVII:

(1) Drug Involvement ($\chi^2 = 23.57$, 1 d.f., $p < .001$ for the total sample, and $\chi^2 = 15.95$, 1 d.f., $p < .001$ for the "GP" sample). Some other drug in addition to alcohol was used by nearly 18% of the drivers in A/R violations within 4 hours prior to the offense, while this was true in only 3% of non-A/R violations.

(2) Perceived Reason for Being Stopped ($\chi^2 = 7.31$, 2 d.f., $p < .05$ for the total sample, and $\chi^2 = 6.25$, 2 d.f., $p < .05$ for the "GP" sample). The major difference between the two types of violations in this regard seems to be that about 37% of the A/R drivers cited vehicular maneuvers other than speeding (i.e., weaving, going too slowly, improper maneuver) as the reason they believed they were stopped; in non-A/R cases, only 22% of the drivers gave these reasons.

It is also worth commenting on the specific offenses with which these drivers were charged. In 12 of the A/R cases (14%), the driver was

Table XXVI

The "Other" Crash: Young Subjects' Involvement

		GP	A	D	Total
Year	71	6	10	6	22
	72	17	9	7	33
	73	15	11	9	35
	74	2	4	2	8
Reported to Officials	Yes	24	20	17	61
	No	16	14	7	37
Type	Ped./Other	24	14	16	54
	Single Vehicle	12	18	8	38
Resultant	Property Damage (only)	35	27	21	83
	Injury	5	6	3	14
Day of Week	M-Th.	20	16	7	43
	F-Sun.	19	17	17	53
Time of Day	0400-0959	3	2	1	6
	1000-1559	12	11	7	30
	1600-2159	20	14	9	43
	2200-0359	4	7	7	18
Speed Prior to Crash	< 20	18	15	12	45
	20-39	16	8	8	32
	40-59	5	7	2	14
	≥ 60	1	4	2	7
Posted Speed	< 20	0	3	1	4
	20-39	21	12	15	48
	40-59	13	13	5	31
	≥ 60	0	2	0	2
Exceeding Posted Speed	Yes	3	4	4	11
	No	31	26	17	74
Number of Passengers	0	18	16	12	46
	1	14	11	10	35
	≥ 2	8	7	1	16
Reported Alcohol Related	Yes	4	7	7	18
	No	36	27	17	80

Table XXVI (Continued)

The "Other" Crash: Young Subjects' Involvement

		GP	A	D	Total
Cited for Violation	Yes	3	4	5	12
	No	37	30	19	86
Time on Road Prior to Crash	< 30	24	22	17	63
	30-59	6	3	5	14
	≥ 60	10	9	2	21
Brake to Avoid Crash	Yes	20	22	11	53
	No	20	12	13	55

Table XXVII

Young Subjects' Violation Involvement

		A/R Violation			Non-A/R Violation		
		GP	A	D	GP	A	D
Year	71	5	0	1	9	7	5
	72	4	5	4	28	10	7
	73	13	9	14	46	46	15
	74	16	9	5	43	36	6
Type	Warning only	1	1	0	8	4	3
	Ticket/Arrest	37	22	24	118	95	30
Perceived Reason for Being Stopped	Speed	12	13	9	59	53	17
	Other maneuver	17	7	7	30	20	6
	Other (e.g., license check)	9	2	8	36	23	10
Drug Involvement	Yes	7	3	5	2	4	1
	No	31	20	19	124	95	32
Specific Offense Charged	DWI/DWAI	5	2	5	0	0	0
	Speed	13	12	11	59	55	17
	Other maneuver	12	6	4	24	17	7
	Other (e.g., defective equipment)	8	3	4	43	27	9

arrested for DWI or DWAI; of course, these charges could not be lodged in non-A/R cases. But, when the remaining (73) A/R case charges are compared with the non-A/R events, one sees that the former include proportionately more citations for non-speeding maneuvers (i.e., following too closely, ignoring traffic devices, reckless driving, improper turn). Twenty-two of these 73 A/R cases (30%) involved such charges, while this is true of 48 of the 258 non-A/R events (15%). This difference does not quite attain the level of statistical significance ($\chi^2 = 5.64$, 2 d.f., N.S. for the total sample, and $\chi^2 = 4.59$, 2 d.f., N.S. for the "GP" sample). However, it may support--or help to explain--the differences in their perceived reason for being stopped. That is, drivers in A/R violations may tend to feel they were stopped because of "risky" driving behavior (weaving, improper maneuver, etc.) because they were ticketed on such charge. In any event, both the perceived reasons for being stopped and the ultimate charges lodged suggest that A/R drivers were experiencing, and exhibiting symptoms of, driving impairment more often than the non-A/R drivers.

(5) Sampled Violation Findings

Extensive comparison of the characteristics of sampled violations for young and older subjects is precluded, owing to the relatively small samples of these events and their high degree of similarity due to sampling procedures (i.e., all were DWI/DWAI arrests taking place in late 1973 or early 1974). However, the following two observations are worthy of mention:

(1) Drug involvement was found in 5 of the 36 (14%) sampled violations of young subjects, but in none of the 13 older driver sampled violations.

(2) Five of the 36 youths (14%) cited excessive speed as the reason they believed they were stopped by the police, while none of the older drivers did so.

(6) Characteristics of "Other" Young Driver Violations

Data on the "other" violation file for young drivers is listed in Table XXVII. As was the case with the "other" crashes, these are largely non-alcohol-related events (84% of the cases).

In order to summarize the crash data comparisons for young drivers, it is instructive to begin by observing that the files provide four gradations of alcohol involvement:

- Non-alcohol related crashes--0% alcohol involvement
- "Other" crashes--18% alcohol involvement
- Sampled crashes--41% alcohol involvement

Table XXVIII

The "Other" Violation: Young Subjects' Involvement

		GP	A	D	Total
Year	71	13	7	0	20
	72	18	15	5	38
	73	21	12	9	42
	74	4	4	2	10
Type	Warning (only)	2	2	1	5
	Ticket/Arrest	54	36	15	105
Perceived Reason for Being Stopped	Speed	27	19	6	52
	Other maneuver	10	10	5	25
	Other (e.g., license check)	18	8	5	31
Alcohol Involvement	Yes	6	5	7	18
	No	50	33	9	92
Drug Involvement	Yes	4	2	2	8
	No	52	36	14	102
Specific Offense Charged	DWI/DWAI	3	1	2	6
	Speed	27	19	7	53
	Other maneuver	8	7	2	17
	Other (e.g., defective equipment)	17	11	5	33

. Alcohol-related crashes--100% alcohol involvement

Thus, the young drivers' crash characteristics that are related to alcohol-involvement can best be delineated in terms of their representations in these files:

(1) The alcohol-involved crash is more likely to be a single-vehicle event.

Single vehicle crashes account for 32% of the non-alcohol related accidents, 41% of the "other" crashes, 39% of the sampled crashes, and 60% of the alcohol-related file.

(2) Alcohol-involved crashes predominately are weekend events.

45% of non-A/R crashes occur on Friday, Saturday, or Sunday, while this is true of 55% of the "other" crashes, 66% of the sampled accidents, and 70% of the A/R crashes.

(3) Excessive speed is more often found in alcohol-involved crashes.

Young drivers were found to have exceeded the posted speed limit in 8% of non-A/R accidents, 13% of the "other" crashes, 14% of the sampled crashes, and 23% of the A/R events.

(4) Passengers are present slightly more often in vehicles in alcohol-involved crashes.

At least one passenger was accompanying 47% of the drivers in non-A/R crashes. This is true of 53% of the "other" events, 55% of the sampled crashes, and 58% of the A/R accidents.

(5) Drug use more often preceeds the alcohol-involved crash.

Here, however, the variation is not systematic across the crash categories. Young drivers were found to have used drugs other than alcohol prior to 5% of the non-A/R crashes, 7% of the "other" accidents, 4% of the sampled accidents, and 15% of the A/R crashes.

(6) The alcohol-involved crash is much more often a late night event.

Here, the sampled event--owing to its selection criteria--

cannot be used as a basis for comparison. But, 58% of the A/R crashes took place between 10:00 p.m. and 4:00 a.m., while this was true of only 20% of non-A/R crashes and 19% of "other" crashes.

(7) The alcohol-involved crash more often produces bodily injury.

Again, selection criteria for the sampled crash preclude its use as a basis for comparison. But, subjects reported that injury was involved in 20% of the A/R crashes, and in roughly 15% of both the non-A/R and "other" events.

(8) Drivers in alcohol-involved crashes tend to be ticketed or arrested more often for moving vehicle violations.

Only 10% and 12%, respectively, of drivers in non-A/R and "other" crashes were ticketed/arrested, as compared with 32% of the A/R crash drivers and 31% of the drivers in sampled crashes.

It should also be noted that these file comparisons disclosed no systematic association between alcohol involvement and:

. The amount of time the driver had been on the road prior to the crash (less than one-half hour in the majority of all cases, and specifically, in 69% of the non-A/R crashes, 64% of the "others", 72% of the sampled events, and 73% of the A/R accidents).

. Whether or not the driver had applied the brakes in an effort to avoid the crash (generally, they did so, and this was reported in 60% of non-A/R accidents, 49% of "other" crashes, 68% of sampled crashes, and 62% of the A/R events).

Finally, several trends concerning the characteristics of youthful drinking-driving are also evident from the violation files. These include the following findings:

(1) Drug use more frequently preceeds violations that are alcohol-involved.

Only 3% of young drivers in non-A/R violations had used some drug within 4 hours prior to their apprehension, while this was true in 7% of the "other" violations, and in 18% of the A/R violations and sampled DWI/DWAI cases.

(2) The A/R violation tends to be more "severe".

Warning tickets were issued to 6% of the drivers in non-A/R violations, but in only 5% of the "other" events and 2% of the A/R cases. Of course, owing to sampling criteria, none of the sampled violations involved warning tickets.

(3) Impaired vehicular control is more often associated with A/R violations.

Weaving, improper maneuvers, and other evidence of poor control was cited by only 22% of the drivers in non-A/R violations as the reason for their apprehension, but such symptoms were mentioned for 37% of the A/R cases. However, the incidence of speeding remains high in alcohol-involved events. In fully 41% of the A/R violations, and 14% of the sampled DWI/DWAI events, the drivers believed they were stopped because of their excessive speed.

One of the most interesting results, however, from the crash and violation data is simply the frequency of occurrence of the sampling groups within each file. More than twice as many young drivers from the general population reported at least one non-alcohol related crash (38% of the young GP drivers to 19% of the old) and more than twice as many reported at least one non-alcohol related violation (34% to 14%). The difference was even larger with respect to alcohol related events. Fully 14% of the young general population drivers (about 1 in 7) reported at least one alcohol related crash as compared to only 5% of the older general population drivers. For alcohol related violations (not associated with an accident) the difference was 10% to 1%. Clearly, not only are young male drivers involved in more crashes and violations, but they are also involved in more alcohol related crashes and violations than are older male drivers.

D. Analyses by Drinking Frequency

Subjects who reported using alcohol indicated that they do so with varying frequency. In particular, frequency of use by time of day differed appreciably both within and among the groups constituting the survey population. Measures of alcohol use frequency were obtained from each respondent for the following periods of the day:

- Morning
- Before/during lunch
- Afternoon
- Before/during dinner
- Evening

Numerical weights were assigned to each frequency class for each of these periods and aggregated to produce a total drinking frequency index (DFI) for

each subject. For purposes of subsequent analysis, subjects were grouped into four DFI categories, which may be described as follows (see also Oates and McKay, 1972):

DFI Category	Description
≤4 (very infrequent drinker and abstainers)	This class includes 65 subjects, 35 to 49 years of age and 244 subjects, 16 to 24. Most typically, they drink no more than once each week during the evening; they may also occasionally drink during or immediately before dinner, but usually do so once each month or less. They almost never drink during the afternoon or around lunch time, and totally abstain from drinking during the morning. These subjects would thus appear to be very infrequent users of alcohol.
5-9 (infrequent drinkers)	This class includes 35 of the older subjects and 150 of the younger. Usually, they drink about once each week during the evening and several times per month during dinner. They may also occasionally drink during the afternoon or at lunch time, but generally do not do so more than once per month. In virtually all cases, they do not drink during the morning. These could be labeled infrequent drinkers.
10-19 (frequent drinkers)	This class includes 38 of the older subjects and 209 of the younger. They drink during the evening several times each week and about once each week at dinner. They will also drink during the afternoon several times each month, and once or twice each month at lunch time. About one in ten of these subjects will also drink during the morning, at least on rare occasions. This class can be considered as frequent drinkers.
≥20 (very frequent drinkers)	This class includes 19 older subjects and 74 of the younger individuals. Usually, they drink during the evening on a daily basis, and at least several times each week during dinner. They also drink during the afternoon once or twice each week, and

several times per week during lunch. About half of the members of this group also admit to drinking during the morning, and many do so at least once each week. This class can be called very frequent drinkers.

Each of these categories was represented in the groups surveyed, as shown in the following tabulation:

	Young Subjects (16-24)			Older Subjects (35-49)		
DFI	General Population	Accident Sample	DWI/DWAI Convicted	General Population	Accident Sample	DWI/DWAI Convicted
≤ 4	148 (40.0)	80 (34.8)	16 (20.3)	31 (42.5)	26 (44.8)	8 (30.8)
5- 9	91 (24.6)	46 (23.0)	13 (16.5)	17 (23.3)	13 (22.4)	5 (19.2)
10-19	102 (27.6)	71 (30.9)	36 (45.6)	20 (27.4)	14 (24.1)	4 (15.4)
≥ 20	29 (7.8)	33 (14.3)	13 (16.5)	5 (6.8)	5 (8.6)	9 (34.6)
N=	370 (100%)	230 (100%)	79 (100%)	73 (100%)	58 (100%)	26 (100%)

Clearly, infrequent or very infrequent drinking is practiced by the majority (approximately 65%) of both the younger and older members of the general population of drivers. However, both age ranges also include appreciable proportions of frequent or very frequent drinkers. Moreover, young subjects who were selected on the basis of accident involvement include many more frequent or very frequent drinkers than does the general population of that age range; note, however, that this is not true of the older subjects. Finally, a majority of the subjects selected on the basis of DWI conviction can be classed as frequent or very frequent drinkers.

Comparisons of the distributions of DFI for young and old subjects disclosed no significant differences for the general population, and accident-involved sample. However, the young DWI versus old DWI samples differed significantly ($\chi^2 = 8.73$, 3 d.f., $p < .05$). The general population differed significantly from the DWI sample for both age ranges ($\chi^2 = 21.01$, 3 d.f., $p < .001$ for young subjects, and $\chi^2 = 12.40$, 3 d.f., $p < .01$ for older subjects). Further, for young subjects, a significant difference was found between the general population and the accident involved sample ($\chi^2 = 8.68$, 3 d.f., $p < .05$), although no significant difference exists between the corresponding samples of older subjects. Finally, drinking frequency varied significantly between the accident involved and DWI involved subjects of both age ranges ($\chi^2 = 8.27$, 3 d.f., $p < .05$ for young subjects, and $\chi^2 = 8.88$,

3 d.f., $p < .05$ for older subjects).

Thus, an appreciable proportion of the driving population is composed of frequent to very frequent drinkers, and this is equally true of the younger and older driver populations. These high frequency drinkers are significantly overrepresented among the drivers convicted of DWI. Perhaps more importantly, young frequent drinkers are significantly overrepresented among the drivers involved in nighttime, injury-producing accidents but this is not true of the older frequent drinkers. Relative to drinking frequency, the older accident involved driver seems quite similar to the members of the general population, while the young accident involved driver appears to fall midway between the general population and DWI sample. This suggests that drinking frequency is an important characteristic of young drivers, in that it is related to their incidence of accident involvement. Accordingly, the questionnaire data was analyzed to determine whether drinking frequency bears any relationship to the subjects' backgrounds, attitudes, or behaviors concerning driving or drinking driving. Each result has been summed across all three sample groups (i.e., general population, accident involved and DWI/DWAI convicted). Thus, these results do not represent the population at large in that individuals who have been involved in night injury producing accidents and DWI/DWAI convictions are overrepresented which in turn produces an overrepresentation of the frequent and very frequent drinkers. The results of these analyses are discussed below.

1. Driving Exposure

Drinking frequency is closely associated with the amount and type of driving done by young subjects, but has little or no relationship to older subjects' driving patterns. Data bearing on this issue is given in Table XXIX. Young drivers who are frequent or very frequent drinkers tend to drive significantly more miles than do their infrequent drinking peers, and also tend to do a significantly larger proportion of their driving at night. Thus, the frequent-drinking young driver exhibits greater driving exposure, particularly during that period when the incidence of alcohol-related crashes is highest. In contrast, total driving exposure and nighttime driving exposure are essentially independent of drinking frequency among older subjects.

There is also evidence that unsafe driving behavior is found significantly more often among young frequent drinkers. Specifically, they more often admit to exceeding the speed limit than do their infrequent drinking peers, and they report a higher incidence of drowsiness while driving. Further, young frequent drinkers report significantly more instances of speeding and the performance of violent vehicular maneuvers when emotionally upset. Among older drivers, none of these behaviors are affected by drinking frequency. Frequent and infrequent drinking youths also differ significantly relative to seat belt usage, with the former being less likely to wear the belt. Older drivers tend to exhibit this same difference, although not to the level

Table XXIX

Driving Exposure and Behavior as a Function of Drinking Frequency

		Young Subjects DFI				Older Subjects DFI			
		≤ 4	5-9	10-19	≥ 20	≤ 4	5-9	10-19	≥ 20
Reported Annual Mileage	< 5000	82	39	43	11	2	2	3	1
	5-10,000	42	28	29	9	12	4	4	3
	10-15,000	53	37	55	19	18	18	13	8
	15-20,000	25	16	24	11	11	3	4	2
	≥ 20,000	37	25	54	23	22	8	14	5
		χ^2 = 27.04, 12 d.f. p < .01				χ^2 = 9.29, 12 d.f. N.S.			
Reported Percentage of Night Driving	< 20%	62	25	26	4	21	12	14	9
	20-30%	49	26	39	6	17	8	9	2
	30-40%	28	26	29	11	10	6	3	1
	≥ 40%	95	67	109	51	17	9	12	7
		χ^2 = 37.33, 9 d.f. p < .001				χ^2 = 5.78, 9 d.f. N.S.			
Tend to Drive Faster than Speed Limit	Agree	77	66	83	37	12	9	11	4
	Neutral	27	15	30	7	5	1	3	0
	Disagree	141	69	96	31	47	25	24	15
		χ^2 = 13.88, 6 d.f. p < .05				χ^2 = 4.15, 6 d.f. N.S.			
Tend to Become Sleepy While Driving	Never	134	50	77	30	37	14	18	6
	Seldom	94	68	98	35	18	15	13	8
	At times	29	31	34	10	9	6	8	5
		χ^2 = 19.90, 6 d.f. p < .005				χ^2 = 5.90, 6 d.f. N.S.			
When Upset, Tend to Drive Faster	Never	117	38	78	18	42	25	23	14
	Seldom	74	48	61	24	14	7	9	2
	At times	54	63	70	33	8	3	6	3
		χ^2 = 32.50, 6 d.f. p < .001				χ^2 = 2.55, 6 d.f. N.S.			

Table XXIX (Continued)

Driving Exposure and Behavior as a Function of Drinking Frequency

		Young Subjects DFI				Older Subjects DFI			
		≤ 4	5-9	10-19	≥ 20	≤ 4	5-9	10-19	≥ 20
When Upset, Perform Violent Maneuvers	Never	202	107	143	47	61	30	36	16
	Seldom	25	28	46	16	3	4	2	2
	At times	18	13	19	12	1	1	0	1
		$\chi^2 = 20.23$, 6 d.f. $p < .005$				$\chi^2 = 4.38$, 6 d.f. N.S.			
Reported Seat Belt Use Frequency	Never	80	49	81	35	22	6	8	9
	less than 50%	63	51	59	25	16	11	14	7
	more than 50%	101	50	69	15	27	18	16	3
		$\chi^2 = 14.68$, 6 d.f. $p < .05$				$\chi^2 = 10.72$, 6 d.f. N.S.			
Reported Having Basic Driver Education	Yes	149	103	132	50	13	5	9	3
	No	96	47	77	25	52	30	29	16
		$\chi^2 = 2.79$, 3 d.f. N.S.				$\chi^2 = 1.21$, 3 d.f. N.S.			
Reported Having Remedial Driver Education	Yes	27	21	26	16	5	2	1	1
	No	217	129	183	59	59	33	37	18
		$\chi^2 = 5.46$, 3 d.f. N.S.				$\chi^2 = 1.21$, 3 d.f. N.S.			

of statistical significance.

Among young drivers, then, high-frequency of alcohol consumption is associated with greater driving exposure and a higher incidence of risky driving, both of which may contribute to their overrepresentation among accident-involved youths. It is also clear that these differences in driving behavior cannot be attributed to variation in driving training, since no significantly different exposure to either basic or remedial driver education courses was found between frequent and infrequent drinkers.

2. Drinking-Driving Behavior

Drinking frequency is also associated with drinking-driving patterns among youths, as indicated in Table XXX. As might be expected, young frequent drinkers report a significantly higher incidence of drinking-driving than do their infrequent-drinker peers, and the same difference is found among older subjects. The frequent drinkers of either age range also more often believe that they can continue to drive well at high BAC, and many more of them report that they have recently driven at an elevated BAC. However, the incidence of drinking-driving is high even for the very infrequent drinkers. Fully 38% of the young very infrequent drinkers have driven after drinking at least 20 times during the past year, and this is true of 23% of the older very infrequent drinkers. Further, of the young very infrequent drinkers who have driven after drinking during the past year, nearly 15% probably had a BAC of at least 0.10% on the most recent occasion; this is true of about the same percentage of older very infrequent drinkers. To be sure, the very frequent drinkers report a much higher incidence of drinking-driving, and of driving with a BAC of 0.10% or more. But, the problem is by no means restricted only to those who drink very often.

Perhaps most importantly, the type of driving done after drinking varies significantly with drinking frequency. Among youths, frequent drinkers much more often indicate that they tend to drive faster after drinking; no such result is found among older drivers. Also, frequent-drinker youths are less likely to fear accident-involvement or police apprehension when driving after drinking than are young infrequent drinkers. Thus, the young frequent drinker reports that he is not only more likely to engage in drinking-driving, but also more often combines drinking-driving and speeding and is less deterred by fear of accident or arrest.

3. Alcohol and Drug Use

As would be expected, drinking frequency is closely related to alcohol consumption quantity among younger subjects. It also appears to be associated with the type of beverage typically consumed. In Table XXXI, it can be seen that the young frequent drinker is much more likely to achieve a very high BAC on any given occasion than is the young infrequent drinker. About 32% of the frequent or very frequent drinkers among the younger popula-

Table XXX

Drinking-Driving Behavior as a Function of Drinking Frequency

		Young Subjects DFI				Older Subjects DFI			
		≤ 4	5-9	10-19	≥ 20	≤ 4	5-9	10-19	≥ 20
Maximum BAC* at which Subject States he can still Drive Well	≤ 0.04%	82	56	47	10	22	24	20	5
	0.05-0.09	47	56	74	19	10	4	9	3
	0.10-0.15	25	14	36	11	4	4	2	3
	≥ 0.16%	31	21	50	34	3	1	7	8
		χ^2 = 59.83, 9 d.f. p < .001				χ^2 = 22.86, 9 d.f. p < .01			
BAC* on Most Recent Drinking-Driving Situation	≤ 0.04%	109	83	118	35	23	23	24	8
	0.05-0.09	28	38	35	9	3	7	6	1
	0.10-0.15	12	10	24	16	2	1	3	4
	≥ 0.16%	12	8	31	12	3	0	3	3
		χ^2 = 33.65, 9 d.f. p < .001				χ^2 = 14.84, 9 d.f. N.S.			
Reported Number of Drinking-Driving Events Per Year	< 9	91	50	38	9	27	15	7	3
	10-19	26	21	26	3	4	6	5	2
	20-29	20	16	17	10	0	4	1	1
	≥ 30	52	62	127	53	9	10	25	13
		χ^2 = 78.85, 9 d.f. p < .001				χ^2 = 34.68, 9 d.f. p < .001			
When Driving after Drinking:									
Tend to Drive Faster	Yes	15	25	37	22	3	0	2	2
	No	148	116	171	51	29	30	34	15
		χ^2 = 16.15, 3 d.f. p < .005				χ^2 = 3.53, 3 d.f. N.S.			
More Afraid of Accident	Yes	78	77	82	24	17	13	15	7
	No	85	64	126	49	15	17	21	10
		χ^2 = 12.73, 3 d.f. p < .01				χ^2 = 1.15, 3 d.f. N.S.			
More Afraid of Police	Yes	78	74	84	26	11	9	10	8
	No	85	67	124	47	21	21	26	9
		χ^2 = 8.11, 3 d.f. p < .05				χ^2 = 2.11, 3 d.f. N.S.			

*BAC measures used in this table were derived by adjusting the respondent's reported number of drinks in accordance with his body weight, and in accordance with an assumption that three (3) hours was or would be spent consuming those drinks.

Table XXXI

Alcohol and Drug Use as a Function of Drinking Frequency

		Young Subjects DFI				Older Subjects DFI			
		≤ 4	5-9	10-19	≥ 20	≤ 4	5-9	10-19	≥ 20
Reported BAC on the Typical Drinking Occasion*	≤0.04%	105	70	81	19	32	28	28	12
	0.05-0.09	48	46	66	26	5	5	5	4
	0.10-0.15	17	17	33	10	1	1	4	1
	≥0.16%	19	15	28	19	2	1	1	2
		χ^2=30.30, 9 d.f. p <.001				χ^2=6.31, 9 d.f. N.S.			
Reported Preferred Beverage	Beer	145	120	183	65	18	22	24	15
	Other	46	30	26	10	22	13	14	4
		χ^2 = 10.71, 3 d.f. p <.05				χ^2= 6.86, 3 d.f. N.S.			
Use Marijuana (within past 6 mos.)	Yes	64	53	97	42				
	No	181	97	112	32				
		χ^2 = 32.51, 3 d.f. p <.001							
Use Hallucinogens (within past 6 mos.)	Yes	7	4	21	14				
	No	238	146	188	60				
		χ^2 = 30.74, 3 d.f. p <.001							
Use Amphetamines (within past 6 mos.)	Yes	13	11	26	14				
	No	232	139	183	60				
		χ^2 = 15.65, 3 d.f. p <.005							
Use Barbiturates (within past 6 mos.)	Yes	8	15	34	19	8	3	4	1
	No	237	135	175	55	57	32	34	18
		χ^2 = 36.69, 3 d.f. p <.001				χ^2 = 0.93, 3 d.f. N.S.			

(Older Subjects Include Insufficient Users of Marijuana, Hallucinogens, or Amphetamines to Permit Statistical Analyses)

*BAC measures used in this table were derived by adjusting the respondent's reported number of drinks in accordance with his body weight, and in accordance with an assumption that three (3) hours was or would be spent consuming those drinks.

tion claim to imbibe enough alcohol on the typical drinking occasion to achieve a BAC of 0.10% or more; the same is true of 20% of the young infrequent or very infrequent drinkers. It is of interest to note that, among older subjects, drinking frequency is not significantly related to the typical consumption quantity; and, only about 10% of all older subjects claim to achieve a BAC of 0.10% or more on the typical occasion. Overall, the young subjects reported higher BAC's on their typical occasion than did older subjects ($\chi^2 = 42.96$, $p < .001$ with 3 d.f.).

It can also be seen that, while beer is the beverage of choice of the majority of all drinkers, a significantly higher proportion of young frequent drinkers choose beer than is the case among young infrequent drinkers. This same trend is evident among older drinkers, although not to the level of statistical significance.

Among young drinkers, the incidence of drug use is closely allied with drinking frequency. The young frequent drinker is much more likely to report using marijuana, hallucinogens, amphetamines and barbiturates than is the young infrequent drinker. Among older subjects, there are very few reported users of the first three substances, too few in fact to permit meaningful statistical analysis. A small, but noticeable, percentage of older subjects do use barbiturates, but this use is not related to their drinking frequency.

In general, then, young subjects as a whole claim to consume greater quantities of alcohol on any typical occasion than do older subjects, and the difference is most pronounced when the young and older frequent drinkers are compared. Beer is the overwhelmingly preferred beverage of young drinkers, and especially the young frequent drinkers, and this observation also applies to older drinkers, although to a somewhat lesser degree. Finally, there is fairly widespread reported use of drugs among young subjects, but most especially among young frequent drinkers. For older subjects, there is very little reported drug use, and no relationship between drug use and drinking frequency.

In summary, drinking frequency is a key factor of the young driver problem. Very frequent drinkers (DFI $\geq$20) among young drivers are overrepresented by a margin of 2 to 1 in nighttime injury producing accidents. Among older drivers in such crashes, there is virtually no overrepresentation of very frequent drinkers. Moreover, the young frequent drinker differs significantly from his infrequent-drinking peer relative to numerous behavioral characteristics that may contribute to crash involvement. First, he exhibits much greater driving exposure, particularly relative to nighttime driving. When driving, he is more likely to speed and to become drowsy, and he more often admits that his emotions may generate risky driving behavior. He also is less likely to wear seat belts while driving. Second, the young frequent drinker tends to drive at higher BACs than does the infrequent drinker youth.

Nevertheless, the former more often combines speeding with drinking driving, and seems relatively less concerned with accidents or arrests when driving after drinking. Finally, the young frequent drinker tends to consume greater quantities of alcohol on any given occasion, and is much more likely to use drugs than is the young infrequent drinker. Among older drivers, drinking frequency has no significant relationship with any of these behaviors. Thus, the young frequent drinker is in many ways distinctly different from the remainder of his age group and he is also dissimilar to older drinkers. He emerges from this analysis as a "problem" driver, both in general and in relation to drinking-driving. However, he is probably quite different from the "problem" drinker characteristically involved in alcohol related crashes among the middle and older age groups.

E. Driving Related Variables

Several questions asked of respondents were concerned with driving itself and driving after drinking. Table XXXII shows the distribution of responses for each of the parts of the question "People who drive in accordance with the law do so because: .....?" This general question was followed by a series of seven specific reasons, such as because "of danger to themselves", "they think the police are present", etc. Overall, more subjects agreed with the reason because "they may lose their driving privilege" than with any other response (70%). This was followed by because "of the penalties" (68%) and because "their insurance may be increased or cancelled" (62%). The lowest number of respondents agreed with the reason because "of strong family pressure" (22%).

Significant differences in the distributions of responses to this question were found with respect to five of the seven reasons listed. The first concerned the "possibility of having to appear in court" ($\chi^2 = 39.28$, $p < .01$ with 18 d.f.). The nature of this difference was that those drivers convicted of DWI or DWAI more often agreed that this factor motivated good driving. This is probably a direct result of their own recent court appearance. The next three concerned "penalties" ($\chi^2 = 29.60$, $p < .05$ with 18 d.f.), loss of the "driving privilege" or license ($\chi^2 = 32.01$, $p < .05$ with 18 d.f.) and cancellation of "insurance" ($\chi^2 = 51.69$, $p < .001$ with 18 d.f.). In all three cases, young drivers more often agreed with the reason than did older drivers. Apparently, maintaining the driving privilege is an especially strong motivating factor for the young driver. Significant differences were also found between the groups with respect to "family pressure" as a motivating factor towards driving in accordance with law ($\chi^2 = 38.70$, $p < .01$ with 18 d.f.). The major difference here was that the middle aged (35-49 year old) drivers of the DWI/DWAI group more often agreed with this reason than did the remaining groups.

A second set of questions asked the respondents whether they agreed or disagreed with six statements concerning their own driving. A typical state-

Table XXXII

Factors Motivating Good Driving

People who drive in accordance with the law do so because of:		General Population GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	Night Injury Accident Involved A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	DWI/DWAI Convicted D16 (16-24 yrs.)	D35 (35-49 yrs.)
danger to themselves	Agree	92	70	47	46	53	47	32	29	42	14
	Neutral	25	12	8	5	14	10	7	5	7	3
	Disagree	40	44	32	22	24	20	23	24	30	9
police presence	Agree	100	77	50	34	48	42	27	27	45	10
	Neutral	15	17	14	6	11	10	13	9	10	2
	Disagree	42	32	23	33	32	25	22	22	24	14
possible court appearance	Agree	68	44	37	20	30	32	20	24	41	18
	Neutral	31	30	23	12	14	9	12	13	17	--
	Disagree	58	52	27	41	37	36	30	21	21	8
legal penalties	Agree	113	85	61	38	65	52	38	36	64	18
	Neutral	17	14	12	7	9	8	6	4	5	1
	Disagree	27	27	14	28	17	17	18	18	10	7
losing license	Agree	114	87	66	36	69	55	40	38	59	20
	Neutral	20	18	11	17	10	4	10	7	11	--
	Disagree	23	21	10	19	12	18	12	13	8	6
losing insurance	Agree	101	78	56	31	60	51	37	29	60	16
	Neutral	31	24	16	11	12	10	8	4	9	2
	Disagree	25	24	15	31	18	16	17	25	10	8
family pressure	Agree	32	20	17	16	15	14	12	21	21	12
	Neutral	46	36	20	13	27	27	17	5	12	5
	Disagree	79	69	50	43	49	36	33	32	46	9

ment was "you tend to drive faster than the speed limit." The greatest amount of agreement was observed for the statement "you enjoy driving" (86%) followed by the statement "driving is a privilege which the state can restrict in any way it sees fit" (75%). The least amount of agreement was found in relation to the statement "you tend to be overly cautious behind the wheel" (32%). Significant differences were found among the sampling groups with respect to five of the six statements. For the first statement, "you tend to drive faster ...", the nature of the difference was that young drivers more often agreed ($\chi^2 = 32.08$, $p < .05$ with 18 d.f.). For the statement concerning enjoyment of driving it was again true that more young drivers agreed ($\chi^2 = 44.70$, $p < .001$ with 18 d.f.). The next statement showing a significant difference across groups was "you are safer than most drivers" ($\chi^2 = 43.35$, $p < .001$ with 18 d.f.). The nature of this difference, however, was that those drivers in the recent night injury accident (A) groups agreed less often than did the drivers from the general population. The next statement concerned driving as a "privilege". Here, there was a tendency for the "A" and "D" drivers to agree less often than the general population, though overall agreement to this statement was high. The last statement, police are "tougher on young drivers" also produced a significant difference across the sampling groups ($\chi^2 = 34.14$, $p < .05$ with 18 d.f.). Again, a higher proportion of young drivers agreed with the statement though overall agreement was high. These results are shown in Table XXXIII.

The next six questions dealt with how often certain factors influenced driving behavior. These results are also shown in Table XXXIII. They indicate, often overwhelmingly, that young drivers more often admit that personal or emotional situations influence their driving behavior. For instance, the first statement was "you drive to let off steam". The differences among the sampling groups was statistically significant ($\chi^2 = 94.12$, $p < .001$ with 18 d.f.) with 17% of the GP16, 22% of the A16 and 22% of D16 drivers responding sometimes or more. This compares with 0% of GP35, 5% of the A35 and 0% of the D35 drivers responding sometimes or more. A significant difference among the groups was also found with the statement "you become very sleepy behind the wheel" ($\chi^2 = 61.61$, $p < .001$ with 18 d.f.), but not for the statement "when another driver cuts in front of you, you try to cut him off or crowd him" ($\chi^2 = 27.11$, N.S. with 18 d.f.). However, perhaps the most interesting results were found for the statements "if upset by a quarrel or conflict you: (1) drive much faster than normal, (2) perform violent maneuvers and (3) do not pay attention while driving. Significant differences among the groups were found for all three statements ($\chi^2 = 60.48$, $p < .001$ with 18 d.f.; $\chi^2 = 39.85$, $p < .01$ with 18 d.f.; $\chi^2 = 28.94$, $p < .05$ with 18 d.f., respectively). In each case, young drivers more often reported the occurrence of these aberrant driving behaviors following a quarrel or conflict. This suggests that for young drivers, a vehicle serves a wider purpose than just providing transportation. It is as if the vehicle provides an extension of the young driver's personality wherein he can act out, or at least react to, personal life stresses.

Table XXXIII

Perception of Driving Event

		General Population				Night Injury Accident Involved				DWI/DWAI Convicted	
		GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-24 yrs.)	D35 (35-49 yrs.)
Drive faster than speed limit	Agree	55	54	38	18	33	31	25	13	27	5
	Neutral	22	11	9	5	14	7	5	3	11	1
	Disagree	80	61	40	50	44	39	32	42	41	19
Enjoy driving	Agree	145	109	79	56	78	67	57	42	71	18
	Neutral	9	11	5	8	6	7	4	5	5	2
	Disagree	3	6	3	9	7	3	1	11	3	5
Overly cautious	Agree	40	40	21	29	27	25	20	22	26	13
	Neutral	49	30	23	17	33	27	14	9	22	3
	Disagree	67	56	43	27	31	24	28	27	31	9
Safer than most drivers	Agree	93	75	54	49	31	37	32	35	36	16
	Neutral	58	43	30	21	48	32	24	16	32	5
	Disagree	6	8	3	3	12	8	6	7	11	4
Driving is a privilege	Agree	125	89	57	61	72	54	45	41	62	19
	Neutral	13	12	12	3	7	8	4	--	2	--
	Disagree	19	15	18	9	12	15	13	17	15	6
Police are tougher on young drivers	Agree	105	85	49	41	63	45	35	29	59	14
	Neutral	32	26	16	16	17	14	13	10	6	3
	Disagree	20	15	22	16	11	18	14	19	14	8
Drive to let off steam	Never	78	66	45	69	43	40	30	51	48	23
	Seldom	52	36	24	4	28	23	19	4	14	2
	Sometimes (or more)	26	24	18	--	20	14	13	3	17	--

Table XXXIII (Continued)

Perception of Driving Event

		General Population				Night Injury Accident Involved				DWI/DWAI Convicted	
		GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-24 yrs.)	D35 (35-49 yrs.)
Become sleepy	Never	71	48	23	29	49	38	23	30	39	16
	Seldom	69	54	40	40	33	27	27	12	33	2
	Sometimes (or more)	16	24	24	4	9	12	12	16	7	7
Cut off other drivers	Never	109	84	57	58	66	53	41	49	60	24
	Seldom	29	24	23	8	15	13	10	7	14	--
	Sometimes (or more)	18	18	7	7	10	11	11	2	5	1
If upset by a quarrel or conflict you:											
Drive faster	Never	57	43	34	46	34	29	22	40	32	18
	Seldom	50	33	31	18	27	28	16	8	22	6
	Sometimes (or more)	49	50	22	9	30	20	24	10	25	1
Perform violent maneuvers	Never	112	94	73	65	65	57	42	55	56	23
	Seldom	31	23	6	7	14	16	11	2	14	2
	Sometimes	13	9	8	1	12	4	8	1	8	--
Do not pay attention	Never	91	56	45	46	53	49	32	44	38	18
	Seldom	42	42	22	16	23	14	17	8	26	4
	Sometimes (or more)	22	28	20	11	15	14	13	6	14	3

Table XXXIV shows the responses, by group, for the question "how often do you wear seat or lap belts?" These responses vary significantly as a function of sampling group ($\chi^2 = 53.3$, $p<.05$ with 36 d.f.). In general, young drivers and drivers from the "A" and "D" groups reported less belt usage than middle aged drivers and drivers from the general population. In short, those drivers who would benefit most from seat belts are least likely to wear them. As a further test of this result, young drivers from the general population (GP16, GP19 and GP22) were separated in two groups: those that reported at least one alcohol related crash versus those that did not. The results showed that 51% of these young drivers in the "had an alcohol related accident" group reported that they never wear seat or lap belts. This compares with only 29% of those young drivers who have not had an alcohol related crash.

Table XXXV shows the distribution of responses to the question "other than for passing or emergency maneuvers, what is the fastest you have ever driven on a public road within the past five years?" These results show clear and consistent differences across the groups. First, the middle aged drivers in groups GP35, A35, and D35 rarely reported driving 100 miles per hour or more. These drivers typically gave responses in the 60-79 mph range and typically said that they were merely following the speed limit. The typical response for the 22-24 year olds, however, was 100 mph or more. Drivers aged 16-21 gave slightly lower estimates than the 22-24 year olds, but even these reported speeds were much faster than with the middle aged drivers. Young drivers, 16-24 years, typically reported that their reason for traveling fast on that occasion was either that they were in a hurry or simply because they enjoy traveling fast.

Subjects were also questioned concerning any perceived changes in their driving when they are driving after drinking. The question read "on the typical occasion when you are driving after drinking, would you say that you: ....." This general statement was followed by nine specific driving actions, or driving related perceptions such as "are more afraid than usual of becoming involved in an accident?" The distribution of responses to this question for all subjects who reported any driving after drinking may be seen in Table XXXVI. Overall, these results indicate that young drivers are much more likely to report change, any change, in their driving following drinking than are middle aged drivers from the general population and accident samples. Middle aged drivers from the DWI/DWAI convicted group also report change which may be the result of their recent conviction or may be due to the fact that they typically drink larger quantities. Significant differences were found among the groups with respect to: more afraid of accident ($\chi^2 = 25.5$, $p<.01$ with 9 d.f.), more afraid of police ($\chi^2 = 39.2$, $p<.001$ with 9 d.f.), drowsy or falling asleep ($\chi^2 = 22.2$, $p<.01$ with 9 d.f.), drive faster ($\chi^2 = 18.8$, $p<.05$ with 9 d.f.), drive slower ($\chi^2 = 17.3$, $p<.05$ with 9 d.f.), and more often drive with the windows open ($\chi^2 = 23.6$, $p<.01$ with 9 d.f.). In short, young drivers as compared with middle aged drivers in the "GP" and "A" groups reported being more afraid of an accident, more

Table XXXIV

Reported Seat Belt Usage

Frequency of Seat Belt Usage	General Population				Night Injury Accident Involved				DWI/DWAI Convicted	
	GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-18 yrs.)	D35 (35-49 yrs.)
Never	51	43	25	21	33	27	27	14	39	10
	33%	34%	29%	29%	36%	35%	44%	24%	49%	38%
Almost Never	19	19	18	14	13	11	4	8	13	5
	12%	15%	21%	19%	14%	14%	6%	14%	16%	19%
Less Than Half the Time	21	14	9	10	16	13	12	9	16	2
	13%	11%	10%	14%	18%	17%	19%	16%	20%	8%
More Than Half the Time	23	9	10	1	8	5	3	4	4	4
	15%	7%	11%	15%	9%	6%	5%	7%	5%	15%
Almost Always	42	41	25	17	21	21	16	23	7	5
	27%	33%	29%	23%	23%	27%	26%	40%	9%	19%

Table XXXV

Fastest Ever Driven on a Public Road

	GP16 (16-18 yrs.)	GP19 (19-21 yrs.)	GP22 (22-24 yrs.)	GP35 (35-49 yrs.)	A16 (16-18 yrs.)	A19 (19-21 yrs.)	A22 (22-24 yrs.)	A35 (35-49 yrs.)	D16 (16-18 yrs.)	D35 (35-49 yrs.
Speed										
0-79 mph	55	36	23	44	37	23	11	42	21	21
	35%	28%	26%	61%	41%	30%	18%	72%	27%	81%
80-99 mph	53	41	26	25	21	18	24	11	17	3
	34%	32%	30%	35%	23%	23%	39%	19%	22%	12%
100 mph or more	49	50	38	3	33	36	27	5	40	2
	31%	39%	44%	4%	36%	47%	44%	9%	51%	8%

Table XXXVI

Perceived Change in Driving Event When Driving after Drinking

On the typical occasion when driving after drinking:		GP16 (16-18 yrs.) N=124	GP19 (19-21 yrs.) N=115	GP22 (22-24 yrs.) N=79	GP35 (35-49 yrs.) N=57	A16 (16-18 yrs.) N=77	A19 (19-21 yrs.) N=69	A22 (22-24 yrs.) N=59	A35 (35-49 yrs.) N=44	D16 (16-24 yrs.) N=77	D35 (35-49 yrs.) N=22
More afraid of accident?	Yes	48%	46%	33%	44%	62%	33%	39%	32%	43%	64%
	No	52%	54%	67%	56%	38%	67%	61%	68%	57%	36%
More afraid of police?	Yes	46%	43%	30%	23%	55%	46%	34%	27%	56%	72%
	No	54%	57%	70%	77%	45%	54%	66%	73%	44%	28%
Have poorer concentration?	Yes	34%	27%	25%	18%	34%	23%	25%	12%	26%	41%
	No	66%	73%	75%	82%	66%	77%	75%	88%	74%	59%
Become drowsy?	Yes	18%	15%	30%	2%	18%	14%	17%	11%	16%	23%
	No	82%	85%	70%	98%	82%	86%	83%	89%	84%	77%
Drive better?	Yes	24%	23%	23%	18%	31%	30%	31%	23%	32%	23%
	No	76%	77%	77%	82%	69%	70%	69%	77%	68%	77%
Drive faster?	Yes	11%	21%	13%	7%	17%	14%	20%	7%	25%	5%
	No	89%	79%	87%	93%	83%	86%	80%	93%	75%	95%
Drive slower?	Yes	52%	40%	44%	40%	57%	52%	39%	39%	38%	68%
	No	48%	60%	56%	60%	43%	48%	61%	61%	62%	32%
More often confused?	Yes	15%	17%	9%	9%	21%	20%	10%	7%	14%	18%
	No	85%	83%	91%	91%	79%	80%	90%	93%	86%	82%
Drive with windows open?	Yes	62%	58%	61%	43%	71%	62%	63%	34%	61%	59%
	No	38%	42%	39%	57%	29%	38%	37%	66%	39%	41%

afraid of police, becoming drowsy, driving faster, driving slower and more often driving with the windows open. These results might be interpreted as representing a simple response bias on the part of young drivers. However, it is felt that the more likely interpretation is that young drivers are still experimenting with drinking and with driving and thus driving after drinking for them is much more variable in its behavioral and emotional consequences and correlates.

Subjects were also asked to estimate the number of times per year that they drive after drinking. The results, by group, are listed below.

Group	Number who currently drink and drive	% of total group	Mean/yr. for those who drink and drive
GP16	124	79%	29.2
GP19	115	91%	38.2
GP22	79	91%	42.1
GP35	57	78%	32.0
A16	77	85%	34.7
A19	69	90%	45.6
A22	59	95%	55.0
A35	44	76%	33.8
D16	77	97%	43.2
D35	22	85%	48.4

It can be seen from this data that most subjects, regardless of group, drink and drive and for many subjects this is a weekly occurrence. Separate analyses were conducted on this data looking only at those young subjects who reported having had an alcohol related accident. The results showed that young (16-24 years) general population subjects who had an alcohol related crash averaged 55.1 drinking driving occasions per year. Young subjects in the night injury producing accident sample averaged 59.8 drinking driving occasions per year. This compares with 32.7 and 32.8 mean occasions per year for young drivers who drink and drive but did not report an alcohol related crash in the two groups, respectively. Thus, it appears that driving after drinking is a common event. It is apparently more common in the "A" and "D" sample, more common for drivers reporting an alcohol related crash and more common for the 22-24 year old, but nevertheless a frequent occurrence across all of the sampling groups.

F. Perception of the Drinking Driver

Question No. 62 of the questionnaire asked the respondent to "rate drinking drivers against a series of descriptive scales". These scales were

structured such that the ends of each scale represented opposite ends of a particular dimension. The subject's task was to place a check mark on the scale to indicate where he felt the drinking driver fell along the dimension in question. One such scale is shown below.

normal ____:____:____:____:____:____:____ disturbed

A checkmark in the middle of this, or any scale, was assigned the score of 4.0. Check marks to either side of the middle received progressively higher scores to the positive side of the dimension and lower scores to the negative side of the dimension. The scoring for the above scale would thus be as follows:

normal 7 : 6 : 5 : 4 : 3 : 2 : 1 disturbed

In all, there were 22 scales or dimensions upon which the drinking driver was rated. In some cases, the positive, or high side, of the scale was essentially assigned arbitrarily. For instance, on the scale hot - cold, check marks toward the hot side of the dimension were scored higher. Also, on the scale old - young, old was arbitrarily assigned the higher values. For some scales (randomly determined) the positive end of the scale appeared on the left side and the negative end on the right side of the page. For others, the positive and negative ends were reversed. The actual presentation format may be seen on page 14 of the questionnaire presented in Appendix A.

Table XXXVII shows the scales and the mean scores obtained by sampling group. A mean score of 4.00 indicates that the subjects were neutral with respect to that scale. Higher scores indicate a positive perception; lower scores a negative perception. Across all groups, only six scales produced mean scores greater than 4.0. These were: joiner (opposite was loner), conforming (non-conforming), hot (cold), happy (sad), brave (cowardly), and impulsive (restrained). Five scales produced mean scores less than 3.0, thus on these dimensions the respondents exhibited a negative perception of the drinking driver. The scales, expressed in terms of the negative concept were: careless (opposite was careful), unstable (stable), unreliable (reliable), dangerous (safe) and slow (quick). Thus, in general terms, the drinking driver tended to be perceived as being "brave", "conforming", "impulsive", "happy" and more of a "joiner". He also tended to be perceived as "careless", "unstable", "unreliable", "dangerous" and "slow". Mean values on the remaining 11 scales ranged from 3.16 (rational - irrational) to 4.00 (independent - dependent).

While the overall data is of interest, the more important comparisons are those between the sampling groups. An examination of the data in Table XXXVII shows a very clear and consistent pattern of differences across the ten sampling groups. First, those drivers who have had drinking driving problems consistently register higher or more positive scale values than

Table XXXVII

Mean Scores by Group for Drinking-Driver Scales

Dimension: Positive - Negative	General Population				Night-Injury Accident Involved				DWI/DWAI Conviction Involved		Total	S. D.
	GP16	GP19	GP22	GP35	A16	A19	A22	A35	D16	D35		
Normal-Disturbed	3.82	3.73	3.94	3.15	3.97	3.58	3.84	3.24	4.24	3.85	3.76	1.65
Ethical-Unethical	3.55	3.63	3.74	2.95	3.88	3.69	3.77	3.53	3.99	4.08	3.65	1.49
Joiner-Loner	4.14	4.24	4.56	4.15	4.58	4.57	4.45	4.38	4.89	4.69	4.47	1.59
Conforming-Non-conforming	4.31	4.35	4.32	3.38	4.33	3.97	4.15	3.91	4.42	4.23	4.18	1.51
Hot-Cold	4.60	4.41	4.30	4.15	4.45	4.61	4.34	4.33	4.25	4.84	4.42	1.24
Careful-Careless	2.43	2.63	2.51	2.07	2.66	2.66	2.68	2.62	3.08	2.69	2.58	1.46
Stable-Unstable	2.59	2.76	2.91	2.30	2.97	2.70	3.19	2.88	3.19	2.88	2.81	1.40
Happy-Sad	3.99	3.98	3.97	3.77	4.33	3.99	4.13	4.55	4.35	3.96	4.08	1.51
Mature-Immature	3.23	3.42	3.40	3.12	3.70	3.53	3.71	3.53	4.03	3.42	3.48	1.34
Strong-Weak	3.07	3.38	3.41	3.11	3.37	3.32	3.48	3.60	3.81	3.38	3.36	1.34
Brave-Cowardly	3.94	3.99	3.78	3.52	4.33	4.09	4.00	4.07	4.54	4.38	4.04	1.44
Independent-Dependent	4.06	3.83	3.91	3.93	3.98	4.38	3.98	3.78	4.06	4.15	4.00	1.60
Healthy-Ill	3.38	3.41	3.59	3.03	3.56	3.45	3.45	3.52	3.78	3.31	3.45	1.36
Reliable-Unreliable	2.69	2.97	3.02	2.51	2.73	3.19	3.32	3.12	3.28	2.92	2.94	1.41
Impulsive-Restrained	4.96	4.87	5.01	5.25	4.88	4.57	4.61	4.66	4.97	4.58	4.88	1.47
Old-Young	3.98	3.90	3.95	3.97	3.91	3.97	3.77	4.10	3.86	3.58	3.93	.77
Popular-Unpopular	3.78	3.72	3.86	3.33	3.92	3.86	3.65	3.53	4.01	3.65	3.75	1.28
Rational-Irrational	2.99	2.98	3.21	2.78	3.29	3.23	3.42	3.40	3.34	3.46	3.16	1.35
Leader-Follower	3.20	3.35	3.33	3.30	3.46	3.31	3.47	3.76	3.72	3.15	3.39	1.27
Smart-Stupid	3.01	3.13	3.37	2.71	3.10	3.47	3.55	3.09	3.39	3.19	3.18	1.26
Safe-Dangerous	2.12	2.24	2.16	1.90	2.13	2.34	2.34	2.34	2.58	2.35	2.23	1.30
Quick-Slow	2.72	3.02	2.60	2.56	2.71	2.97	2.95	3.45	3.19	2.35	2.86	1.57

NOTE: Theoretical mean value was 4.00; higher values indicate responses tended toward the positive side of the dimension; lower values toward the negative side.

those drivers who have not had problems. Second, young drivers consistently register higher scale values than older drivers. The D16 group being both young and with drinking driving problems scored more than 4.00 on ten scales and less than 3.00 on only one (safe - dangerous). Their mean score was above the mean score for all groups on every scale except "old - young" and "hot - cold" both of which were positive or negative only in an abritrary sense. The GP35 group, older and largely without a recent alcohol related accident or conviction, had a mean score below the mean for all groups on 18 of the 22 scales. They scored above the mean only on the scales: "impulsive - restrained", "old - young", "leader - follower", and "quick - slow".

A one-way analysis of variance was used to statistically test these differences across the sampling groups for each of the 22 scales. The results showed that the differences across groups were statistically significant for 12 of the 22 scales. The scales and F values were as follows:

normal - disturbed	$F_{9, 827} = 2.97$	$p<.01$
ethical - unethical	$F_{9, 827} = 3.02$	$p<.01$
conforming - nonconforming	$F_{9, 827} = 3.43$	$p<.001$
careful - careless	$F_{9, 827} = 2.36$	$p<.05$
stable - unstable	$F_{9, 827} = 2.98$	$p<.01$
mature - immature	$F_{9, 827} = 3.28$	$p<.001$
strong - weak	$F_{9, 827} = 2.42$	$p<.01$
brave - cowardly	$F_{9, 827} = 3.20$	$p<.001$
reliable - unreliable	$F_{9, 827} = 3.03$	$p<.01$
rational - irrational	$F_{9, 827} = 2.07$	$p<.05$
smart - stupid	$F_{9, 827} = 3.08$	$p<.01$
quick - slow	$F_{9, 827} = 2.64$	$p<.01$

With only minor exceptions, the pattern of group differences on each of these variables producing statistical significance was the same. Groups containing young drivers (16-24 years old) and groups containing more drivers with alcohol related driving events (e.g., DWI/DWAI convictions) registered more positive responses.

A factor analysis was conducted across all scales and all groups. The

resulting principal component solution was then rotated othogonally to simplify the resulting factors with respect to the 22 scales. Four underlying factors emerged accounting for 46.6% of the variance. These four factors may be considered as the underlying or basic dimensions in the subjects' perception of the drinking driver. The first factor (26.3% of the variance) appeared to be related to risk taking behavior. The scales "dangerous - safe" and "reliable - unreliable" were weighted heavily. The second factor (7.9% of the variance) appeared to be related to personality development. The scales "normal - disturbed" and "stable - unstable" were weighted heavily on this factor. The third factor (7.1% of the variance) appeared to be related to personal bravery and life style. The scales "brave - cowardly" and "independent - dependent" were weighted heavily. The fourth factor (5.3% of the variance) did not suggest any readily apparent interpretation. The two most heavily weighted scales were "stable - unstable" and "joiner - loner". These were followed, in order, by "reliable - unreliable", "happy - sad", "old - young", "careful - careless", "follower - leader" and "conforming - nonconforming". It is felt that this factor is probably related to social pressure and the general concept of conformity. However, it accounts for only a small proportion of the variance and its interpretation is not clear.

In summary, young drivers perceive the "drinking driver" more positively than do older drivers. Further, drivers who have recently been involved (as a driver) in an alcohol related driving event also perceive the drinking driver in a more positive light. There appear to be four underlying factors determining a subject's overall perception of the drinking driver. The first factor appeared to be related to risk taking, the second personality development, the third bravery and independence and the fourth is possibly related to social conformance in general. It is felt that these results clearly indicate the need to modify current perceptions of drinking-driving among young motorists. In particular, the perception of the drinking driver as being "brave" should be challenged.

G. Drinking-Driving Knowledge Measurements

This section discusses the survey population's current state of knowledge in regard to various aspects of the traffic safety/drinking driving problem. The relevant data is summarized in Table XXXVIII. The discussion of this data is broken into three parts: highway fatalities and their causes, drinking-driving statutes and knowledge of factors affecting intoxication.

1. Knowledge of Highway Fatalities and their Causes

No significant difference was found among the ten sampling groups relative to their knowledge of the annual number of highway fatalities ($\chi^2 = 22.67$, 18 d.f., N.S.). However, within all groups, there is wide variation in the accuracy of this knowledge. Some 43% of all respondents felt

Table XXXVIII

Sampling Groups Versus Drinking-Driving Knowledge

		GROUPS									
		GP16	GP19	GP22	GP35	A16	A19	A22	A35	D16	D35
Estimated Yearly Highway Deaths (1,000)	< 40	67	49	27	31	40	44	26	27	38	8
	40-59	38	31	32	23	19	15	14	11	17	7
	≥ 60	52	46	28	18	32	17	22	16	24	8
Estimated Percent of Fatals Involving Drinking Driver	< 40	26	21	13	18	19	13	15	18	11	7
	40-59	46	43	30	25	26	24	15	15	27	7
	≥ 60	85	62	44	30	46	40	32	25	41	11
Estimated Percent of Fatals Involving Speeding	< 40	50	41	29	12	23	23	18	17	28	5
	40-59	58	36	28	28	34	21	19	13	28	10
	≥ 60	49	49	30	33	34	33	25	28	23	10
Estimated Percent of Fatals Involving Marijuana	< 40	116	94	76	57	64	55	48	41	62	15
	40-59	21	14	7	7	16	13	8	6	10	6
	≥ 60	20	18	3	7	11	9	4	6	7	4
Estimated BAC of Legal Intoxication (liquor)*	≤ .02	101	77	64	44	54	53	41	29	53	12
	.03-.06	35	27	17	14	20	14	14	15	12	5
	.07-.12	13	14	6	8	9	6	3	7	6	5
	≥ .13	7	9	0	7	7	4	4	6	7	3
Estimated BAC of Legal Intoxication (beer)*	≤ .02	58	44	38	21	36	42	25	22	34	8
	.03-.06	46	27	22	16	24	14	18	15	15	7
	.07-.12	39	31	14	17	12	16	10	10	14	8
	≥ .13	14	24	13	18	18	5	9	10	16	3

*Question asked number of drinks before individual would be legally too drunk to drive. BAC estimated as before from number of drinks, body weight and three hour assumption (see text).

Table XXXVIII (Continued)

Sampling Groups Versus Drinking-Driving Knowledge

		GP16	GP19	GP22	GP35	A16	A19	A22	A35	D16	D35
Penalty--Fine ($)	< 40	51	30	24	21	34	27	15	15	7	3
	40-98	41	41	28	32	21	21	22	17	44	12
	≥ 99	52	44	24	13	27	24	21	22	25	10
Penalty--Loss of License (Months)	None	42	28	30	30	25	16	14	24	8	2
	1-3	42	25	18	9	22	21	14	14	39	13
	> 3	68	71	36	30	44	39	30	19	31	11
Penalty--Jail (Days)	None	94	76	62	50	66	45	41	36	50	20
	1-7	19	18	7	4	7	9	5	2	6	1
	> 7	29	23	15	15	14	20	12	15	18	5
Penalty--Loss of Insurance	Yes	43	33	23	16	24	29	15	15	16	2
	No	104	83	55	51	61	43	38	38	61	23
Get Drunk Quickest on Empty Stomach	True	152	123	82	72	91	71	62	54	78	26
	False	5	3	5	1	0	6	0	3	1	0
Small, Drunk Faster	True	113	69	46	35	60	38	25	25	49	16
	False	41	57	40	35	29	38	37	29	27	9
Experienced Drinkers can Drink More and Not Get Drunk	True	79	74	38	43	49	41	31	39	46	20
	False	76	52	48	30	39	36	29	16	30	6
Alcohol is a Drug	True	126	104	76	54	75	74	49	48	68	21
	False	31	21	11	18	14	3	13	10	10	4

Table XXXVIII (Continued)

Sampling Groups Versus Drinking-Driving Knowledge

		GP16	GP19	GP22	GP35	A16	A19	A22	A35	D16	D35
Alcohol Acts Faster with Tranquilizer	True	152	123	85	70	88	71	59	54	78	25
	False	2	2	2	2	2	3	2	2	0	1
Black Coffee Helpful in Sobering Up	True	58	53	33	36	40	37	29	33	26	16
	False	93	71	51	35	47	37	31	19	50	10
Alcohol Makes Drivers React More Quickly to Road Hazards	True	8	3	3	2	9	5	1	7	5	4
	False	147	123	84	70	80	72	59	49	72	22

that less than 40,000 highway fatalities occur each year, while 27% believe that the figure exceeds 100,000. Another 20% place the total between 50,000 and 60,000, the range that is approximately correct. Thus, only one out of five of the subjects interviewed was able to accurately recall one of the more widely publicized highway safety statistics. The remaining four out of five generally tend to underestimate the death toll. This is particularly true of the "A" sample (young and old combined), some 48% of whom believe that fewer than 40,000 deaths occur; the corresponding figure for the "D" sample is 45%, and for the "GPs", 39%.

There also are no significant differences among the sampling groups concerning their impressions regarding various factors that may contribute to fatal crashes. In particular, their opinions are fairly uniform concerning the causal role of:

- Drinking Driving (χ^2 = 16.11, 18 d.f., N.S.)

About half, (49.8%) of all respondents believe that drinking drivers are involved in 60% or more of fatal accidents. Less than one in five (19.3%) believe that fewer than 40% of these crashes involve drinking drivers. However, the younger subjects tend to give higher estimates of drinking-driving involvement than the older group. Fifty two percent of all respondents aged 16 to 24 felt that drinking-drivers contribute to at least 60% of fatal crashes, while this was true of 42% of the older respondents.

- Speeding (χ^2= 20.76, 18 d.f., N.S.)

Overall, about 38% of respondents believe that speeding contributes to 60% or more of fatal crashes, and another 33% feel that 40-60% of these crashes involve excessive speed. But, younger subjects are somewhat less likely to view speeding as a major cause of these crashes. Thirty one percent of all young respondents feel that excessive speed contributes to fewer than 40% of all fatal crashes, while 22% of older subjects share this view.

- Marijuana (χ^2 = 19.24, 18 d.f., N.S.)

Roughly half (49.2%) of respondents feel that marijuana use is involved in less than 20% of fatal crashes, while about one out of four (23.9%) believe it contributes to at least 40% of these accidents. These percentages are quite consistent between the two age ranges.

Thus, while subjects generally tend to underestimate the number of traffic fatalities occurring each year, there is little evidence that the accuracy of their knowledge is affected by their age or the sampling procedures that led to their inclusion in the study. Further, both drinking-driving and excessive speed generally are felt by these subjects to contribute substantially to fatal

crashes. However, younger subjects are somewhat more likely to emphasize the causal role of drinking-driving, and to deemphasize the contribution of speeding, when their views are contrasted with those of older drivers.

2. Knowledge of Drinking-Driving Statutes

In the course of their interviews, subjects were asked to estimate the number of ounces of liquor, and bottles of beer, they would have to consume before they would be legally too drunk to drive. These answers were adjusted in accordance with the subjects' body weights in order to arrive at estimates of the BAC at which "legal intoxication" occurs in the drinking driving context. The adjustment was predicated on the assumption that the drinking occured on an empty stomach and took place over a three hour period. *

No significant differences were found among the sampling groups relative to these BAC estimates ($\chi^2 = 25.95$, 27 d.f., N.S. for estimates derived from quantity of liquor, and $\chi^2 = 38.34$, 27 d.f., N.S. for estimates derived from quantity of beer), although the variation in the beer/BAC estimates approaches the level of statistical significance. What is most notable is that the vast majority of all subjects grossly underestimate the presumptive BAC limit. Specifically, 63% of the respondents cited a quantity of liquor which, if consumed under the conditions cited above, would produce a BAC no higher than 0.02%. ** Another 21% cited a quantity that would produce

*This adjustment was accomplished through the following formula:

$$BAC = 3.625 (ND/BW) - 0.045,$$

where ND is the number of drinks (either ounces of whiskey or bottles of beer), and BW is the respondent's body weight in pounds. The constant value of 0.045 approximates the BAC decrement that would occur over the three hour period, i.e., it assumes that the average person metabolizes an amount of alcohol equivalent to 0.015% BAC per hour. The multiplier of 3.625 simply represents the proportionality constant between BAC and the quantity/weight ratio. This formula was derived from data developed by the Charlotte-Mechlenburg (N. C.) Alcohol Safety Action Project. The formula is only an approximation and will not be completely accurate for any given individual; however, it should provide a fair estimate of the BAC that would result from the indicated amount of alcohol.

To elucidate the use of this formula, a 175 lb. subject who indicated that 4 ounces of whiskey would be required to attain the presumptive limit would be said to provide a practical estimate of slightly less than 0.04%. That is, he would underestimate the true presumptive limit by a wide margin.

**The computation of BAC estimates from quantity of liquor consumed assumed that each "shot" contained one (1) ounce of 86-proof liquor. In fact, some subjects may be used to "shots" of 1.5 ounces, or may ordinarily drink 100 proof whiskey, or both. Thus, a slight bias toward lower BACs may exist in the BAC/liquor estimates.

a BAC between 0.03% and 0.06%. Their estimates on beer tended to be slightly more realistic, although 39% estimated a number of bottles that would elevate BAC no higher than 0.02%, and some 25% cited a quantity that would attain the 0.03% to 0.06% range.

It should be noted at this point that the assumptions made in calculating BAC estimates actually tend to elevate the concentrations corresponding to any given quantity. If the drinking takes place shortly after food has been eaten, or over a period longer than three hours, the actual BAC would be lower than the value computed for this analysis. This fact lends further credence to the conclusion that the vast majority of drivers believe that extremely small quantities of alcohol are sufficient to lead to DWI/DWAI arrest, quantities much smaller, in fact, than actually are required by law.

Since the beer/BAC estimates exhibited the greatest differences among the groups, detailed comparisons of the various categories of subjects can best be made relative to those estimates. First, young subjects proved somewhat more likely to grossly underestimate the quantity of beer that would have to be consumed to attain the presumptive limit of BAC; overall, 65% of all younger subjects cited an amount of beer that would produce BACs no greater than 0.06%, while this was true of 57% of older subjects. Second, the "A" sample also showed a greater tendency toward underestimation; 69% of those subjects' estimates were below the 0.06% level, as contrasted with 62% of the "GPs" and 61% of the "Ds".

The sampling groups were found to differ significantly with respect to their knowledge of the penalties imposed for first conviction of "drunk driving", specifically with respect to the amount of monetary fine (χ^2 = 47.24, 18 d.f., $p < .001$) and the duration of license suspension (χ^2 = 64.81, 18 d.f., $p < .001$). Overall, about one third of the respondents (33.4%) believe that the fine is in the neighborhood of $40 to $98, and almost as many (31.3%) believe it to exceed $99. However, among the "D" subjects, only 10% felt the fine was no greater than $40, while 31% of "GP's" and 34% of "A's" felt this was the case. Similarly, about one quarter (26.2%) of the total sample felt that no loss of license results from "drunk driving" conviction, and roughly as many (25.9%) believe the period of suspension is 3 months or less. But, only 10% of "D's" believe there is no loss of license. Thus, the statistically significant differences in knowledge of penalties seems to stem primarily from the "D" subjects' actual exposure to these penalties. However, it is important to note that the "unexposed" samples ("GP's" and "A's") tend to underestimate the magnitude of the penalties, and so may be less detered by them than might be the case if their knowledge were more accurate.

Thus, the majority of subjects underestimate the quantity of alcohol that must be consumed to achieve a BAC that equals or exceeds the presumptive limit for DWI/DWAI, and in many cases this underestimation is by a very wide margin. Younger subjects and those who were sampled on the basis of accident involvement are most prone to this underestimation, although

the variation is not statistically significant. Hence, if their knowledge in this area were more accurate, it is doubtful that deterence of drinking-driving would increase--in fact, the opposite could be the case. However, improved knowledge should enhance their appreciation of the reasonableness and fairness of the statutes. Perhaps more importantly, an appreciable proportion of subjects underestimate the penalties that can be faced upon conviction of DWI/DWAI, and the provision of better knowledge in this area could well bolster deterence.

3. Knowledge of Factors Affecting Intoxication due to Alcohol

Several important aspects of the relationship between alcohol consumption and intoxication are not well known by the respondents. In particular, 42% of the respondents believe that the statement "A small person will get drunk faster than a large person, drinking the same amount" is false. Forty four percent deny that "experienced drinkers can drink more than novice drinkers and not get drunk". Forty five percent think it is true that "black coffee is helpful in sobering up". It is also important to note that the responses (true/false) to these three statements differ significantly among the sampling groups:

- Small person ... drunk faster ($\chi^2 = 35.98$, 9 d.f., $p < .001$)
- Experienced ... drink more ($\chi^2 = 18.00$, 9 d.f., $p < .05$)
- Coffee ... sobering up ($\chi^2 = 19.61$, 9 d.f., $p < .05$)

From the first of these statements, it is clear that a large segment of the population is unaware that BAC ... and impairment ... is dependent not only on the quantity of alcohol consumed but also on the body weight of the drinker. However, this lack of awareness is found somewhat less often among the "D's": approximately 35% of the young "D's" and 36% of older "D's" indicated that this statement is false. And, among the "GP" and "A" samples, it is the older drivers who more often deny a dependence on body weight--50% of the older "GP's" but only 38% of younger "GP's", responded false, as did 54% of older "A's", but 46% of the younger "A's". Thus, while many young motorists are unaware of this facet of the drinking/intoxication relationship, their knowledge is, on the whole, somewhat better than that of older drivers.

From the second statement, it is evident that many individuals deny that drinking experience enhances tolerance of the impairing effects of alcohol. To be sure, any increased tolerance need not be very great, and may not apply at all at moderate to high BAC. However, it is certainly probable that modest quantities of alcohol may appreciably affect novice drinkers while creating relatively little impairment among experienced consumers of alcohol. In this case, it is the young subjects who are less likely to grasp this fact.

Forty eight percent of young "GP's", 46% of young "A's", and 39% of young "D's" deny any dependence on drinking experience, as contrasted with 41% of older "GP's", 29% of older "A's", and 23% of older "D's". Of course, it is the younger subjects who are more likely to be relatively inexperienced drinkers, so their responses may reflect a desire to deny any lack of "capability" on their part.

The third statement's responses shows that one of the oldest of "old wives' tales"--the efficacy of coffee as an antidote to alcohol--is still subscribed to by many drivers. Of course, coffee can be helpful in certain indirect ways: for example, it can mitigate fatigue to a certain degree and so can help reduce an extraneous source of impairment that may be operating in parallel with alcohol. But, research has consistently shown that it will not affect BAC nor the debilitating effects of alcohol per se. Nevertheless, nearly half (45%) of those interviewed apparently believe that it will. But, it may be encouraging to note that young subjects proved less likely to subscribe to this belief. Across all sampling groups, 42% of young subjects, but fully 57% of older subjects, believe that coffee is helpful in sobering up.

Other factors explored in the interviews were fairly well known by the respondents and showed no significant differences among the sampling groups. In particular, 97% of the survey population was aware that "a person will get drunk quickest on an empty stomach". Eighty four percent realized that "alcohol is considered a drug". Ninety eight percent know that "alcohol affects a person faster if he's under medication like a tranquilizer or antidepressant". Ninety four percent realize it is not true that "alcohol tends to make drivers react more quickly to road hazards".

PART III

COUNTERMEASURES AND RESEARCH/IMPLEMENTATION RECOMMENDATIONS

I. INTRODUCTION

This section of the report contains the conclusions of the study with respect to future countermeasure development. There are eight areas in which it is felt that countermeasures can be effectively examined. These range from restriction of driving to driver rehabilitation. The eight areas or countermeasure approaches are covered in the remaining eight sections of Part III. Within each area or approach, the countermeasure is outlined, the problem which it attempts to address is defined, factors associated with implementation are discussed, the cost/benefit structure is considered and specific recommendations are made concerning the steps which would have to be taken to develop and implement the countermeasure.

Each countermeasure discussed below was designed to address a specific identified problem or characteristic either as found in the literature (Part I) or as found in the survey of young drivers (Part II). The first and overriding question must be whether or not there is a youth-alcohol-crash problem. The results from the literature, especially the literature on fatal crashes, indicate strongly that a definable problem does exist. Young drivers are overrepresented among fatally injured drivers who had been drinking by a factor of approximately 2 to 1 with respect to the number of young drivers in the license population. From the survey data, it was found that 13.8% of the young drivers in the general population (about one out of every seven) reported an alcohol related crash within the past three and one half years as compared with only 5.5% of the middle aged drivers. Clearly, alcohol related crash involvement is a problem for young male drivers.

In many ways, however, this problem has several unique features either as compared with the non-alcohol related crash problem for youth or as compared with the alcohol related crashes of middle aged drivers. The survey showed, for instance, that the young driver alcohol crash as compared with the young driver non-alcohol crash more often involved:

- Exceeding the posted speed limit
- Weekend and late night time periods
- A single vehicle, as opposed to more than one vehicle or a pedestrian
- The presence of passengers
- The use of drugs other than alcohol

Further, it was found both from the literature and from the current data that young drivers are typically involved in alcohol related crashes at lower

BAC's than are middle aged drivers. Also, speeding and excessive speed are more often associated with young drivers than with middle aged drivers.

The specific characteristics of this problem as identified from the literature review and the survey can best be summarized by returning to the hypotheses stated in the Introduction to Part II of this report. These hypotheses and the conclusions for each with respect to the nature of the problem are presented below.

Youthful Drinking

- Light to moderate use of alcohol is the norm for young American males. No difference was found between young and middle aged males of the general population with respect to drinking frequency or quantity. Light to moderate use of alcohol was the norm for both groups.

- Peer pressure is a key motivation for alcohol use among youth. This is apparently true from the literature. The current data also provide some support for this hypothesis.

- Deviant or socially undesirable behavior and attitudes are more often found among heavy drinking youths. The current data provide strong evidence for this hypothesis. The DWI/DWAI convicted drivers and to a lesser extent the accident involved drivers more often reported a non-traffic criminal arrest, were less educated and generally displayed less desirable attitudes towards drinking and driving. Frequent drinkers were more likely to speed, speed after drinking, use drugs other than alcohol, avoid wearing their seat belts, etc.

- Youths are relatively poor judges of their own state of intoxication. While this hypothesis is true, it is not in the direction predicted. Young drinkers tend to underestimate their consumption limits with respect to the legal definition of intoxication.

Youthful Driving

- Young drivers are substantially overinvolved in highway accidents. This was absolutely true in the current data. Reported annual mileage for young and middle aged drivers was comparable yet 46.5% of the young general population drivers reported a motor vehicle accident within the past three and one half years as compared with only 24.7% of the middle aged drivers.

- Young drivers more often engage in risky driving. This was also true in the current data. More young drivers have driven in excess of 100 mph within the past five years, young drivers more often

avoid wearing their seat belts, they more often allow personal or emotional problems to affect their driving, etc. Most importantly, young drivers enjoy driving and enjoy driving at speeds in excess of the posted limit.

Youthful Drinking-Driving

- Young drivers engage in drinking-driving at a rate comparable to older drivers, but the young drinking-driver tends to exhibit a lower BAC. The current data show that the frequency of drinking-driving is comparable across age groups. It is lowest for the 16-18 year olds, highest for the 22-24 year olds with the middle aged drivers somewhere in between. It is also true that the young driver tends to have a lower BAC at the time of his alcohol related crash.

- Young drivers take a more tolerant view of drinking-driving. This was absolutely true in the current data. It was particularly true for those young drivers convicted of an alcohol related driving offense.

- Young drivers are generally unaware of the causative role of alcohol in highway accidents. This hypothesis was only partially true in the current data. Young drivers did know the importance of alcohol in highway fatalities. However, many were unaware of the penalties for drinking driving and many did not know the importance of a variety of factors affecting level of intoxication and impairment.

- Personality and life style factors contribute heavily to the youth alcohol crash. The overriding conclusion from the current data is that alcohol interacts strongly with the life style and driving patterns of young males. This interaction or synergism heightens the problems associated with alcohol and antagonizes those pre-existing factors which make young drivers vulnerable to crash involvement.

Taken together, these results indicate that there are problem areas of particular importance to the youth-alcohol crash. The countermeasures discussed in the following sections attempt to address these major problems. Specifically, the countermeasures recommended attempt to deal with:

- Speed
- Crash involvement at low BAC
- The association of speeding and drinking

- The late night and weekend character of the alcohol crash
- Attitude of young drivers toward driving and drinking driving
- Lack of knowledge in certain key areas related to drinking driving
- Recurrence of drinking-driving

It is felt that those countermeasures dealing with the problems of speed and the association of speed and alcohol show the most promise for accident reduction.

Several countermeasure concepts were considered before arriving at the final list presented in the following sections. Many were rejected either as being not workable or as not addressing an identified problem. Others were combined or modified as indicated by the data. Three of the countermeasure concepts suggested in the Introduction to Part II do not appear promising (at least at this time). They were:

- High risk drivers can be identified. There are characteristics, such as criminal arrest and educational status, which do provide some discrimination between high risk and lower risk young drivers. However, it is not felt that these characteristics distinguish between young drivers sufficiently well to warrant development of a countermeasure based on this concept. First of all, the problem of drinking and driving among young people is quite pervasive. Secondly, it still appears that the best predictor of future driving remains prior driving, and countermeasures are proposed below dealing with halting the recurrence of drinking driving behavior.

- Restriction of drinking per se would be neither acceptable nor practical. Nothing in the current data base indicates that restriction of drinking is a currently viable countermeasure approach. Recent research (see e.g., Douglass and Filkins, 1974) indicates that lowering the minimum legal drinking age does produce a small, yet measurable, highway safety decrement. Nevertheless, it is not likely that this trend toward lowered age limits can be reversed, nor is it likely that specific restrictions of drinking by time of day or day of week can be imposed.

- Youths would accept alternatives to driving after drinking. The current data suggests that youths would not accept such alternatives. Most would not, for instance, be willing to leave their vehicle and call the police for assistance.

The remaining countermeasure concepts presented in Part II appear in some form in the following sections. Many have been modified and additional

concepts have been added as indicated by the current data. Together, these countermeasures address the major problems and characteristics of the youth alcohol related crash.

II. LATE-NIGHT DRIVING RESTRICTION

It is recommended that serious consideration be given to prohibiting or severely restricting operation of motor vehicles by young drivers during late-night hours. This suggestion is predicated on the reported time distribution of alcohol-related crashes involving young drivers and on the temporal characteristics of their driving exposure. The precise strategy for such prohibition/restriction is a matter for further study, although various possible approaches and constraints can be enumerated at the present time. The expected benefit of this recommendation cannot be precisely computed, since it may induce a temporal redistribution of drinking-driving patterns and, in particular, alcohol-related crashes. However, restriction of driving during relatively brief periods of the day would directly focus on up to 50% of the young driver alcohol-involved crashes now being experienced.

A. Definition of the Problem

Among the general population of young drivers, the typical (62%) alcohol-related crash occurs between the hours of 10 p.m. and 4 a.m. A relatively small minority of their non-A/R crashes take place during that time interval (17%). Further, night driving among youths is particularly practiced by frequent and very frequent drinkers. Fifty eight percent of the young frequent and very frequent drinkers accumulate 40% or more of their annual mileage at night, while this is true of only 43% of the young infrequent and very infrequent drinkers.

Restriction of nighttime driving by young motorists thus would not only provide a means of intervention into the majority of alcohol-related crashes, but also would prove less inconvenient to young drivers who rarely or never engage in drinking-driving.

B. Implementation Considerations

Among the considerations that must be faced in devising a nighttime driving restriction countermeasure are:

- The time periods during which it will apply
  - both the benefit and likelihood of implementation of a driving restriction countermeasure will probably depend on the specific period of prohibition envisioned. For example, as stated above, prevention of driving from 10 p.m. to 4 a.m. may permit intervention into 62% of the young driver alcohol-related crashes. However, legislatures and/or licensing agencies--as well as the general driving public--might be loathe to enact or support a prohibition of driving during a full quarter of the day. Restric-

tion of driving during a shorter period, e.g., 1 a.m. to 3 a.m., might be more readily implemented, but its effectiveness in crash prevention would obviously be less. Effort should be undertaken to explore the feasibility of various driving restriction schemes with representative legislative, licensing, and law enforcement personnel (and members of the driving public) to determine the degree to which such countermeasures would be sponsored, enforced, and supported.

- The day(s) of week on which it will apply

  - similar to the timing considerations discussed above is the question of the days on which nighttime driving would be prohibited. Again, this question relates to both the effectiveness and practicality of the countermeasure. Ideally, one might wish to apply night-driving restriction during each day of the week, but its application to weekend nights (Friday and Saturday, or Friday, Saturday and Sunday) might more readily be accepted by the relevant agencies and segments of the population. Here, too, data are needed that define the acceptability of various such schemes and their possibility of implementation.

- The individuals to whom it will apply

  - the countermeasure is, of course, recommended for application to young drivers. However, it may not be possible to single out specific age groups as the target population for driving restriction schemes. In many states, individuals aged 18 or older have been granted full majority rights; in all states, these rights apply to all persons 21 years of age or older. Thus, legislation to enforce a driving restriction upon a particular age group might be precluded on the basis of age discrimination. However, the licensing agency may be authorized to consider all individuals who have been licensed for, say, eight years or less as "novice" or "probationary" drivers, in which case, nighttime restriction could be a statutory condition of the probationary license period. Under this scheme, certain older drivers would also be bound by the restriction, although young drivers would remain its major focus.

    If this approach were adopted, it obviously would be necessary to define a probationary license duration that would strike a proper balance between the effectiveness and acceptability of the driving restriction countermeasure. One possible solution to this problem might be to mandate a probationary license for the first two to four years of the driving privilege, with automatic extension of probation tied to a violation "point" system.

Then, a young driver who maintained a (relatively) "clean" record for his first few years would at the end of that period be entitled to a "full privilege" operator's license. Conversely, one who had been cited for sufficient violations to amass the criterion number of points would face an additional period of probation. In this way, the countermeasure ultimately would exert its maximum impact--and inconvenience--on the subset of youths most prone to exhibit driving problems.

C. Anticipated Benefits and Costs

At the present time, both the costs and benefits that may be associated with the recommended night driving restriction are difficult to estimate. Clearly, both would depend on the specific implementation strategy selected. What can be said regarding benefits is that up to 50% or more of the young driver alcohol-related crashes--depending upon the implementation scheme--occur during periods when the countermeasure would prohibit driving. Of course, not all of these crashes would be prevented, since some young motorists undoubtedly would continue to drive, and become involved in crashes, during the prohibited times. Also, the countermeasure might induce a shift in the driving patterns of young motorists that could lead to a "redistribution" of some crashes: i.e., some accidents might simply take place earlier or later than would have been the case had the countermeasure not been in force. However, even 50% effectiveness of this countermeasure could result in prevention of one-quarter or more of all alcohol-related crashes involving young drivers.

With regard to costs, the chief impact probably would be felt in the need for increased resource expenditures by licensing agencies (who would administer the countermeasure) and law enforcement agencies (who would be charged with enforcing it). Additional study is necessary before this impact can accurately be gauged. However, it should be noted that a successful driving restriction countermeasure would help reduce certain cost requirements faced by these agencies, e.g., those associated with accident investigation, reporting and record keeping.

D. Specific Recommendations

In accordance with the preceeding discussion, it is recommended that the following efforts be pursued to develop and validate a countermeasure based on restriction of late-night driving by young motorists:

- Determine, through surveys and/or other appropriate techniques, the attitudes of legislators, motor vehicle administrators, police, other relevant officials, and the general driving public relative to alternative driving restriction strategies. Problems and costs associated with the implementation of such strategies should also be determined for the groups listed above.

- To augment the existing data from this and previous research, collect, through driver surveys, examination of traffic records systems, and other appropriate techniques, data on the distribution of alcohol-related and non-alcohol-related crashes by time of day and day-of-week. In pursuing this effort, a sufficient data base should be developed to permit accurate estimation of the maximum possible impact of the various implementation strategies on youth-alcohol-crashes.

- Develop, from the results of the two preceeding steps, the night driving restriction strategy offering the optimum balance among potential effectiveness, cost and acceptability.

- Test the night driving restriction countermeasure developed in the preceeding step to determine its effectiveness.

- If the preceeding step is found to produce a cost-effective reduction in youth-alcohol-crashes, implement such countermeasure on a national basis, through promulgation of a highway safety standard for driver licensing or other appropriate mechanism.

III. LOWERED SPEED LIMITS FOR NIGHTTIME DRIVING

It is recommended that lower speed limits be posted for night driving, at least on limited access roads and other thoroughfares where relatively high speeds (45 mph or more) are permitted during daylight hours. This suggestion stems from the evidence that excessive speed often is coupled with drinking-driving by young motorists. Reduced speed limits, of course, would apply to all drivers, but would have the greatest impact on youths. The manner in which this recommendation could be implemented is fairly straightforward, and could follow the approach that already has been adopted in certain localities. This suggestion is intended to focus on the youth-alcohol-crashes reported to involve excessive speed; however, estimation of its potential effectiveness in preventing these crashes must await further study.

A. Definition of the Problem

In more than one third (35%) of their alcohol-related crashes, young drivers reported they had been travelling at 40 mph or more, while this is true in less than one fifth (18%) of their non-alcohol-related crashes. Further, in nearly one quarter (23%) of the alcohol-related events, these young drivers indicated they had been exceeding the posted speed limit, while this was the case in only 8% of their non-alcohol-related accidents. These differences exist despite the lack of any appreciable variation in the posted speeds at these crash locations.

The evidence is also clear that speeding is most often practiced by the young frequent or very frequent drinkers. Some 42% of these individuals agree that, in general, they tend to drive faster than the speed limit, while this is true of 36% of young drivers who are infrequent or very infrequent drinkers. Also, 21% of the more frequent drinkers attest that they tend to drive even faster than usual when driving after drinking, but only 13% of the more infrequent drinkers indicate this to be the case.

Thus, among young motorists, high speed is especially a characteristic of drinking-driving, and probably augments the risk posed by that behavior. Reduction of speed during the period of highest incidence of drinking-driving (nighttime) offers an indirect--but potentially fruitful--means of diminishing that risk.

B. Implementation Considerations

Implementation of a reduced nighttime speed countermeasure would require posting separate day/night limits on all affected roadways, and definition of the times during which each limit applies. Perhaps the simplest approach would be to tie the nighttime limit to the time period during which the law mandates activation of headlights; typically, this spans the period

from one half hour after sunset to one half hour before sunrise. Then, non-reflective signs could be employed to post the daytime limits; their lack of visibility under headlight illumination would unambiguously signify the applicability of the nighttime limit. This approach has already been taken, for example, on high-speed roadways in Arizona.

Specific considerations that must be addressed prior to implementation of such countermeasure include:

- Selection of roadways on which the reduced nighttime speed should apply;
- Definition of the maximum nighttime speed.

The proper formulation of these decisions requires data on the incidences of crashes, alcohol and/or speed related violations, traffic volume, etc. on the various roadways under consideration, and an assessment of the enforceability of alternate reduced speed limits. Additional research is needed to supply such data. However, as a point of departure, it is suggested that consideration be given to adopting a maximum nighttime speed of 45 mph, and applying this to all roads and highways where the current posted speed exceeds that limit. In some cases, this could necessitate a corresponding reduction of the legal minimum speed.

C. Anticipated Benefits and Costs

As mentioned earlier, the proposed countermeasure would be targeted toward the youth-alcohol-crashes that involve speed plus the (presently unknown) segment of older driver-alcohol-crashes that are speed related. Further, some benefit would be realized in reduction of non-alcohol-related crashes, although the data suggests that far fewer of these involve speeding. Of course, one would not expect that all, or even necessarily most, of these "target" crashes would be prevented solely through reduction in the speed limit. However, the existence of differential day/night speed limits in certain parts of the nation suggests that studies could be undertaken that would shed light on the potential effectiveness of this countermeasure.

Costs associated with this recommendation would include "one time", or initial, expenditures for modifying the posted speed signs and perhaps continuing requirements for additional law enforcement resources to ensure compliance with the regulation. Estimates of these could be infered from the experiences of virtually all states in the recent establishment of 55 mph posted speed limits as a fuel-conservation measure.

D. Specific Recommendations

In accordance with the preceding discussion, the following tasks should be undertaken in preparation for the implementation of a lower

nighttime speed limit countermeasure:

- Determine, through comparisons of crash incidences at selected locations, the impact of existing lowered night speed limits on accident occurrences. Selected locations should include states which have and have not implemented such programs in the past. To the extent possible, this research should attempt to identify the impact of reduced nighttime limits on:

  - Total crashes
  - Nighttime crashes
  - Young driver crashes
  - Alcohol related crashes.

- Determine, through field observations and other appropriate techniques, daytime and nighttime vehicle speed patterns and distributions at selected sites. This research could employ roadside interviews similar to those conducted by ASAPs, perhaps augmented by automated speed measurement systems (e.g., ORBIS). If possible, this research should attempt to determine speed distributions as a function of driver age and alcohol usage.

- If the preceeding steps show evidence of a night-speed problem that potentially can be ameliorated by reduced speed limits, implement such a program in carefully controlled limited applications to permit better estimation of its effectiveness.

IV. LOWERED ABSOLUTE LIMIT BAC LIMIT FOR NEWLY LICENSED DRIVERS

It is recommended that legislation be considered to establish a lowered absolute limit of BAC to restrict drinking-driving by newly licensed motorists. This recommendation stems from the relatively high incidence of crash involvement by young drivers at low to moderate BAC levels--specifically, at levels well below the presumptive or absolute limits embodied in the existing statutes in most states, and below the levels generally exhibited by older crash-involved drinking drivers. The strategy for establishment of such legislation could follow the model of current drinking-driving statutes. The chief benefit of this recommendation is expected to be realized in increased deterrence of drinking-driving resulting from facilitation of enforcement. In particular, such deterrence could help to prevent the (roughly) one half of youth alcohol crashes that occur at low BAC.

A. Definition of the Problem

Crash involvement at low-to-moderate BAC is largely a young driver phenomenon. Borkenstein, et al. (1964) found that very young drivers (age <20) were overrepresented by a factor of nearly 3 to 1 in crashes occurring at BACs between 0.01% and 0.04%, in comparison to their proportion in the non-crash involved population operating vehicles at the times and places of accidents (see Figure 1). In contrast, drivers aged 20-24 show almost no overrepresentation in crashes at those BACs, and middle aged (35-44) drivers are actually underrepresented in those crashes. An even greater age difference was observed in crashes where the driver's BAC was between 0.05% and 0.09%.

The present study also produced data supporting this finding. Among young drivers who had been drinking prior to the night, injury crash which led to their inclusion in the sample, 43% reported they had consumed only one or two drinks. However, only 21% of the middle aged drinking-drivers in these crashes had consumed no more than two drinks prior to the crash.

These findings clearly indicate that a large proportion of the youth-alcohol-crash problem--as distinct from the middle age-alcohol-crash problem--stems from driving at low BAC. Existing drinking-driving laws do not address this portion of the problem: in most states, evidence that a driver's BAC was 0.05% or less essentially precludes conviction on an alcohol-traffic charge, and only rarely will conviction result if the BAC was between 0.05% and 0.09%. Provision of a lower absolute BAC limit for young drivers would enable enforcement to be better directed toward the true nature of the problem.

B. Implementation Considerations

The recommended legislation should almost certainly establish an absolute, rather than presumptive, BAC limit. Presumptive limits (which currently are in force in most states) generally are employed to establish evidence of "intoxication" or "impairment" or other subjective correlates of alcohol consumption. An absolute limit makes it an offense per se to operate a motor vehicle when BAC equals or exceeds the specified value, whether or not intoxication or impairment is evident. Since much of the youth-alcohol-crash problem exists at low BAC, where physical impairment may be slight and difficult to establish, an absolute limit is clearly preferable.

Among the specific considerations that must be addressed in developing this recommendation are the following:

- The format of the legislation
  - One model for the necessary legislation may be found in existing absolute, or "per se", drinking driving laws, such as that in force in New York State (section 1192, part 2, of the Vehicle and Traffic Law):

> "No person shall operate a motor vehicle while he has .10 of one per centum or more by weight of alcohol in his blood ... "

For the recommended countermeasure this model must be adapted to address both the lowered limit and the segment of the driving population to which it is to apply. For example, this could be achieved as follows:

> "No person holding a probationary operator's license shall operate a motor vehicle while he has X of one percentum or more by weight of alcohol in his blood ... "

The suggestion to apply the recommended legislation to "probationary" drivers is, in part, motivated by the previously observed need to avoid specification of age ranges that may conflict with the exercise of full majority rights. Also, probationary licensing may provide a means of applying the lowered limit to older drivers previously convicted of alcohol-traffic violations.

The selection of a specific value of the absolute limit ("X" in the above model) is another key consideration for implementation, and is discussed below.

- Definition of the absolute limit
  - Establishment of the legal maximum BAC for probationary

drivers requires striking the optimum balance among acceptability, enforceability and the nature of the problem. The data cited above suggests that a fair proportion of the problem may exist at BACs as low as 0.02% or even 0.01%. However, enactment of such an extremely low absolute limit would be tantamount to prohibiting driving after any drinking, which may not prove acceptable to legislators and/or law enforcement personnel.

Clearly, additional study is needed before this decision can be formulated. Among other issues, such a study may disclose a need to inform legislators, police officers and other relevant officials of the nature and magnitude of the youth-alcohol-crash problem as a means of securing their support for the recommended legislation. However, at present, the data seems sufficiently clear to conclude that the absolute BAC level for probationary drivers should be set no higher than 0.05%, and if possible, a level as low as 0.03% should be seriously considered.

- Provision of an adequate "Implied Consent" statute

In order to enforce the recommended lowered absolute limit, steps must be taken to ensure that a chemical test of a suspect's BAC will be secured. In all states, this need is now addressed through "Implied Consent" statutes, which typically contain clauses similar to the following:

> "Any person who operates a motor vehicle in this state shall be deemed to have given his consent to a chemical test ... to determine the alcoholic content of his blood when such test is requested by a police officer having reasonable grounds to believe such person has been operating a motor vehicle in violation of [the drinking-driving statute]. If such person refuses to submit to a chemical test none shall be given, but ... his operator's privilege shall be revoked [suspended] for [a period similar to that imposed upon conviction of violation of the drinking-driving statute].

Thus, the "Implied Consent" statutes provide a means of either (1) securing a chemical test, or (2) taking appropriate action against the suspect's license if the test is refused. However, in order to invoke the statute, the officer must have reasonable grounds to believe that the drinking-driving offense has been committed. In cases where the (presumptive or absolute) limit is set at 0.10% BAC or higher, the officer may well have sufficient evidence of physical impairment to constitute "reasonable grounds". However, if the recommended lowered limit is enacted, such evidence may not be available in many cases where the law has been violated. Hence, current "Implied Consent" legislation should be revised to facilitate enforcement. While the specific wording of the revised statute is a matter for additional study, one approach might be to empower a police officer to request a chemical test of a probationary driver whenever the officer has

reason to believe such driver has alcohol in his body.

C. Anticipated Benefits and Costs

The impact of the recommended legislation relative to crash prevention is particularly difficult to estimate because its immediate goal is to improve enforcement and thus to increase deterrence of drinking-driving. However, at this point, it is impossible to determine the degree to which the law would serve to increase enforcement, or the extent to which deterence of drinking-driving will be improved by a given level of encorcement, or even whether increased deterence of drinking-driving will necessarily produce a proportionate decrease in alcohol-related crashes. It is clear that the mere enactment of the recommended lower absolute limit is not enough to ensure a decrease in crashes--it is also essential that the law be rigorously enforced and that the young driver population is aware of the enforcement and the possible penalties they face.

At the present time, perhaps the most that can be said about the potential impact of this countermeasure is that young drivers do seem sensitive to enforcement and resulting license action. As discussed earlier in this report, they exhibit much more concern over the possible loss of their driving privilege than do middle aged drivers, and accordingly, they appear more fearful of the police, courts and other agencies empowered to restrict that privilege. This at least suggests that a strong law, well enforced and well publicized, should certainly affect their drinking-driving behavior in the desired direction.

Costs associated with this countermeasure largely will be borne by the enforcement/adjudication system. Each arrest for an alcohol-traffic offense requires expenditures of several man-hours by the arresting officer, chemical testing technician, prosecutor, judge, etc. The recommended law, if rigorously enforced, undoubtedly would dramatically increase the number of arrests and conceivably could create a need for additional personnel in law enforcement and court agencies. At least rough estimates of these costs might be available from ASAP communities, where increased enforcement programs have been implemented. It is also worth considering whether a mechanism could be established whereby the fines imposed on convicted alcohol-traffic offenders could be used to help defray some of the enforcement/adjudication costs.

D. Specific Recommendations

In order to pursue the development of this concept as a young drinking-driving countermeasure, the following steps would be needed:

- Identify the legal/constitutional issues associated with the recommended legislation and determine whether these issues can be re-

solved. Among the issues to be addressed are:

- The establishment of an absolute limit of BAC that is below the level typically associated with physical impairment
- Application of differential limits to various segments of the driving population ("novice" vs. "experienced" drivers)
- Extension of the "Implied Consent" concept to ease the grounds required for lawful request of a chemical test

If the preceeding indicates the concept is constitutionally feasible, determine, through surveys of legislative, court, police and other relevant personnel, the extent to which such legislation would be supported and enforced. In this effort, particular attention should be paid to the degree of acceptability and support associated with various absolute limits that might be enacted.

Examine carefully controlled applications of the recommended legislation--together with the necessary level of enforcement--in selected states. In this effort, care should be taken to measure the impact of the law relative to both crash prevention and deterence of drinking driving.

If the preceding indicates that the legislation/enforcement will cost-effectively decrease the incidence of youth-alcohol crashes, take the necessary steps to encourage enactment of such laws in all states.

V. LEGISLATION REGULATING SPEEDING-AFTER-DRINKING

It is recommended that vehicle and traffic laws be modified to designate a new alcohol-traffic offense: "Speeding/Had Been Drinking". This violation would correspond to the simultaneous occurrence of the following two elements: (1) operation of a motor vehicle by a person who has any amount of alcohol in his blood, and (2) operation of that vehicle at speed in excess of the posted limit. This recommendation is intended to permit legal recognition of one of the key characteristics of the youth-alcohol-driving problem, both to facilitate enforcement and identification of young drinking-drivers. The recommended legislation should, however, be applied to all drivers regardless of age.

A. Definition of the Problem

Speed in excess of the posted limit was reported by 23% of young drivers involved in alcohol-related crashes, but by only 8% of young drivers in non-alcohol accidents. Also, 42% of young drivers who are frequent or very frequent drinkers agree that they generally drive faster than the speed limit, as compared with 36% of young infrequent drinkers and 29% of middle aged drivers who are frequent drinkers. Further, 21% of young frequent drinkers claim to drive even faster after drinking than they normally do, while this is true of 13% of the young infrequent drinkers and 8% of the middle aged frequent drinkers.

Thus, it is evident that speeding and drinking are often linked among young drivers. To be sure, neither need necessarily be very exaggerated: The most common speeding from the current self-report data involves speeds roughly 5 to 15 mph above the posted limit, and drinking-driving usually occurs at relatively low BAC. However, the joint occurrence of "slightly excessive" speed and low to moderate BAC features prominently in the crash experience of young drivers. Additional evidence, based on police estimates of speed and presented in Part I, show even a stronger relationship between speeding and driving. Thus, efforts to combat this aspect of the problem definitely seem worthy of consideration.

B. Implementation Considerations

Apart from the obvious need for legislation to define the recommended offense, implementation of this countermeasure requires that steps be taken to address two major needs:

- Assurance of strict enforcement of posted speed limits--first and foremost, a real committment by law enforcement agencies to apprehend and investigate motorists exceeding the posted speed is absolutely required. Of course, speeders have long been a major

target of traffic patrolmen. However, as discussed above, the "speeding/had been drinking" driver is not necessarily travelling at very high speed; if strict speeding enforcement were limited to only flagrant violators, a large proportion of young drinking drivers would remain undetected and undeterred. Moreover, the current data clearly shows that the young speeding-drinking driver's crashes are not limited to freeways and other high posted speed roads. Thus, rigorous enforcement must be applied not only on limited access highways but on virtually all thoroughfares.

To be sure, in calling for strict speeding enforcement across-the-board, one must recognize the practical problems faced by the traffic patrolman. Technically, a motorist travelling 1 mph above the posted speed may be just as "guilty" as one who exceeds the limit by 15-20 mph. Nevertheless, some latitude is essential before enforcement action can be taken. Most law enforcement agencies are aware that speeding conviction is extremely difficult to secure if the motorist has only slightly exceeded the limit, and as a result generally have established informal policies that allow some leeway (perhaps 5 mph above the limit) before a citation will be issued. Such policy is certainly prudent, and would not conflict with the spirit of the recommended "speeding/had been drinking" legislation. But strict enforcement within the constraints of the policy is essential if the recommendation is to produce the desired impact on the problem.

Provision of means of establishing that the driver "has been drinking"--at the time of initial apprehension of a speeder, the patrolman may have no reason to suspect that the driver has been drinking. Subsequently, the odor of alcoholic beverage may be detected on the driver's breath, and other symptoms of drinking may be present (e.g., slurred speech, etc.). Naturally, if the evidence is sufficient to provide reason to believe that the driver is under the influence of alcohol in the sense of existing drinking-driving laws, the officer should arrest the driver for DWI or an equivalent offense. However, if the officer cannot reasonably conclude that the driver is legally impaired, the recommended "speeding/had been drinking" law would apply.

The key practical problem in this instance is that the officer generally would have little or no evidence of drinking other than the odor of alcohol on the suspect's breath. Such odor may be strongly suggestive of drinking, but may not constitute "relevant, admissable" evidence for court testimony, especially since alcohol itself has little or no odor.

Accordingly, effective implementation of the recommended countermeasure may require enactment of legislation to require breath

screening tests of motorists suspected of "speeding/had been drinking". Such tests need not necessarily provide quantitative measurement of BAC, although that would be preferable. Rather, qualitative indication of the presence or absence of alcohol could suffice.

C. Anticipated Benefits and Costs

The benefits of the recommended countermeasure should be two-fold:

- It should increase deterence of speeding, both in general and, especially after drinking. In so doing, it should help to minimize one aspect of youthful driving behavior that appears to associate heavily with crashes.

- It should facilitate identification of young drinking-driving offenders. Such increased identification should enhance the effectiveness of other recommended countermeasures (ASIS, rehabilitation) designed to prevent recurrence of drinking-driving.

The major contribution to the costs associated with this recommendation would arise from its demands on the resources of law enforcement agencies. As noted earlier, this recommendation cannot prove to be effective unless rigorous enforcement of speeding is established and maintained. Realization of the necessary level of enforcement may require an appreciable increase in the number of traffic patrols fielded by police departments. Of course, provision of appropriate fines for "speeding/had been drinking" violations may help to offset the increased expenditures for enforcement.

Accurate estimation of both the cost and benefit of this recommendation clearly requires data beyond that obtained in this study. However, such data is available. Some states currently have legislation governing moving vehicle violations by drivers who have been drinking. For example, in Kentucky, motorists can be, and frequently are, cited for "reckless/had been drinking"; in Connecticut, warning tickets for driving-after-drinking can be issued in certain cases. Agencies in these and similar states may be able to provide estimates of the impact and cost of such legislation.

It should be noted in passing, that although this recommendation focuses on the speeding-drinking interrelationship, a similar approach could be taken toward any moving vehicle violation committed by a drinking-driver. In all cases, it would be prudent to establish more severe penalties for the alcohol-associated violation than for the basic offense itself. The overall effect of such across-the-board legislation should be to deter drinking-driving at even low to moderate BAC.

D. Specific Recommendations

Validation of the benefit of "speeding/had been drinking" violations, will necessitate pursuit of the following activities:

- Determine, through surveys in appropriate states, the effectiveness and cost of current enforcement efforts aimed at drinking-driver moving vehicle violations. Impact relative to the incidence of alcohol-related crashes should receive special focus in this effort.

- Ascertain, through surveys of legislative, motor vehicle administrative, and judicial personnel, the feasibility of enacting legislation such as that recommended for this countermeasure.

- Identify law enforcement resource requirements associated with this recommendation, and estimate the costs corresponding to these requirements.

- Continue the development and testing of protable breath alcohol measurement devices to ensure the availability of the equipment necessary for effective enforcement.

- Examine the effect of enactment of the recommended legislation to permit full assessment of its cost and benefit.

- If the preceeding indicates sufficient cost/effectiveness, encourage similar legislation in all states, through promulgation of traffic enforcement standards or in other appropriate ways.

VI. PUBLIC EDUCATION TO IMPROVE AWARENESS OF KEY CHARACTERISTICS OF DRINKING-DRIVING

It is recommended that education/information campaigns be considered to improve the driving public's knowledge of certain legal and technical characteristics of drinking-driving. It is fully recognized that much effort and funds already have been devoted to this area--in fact, the data from this study indicates that previous campaigns may well have improved the public's knowledge in many respects. However, the current data also show that knowledge continues to be relatively poor in certain specific instances. In particular, the public seems insufficiently aware of the penalties for alcohol-traffic violations and certain factors that affect the degree of intoxication produced by a given amount of alcohol. In general, these gaps in knowledge apply to both young and middle aged drivers, however, there is evidence that the lack of knowledge has a different effect on the drinking and drinking-driving behavior of the two age groups. This suggests that it would be desirable to develop a youth-oriented public education program to help remedy the problem.

A. Definition of the Problem

Among young drivers, penalties and police enforcement apparently can exercise a real deterence of dangerous driving. For example, 72% of the young general driving population agree or strongly agree that the possible loss of license motivates those who drive in accordance with the law. Similarly, 70% agree or strongly agree that the overall penalties for traffic infractions deter illegal driving behavior. In contrast, only about 55% agree or strongly agree that the "danger" inherent in violation of traffic laws motivates safe driving. Clearly, enforcement and punishment can have a major impact on youthful driving behavior.

However, many youths are unaware of the punishment they may experience for drinking-driving. For example, 27% believe that conviction of drinking-driving will not result in loss of license, and another 7% believe the license would be suspended for one month or less. About 28% think that, upon conviction, they would be required to pay a fine no greater than $40.00, or no fine at all.

Here, then, is one area that previous public education campaigns have failed to emphasize. The fact that youthful driving behavior can be influenced through fear of license suspension will be of little value in combating the youth-alcohol-crash problem unless it is widely understood that drinking-drivers will lose their licenses.

It should be noted that many middle aged drivers of the general population are also unaware that DWI conviction can lead to license suspension--in

fact, as many as 41% of those drivers apparently are unaware of that penalty. However, less than half (49%) of these middle aged drivers agree that fear of license suspension motivates driving in accordance with the law. Therefore, while similar public education programs might be developed for the middle aged drivers, the information they would convey probably would have less impact on their driving behavior than is expected from the recommended young driver program.

The second aspect of the problem at hand concerns the driving public's knowledge of factors affecting intoxication. In particular, it was found that many drivers of the general population:

- Are unaware that body weight influences the degree of intoxication produced by a given amount of drinking (this was true of 37% of young drivers and 48% of middle aged drivers)

- Deny that less experienced drinkers tend to become intoxicated on smaller amounts of alcohol (48% and 41%, respectively, of young and middle aged drivers)

- Believe that black coffee is helpful in sobering up (39% of young drivers, 49% of middle aged)

An individual possessing a proper understanding of these factors would be better prepared to adjust (moderate) his drinking in accordance with his specific characteristics and circumstances. Most importantly, he would not unknowingly be lured into an impaired condition because of a perceived need to "keep up" with drinking companions more experienced or physically larger than himself, or in the belief that an antidote to alcohol is readily avaliable. The need for knowledge in this area is fairly common to young and middle aged drivers. However, since the young drivers generally are less experienced drinkers, and so less "set in their ways", public education programs to provide this knowledge should be more beneficial for that age group.

B. Implementation Considerations

The two major considerations to be faced in developing the recommended youth-oriented public education campaign concern the content of information and the media through which it is to be conveyed.

. Content

The major knowledge "gaps" that should be addressed have been outlined above. First, stress should be placed on the clear delineation of the penalties imposed for alcohol-traffic infractions. Second, physiological and experiential factors affecting alcohol-induced intoxication must be explained. However, although the issues to be raised can be identified, further study is

needed to define the most appropriate format of presentation. For example, should the campaign be designed to connote a "threatening" message to capitalize on the young driver's fear of penalties, or would a "low key" presentation be more beneficial? What is the best balance that can be struck between the two issues to be addressed?

Media

The current study attempted to gauge the subjects' exposures to various media. In the order of decreasing contact-hours for young drivers, these were:

- Radio (68% listen to the radio at least 15 hours per week; less than 3% do not listen to the radio)
- Television (22% watch television at least 15 hours per week; less than 5% do not watch television)
- Newspapers (39% spend at least 5 hours per week reading newspapers; about 5% do not read newspapers)
- Magazines (21% spend at least 5 hours per week reading magazines; nearly 14% do not read magazines)

In addition, 53% attend movie theatres at least 9 times per year, and 21% attend drive-in movies with that frequency. Nearly half (48%) regularly attend athletic events.

Based upon this data, the electronic media would seem to offer the best avenue of approach to young drivers. However, further study is needed before the most cost/effective approach can be selected.

C. Anticipated Benefits and Costs

It is always difficult to predict the benefits of a public education campaign. To be sure, one might, from previous programs dealing with drinking driving, extrapolate estimates of the percentages of the target population that will be "reached" and the degree to which knowledge of a particular fact will improve. However, such measures address "benefit" only in the most narrow sense. What is of real interest is the degree to which the improved knowledge will contribute to a reduction of drinking-driving and alcohol-related crashes. Because previous programs differed from the recommended campaign in both content and target population, their ultimate benefits are at best a tenuous base for extrapolation. The effectiveness of the recommended program thus remains a matter for experimental resolution.

Cost estimates, however, can be inferred from previous campaigns. Of course, these will vary with the media selected and the intensity (number

of repetitions) of the messages.

D. Specific Recommendations

The following steps would be needed to develop the necessary public education campaign:

- Identify in detail the instructional content to be addressed. The data of this study will serve as an excellent starting point for this effort. However, additional sampling of young drivers from various other areas of the nation may be needed to validate the representativeness of the knowledge requirements which have been identified.

- Determine whether or not knowledge of this content will, in fact, lead to a positive change in behavior.

- Assess alternative campaign formats. Test audiences and media consultants can help tc determine the most appropriate means of structuring the content identified in the preceeding step.

- Pre test the campaign in selected areas. Pre and post-measurement of knowledge, using stratified sampling techniques, is necessary to assess the immediate impact of the campaign relative to its success in conveying the necessary information.

- If the preceeding indicates that the campaign shows promise of achieving its immediate objectives, implement it on a national basis.

VII. PUBLIC INFORMATION-DISTURBED BEHAVIOR

Young drivers, particularly those young drivers convicted of Driving While Intoxicated or Driving While Ability Impaired-Alcohol, tend to have a more favorable attitude toward the drinking driver. This countermeasure recommendation is aimed at modifying this attitude or at least modifying any behavioral consequences of the attitude. The thrust of the countermeasure is in the area of public education. Two possible approaches can be taken. The first is a straight public information program aimed at modifying the basic attitude. The second is essentially the "Lackland Countermeasure Experiment" discussed in Part I of this report. Essentially, under this approach, the licensing agency unequivocally states that it views drinking-driving as disturbed behavior and that all those convicted of drinking-driving would be subjected to a psychiatric evaluation to determine their fitness to operate a motor vehicle.

A. Definition of the Problem

Each driver in the survey was asked to rate the drinking-driver on a series of 22 descriptive scales. The results showed significant differences across the sampling groups for 12 of these 22 scales. In each case, drivers convicted of DWI or DWAI, followed by the accident involved sample were more favorably disposed to the drinking driver than were drivers from the general population sample. It was also found that young drivers, regardless of sampling group, tended to be more favorably disposed than their corresponding sample of middle aged drivers. Factor analysis of this data revealed that there were at least three primary, underlying, components in the structure of this attitude: danger or threat posed by the drinking driver; personal normality-stability of the drinking driver; and bravery of the drinking driver.

B. Implementation Considerations

Two different approaches may be taken to implement this recommendation. Research and feasibility testing will be required to choose between the two alternatives. First, a public information program directed toward young drivers could be implemented attempting to modify these attitudes. The structure of this program, and the messages employed would have to be developed and the entire package would have to be tested for message transmission and behavioral change. The central questions in this testing would thus be:

1. Can the attitude be modified?

2. Does attitude modification lead to positive behavioral change?

The second approach to this problem, again basically public education in nature, would be to focus directly on obtaining behavioral change via the "Lackland Countermeasure" approach. This approach could be implemented via a media campaign focusing on the message that the licensing agency construes drinking and driving as disturbed or deviant behavior. Persons convicted of Driving While Intoxicated, or the new speeding and drinking charge recommended above, could be subjected to a psychiatric evaluation. The results of this evaluation would be used to determine the individual's fitness to operate a motor vehicle. In the Lackland situation, the results of the evaluation could have been used to dismiss an individual from the Air Force. Though no one was actually dismissed from the Air Force through this countermeasure, the Lackland experiment did produce a significant decrease in injury producing motor vehicle crashes.

It is felt that the Lackland approach would probably be the better approach of the two suggested here. This approach did produce significant results, though it may be argued that airmen are a unique or highly specific population. Nevertheless, the current data suggests that loss of license is a strong motivating force for young drivers. This, coupled with the threat of psychiatric evaluation could be a strong motivating force in limiting drinking and driving.

The actual "psychiatric" evaluations could be performed by a "Driver Improvement Analyst." Or, the program could be coupled to state mental health agencies. The results of the evaluation could be used, in some cases, to withhold the driving privilege from individuals until such time as they have found help for any emotional disorders uncovered. In short, the licensing agency would have grounds to suspend the driving privilege until such time as the individual was emotionally fit to drive. However, the main thrust of the Lackland program and of the program suggested here is deterrence of drinking driving via public education. This program would have to be developed and tested prior to full scale implementation. The central question during this development and testing would be whether or not the knowledge that a psychiatric evaluation would be conducted will deter drinking and driving.

C. Anticipated Benefits and Costs

The cost of implementing such a program could be minimal in those states which already have a Driver Improvement Analyst program. However, there could be additional costs incurred by mental health agencies since it is anticipated that the program would uncover drivers who, in fact, have severe emotional problems. These individuals would require either private or state supported treatment. Identifying these individuals could be a secondary benefit of the program. Ideally, the primary benefit of this program would be to deter drinking and driving.

D. Specific Recommendations

The first step would be to choose between the two public education

approaches suggested here. This could be done by developing the two approaches and making the final choice based on research test results. However, it is felt that the best approach might be to simply develop the Lackland countermeasure, and if successful, drop further consideration of the other approach. This development could proceed in the following manner:

- Determine the acceptability/feasibility of implementing such a program within existing governmental, etc., structures.

- Develop the required public education materials and pre-test their effectiveness in terms of information transmission and behavioral change.

- Field test the entire package and evaluate in terms of alcohol related accident reduction. If this approach is not effective, then the second approach; namely, a direct campaign aimed at actually changing the attitude, can be developed.

It is not felt that the actual characteristics of the psychiatric evaluation are key to the success of this program. If possible, these evaluations should simply be tied to other ongoing diagnostic or driver referral programs operating within the jurisdiction where the countermeasure is implemented.

VIII. DRIVER REHABILITATION

The best predictor of future driving has traditionally been prior driving. The current data shows essentially the same results. Prior DWI/DWAI convictions were most prevalent among those drivers who were sampled on the basis of a recent DWI or DWAI conviction. The purpose of this countermeasure would be to provide the young convicted drinking-driver with a program or set of programs aimed at rehabilitating or otherwise modifying his drinking-driving behavior.

A. Definition of the Problem

Drinking-driving among young people is not a rare occurrence, nor does it cease following a drinking-driving crash or conviction. Drivers from the DWI/DWAI sample drove most frequently after drinking, and most frequently had a prior DWI/DWAI conviction. Strictly speaking, driver rehabilitation is not specifically a youth countermeasure. At least in the general population, the alcohol related traffic events uncovered in this study were most often the first such event the driver has had. Thus, the preventive countermeasures suggested earlier in this section are really more appropriate to the total youth problem. Nevertheless, recurrence of drinking-driving is a serious problem demanding attention and a solution to this problem could provide additional benefits with respect to the middle aged alcohol crash problem. Specifically, a well conceived, broadly based youth program could not only help the youth crash problem, but could also help solve the problem posed by those 25 years of age or older.

B. Implementation Considerations

Rehabilitation programs have been tried in the past that have dealt with young drivers as part of the total DWI/DWAI arrest population. The Nassau County experience with this approach, however, has been largely negative. As discussed in Part I, young drivers were less likely to complete the Nassau program than were older drivers. Part of this problem could be that the characteristics of the youth alcohol crash problem are in fact different from the characteristics of the alcohol related crashes involving older drivers. Regardless, it is recommended that specially designed youth-oriented programs be developed and implemented.

The basic input mechanism to these programs would be the DWI/DWAI conviction. However, a second and possibly even more important mechanism could be the speeding-after-drinking legislation recommended earlier. Further, it has also been recommended that convicted drinking-drivers undergo a "psychiatric evaluation" following conviction. The results of this evaluation, or diagnosis, could provide the raw data needed to assign drivers to rehabilitation groups and determine exactly what therapy or remedial training

was required.

It is felt that there are several sufficiently unique aspects of the youth crash problem, and of young people themselves, to recommend a rehabilitation program designed specifically for young drivers. The following key characteristics should be covered in such a program.

- Speed and risk taking behavior on the highway
- Vehicle as an extension of the young person's own personality (acting out frustrations, aggressions, etc.)
- The synergistic effects of small amounts of alcohol with risk taking behavior and personality characteristics
- Attitude toward drinking driving

In addition, several of these young drivers will require help specific to their drinking problem. While most young drinking drivers are not alcoholics, nor are most true "problem drinkers", many will exhibit serious drinking problems exclusive of the driving situation.

C. Anticipated Benefits and Costs.

The costs typically associated with drinking driver rehabilitation programs vary tremendously with program structure. Some previous programs have consisted of no more than a two-hour film/lecture presentation. Others have consisted of 20-30 hours of small group and individual sessions. Neither the current data nor the literature are sufficiently complete to specify the required structure of a young driver program. Thus, costs must remain an open issue.

Unfortunately, the expected benefit from such a program is also an open issue. Prior rehabilitation programs have had mixed evaluation results with middle aged drivers. Thus, the first problem is to create an effective program. The current data do, however, provide some indication of the expected benefit from a 100% effective program. Fully 9.8% of the young drivers in the DWI/DWAI total sample (N=295) had a DWI or DWAI conviction during 1971 or 1972. Complete success from an operating program during 1971 and 1972 would thus have resulted in a 9.8% reduction in incidents leading to a subsequent DWI/DWAI conviction on the part of these drivers. Of course, the greatest expected benefit from such a program would be the halting of the recurrence of drinking driving beyond the age of 25. This benefit cannot be estimated from the current data.

D. Specific Recommendations

- Current driver rehabilitation/re-training programs should incorporate

many of the young driver characteristics uncovered in the current data. Where possible, young drivers should be segregated from older drivers and further separation should be conducted based on the severity of the young driver's drinking problem.

- A young driver specific rehabilitation program should be developed. This program should be prepared to handle young drivers with only moderate drinking problems convicted on the new speeding-after-drinking statute.

- This program would then have to be tested and evaluated. If warranted, the program could then be implemented on a broad scale. It is felt that the success of such a program will be highly dependent upon its ability to modify speed and risk taking behavior when driving after drinking.

IX. MANDATORY INSTALLATION OF ALCOHOL SAFETY INTERLOCK SYSTEMS FOR CONVICTED ALCOHOL-TRAFFIC OFFENDERS

It is recommended that alcohol safety interlock systems (ASIS) be developed and considered for vehicles operated by convicted drinking-drivers as a condition of license reinstatement. This recommendation is in response to the fact that individuals with previous convictions continue to drink and drive--and become involved in alcohol-related crashes--at much higher rates than do the general driving population. The ways in which this recommendation could be implemented are numerous, but vary chiefly in terms of the types of drinking-driving intended to be prevented. The chief benefit of this recomendation would be its ability to deter effectively drinking-driving among those most likely to commit that offense. Prior offenders account for a relatively small percentage of the driving public, but are substantially over-represented among those who frequently drink and drive.

Mandatory ASIS installation could apply to all convicted drinking-drivers, regardless of age. However, ASIS implementation strategies should be required to deal properly with the special characteristics of the young drinking-driver problem.

A. Definition of the Problem

Young drivers who were previously convicted of an alcohol-traffic offense reported the highest drinking frequency, incidence of drinking-driving and incidence of involvement in alcohol-related crashes of all groups surveyed. For example, nearly two thirds (62.1%) of young "D's" may be classed as frequent or very frequent drinkers, as compared with 50% of middle aged "D's" and 35.4% of young "GP's". Approximately 62% of young "D's" drive after drinking at least 20 times per year, as compared with 60% of middle aged "D's" and 50% of young "GP's". Finally, some 29% of young "D's" had been involved in at least one alcohol-related crash during the past three years (exclusive of the crash that may have led to their alcohol-traffic conviction), while this was true of 19% of the older "D's" and 14% of the young "GP's". Clearly, the convicted drinking-drivers--and especially the younger members of that group--are much more likely to violate alcohol-traffic laws. Application of ASIS to such individuals thus can provide an effective means of limiting a substantial proportion of the drinking-driving problem.

It is also important to note that the ASIS countermeasure generally is favorably viewed by the driving population, including the very individuals to whom it would be applied. Specifically, 77% of the young general population drivers indicated they would favor mandatory ASIS installation for drivers convicted of alcohol-traffic offenses--and, so would 65% of the young drivers who themselves were convicted of such offense. Approximately 73% of both the middle aged "GP's" and middle aged "D's" would also favor this applica-

tion of ASIS. Thus, there is evidence that the countermeasure would meet with sufficient acceptability to permit its implementation.

B. Implementation Considerations

Several key issues must be resolved before the ASIS could be put to widespread use. These include:

- Installation Strategy

  - This issue includes such questions as:

    --which drivers should be singled out for ASIS?
    --at what point in time should the ASIS be installed?
    --for what period of time should installation be required?

With regard to the first question, it seems obvious that, in order to derive maximum benefit, the countermeasure should be applied to as many identified drinking-drivers as possible. Clearly, then, the target population should include all drivers convicted of any alcohol-traffic offense, including the existing offenses of DWI, DWAI, etc., as well as violations of the recommended speeding-drinking statute and the lowered absolute limit for newly licensed drivers. In addition, it may also be desirable to mandate ASIS installation for drivers who demonstrate a poor driving record in general (e.g., frequent crash and violation involvements) whether or not alcohol has clearly been established as a contributor to that poor record. This study and previous research have shown that the drinking-driver is more likely to develop a history of crashes and violations than is the non-drinking driver. Thus, by extending ASIS to the "problem drivers" in general, a larger proportion of drinking-drivers can be affected by the countermeasure.

At least two approaches could be taken to answer the second question posed above. First, ASIS installation could take place immediately upon conviction of the alcohol-traffic offense. In that case, the standard license suspension/revocation need not be imposed. Alternatively, installation could be a prerequisite for license reinstatement after the suspension period had elapsed. The proper approach to take should be identified on the basis of the relative effectiveness of suspension and ASIS as a means of preventing drinking-driving. While further study is needed on this point, it generally is conceded that it is extremely difficult to enforce license suspension effectively. Thus, immediate ASIS installation upon conviction may be the better choice.

The third question may have the greatest impact on the ultimate effectiveness of the ASIS countermeasure, for its answer will define the degree of intervention into the drinking-driving patterns of the target population. Obviously, the longer the period of installation, the greater should be

the ultimate impact. Ideally, one might wish to require an indefinite period of installation, with removal of the device contingent upon the driver's ability to maintain a "clean" record for some fairly lengthy period of time (say, five years). However, a shorter, specified time period of installation might prove more feasible in light of existing penalties for alcohol-traffic offenses.

At this point, no final resolution of these issues can be made. In order to arrive at the optimum answer to each question, the views of court and licensing agency representatives should be solicited and any requirements for enabling legislation should be identified.

- The type of drinking-driving intended to be prevented

In theory, ASIS is capable of detecting any desired degree of blood alcohol concentration and/or alcohol-induced impariment. Thus, for example, the system could be designed to detect a given degree of psychomotor impairment, e.g., through tests of reaction time, compensatory tracking ability, etc. With that approach, the instrument would prevent driving by most, but not necessarily all, individuals whose BAC exceeds the "legal" limit, and also by some whose BAC is below that value. On the other hand, the instrument could be designed to directly measure the motorist's BAC, e.g., through a breath test, and preclude driving if that BAC equals or exceeds some particular value.

In one sense, the psychomotor-test ASIS might be preferable, since it is compatible with existing alcohol-traffic laws in most states (which laws are intended to focus on drivers who are "under the influence" of alcohol) and because the test more closely relates to driving ability. However, the data discussed earlier in this report indicates that many young drivers become involved in alcohol-related crashes at fairly low BACs--specifically, at BACs that generally do not produce reliably measureable psychomotor impairment. Thus, at least for young target population drivers, a psychomotor-test ASIS might be incapable of addressing a major segment of the problem at hand. Accordingly, a breath-test ASIS would likely be the better choice, at least for young drivers. Moreover, such ASIS should be designed to prohibit driving at a relatively low BAC threshold. At the very least, the threshold should not exceed the lowered absolute limit discussed in a previous recommendation. Ideally, it would be best to design the system so that even a trace of alcohol in the breath would suffice to prohibit driving.

- Other issues affecting feasibility, cost and effectiveness

It may well be possible to resolve the preceeding issues and arrive at the optimum installation strategy and BAC threshold, but that alone will not ensure the practicality of the ASIS concept. For, many other factors may affect the instrument's ideal performance. These include:

- The possibility that the device may be circumvented, e.g., by electrical or mechanical tampering, by supplying artificial breath samples, or in various other ways.

- The potential need for expensive safeguards to prevent this circumvention, including elaborate tamper-proof design, frequent inspection, etc., which could intolerably degrade cost-effectiveness.

- The possibility of litigation affecting the instrument's manufacturer, the licensing agency, and the enforcement/adjudication system resulting from any failure of the device to perform its intended function. For example, could the manufacturer be held liable for any damage caused by a drinking-driver who had somehow managed to "pass" the interlock? Would his success in "passing" the test preclude his conviction on an alcohol-traffic charge?

Clearly, these and similar issues must be resolved, at least to the extent that they will only minimally affect cost-effectiveness. To accomplish this, further study of both a technical and legal nature is required.

C. Anticipated Benefits and Costs

Several allusions have already been made to factors that may effect the cost or effectiveness (or both) of the ASIS countermeasure, which illustrates the difficulty of assessing its merits at this state of development. Certainly, both benefit and cost will be influenced by the implementation strategy, the type of drinking-driving intended to be prevented, the instrument's accuracy and reliability, its susceptibility to circumvention, its legal ramifications, etc. Perhaps most importantly, cost-effectiveness hinges upon the extent to which such devices can be put to use, i.e., the percentage of the drinking-driving population that is affected by the countermeasure. This in turn will be closely associated with the level of police enforcement. In part, previous recommendations concerning legislative revisions (lowered absolute limit, speeding/had been drinking offense) are intended to facilitate enforcement to ensure better identification of drivers for whom ASIS is a suitable countermeasure.

D. Specific Recommendations

In order to establish definitively the merits of the ASIS countermeasure, it is recommended that research be conducted in the following areas:

- Continued development and testing of alternative ASIS concepts. This should include both laboratory and field testing of both psychomotor and breath-test systems. Such testing should address performance

(i.e., accuracy), reliability (mechanical, electrical, etc.), susceptibility to circumvention, etc.

- Estimation of effectiveness and cost. This should, if possible, seek estimates of crash prevention potential for a variety of implementation strategies.

- Assessment of legal requirements/problem areas; including the need for enabling legislation and the possible liability that may be associated with the concept. In such matters, the views of a representative sample of legislative and judicial personnel should be sought.

- If the preceeding indicates that the concept is potentially cost-effective, the most promising ASIS device(s) should be put to use to permit fully realistic testing of the countermeasure.

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APPENDIX A

QUESTIONNAIRE

Interviewer's Name _____

Date of Interview _____

Unit Number _____

Interviewer:

Fill in Respondent's name, address and telephone number prior to the interview. Be sure to check with Respondent to verify correct name, mailing address and date of birth.

Respondent's Full Name _____
First Middle Last

Respondent's Mailing Address _____
Street and Number

_____
City State Zip

Respondent's Telephone Number _____

Location code (leave blank) _____ F1(6)

Date of birth

Month _____ F1(7-8)

Day _____ F1(9-10)

Year _____ F1(11-12)

1. How much do you weigh? _____ F1(13-15)

2. In the past 3 years have you ever resided outside this State for more than three months?

1. Yes _____ 2. No _____ 9. No Response _____ F1(16)

3. What is your current marital status?

1. Married ____
2. Divorced ____
3. Separated ____
4. Widowed ____
5. Never married ____
9. No response ____

F1(17)

4. In what year were you first licensed to drive? _____ F1(18-19)

5. Did you ever take a formal Driver Education Course?

Yes _____ No _____

If yes, was it:

1. High School ____
2. Commercial ____
3. Other (specify) _____
9. No response ____

F1(20)

6. About how many total miles per year did you drive before the current fuel shortages? _____ F1(21-23)

PROBE: (If Respondent can give accurate weekly or monthly average get this information--calculation will be made later.)

7. What percent of this driving was at night?

_____% F1(24-25)

8. Have the current fuel shortages limited your driving?

1. Yes ____ 2. No ____ 9. No response ____

If yes--by about what percent have you reduced your driving during daylight hours?

_____% F1(26-27)

by about what percent have you reduced your driving during night hours?

_____% F1(28-29)

9. How often do you wear seat or lap belts? (Read categories)

0. Never ____
1. Almost never (1-9%) ____
2. Less than half the time (10-49%) ____
3. More than half the time (50-89%) ____ F1(30)
4. Almost always (90% or more) ____
5. Other (specify) _____
9. No response ____

(Hand Respondent response card 1.)

10. People who generally drive in accordance with the law, do so because:

	Enter number from card	
a. Of danger to themselves	____	F1(31)
b. They think the police are present	____	F1(32)
c. Of the possibility of having to appear in court	____	F1(33)
d. Of the penalties	____	F1(34)
e. They may lose their driving privilege	____	F1(35)
f. Their insurance may be increased or cancelled	____	F1(36)
g. Of strong family pressure	____	F1(37)

11. How many accidents, reported or unreported, have you had as a driver of a motor vehicle since January 1, 1971? _____ F1(38)

If "0", skip to Q #30.
If 1 or more:

"I would like to ask you some questions about the accident(s). (If more than 1 accident)--Please tell me about the most recent accident first."

Interviewer: *Ask questions in chart and record actual response or code numbers for each.*

Complete for maximum of 4 most recent accidents since January, 1971.

Questions	Accidents			
	1	2	3	4
12. What was the approximate date? (Month/year. Probe for month or season)				
13. Was the accident reported? 1. Yes 2. No				
14. In what State did it occur? 1. This State 2. Other State (specify) 3. Canadian Province (specify) 4. Other country (specify) 9. No response				
15. What type of accident was it? (read each) 1. Pedestrian 2. Other moving motor vehicle 3. Fixed object (pole, etc.) 4. Parked motor vehicle 5. Ran off road 6. Overturned in road 7. Other (specify) 9. No response				
16. What did the accident result in? (read each) 1. Property damage (only) 2. Injury (of any kind) 3. Fatality 9. No response				
17. What day of the week did it occur on? 1. Sunday 2. Monday 3. Tuesday 4. Wednesday 5. Thursday 6. Friday 7. Saturday 9. No response (Probe: weekday or weekend)				
18. What time of day or night? (Record actual a.m. or p.m.-- probe and record best estimate if subject is unsure.				

Question	Accidents			
	1	2	3	4
19. What was your speed prior to the accident? (prior to evasive action?) (Record actual or best estimate)				
20. What was the posted speed limit? (Record actual or best estimate)				
If above the limit, 21. What was the primary reason for your traveling above the posted limit? 1. In a hurry 2. Didn't pay attention 3. Drag racing 4. Enjoy going fast 5. Emergency maneuver 6. Passing 7. Other (specify) 9. No response				
22. How many passengers were with you?				
23. How many drinks did you have within 4 hours prior to the accident? *(If "0", skip to Q #25)*				
24. What were you drinking? (read each) 1. Beer 2. Wine 3. Liquor 4. Other (specify) 9. No response				
25. Did you use any of the following prescription and non-prescription drugs within 4 hours prior to the accident? (Enter 1. Yes or 2. No for each) a. Amphetamines (diet pills, Dexedrine, Benzedrine, Methedrine) b. Barbiturates (Amytal, Seconal; Tranquilizers-Librium, Valium) c. Marijuana or hashish d. Hallucinogens (LSD, DMT, mescaline, psilocybin) e. Cocaine f. Deliriants-Inhalants (glue, gasoline) g. Narcotics (Heroin, Methadone, Morphine) h. Other (specify) *NOTE: If uncertain about category of a drug, record actual drug in "h" "Other"*				

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Question		Accidents 1	2	3	4
26. Were you given a warning ticket or summons or arrested for a violation associated with the accident? If yes: What was it for? (If more than one check each)	0. None				
	1. Speeding				
	2. Following too close				
	3. Failing to stop at red light/stop sign				
	4. Reckless driving (weaving, improper passing, wrong way)				
	5. Improper equipment				
	6. Improper documents (no license, registration; driving while license suspended or revoked)				
	7. Driving while intoxicated or impaired by alcohol				
	8. Improper turn				
	9. Other (specify) NR= no response				
27. What was the purpose of the trip? (record code number) 1. To or from work or school 2. Driving done as part of your job 3. Visiting friends or relatives 4. Attending meetings, sporting events, or movies 5. Shopping 6. To or from bar or party 7. Pleasure driving only 8. Other (specify)					
28. How long had you been on the road prior to the accident? (Enter hours and minutes)					

Question	Accidents 1	2	3	4
29. a. Did you brake in an attempt to avoid the crash? (Enter 1 Yes, 2 No) If yes--why didn't it work? (Specify) If no--why not? (Specify)				
b. Did you take any other evasive action prior to the crash? (If yes, specify)				

Return to Q #12 until all accidents are completed

30. How many tickets, warning tickets or arrests for traffic violations (not associated with an accident) have you had since January 1, 1971? _____ F3(30)

If "0", skip to Q #39.

If 1 or more:

"I would like to ask you some questions about the violation(s) or warning(s). (If more than 1 violation): Please tell me about the most recent first."

Interviewer: Ask questions in chart and record actual response or code numbers for each.

Complete maximum of 4 most recent violations or warnings since January, 1971.

Questions	Violations 1	2	3	4
31. What was the approximate date? (Month/year. Probe for month or season)				
32. Was it a warning, a ticket, or an arrest? 1. Warning 2. Ticket 3. Arrest 9. No response				

Questions		Violations			
		1	2	3	4
33. In what State did the violation occur? 1. This State 2. Other State (specify) 3. Canadian Province (specify) 4. Other country (specify) 9. No response					
34. What was it for? (If more than one violation for the same event, check each)	1. Speeding				
	2. Following too close				
	3. Failing to stop at red light/stop sign				
	4. Reckless driving (weaving, improper passing, wrong way)				
	5. Improper equipment				
	6. Improper documents (no license, registration; driving while license suspended or revoked)				
	7. Driving while impaired by alcohol				
	8. Improper turn				
	9. Other (specify)				
35. Why do you think the policeman stopped you? (record all applicable code numbers) 1. Weaving in road 2. Driving too fast 3. Driving too slowly 4. Vehicle defect 5. Routine license check 6. Improper maneuver (specify) 7. Other (specify)					
36. How many drinks did you have within 4 hours prior to the violation? *(If "0", skip to Q #38)*					

Question	Violation 1	2	3	4
37. What were you drinking? (read each) 1. Beer 2. Wine 3. Liquor 4. Other (specify)				
38. Did you use any of the following prescription and non-prescription drugs within 4 hours prior to the violation? (Enter 1. Yes or 2. No for each) a. Amphetamines (diet pills, Dexedrine, Benzedrine, Methedrine)				
b. Barbiturates (Amytal, Seconal; Tranquilizers-Librium, Valium)				
c. Marijuana or hashish				
d. Hallucinogens (LSD, DMT, mescaline, psilocybin)				
e. Cocaine				
f. Deliriants-Inhalants (glue, gasoline)				
g. Narcotics (Heroin, Methadone, Morphine)				
h. Other (specify) *NOTE: If uncertain about category of a drug record actual drug in "h" "Other"*				

Return to Q #31 until all violations are completed

39. Have you ever attended a remedial driver education, rehabilitation or retraining program of any kind as a result of being involved in crashes or motor vehicle violations?

1. Yes _____ 2. No _____ 9. No response _____ F4(12)

40. Other than for passing or emergency maneuvers, what is the fastest you have ever driven on a public road within the past five years? _____(mph) F4(13-15)

41. On that occasion, why were you traveling at that rate of speed? F4(16)

1. Drag racing ___
2. Didn't realize ___
3. Enjoy going fast ___
4. In a hurry
5. Following speed limit ___
6. Other (specify) _____

42. Have you ever been arrested for a criminal offense? F4(17)

1. Yes_____ 2. No_____ 9. No response_____

If yes:

What was the date (year)?	Charge (offense)	Disposition--Jail (amount of time) Fine (amount of dollars) Probation (amount) of time)

43. Did you ever drink or taste liquor, beer or wine?

1. Yes ____
2. No ____ *Skip to #45* F4(18)
9. No response ____

44. Do you currently ever drink or taste liquor, beer or wine?

1. Yes ____ *Skip to Q #47*
2. No ____ *Skip to Q #46* F4(19)
9. No response ____

45. If no:

What are the main reasons that you don't drink?

(Interviewer: If uncertain, record actual response:)

1. Religious or moral ____
2. Don't care for it ____
3. No need or desire ____
4. Bad for health ____
5. Exposed to bad example in past ____ F4(20)
6. Brought up not to drink ____
7. Financial reasons ____
8. Social reasons ____
9. Other (specify) _____

Interviewer: Skip to Q #54

46. Why did you stop?

(Interviewer: If uncertain, record actual response:)

Reasons for Stopping

1. Increased responsibilities or problems ____
2. Financial reasons ____
3. Go out less now ____
4. No need or desire ____ F4(21)
5. Social reasons (including influence of others) ____
6. Older, more mature ____
7. Less opportunity ____
8. Health reasons ____
9. Other (specify) _____

Interviewer: Skip to Q #51

47. What do you drink most often, liquor, beer or wine? (check one)

1. Liquor _____ (If liquor) How many 1 to 1-1/2 ounce shot drinks could you have and still drive well? _____

2. Beer _____ (If beer) How many 12 ounce bottles or cans could you drink and still drive well? _____

3. Wine _____ (If wine) How many glasses could you have and still drive well? _____ F4(22-24)

4. Other (specify) _____ (If other) How much of this could you drink and still drive well? _____

Hand Respondent card 2.

48. Which of the categories on this card best describe how often you drink:

a. During the morning? _____ F4(25)
b. Immediately before or during lunch? _____ F4(26)
c. During the afternoon (after lunch, but before cocktail hour)? _____ F4(27)
d. Immediately before or during dinner? _____ F4(28)
e. During the evening (after dinner is over)? _____ F4(29)

49. How many drinks do you generally drink on any one typical occasion? (record actual): _____ F4(30-31)

50. How often do you drink much more than your usual--really "tie" one on? (record actual): _____ F4(32-33)

51. In the past year, how many times would you say you have driven after drinking an alcoholic beverage? _____ *(If "0", skip to Q #54)* F4(34-35)

52. Recall the most recent time you were driving after drinking liquor, beer or wine. How many drinks did you have? ____ F4(36-37)
How many miles did you drive after drinking on that occasion? ____ F4(38-40)

53. On the typical occasion when you are driving after drinking would you say that you: (read each)

	1. Yes	2. No	
a. Are more afraid than usual of becoming involved in an accident?	___	___	F4(41)
b. Are more afraid than usual of being stopped by the police?	___	___	F4(42)
c. Notice your concentration is poorer?	___	___	F4(43)
d. Are drowsy or falling asleep?	___	___	F4(44)
e. Tend to drive better?	___	___	F4(45)
f. Drive faster?	___	___	F4(46)
g. Drive slower?	___	___	F4(47)
h. Are confused or uncertain in reacting to emergency situations?	___	___	F4(48)
i. More often drive with the windows open?	___	___	F4(49)
j. Notice no difference in your driving?	___	___	F4(50)

54. I'd now like to get your opinion about some statements. *(Hand Respondent Card 1.)* As I read each statement, please give me the number from this card that best describes how strongly you agree or disagree with it. (read each)

a.	You tend to drive faster than the speed limit. ____	F4(51)
b.	You enjoy driving. ____	F4(52)
c.	You tend to be overly cautious behind the wheel. ____	F4(53)
d.	You are safer than most drivers. ____	F4(54)
e.	Driving is a privilege which the State can restrict in any way it sees fit. ____	F4(55)
f.	The police are tougher on young drivers than on older drivers for the same offense. ____	F4(56)
g.	Your friends would kid you if you didn't drink. ____	F4(57)

Hand Respondent Card 3.

h.	You drive to let off st am. ____	F4(58)
i.	You become very sleepy behind the wheel. ____	F4(59)
j.	When another driver cuts in front of you, you try to cut him off or crowd him. ____	F4(60)
k.	If upset by a quarrel or conflict you:	
	drive much faster than normal ____	F4(61)
	perform violent maneuvers ____	F4(62)
	do not pay attention while driving ____	F4(63)

55. About how many people are killed on the highway each year in this country? _____ F4(64-66)

56. I'd like to get your opinion on how often certain factors might be involved in fatal accidents. As I read each factor, please tell me the percentage that you think comes closest to the percentage of fatal accidents involving that factor. Some accidents involve several factors; others may involve none, thus, your answers do not have to total 100%.

What percentage of fatal accidents involve:	Percent	
a. Vehicle defects	_____	F4(67-68)
b. Speeding	_____	F4(69-70)
c. Driver who has been drinking	_____	F4(71-72)
d. Driver who has been using marijuana	_____	F4(73-74)
e. Poorly designed roads	_____	F4(75-76)

57. About how many 1 to 1-1/2 ounce shots of whiskey could you drink before you would be legally too drunk to drive? (If Respondent is unsure, ask for his best guess.) _____ F4(77-78)

58. About how many 12 ounce bottles of beer could you drink before you would be legally too drunk to drive? _____ F4(79-80)

59. In this State, does the penalty for a driver's first drunken driving conviction include: (ask each)

	1. Yes	2. No	3. Don't Know		
a. Fine	___	___	___	If yes, how much?___	F5(6-8)
b. Impounding the vehicle	___	___	___	If yes, how many months?___	F5(9-10)
c. Loss of insurance	___	___	___	If yes, how many months?___	F5(11-12)
d. Jail sentence	___	___	___	If yes, how many days?___	F5(13-15)
e. Loss of license	___	___	___	If yes, how many months?___	F5(16-17)
f. Anything else?	___	___	___	Specify_____	F5(18)

60. Do you consider these penalties to be too severe, too lenient or about right?

1. Too severe ____
2. Too lenient ____ F5(19)
3. About right ____
9. No response ____

61. I'd like to read some statements about drinking and becoming intoxicated. Please tell me if you think each statement is true of false. (If R. says "don't know," probe for True or False. If R. still does not know, then check "Don't Know.")

	1. True	2. False	3. Don't Know	
a. A person will get drunk quickest on an empty stomach.	____	____	____	F5(20)
b. A small person will get drunk faster than a large person, drinking the same amount.	____	____	____	F5(21)
c. A person who has had one drink should not be allowed to drive an automobile.	____	____	____	F5(22)
d. Experienced drinkers can drink more than novice drinkers and not get drunk.	____	____	____	F5(23)
e. Alcohol is considered a drug.	____	____	____	F5(24)
f. Alcohol affects a person faster if he's under medication like a tranquilizer or antidepressant.	____	____	____	F5(25)
g. Black coffee is helpful in sobering up.	____	____	____	F5(26)
h. Alcohol tends to make drivers react more quickly to road hazards.	____	____	____	F5(27)

Interviewer: Administer drinking driver attitude test.

"The purpose of the following form is to determine the general view people have toward individuals who drink and drive by having them rate drinking drivers against a series of descriptive scales. Please read the instructions. I will be glad to answer any questions you may have."

Turn page to Instructions and hand to Respondent.

Instructions

If you feel the concept of a "drinking driver" is very closely related to one end of the scale you should place your "x" as follows:

Desirable x : ___ : ___ : ___ : ___ : ___ : ___ undesirable

or

desirable ___ : ___ : ___ : ___ : ___ : ___ : x undesirable

If you feel that the "drinking driver" concept is quite closely related to one or the other end of the scale (but not extremely), you should place your "x" as follows:

strong ___ : x : ___ : ___ : ___ : ___ : ___ weak

or

strong ___ : ___ : ___ : ___ : ___ : x : ___ weak

If the concept seems only slightly related to one side as opposed to the other side (but is not really neutral), then you should check as follows:

active ___ : ___ : x : ___ : ___ : ___ : ___ passive

or

active ___ : ___ : ___ : ___ : x : ___ : ___ passive

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the concept. Please check the center only if you consider the concept to be neutral on the scale, both sides of the scale equally associated with the concept, or if the scale is completely irrelevant.

East ___ : ___ : ___ : x : ___ : ___ : ___ West

Please make your ratings on the basis of what this concept means to you. Sometimes you may feel as though you've had the same item before on the form. This will not be the case, so do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the form. Make a separate and independent judgment for each scale.

Make one check mark on each scale. Work at fairly high speed through this form. Do not worry or puzzle over individual items--there are no right or wrong answers! It is your first impressions, your immediate "feelings" about the items, that we want.

Please turn the page and begin.

62. The drinking driver is:

normal	___:___:___:___:___:___:___	disturbed	F5(28)
ethical	___:___:___:___:___:___:___	unethical	F5(29)
joiner	___:___:___:___:___:___:___	loner	F5(30)
conforming	___:___:___:___:___:___:___	nonconforming	F5(31)
hot	___:___:___:___:___:___:___	cold	F5(32)
careful	___:___:___:___:___:___:___	careless	F5(33)
stable	___:___:___:___:___:___:___	unstable	F5(34)
happy	___:___:___:___:___:___:___	sad	F5(35)
immature	___:___:___:___:___:___:___	mature	F5(36)
weak	___:___:___:___:___:___:___	strong	F5(37)
brave	___:___:___:___:___:___:___	cowardly	F5(38)
independent	___:___:___:___:___:___:___	dependent	F5(39)
healthy	___:___:___:___:___:___:___	ill	F5(40)
unreliable	___:___:___:___:___:___:___	reliable	F5(41)
impulsive	___:___:___:___:___:___:___	restrained	F5(42)
old	___:___:___:___:___:___:___	young	F5(43)
popular	___:___:___:___:___:___:___	unpopular	F5(44)
irrational	___:___:___:___:___:___:___	rational	F5(45)
follower	___:___:___:___:___:___:___	leader	F5(46)
smart	___:___:___:___:___:___:___	stupid	F5(47)
dangerous	___:___:___:___:___:___:___	safe	F5(48)
slow	___:___:___:___:___:___:___	quick	F5(49)

(Return Booklet to Interviewer)

Interviewer: *Check Respondent's form to be certain that each scale has one and only one checkmark. If any checkmarks are missing or if there are 2 or more checkmarks for one scale, return to R. to be changed.*

It is extremely important that each scale has one checkmark.

63. In your opinion the term "drinking driver" applies to a driver who had at least how many drinks before driving? _____ F5(63)

Interviewer: "I'd now like to get some information about your spare time activities."

64. How many hours do you spend each week:

a. Watching television	_____	F5(51-52)
b. Listening to the radio	_____	F5(53-54)
c. Reading newspapers	_____	F5(55-56)
d. Reading magazines	_____	F5(57-58)

65. How many times per year do you go to drive-in movies? _____ F5(59)

66. How many times per year do you go to regular movie theaters? _____ F5(60)

67. How many times per year do you go to automobile races/ shows? _____ F5(61)

68. Do you regularly attend meetings, functions or activities for any of the following types of organizations? (read categories and record yes or no for each)

	1. Yes	2. No	
a. Religious/Church-Affiliated	___	___	F5(62)
b. Fraternal/Social	___	___	F5(63)
c. School-Affiliated	___	___	F5(64)
d. Political/Activist	___	___	F5(65)
e. Organized Athletics	___	___	F5(66)

69. I would now like to talk once again about driving after drinking. Let's assume that you could accurately determine that you were legally too drunk to drive. In that situation, which of the following steps would you be willing to take? Just answer "yes" if you would be willing to do the things I'll mention, or "no" if you wouldn't.

	1. Yes	2. No	3. Not Sure	
a. Have a sober individual drive your car.	___	___	___	F5(67)
b. Drive home anyhow.	___	___	___	F5(68)
c. Leave your car and:				
. Ride home with sober driver	___	___	___	F5(69)
. Call home for a ride	___	___	___	F5(70)
. Call a friend for a ride	___	___	___	F5(71)
. Pay as much as $5 for a cab ride home	___	___	___	F5(72)
. Call police for assistance	___	___	___	F5(73)
d. Wait as long as two hours until you are sufficiently sober to drive.	___	___	___	F5(74)

70. Would you favor installing an instrument in cars operated by persons convicted of drinking driving that would prevent their cars from starting when they are legally too drunk to drive?

1. Yes _____ 2. No _____ 3. Undecided _____ F5(75)

71. Would you favor installing an instrument in cars operated by persons convicted of speeding that would prevent them from traveling faster than some maximum speed?

1. Yes _____ 2. No _____ 3. Undecided _____ F5(76)

72. Are you currently a full-time student?

1. Yes _____ 2. No _____ 9. No response _____ F5(77)

73. What is the highest grade you completed in school? (Circle grade)

1,2,3,4,5,6, 7,8,9,10,11,12, 13,14,15,16,17 + F5(78-79)

74. Are you currently employed full-time?

1. Yes _____ 2. No _____ 9. No response _____ F5(80)

75. (If employed) What is your current occupation? (Describe)

_____ F6(6)
_____
_____

76. In the last 6 months, have you used any of the following?

	1. Yes	2. No	
a. Amphetamines (prescription or non-prescription--e.g., "ups" diet pills, speed, Dexedrine, Benzedrine, Methedrine)	___	___	F6(7)
b. Barbiturates or tranquilizers ("downs," Seconal, Amytal, Valium, Librium)	___	___	F6(8)
c. Marijuana (hashish)	___	___	F6(9)
d. Hallucinogens (LSD, Mescaline, psilocybin)	___	___	F6(10)
e. Cocaine	___	___	F6(11)
f. Deliriants-Inhalants (glue, gasoline)	___	___	F6(12)
g. Narcotics (Heroin, opium, morphine, methadone)	___	___	F6(13)

If R. is unsure for any of the drug categories, write actual name of drug used. _____

77. Within the past six months, have any of your friends or acquaintances used any of the following?

	1. Yes	2. No	3. Don't know	
a. Amphetamines (prescription or nonprescription e.g., "ups", diet pills, speed, Dexedrine, Benzedrine, Methedrine)	___	___	___	F6(14)
b. Barbiturates or tranquilizers ("downs", Seconal, Amytal, Valium, Librium)	___	___	___	F6(15)
c. Marijuana (hashish)	___	___	___	F6(16)
d. Hallucinogens (LSD, Mescaline, psilocybin)	___	___	___	F6(17)
e. Cocaine	___	___	___	F6(18)
f. Deliriants-Inhalants (glue, gasoline)	___	___	___	F6(19)
g. Narcotics (Heroin, opium, morphine, methadone)	___	___	___	F6(20)

Interviewer: "Now I am going to read some statements. *(Hand R. Card 1.)* Please read the number that best describes how strongly you agree or disagree with each statement as it applies to you."

78. If somebody annoys me, I am apt to tell him what I think of him. ____(H) F6(21)

79. The people I deal with aren't too friendly. ____(A) F6(22)

80. It's hard to know how to treat people. ____(A) F6(23)

81. This world has more pain than pleasure. ____(A) F6(24)

82. I sometimes get into fist fights or feel like hitting someone. ____(H) F6(25)

83. I react quickly to other people's remarks. ____(I) F6(26)

84. There have been occasions when I felt like smashing things. ____(H) F6(27)

85. When shopping, I sometimes buy things I really don't have much use for. ____(I) F6(28)

86. I often act on the spur of the moment without thinking things through. ____(I) F6(29)

87. I can tell right away whether I'll like someone I meet. ____(I) F6(30)

88. I can't help getting into arguments when people disagree with me. ____(H) F6(31)

89. I often have the feeling that I am different. ____(A) F6(32)

90. I sometimes have arguments or quarrels with my family or people in authority. ____(H) F6(33)

91. If I had the opportunity I would live very differently. ____(A) F6(34)

92. I tend to change my mind abruptly. ____(I) F6(35)

INTERVIEWER'S SUPPLEMENT

Unit Number of Respondent: _____
Interviewer's Name: _____

F6(36-37)

To be Completed by Interviewer After Interview

1. Respondent's race:

1.	White _____	4.	Latin American _____	F6(38)
2.	Black _____	5.	Other (specify)_____	
3.	Oriental _____			

2. Respondent's cooperation was:

1.	Very good _____	4.	Poor _____	F6(39)
2.	Good _____	5.	Very poor _____	
3.	Fair _____			

3. Did the respondent seem:

1.	Completely frank and honest _____	F6(40)
2.	Generally frank and honest _____	
3.	Evasive or guarded at least occasionally _____	
4.	Untruthful _____	
5.	Other (specify) _____	

4. The housing unit was:

1.	Single family structure _____	F6(41)
2.	Two family structure _____	
3.	Multiple dwelling _____	

5. The housing unit apparently was (check one):

1.	Dormitory _____	F6(42)
2.	Military barracks _____	
3.	House or apartment of respondent's parent(s)/guardian(s) _____	
4.	Respondent's own house or apartment _____	
5.	House or apartment shared by respondent and others of similar age _____	
6.	Other (specify) _____	

6. Other persons present during the interview were (check all that apply):

1.	None _____	6.	Other relatives _____	F6(43)
2.	Children under 6 _____	7.	Other adults _____	
3.	Older children _____	8.	Friend(s) _____	
4.	Spouse _____	9.	Girlfriend _____	
5.	Parent(s) _____	0.	Other (specify) _____	

CARD 1

1. Strongly disagree
2. Disagree
3. Neither agree nor disagree
4. Agree
5. Strongly agree

CARD 2

1. Never
2. Monthly or less
3. Two or three times each month
4. Once a week
5. Several times each week
6. Daily

CARD 3

1. Never
2. Seldom
3. Sometimes
4. Frequently
5. Always

APPENDIX B

LETTER SENT TO EACH SUBJECT

DUNLAP and ASSOCIATES, INC.
EASTERN DIVISION
ONE PARKLAND DRIVE, DARIEN, CONN. 06820 • 203•655-3971

Dunlap and Associates, Inc., an independent research firm, is currently conducting an important study of problems faced by drivers for the National Highway Traffic Safety Administration of the U.S. Department of Transportation. You and several other drivers have been randomly selected to represent your state in this research. We are interested in learning about you, the driving you do and your attitudes toward driving.

One of our interviewers will be calling you within the next few weeks. He will ask for about 45-60 minutes of your time, at your convenience in your home. All of the answers you give to his questions will be confidential and used only for research purposes. Following the interview, we will send you a check for $5.00 to help compensate for your time. Our study will be successful only if a large percentage of drivers agree to participate. Your cooperation will be greatly appreciated and will help toward the improvement of highway safety.

Sincerely,

David F. Preusser

David F. Preusser, Ph.D.
Project Director

DFP:cp