njury-Producing Private Motor Vehicle Accidents Among Airmen

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Part I describes some of the important correlates of lost time accidents to 138 Airmen in privately owned vehicles. Some comparative data on 100 controls are also provided. Drinking alcoholic beverages rather than long distance pressure driving appeared to be the primary correlate of this class of accidents. The drinking proportion is within the range of proportions of drinking among nonmilitary personnel involved in accidents, but at the upper end of the distribution. Lines of evidence in support of this view are presented.

Part II compares some biographical correlates of Airmen who were drinking prior to lost time accidents with those who were not and with those of 100 controls. The drinking was not an isolated event. The drinking accident drivers had a higher incidence of remote and and recent disrupted home life and a higher involvement in disciplinary infractions.

The Role of Drinking

PRIVATE MOTOR vehicle accidents have been shown to lead all other classes of cidents as a cause of death and injury to servicemen (13). The consequences of ivate motor vehicle accidents constitute a major medical problem for the military rvices.

The present study was part of a program of research devoted to the development of cident countermeasures. It focused on the antecedents of personal injury accidents volving private motor vehicles driven by Airmen. The study was restricted to per- nal injury accidents on the assumptions that this class was different from the pro- rty damage type and that the inclusion of large numbers of the latter might well ob- ure any distinctive characteristics of injury-producing accident drivers.

Although the use of control groups is rare in field investigations of accident phe- mena, they are important in clarifying data trends. Consequently, this study was signed to permit certain comparisons of a sample of accident drivers and a sample non-accident control drivers.

Early in the study drinking was found to be a frequent precursor of personal injury cidents. Accordingly, investigation was directed to an appraisal of the role of drink- g in private motor vehicle accidents and to an analysis of factors which attend drink- g-driving accidents. The role of drinking is discussed in this article; factors in the rsonal histories of drivers involved in accidents preceded by drinking are discussed Part II.

The subjects of this study were Airmen. Personnel from other services were ex- uded for two reasons: (1) the exploratory phase of this study began with Airmen—ex- nsion of the research to include members of the other services was planned; and with a limited number of subjects, homogeneity with respect to branch of service emed desirable to avoid problems of fractionating the samples into ones which would ke a statistical treatment of the data impractical.

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Although the subjects are servicemen, the problem of the drinking driver is not limited to the services. A digest of representative studies on the incidence of preaccident drinking is presented in Table 1.

Table 1 reveals that the incidence of preaccident drinking reported in various stud ranged from 1.3 percent to 69.9 percent. Some of this variability probably can be ac counted for on the basis of differing degrees of leniency in the criterion of drinking, differing lengths of time between accident and blood test, and by inevitable random fluctuations due to small sample sizes. Also, as Plymat (16) has pointed out, the va idity of reports of extremely low preaccident drinking percentages are often question able. On the other hand, although the magnitude of the drinking-driver involvement i accidents may have been underestimated generally in the past, there is reason to be- lieve that the significance of the problem is gaining recognition (14).

METHOD

The Accident Sample

The accident population was defined as all Airmen who, while driving a privately- owned motor vehicle, were involved in an accident which resulted in a lost-time in- jury to the driver or to a military passenger. To secure a reasonably large sample of accident drivers, 14 Air Force Bases were visited.

During the period of the study (January 1, 1958 to June 30, 1959), a total of 239 drivers at these bases were involved in this kind of accident. Of these, 155 (64.9 pe cent) were interviewed. Seventeen of the interviewed subjects had been riding motor scooters or motor cycles. This number was too small for a separate analysis, and was omitted. Consequently, the final sample of the study comprised 138 interviewed drivers.

Since 35.1 percent of the accident population was not interviewed, the possibility a biased sample had to be considered. To identify possible sources of bias arising i

TABLE 1

PERCENTAGES OF DRINKING-DRIVER ACCIDENTS IN PUBLISHED STUDIES

Date	Author	Type of Accident	N	Test of Drinking	Criterion	Percent Meeting Criteria
			(a) Civilian Subjects			
1934	Heise	Hospitalized	270	Drunkometer	Any alcohol	46.
1934	Hindmarsh and Linda	Hospitalized	113	Blood alcohol	Any alcohol	44.
1938	Holcomb	Personal injury	270	Urinalysis	Any alcohol	46.
1941	Gonzales and Gettler	Fatality (death within 24 hrs)	3471	Brain alcohol	"Under influence"	56.
1951	Smith and Popham	Personal injury	428	Intoximeter	0.01% or more	32.
1954	Lucas, et at.	All reported evening accidents	423	Drunkometer	0.05% or more	22.
1955	Bjerver et al.	Personal injury	71	Blood alcohol	0.01% or more	32.
1955	Coldwell	Fatality	1,755	Unspecified	0.05% or more	45.
1955	Plymat	Fatality	31-3048	Unspecified	"Drunk or drinking"	1.3-64.
1959	Haddon and Bradess	Single vehicle drivers (death within 4 hrs)	83	Blood alcohol	0.05% or more	69.
			(b) Military Subjects			
1957	Ribble	Personal injury (Marines)	48	Bogan Test	Any alcohol	64.
1959	This study	Personal injury (Airmen)	138	Interview	Admitted 2 or more drinks within 4 hr of accident	64.

ne selection of cases for interview, the reason for the unavailability of each case was etermined and a copy of the official accident report (the AF Form 122 Report) for ach was also obtained.

Of the uninterviewed cases, the most frequent reason for unavailability was a per-anent change of station (28.6 percent of the cases). Death was the next most fre-uent reason (19 percent). Other reasons included confinement in a remote hospital, ischarge, leave, and on the hospital critical list. These events could occur because ne average interval between the accident and the interview was 2.4 months.

A comparison of selected data from the official accident reports of the interviewed nd uninterviewed is shown in Table 2.

TABLE 2

COMPARISON OF INTERVIEWED AND UNINTERVIEWED ACCIDENT DRIVERS

Characteristic	Interviewed (N = 138)	Noninterviewed (N = 84)
ge (median)	23.5 years	22.3 years
ank (modal)	Airman Second Class	Airman Second Class
rinking noted (% of cases)	44.7	52.4
river judged responsible, %	84.1	83.8
ultiple vehicle accident, %	42.7	40.3

ote: None of the differences was statistically significant.
Data from AF Form 122.

The differences are small and not significant statistically. The data permit a re-ction of the hypothesis that the procedure for getting to the cases filtered out the vorst" ones to be interviewed. If any bias was operating, it was in the direction of derstating the drinking involvement in the sample.

ne Control Sample

To assure randomness the control sample was selected from Air Force personnel nose serial numbers ended in an arbitrarily chosen double number. These numbers ere different for each base (for example, xxx-xxx-x22 at one base, xxx-xxx-x33 at other, etc.). From these groups, individuals were chosen who possessed a cur-ntly valid driver's license, and who had had no traffic accidents for one year or nger. Of the total number of persons who met these criteria, 40 percent were in-rviewed. The remainder were unavailable because of leaves, inaccessibility of ty site, high priority duty, and other reasons. The census characteristics of the al interviewed group matched fairly closely the Air Force as a whole, except that e officer population was under-represented. Few of the accident drivers were of-ers; therefore, the controls were chosen to match the distribution of Air Force rsonnel in the enlisted grades.

The definition of a control for an accident group poses some difficult problems. ne properties of a control group should be dependent on the types of questions ad-essed to the data. Consequently, no single group can effectively serve as a univer-l control when the questions asked are varied, as they must be in an exploratory udy. The members of the control group selected by this method were older by 2½ ars than the members of the accident group, fewer were driving borrowed cars, eir cars were older, and had more mileage on them. Although there was no signif-nt difference in the number of miles driven in the last year, the trend suggested a mewhat higher exposure in the accident group. Other differences are discussed in e results but in substance there is no clear evidence that the procedure for selecting e control group singled out the individuals with especially low exposure characteris-s.

Correlated with this difference in age are differences in marital status, which in turn relate to the availability of funds for new cars. Finally it should be noted that the accident sample in this study was not selected on the basis of accident repetition, but rather on the basis of a single injury-producing accident which occurred during a given span of time. Similarly, the control sample was not selected because its members were completely accident free, but rather because they were free from property damage or personal injury accidents for a year. Accident repeaters and accident-fre individuals are useful in studying accident proneness. However, a study designed to find the causes of personal injury accidents must sample all cases as they occur with out excluding the nonrepeaters.

The Interview Procedure

The primary data collection procedure was a semistructured personal interview. The close cooperation of Air Force personnel throughout the study, and their respect for the interview data as privileged communication greatly facilitated the conduct of this study.

Each interview required from two to four hours, and covered: family background, schooling and employment, military service, marital status, future career plans, ca ownership, driving and accident history, opinions about accident causation and preve tion, recreational activities, drinking practices, and the events of the 48 hours preceding the accident.

Interviews with control subjects covered similar areas except for the events surrounding the accident. In place of a description of the accident, controls were asked to describe in detail their driving (and drinking) activities during the seven days immediately preceding the interview.

The first step in the interview procedure was to explain the nature and purpose of the research program to the subject. He was assured that his communications would be privileged and advised that he could feel free to decline to answer any questions, but was urged to answer frankly. Interviewer bias was minimized by the careful delineation of criteria for categorizing responses and by the use of six interviewers.

RESULTS

The Incidence of Preaccident Drinking

The criterion for preaccident drinking was two or more alcoholic beverages withi four hours of the accident. The minimum blood alcohol level of any subject who met this criterion would have been approximately 0.01 percent using a formula for estim tion described by Ferguson and Bell (5). Actually, since the interval between last drink and accident averaged 1.4 hours, the average blood alcohol level for those who met the minimum criterion is estimated to have been 0.034 percent.

Of the 138 accident drivers, 89 (64.5 percent) were classified as drinking drivers Although this is at the upper end of the distribution reported for civilians in Table 1, it is almost identical with the 64.6 percent preaccident drinking reported by Ribble (17) for Marines. He used an objective method of measuring blood alcohol.

The percentage of drinking drivers, according to interview results, was higher b one-half than official Air Force accident investigation reports (AF 122) indicate. "H been drinking" was mentioned in the accident reports for only 44.4 percent of the dr ers in this sample. There are, however, several reasons for believeing that the off ially reported incidence of drinking was low:

1. Base accident investigators serve in an official capacity with certain administrative responsibilities toward the driver of the accident vehicle. Consequently, the are unlikely to suggest preaccident drinking in the absence of reasonably conclusive evidence at the time of the investigation. This evidence can be difficult to obtain except in the case of heavy, recent drinking. Sometimes accident drivers cannot be seen until hours, or even days, after the accident. The driver is understandably wary of official investigation and may attempt to conceal or deny preaccident drinking
2. Blood alcohol tests, if administered routinely within a short time after the ac

ident, could provide definitive information. However, blood samples were taken rom only one-third of the accident drivers. The outcome of the blood alcohol test vas not always included in the Air Force accident reports.

3. Military physicians on emergency service are frequently shorthanded: injury reatment takes priority over blood tests. In some instances physicians stated that hey hesitated to become involved in the medico-legal aspects of the cases.

4. The blood tests are often administered not to assess drinking involvement but ather to confirm a prior suspicion of drinking.

Interviews of the type used in this study, in spite of their reliance upon the memory nd candor of the subject, can be expected to provide more complete information than nsystematically applied objective tests. Consequently, the 64.5 percent incidence of reaccident drinking is judged to represent a reasonably conservative estimate of the rue incidence in the population.

Almost equally important as the incidence of preaccident drinking is the amount of rinking. The criterion used in this study would admit as drinking drivers persons ith blood alcohol levels below those considered legally significant. Table 3 gives he amount of preaccident drinking reported by the drivers; it does not reflect the a-

TABLE 3

AMOUNT OF PREACCIDENT DRINKING REPORTED BY ACCIDENT DRIVERS

Number of Drinks	Accident Drivers (N = 83)[a]		
	Number	Percent	Cumulative, %
2	8	9.7	100.0
3-5	25	30.2	90.3
6-10	19	22.9	60.1
11-15	9	10.8	37.2
16-20	12	14.4	26.4
1 or more	10	12.0	12.0

Six subjects who admitted drinking more than two drinks within four hours of the ac- ident could not specify the amount actually consumed.

ount of drinking in four hours. Rather, it reflects the amount of preaccident drink- g, often for longer periods among those who had at least two drinks within four hours the accident.

Very few (9.7 percent) of the drinking drivers were near the lower limit in the a- ount they reported drinking. The fact that 60.1 percent of the drivers reported con- ming six or more alcoholic drinks suggests that heavy preaccident drinking was mmon. The percentage of the drinking-driving controls who admitted drinking as avily was only one-half as large (30 percent).

rinking, Driving, and Day of the Week

The distribution of drinking and nondrinking accidents is given in Table 4 which in- icates that the average number of accidents per day was almost twice as high on week- ds as on weekdays (29 per day on weekends versus 16 per day on weekdays). How- er, the percentage of drinking-driver accidents remained approximately the same on eekends as on weekdays.

The piling up of accidents on weekends was not surprising; similar findings have en reported by many other investigators (1, 2, 7, 8, 16). The consistently high per- ntage of drinking-driver accidents through the week, however, was somewhat sur- ising. Although Haddon and Bradess (7) found no difference in percentage drinking tween weekend days and weekdays, several other investigators have found a higher

percentage of drinking-driver accidents on weekends (2, 11, 16).

Because the number of cases on any one day was quite small, it was possible that a few cases could produce large apparent percentage differences. For instance, if a number of the weekend cases classified as nondrinking-drivers had been drinking heavily more than four hours before their accident the weekend percentage could be a serious underestimation. To test this possibility, all cases classified as nondrinking, whose accidents occurred between midnight Friday and midnight Sunday, were

TABLE 4

DISTRIBUTION OF ACCIDENTS

Type	Daily Variation							Total Week	Weekday-Weekend Comparison	
	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.		Weekdays[1]	Weekend[2]
Drinking-driver	8	10	8	11	15	22	15	89	10.4	18.5
Nondrinking-driver	4	3	5	7	9	8	13	49	5.6	10.5
Total	12	13	13	18	24	30	28	138	16.0	29.0
Drinking-driver percentage	66.7	77.0	61.5	61.1	62.5	73.3	53.6	64.5	65.0	63.8

[1]Average for Monday, Tuesday, Wednesday, Thursday, Friday.
[2]Average for Saturday, Sunday.

re-examined. Of the 21 cases, five were marginal, as follows:

1. Five beers, last drink six hours before accident.
2. One beer, two hours before accident.
3. Could not remember whether had been drinking or not.
4. One beer, two hours before accident.
5. Two beers, six hours before accident, visited several bars between second beer and accident, but denied further drinking.

If these five cases had been classified as drinking-driver accidents, the weekend percentages would have been noticeably increased (that is, Saturday 76.7 percent rather than 73.3 percent, Sunday 67.9 percent rather than 53.6 percent). However, the conclusion would not thereby have been changed—the percentage of preaccident drinking on weekend days still would not have been significantly greater than the percentage of preaccident drinking on weekdays.

It remains to be determined whether the drinking-driving experience of the control group during the week parallels that of the accident group. The relation of accident occurrence to control exposure, while not conclusive, should suggest some of the exposure-accident correlates.

The measure of driving exposure among the control subjects was simply the total number of times each respondent reported driving, for any part of each hour of the day, during each of the seven days prior to the interview. The same criterion for drinking-driving exposure was used as had been applied to the accident drivers: two or more drinks within four hours of driving. If the drinking driver was on the road for more than an hour, he was so tallied for each hour or part of an hour that he was driving, unless four hours had elapsed from the time of his last drink. In that case, he was tallied as driving but not drinking.

The driving and drinking-driving exposure of the control subjects is shown in Table 5, which indicates that the total driving activity of the control subjects was only slightly higher on weekends than on weekdays; however, drinking-driving increased substantially on weekends. Although drinking-driving accounted for a significantly larger percentage of weekend driving (almost three times as much as weekdays), drinking-driving among the control subjects never accounted for more than a small percentage of all driving. These results are consistent with the findings of Holcomb (11) who found a similar low incidence of drinking-driving in a nonaccident sample of drivers.

TABLE 5

DISTRIBUTION OF DRIVING EXPOSURE AMONG CONTROL SUBJECTS

Number of Driving Hours	Daily Variation							Total Week	Weekday-Weekend Comparison	
	Mon.	Tue.	Wed.	Thur.	Fri.	Sat.	Sun.		Weekdays[1]	Weekend[2]
rinking-driver	12	5	12	4	6	29	19	87	7.8	24.0
ondrinking-driver	259	228	188	192	242	210	234	1,553	221.8	222.0
Total	271	233	200	196	248	239	253	1,640	229.6	246.0
rinking-driver percentage	4.4	2.1	6.0	2.0	2.4	12.1	7.5	5.6	3.4	9.7
									p = 0.0001	

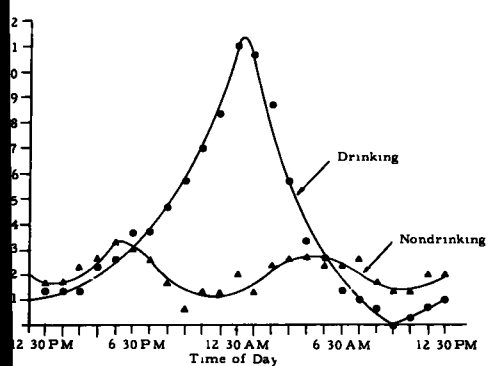
verage for Monday, Tuesday, Wednesday, Thursday, Friday.
verage for Saturday, Sunday.

The contribution of alcohol to accidents is suggested by the fact that drinking preeded 64.5 percent of the accident trips, but only 5.3 percent of the nonaccident drivng. In other words, drinking-driving preceded accidents twelve times more often han would be expected on the basis of the obtained control exposure data.

ccidents and Driving by Time of Day

The frequency of drinking-driver and nondrinking driver accidents by time of day s shown in Figure 1. The distribution of not-drinking accidents was fairly flat throughut the day, and corresponds roughly to the driving experience or exposure for a military opulation (that is, largest volume of travel early in morning and late in afternoon—going to and coming from the base—see Figure 2). The contingency coefficient for the elationship between the nondrinking accident frequency and driving exposure per hour as + 0.67 (p = 0.001 for a 3 x 3 table, for which maximum value of C is + 0.82.

On the other hand, the drinking-driver accidents distributed quite differently from



gure 1. Distribution of drinking-driver d not-drinking-driver accidents by time day. Figure smoothed by method of movg averages, using average of three points for each point plotted.

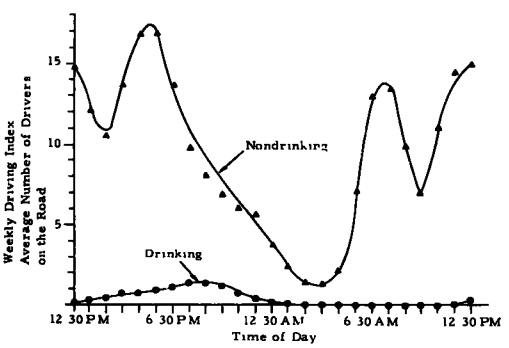


Figure 2. Distribution of driving exposure for 100 control subjects, separated according to whether drinking did or did not precede the driving. Figure smoothed by method of moving averages, using average of three points for each point plotted.

e nondrinking ones. Most of the drink-
g-driver accidents occurred during the hours of darkness. Between 6:00 PM and
00 AM 83.1 percent of the drinking-driver accidents occurred as compared with
.0 percent of the nondrinking-driver accidents. The difference is statistically sigficant (p = 0.0001). For practical purposes this difference is important, if only to ide the assignment of police patrol activities.

The distribution of driving exposure among the control subjects is shown in Figure 2. The distribution of nondrinking driving among the control subjects exhibited pronounced peaks in the early morning and late afternoon. Drinking-driving accounted for a relatively small amount of the driving exposure of the control subjects. On the other hand, the times during which the drinking drivers were on the road correspond fairly well to the times at which the drinking-driver accidents occurred. The rank-order correlation between accident frequency and control group exposure was + 0.89 (p = 0.001). Again, the time during whic most drinking-driving is to be found on the road is the evening.

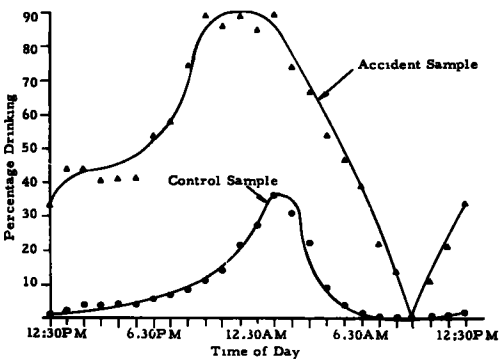


Figure 3. Distribution of percentage of drinking drivers among 138 accident drivers and 100 control drivers by time of day. Figure smoothed by method of moving averages, using average of three points for each point plotted.

Figure 3 shows the percentage of the accident and control groups who were drinking and driving during the day.

The results presented indicate that, a though the maximum percentage of drinki drivers on the road (among the control s jects) occurred at about 2:00 AM the ma mum percentage of drinking-driver acci dents occurred about 2½ hours earlier.

In the absence of exposure data to ind cate the times and amount of driving a- mong the drinking accident group (for a week before the accident occurred) the reason for the discrepancy in the peaks cannot be unequivocally stated. It may b that the earlier peaks of the drinking-dri accidents reflect a higher exposure rate during the pre-midnight hours as a resul of "bar-hopping." Over half (57.6 perce of the drivers involved in drinking-drive accidents had been drinking in more than one place prior to the accident as compared with 10.2 percent among the drinking-driving controls.

One other association between drinking and accidents should be noted. To compar the amount of preaccident drinking and the type of accident, the following classifications were used:

1. Drinking: (a) Heavy drinking—six or more preaccident drinks; (b) Moderate drinking—two to five preaccident drinks; and (c) No drinking—one or no preaccident drinks.

2. Type of accident: (a) Single vehicle—no contact with any other vehicle, noncol lision or fixed object collision; (b) Complicated single vehicle—single vehicle accide in which another vehicle was alleged to have contributed (for example, blinding head- lights and crowding) but without contact; and (c) Multiple vehicle accident—collision between two vehicles on the roadway (includes one collision with a railroad train and three with parked cars).

The relationship between amount of drinking and type of accident is given in Table 6. Those drivers who drank heavily prior to the accident were involved in single-ve- hicle accidents almost twice as often as the not-drinking ones. The contingency coefficient between drinking and type of accident was + 0.31 (p = 0.001). (Because the heavy drinking drivers included, as multiple vehicle accidents, three individuals who struck parked cars, both the X^2 and the C for Table 6 are conservative estimates. Thus, had the three cases in question been classified as single vehicle accidents, the X^2 for Table 6 would have been 15.84, and the contingency coefficient + 0.33.) In oth words, the data indicate a significant association between drinking and single-vehicle accidents.

The data do not include information on the drinking status of the "other" driver in the multiple-vehicle accidents, except in the very few instances where two drivers from a base were involved in the same accident. Conceivably, if such information

TABLE 6

RELATION OF TYPE OF ACCIDENT TO AMOUNT OF DRINKING

ype of Accident	Heavy (N = 50) %	Moderate (N = 34) %	None (N = 49) %
ingle vehicle			
Uncomplicated	60.0	44.1	34.7
Complicated	12.0	14.7	4.1
ub total single	72.0	58.8	38.8
lultiple vehicle	28.0	41.2	61.2
Total	100.0	100.0	100.0

ote: $X^2 = 13.77$, df = 2, p = 0.001. This value permits rejection of the hypothesis at the three groups, separated on the basis of the amount of drinking, have equivaent distributions of single vehicle accidents.

ere available, the association between heavy drinking and single-vehicle accidents ould be attenuated. But assuming that as high as 70 percent of the "other" drivers ere drinking (in the ratio of 60 percent "heavy," and 40 percent "moderate") a spread 19 percent still persists in favor of single vehicle incidence among heavy drinkers ver nondrinkers, in spite of the fact that these assumptions are least favorable to the ssociation between drinking and the single vehicle accident. It is much more likely at the proportion of "other" drinking drivers who collided with the multiple vehicle ccident drivers here studied was far less than 50 percent if only because these accients occurred primarily during the day, when drinking-driving was least frequent.

The conclusion is warranted that single-vehicle accident drivers exhibit the highest cidence of preaccident drinking. The National Safety Council (1) has reported subtantial increases in single-vehicle accidents during the past ten years. Collisions ith fixed objects increased 65 percent from 1947-1957; noncollision accidents inreased 55 percent during the same period. Multiple-vehicle accidents increased only 5 percent during this time. With single-vehicle accidents assuming an increasingly rge proportion of all accidents, a careful investigation of the role of preaccident rinking seems indicated (7). There is reason to suspect that the drinking-driver roblem is increasing rather than decreasing in magnitude.

riving Distance and Location

It is sometimes suggested that private motor vehicle accidents among servicemen esult primarily from driving long distances at high speeds to make the most of a eave or pass. The data do not support this suggestion. In the sample of accidents tudied, virtually all (87.0 percent) occurred within 50 miles of the base; slightly ss than half (47.8 percent) occurred within five miles of the base. The average disnce driven before the accident amounted to only 2.7 miles for the drinking drivers nd 6.0 miles for the not drinking drivers.

DISCUSSION

Laboratory studies can demonstrate that alcohol may cause an impairment of many erformances important to the control of a vehicle (4). Such studies do not demontrate that alcohol causes motor vehicle accidents. Field studies such as this cannot rove that alcohol causes accidents either, but there is substantial evidence that drinkg is significantly associated with personal injury accidents occurring in privately wned vehicles. The problem of "proving" that alcohol causes accidents, or more enerally, the problem of determining the causes of known effects is a formidable ne. There are both legal and ethical constraints against obtaining proof by manipu-

lating a cause (alcohol) in such a way as to produce a specific effect (injury-producin accident). Under the circumstances, it is necessary to rely upon the implications of converging lines of evidence. Field studies such as this one provide the necessary link between the laboratory studies and the belief that alcohol may play a causal role in inducing accidents on the highway.

This study has shown that the ratio of preaccident drinking to nondrinking was sub stantially higher than the ratio of drinking-driving to not drinking-driving among a control sample. Drinking accidents have a different time distribution than nondrinki accidents. While the nondrinking accident distribution paralleled the over-all exposu data for the controls, the drinking accident distribution did not, but rather paralleled the drinking-driving distribution of the controls. The drinking accident driver drank more heavily and was more likely to bar-hop on the day of the accident than the non-accident control. The bulk of the accidents were local, therefore fatigue from long distance driving played a negligible role. There is an association between the amoun of drinking and the type of accident. Single-vehicle accidents are more likely to occ with preaccident drinking. This association tends to divorce the drinking accident fr the responsibility of others. These diverse characteristics of the drinking accident have a logical consistency if a causal quality is imputed to the drinking.

One paradox emerged from the data. The ratio of drinking to nondrinking acciden was high throughout the week. Even though there were roughly twice as many accide on Saturday and Sunday as on weekdays, the ratio of drinking to nondrinking accident for the weekend was the same. This constancy is particularly puzzling in view of the fact that the incidence of drinking-driving for the controls was three times as high o the weekends as on weekdays.

In view of the causal role imputed to alcohol, it is tempting to let alcohol carry th heuristic burden for resolving the paradox. A number of hypotheses can be develope about how alcohol was involved.

It may be assumed that the drinking accidents are "selected," so to speak, from the drinking-driving control population who drink too much. There is evidence that the preaccident drinking was, on the whole, heavier than that of the drinking-driving controls. This assumption can account for the paradox of a constant proportion of drinking accidents throughout the week however, only if it is assumed further that th rise in weekend drinking and driving for the controls is light "social" drinking. A careful study on a larger number of cases is indicated to test this hypothesis.

It may be assumed further that because of the higher proportion of bar-hopping among the preaccident drinkers than among the drinking-driving controls, their frequency of exposure at the time of heavy drinking was greater. This hypothesis would also require fuller investigation than was possible in this study.

Finally, it may be assumed that the control group, in addition to being older, was otherwise different from the accident group in the role that alcohol played in their lives. This hypothesis is discussed more fully in Part II.

IMPLICATIONS FOR COUNTERMEASURE DEVELOPMENT

One of the primary purposes of this investigation was to provide information usef in the development of countermeasures. What countermeasures are suggested by th data here reported? Since drinking was so prominently associated with lost-time ac cidents, efforts to discourage drinking and driving would appear promising.

The Scandinavian countries have reported notable successes with police programs designed to detect the drinking driver—usually by means of random spot checks amo evening drivers, using some form of chemical test for blood alcohol. Detroit is reported to have reduced drinking-driver accidents by an impressive 95 percent throug "ten years of rigid enforcement backed by chemical tests (14)." A program of off-base patrolling at a Marine Corps base (12) although not directly aimed at the drinki driver, indicated the feasibility and effectiveness of creating a "sense of surveillanc among military personnel driving in the vicinity of their base. A 42 percent reductio in accident frequency was obtained following a ten-week program. The effect lasted nine weeks after the countermeasure was discontinued.

One barrier to applying such countermeasures effectively are legal restrictions on ıe off-base activities of military enforcement personnel. The success of counter-ıeasures specifically designed to affect the drinking driver indicates that the coordina-ıon of military and civilian programs in the area of patrolling and supervision of traf-ic in the vicinity of military bases would pay off handsomely. Initiative in this area hould be encouraged.

Another countermeasure which appears promising is a chemical test at the gate ombined with an educational program of discouraging drinking and driving and encour-ging the driver, at least, to remain sober.

Still another countermeasure suggested by the data is a program of alerting base ersonnel to the hazards of bar-hopping.

Whether or not these latter countermeasures would, in fact, be effective remains be evaluated.

SUMMARY

An interview study of 138 drivers involved in injury producing accidents and 100 ontrol drivers drawn from a random sample of Airmen revealed:

1. Preaccident drinking occurred in roughly two-thirds (64.5 percent) of the sam-e of accidents. This figure was at the upper end of the distribution of percentages eported for civilian accident drivers, but consistent with another study of preaccident rinking among military personnel.
2. Official accident reports underestimated the incidence of preaccident drinking.
3. The total number of accidents and the total number of drinking-driver accidents ere greater on weekends than on weekdays. However, the percentage of drinking-river accidents was fairly consistent from day to day.
4. Total driving exposure among the controls was only slightly higher on weekends an on weekdays, but their drinking-driving exposure, though small, trebled on week-nds.
5. Drinking-driving accounted for no more than 5.3 percent of the total driving of e control subjects. Accordingly the incidence of drinking-driving among the accident roup was twelve times that of the controls.
6. Nondrinking accidents were associated with traffic density, and tended to occur ost often during the morning and afternoon "rush" hours.
7. Drinking accidents were primarily night accidents, 83.1 percent occurring be-ween 6 PM and 6 AM.
8. Drinking was associated with single-vehicle accidents.
9. Drinking and nondrinking accidents tended to be local (occur in the vicinity of e base) and occur during short-distance trips. Very few accidents could be attributed long-distance driving and fatigue.
10. Cooperation of military and civilian personnel for the development and testing of ograms to carry surveillance of the drinking driver beyond the base gates seems ghly desirable for effective reduction of drinking accidents. A number of promising untermeasures were suggested for evaluation.

I. Background Correlates of the Lost-Time Accident

BECAUSE preaccident drinking was so prominent a characteristic of the class of cidents studied, it is important to know something about the role of drinking in the ves of the accident victims if effective preventive measures are to be developed. reventive measures for reducing drinking-driver accidents could be designed to per-ade individuals to avoid the combination of drinking and driving. The form of per-asion would depend on whether the bulk of the drinking accident drivers are social inkers as suggested by Kearney (14) or compulsive drinkers as Popham (24) has

proposed. Rational appeals may have some influence on social drinkers but little or no influence on compulsive drinkers.

However, there are several complications to the apparently simple distinction between the social drinker and the compulsive drinker. Drinking habits do not fit into discrete categories, rather they occupy a broad spectrum of which some of the crucial variables are time, frequency, amount, control, and health and social effects.

Bjerver, Goldberg and Linda, (12) and Goldberg (22) utilized a Swedish system which includes three levels of problem drinkers: (a) addicts—persons confined to institutions for alcoholics (under Article 1 of the Swedish Alcohol Law) at any time during the three years preceding the study; (b) abusers—persons with three or more convictions for offenses involving drinking; and (c) excessive drinkers—persons with one or two convictions involving drinking. Bjerver, et al. (12) found a 32.5 percent incidence of all three classes of problem drinkers in a male accident-injured population; among those victims whose blood tests were positive for alcohol at the time of hospital admission, 69.5 percent were problem drinkers, though only 8.7 percent qualified as addicts.

The drinking habits of a military population, of course, might be expected to differ from those of a civilian one as a result of selection. Overt alcoholics are not accepte by the Armed Forces if their condition is known; if it is discovered subsequent to induction, they are likely to be separated from the service soon after.

Another important issue affecting the development of accident countermeasures is the degree of relationship between accidents and psychopathology. The accident drive is not usually thought of as mentally ill, though the accident repeater may be. Canty (21) for instance, reported that only 9.7 percent of the traffic violation repeaters seen in his clinic were free of major psychopathy. On the other hand, this estimate cannot be applied to accident repeaters in general (much less to the non-repeater accident driver) since the cases seen in the clinic had all been referred by state and municipal judges and officials who presumably had reason to question the mental health of the offenders.

Most studies suggest that accident repetition reflects a pattern of inadequate adjustment which does not readily fit into existing psychiatric diagnostic categories (20, 22, 26, 27, 28). The accident repeater has been described as the product of a broken home, (26, 27) socially immature and impulsively resentful toward authority, (27) wit escapist (22) and/or self-destructive tendencies (20). Of course, the primary focus of the present investigation was not on repeaters. It was desired to determine whethe the characteristics of repeaters, as cited in the literature, could be confirmed on a representative sample of airmen involved in lost-time accidents in privately owned vehicles. The nature of the adjustment problems and their accessibility to psychiatri treatment are important in assessing the feasibility of countermeasures which would involve psychiatric assistance.

METHOD

The details of procedure were described in Part I. The essential feature of the procedure was an intensive semistructured interview of two to four hours duration. Three groups of drivers were involved:

1. A drinking accident group, consisting of 89 drivers (Airmen) involved in private automobile accidents which resulted in lost-time injuries to themselves or to their passengers. They reported having had at least two alcoholic beverages within four hours of the accident.
2. A not-drinking accident group consisting of 49 drivers involved in lost-time accidents, but who reported they had not been drinking, or at most had a single alcoholi drink within four hours of the accident.
3. A control group, consisting of 100 randomly selected drivers who had not been involved in a lost-time or property damage accident within one year of the interview.

TABLE 7

ACCIDENT HISTORY BEFORE AND INCLUDING CURRENT ACCIDENT

Number of Accidents	Accident Drivers: Drinking (N = 89) Present Accident Excluded %	Accident Drivers: Drinking (N = 89) Present Accident Included %	Accident Drivers: Not Drinking (N = 49) Present Accident Excluded %	Accident Drivers: Not Drinking (N = 49) Present Accident Included %	Control Drivers (N = 100) Any Past Accident Experience %
0	47.2	0.0	46.9	0.0	44.0
1	31.4	47.2	30.6	46.9	36.0
2	14.6	31.4	16.3	30.6	12.0
3	3.4	14.6	6.1	16.3	4.0
4 or more	3.4	6.8	0.0	6.1	4.0
Average per man	0.92	1.92	0.82	1.82	0.92

RESULTS

A comparison of the motor vehicle accident histories of the three groups with and without the current accident included is shown in Table 7, which indicates that the accident and control groups were strikingly similar in frequency of accidents before the present one. Of course, inclusion of the current accident markedly changed the distribution. With the present accident included, 52.8 percent of the drinking accident group had two or more accidents, as opposed to 53.0 percent of the not-drinking group, and 20.0 percent of the controls. While the number of repeaters was enlarged, still only half of the accident drivers could be categorized as repeaters. In other words, on the basis of past accident experience, there was no difference between the group who became involved in accidents and the control group who remained accident free for at least one year.

The usual drinking habits of the three groups were compared to determine whether the drinking of the drinking accident sample was an isolated event or part of a recurring pattern. The data are shown in Table 8, and indicate that the distributions of fre-

TABLE 8

REPORTED FREQUENCY OF DRINKING AMONG ACCIDENT AND CONTROL DRIVERS

Frequency of Drinking	Accident Drivers: Drinking Prior to Accident (N = 58)[1] %	Accident Drivers: Not Drinking Prior to Accident (N = 36)[1] %	Control Drivers (N = 100) %
More than once a week	72.4	36.1	44.0
Once a week - once a month	25.9	30.6	21.0
Once a month - once a year	1.7	13.9	17.0
Not at all	0.0	19.4	18.0
Total	100.0	100.0	100.0

[1] Because this line of inquiry was not begun until the study was well under way, this information is reported on two-thirds of the accident cases but on all of the controls.

quency of drinking for the not-drinking accident sample and the control sample resembled each other closely, but that the distribution of the drinking accident group was markedly different from the other two ($p = 0.001$).

The practical significance of the higher frequency of drinking among the drinking accident group is attenuated somewhat by the fact that if one asked individuals selecte at random about their drinking habits, and separated them into two groups: (a) those who had been drinking on a recent, randomly selected date, and (b) all others, the drinking frequency distributions would also differ. The "dated" group would be devoi of the 18-19 percent who do not drink at all. Nevertheless, even taking this fact into account, the distribution of the drinking accident group was still skewed toward the high frequency end. The data demonstrate that drinking at the time of the accident wa not an isolated or chance event but rather that this type of accident included a high pr portion of regular drinkers.

The fact that more members of the drinking accident sample were likely to drink more frequently does not mean they were alcoholic.

In order to quantify the extent to which drinking was a problem the categories and criteria reported by Goldberg (23) were used. Table 9 presents the incidence of prob lem drinkers in the accident and control samples and indicates that the problem drinke were very significantly over-represented in the drinking accident driver group. Al-

TABLE 9

INCIDENCE OF PROBLEM DRINKERS AMONG THE ACCIDENT AND CONTROL DRIVERS

Problem Drinking Habits	Accident Drivers: Drinking (N = 89) %	Accident Drivers: Not Drinking (N = 49) %	Control Drivers (N = 100) %
Addict	0.0	0.0	0.0
Abuser	11.2	2.0	1.0
Excessive	22.5	8.2	8.0
Subtotals			
Problem drinkers[1]	33.7	10.2	9.0
No drinking problem	66.3	89.8	91.0
Total	100.0	100.0	100.0

[1]Incidence of problem drinkers among drinking accident drivers significantly higher than among not drinking accident drivers (CR = 3.1, $p = 0.002$), or controls (CR = 4.2, $p = 0.0001$).

though the drinking accident group had a significantly higher percentage of problem drinkers, the hypothesis of Popham that "...traffic accidents involving drivers who had been drinking are to a considerable extent a problem of alcoholism rather than largely a problem of the effects of alcohol on the casual drinker (24, p. 231)," was not completely confirmed. There were no addicts in any of the groups, and the proportion of problem drinkers did not constitute a majority even among the drinking accident drivers.

Adjustment Problems

No psychiatric diagnostic examination was obtained for any of the interviewees, consequently their current psychiatric status cannot be described definitively. However, there was no case of a diagnosed psychotic episode requiring hospitalization re ported in the biographical data of any of the three groups. Although it cannot be concluded with confidence that there was none, it is clear that psychosis was not a noteworthy biographical characteristic of the accident groups.

TABLE 10

INCIDENCE OF EARLY FAMILY TRAUMA[1] AMONG ACCIDENT AND CONTROL DRIVERS

Family Background	Accident Drivers: Drinking (N = 89) %	Accident Drivers: Not Drinking (N = 49) %	Control Drivers (N = 100) %
Traumatic	39.3	16.3	28.0
Nontraumatic	60.7	83.7	72.0
Total	100.0	100.0	100.0

Note: Chi square = 8.19, df = 2, p = 0.02. This value permits rejection of the hypothesis that the two accident groups and control have the same distribution of family backgrounds.

[1]The traumatic category includes those who were separated from one or both parents before age 13 for reasons of parental death, desertion, separation, divorce, imprisonment, or commitment to a mental hospital. Also included were those who were separated and were raised by others for at least six months while both parents were still alive. The nontraumatic category included all others. It is not implied that the members of the nontraumatic group were free from emotional trauma, but rather that they did not meet certain criteria of trauma. The particular criteria were selected because they could be clearly identified in biographical data.

There was evidence, however, that the drinking accident tended to select those persons who had early family environments identified as emotionally traumatic. Table 10 compares the incidence of early family trauma among the three groups. The most striking finding is the lack of homogeneity among the two accident groups. (The difference in incidence of trauma between them was 23.0 percent, CR = 2.7, p = 0.02.) This difference remained fairly stable from the first few cases throughout the collection of the entire sample.

In view of the studies by Tillman (27), Schulzinger (26) and others associating accident repetition with a history of a broken home, the question may be raised as to how much this association owes to the intervention of alcohol as a palliative for the feelings of loneliness, rejection, resentment, etc., generated by the broken home experience.

Table 10 also shows that while an incidence of 39.3 percent broken homes seems high it is only 11.3 percent higher than that of the control group (CR = 1.7, p = 0.09) and 14.5 percent higher than the figure (24.8 percent) reported by Ryan (25) for 1,262 unselected Army recruits. Accordingly, this characteristic is meaningfully and differentially associated with a relatively small subgroup of the drinking accident sample.

There is evidence that some of the criteria of trauma are more heavily associated than others with the drinking accident. One quarter of the 35 drinking drivers who came from broken homes had been exposed to socially stigmatized parental separations (for example, felony conviction of parent, suicide, hospitalization of parent for mental illness, or desertion). Only one of the eight not-drinking accident drivers from broken homes and one of the 28 controls from broken homes had experienced socially stigmatized separations. The number of cases involved is small, however, and the differences not statistically significant.

Another clue to the quality of the home life of a substantial proportion of the drinking drivers is provided by the incidence of problem drinking among the drivers' parents. A problem drinking parent was defined as one who drank heavily to a point impairing health or job stability and resulting in medical advice to stop, and/or quarreling with the other parent about stopping drinking. The data in Table 11 suggest that one thread in the etiology of this type of accident may be that the drinking accident

TABLE 11

INCIDENCE OF PROBLEM DRINKERS AMONG THE PARENTS OF THE ACCIDENT AND CONTROL DRIVERS

Parental Drinking	Accident Drivers: Drinking Prior to Accident (N = 89) %	Accident Drivers: Not Drinking Prior to Accident (N = 49) %	Control Drivers (N = 100) %
Father a problem drinker	21.3	14.3	9.0
Mother a problem drinker	1.1	0.0	0.0
Both problem drinkers	7.9	2.0	1.0
Total[1]	30.3	16.3	10.0

[1]Incidence of problem drinkers among parents of drinking accident drivers is significantly higher than their incidence among the parents of the not-drinking accident drivers ($p = 0.05$) or the controls ($p = 0.0001$).

driver has acquired, through parental example in some cases, the mode of using alcohol to deal with tension or other unpleasant feelings. Still another explanation might be that a problem drinking parent generates a variety of family disturbances of which drinking by the offspring may be one expression.

The data on parental characteristics (Tables 10 and 11) do not prove that the three groups of offspring are different in their ability to cope or to adjust. They merely indicate that the drinking accident population is moderately over-represented with individuals who had more to cope with as children. As Ryan (25) has shown, this circumstance does not necessarily impair coping ability. In his study, the vast majority (88 percent) of the men who came from broken homes were effective in the service. However, the remaining 11.5 percent contributed disproportionately to the usual criteria of non-effectiveness (involvement in company punishment, courts martial, and civil difficulties). To these criteria might be added on the basis of this study, the drinking lost-time accident.

TABLE 12

MARITAL STATUS OF ACCIDENT AND CONTROL DRIVERS

Marital Status	Accident Drivers: Drinking Prior to Accident (N = 89) %	Accident Drivers: Not Drinking Prior to Accident (N = 49) %	Control Drivers (N = 100) %
Single[1]	51.7	44.9	34.0
Married: living apart[2]	22.5	16.3	8.0
Subtotal: living alone[3]	74.2	61.2	42.0
Married: living together	25.8	38.8	58.0
Total	100.0	100.0	100.0

[1]Difference between accident groups not significant, but drinking accident group significantly different from controls ($p = 0.02$).
[2]Difference between accident groups not significant, but drinking accident group significantly different from controls ($p = 0.01$).
[3]Difference between accident group not significant, but drinking accident group significantly different from controls ($p = 0.001$).

There is evidence that the accident groups (and the drinking accident particularly) were selective of individuals with no immediate home ties. Table 12 compares the marital status of the three groups. Nearly three quarters (74.2 percent) of the drinking accident drivers and 61.2 percent of the not-drinking drivers were living alone as compared with 42 percent of the controls. The difference between the accident groups was not statistically significant, but the difference between the drinking accident group and the control was significant (at the 0.001 level) as was that between the not-drinking group and the control (at the 0.03 level).

One may assume that Airmen who are living alone are more likely to spend leisure time drinking and bar or party hopping; they become more vulnerable to accidents as a consequence.

It could be postulated that the differences in incidence of living alone are an adventitious function of the age differences of the three groups. The average age in years of the drinking accident sample was 23.7; of the not-drinking accident sample, 23.1; and of the controls, 26.1. These age differences occur in a period during which many young men marry. However, single status, regardless of its relationship to age, could contribute more directly to accidents than other correlates of age by virtue of the social factors mentioned previously. Support for this view is found among the reports of some of the married controls who cited a relatively high frequency of drinking and driving before marriage, followed by a "settling down" in which this pattern either diminished or disappeared entirely.

Table 12 also shows a surprising difference between the drinking accident sample and the controls in their proportions of married Airmen living apart from their wives, 12.5 percent vs 8.0 percent. The difference is more striking than shown since the percentages do not take into account the different proportions of married individuals in the two populations. When this is done it is clear that 46.6 percent, or almost one-half the married men in the drinking accident group, and 29.5 percent of the not-drinking accident group are not living with their wives as compared with 12.1 percent of the married controls.

The small number of cases among the married men not living with their wives prohibits statistical comparisons of the reasons for living apart. "Economic" reasons were most frequently cited by all three groups, but marital conflict turned up proportionately more frequently among the drinking accident group.

These data lend support to the view that the drinking accident may be selective of individuals with a current marital adjustment problem; however, additional data are needed. It would be desirable to match the drinking accident group with a control group having the same age distribution and the same proportion of married men, and explore more intensively the nature of the marital adjustments of the two groups.

If "living apart" is used as a coarse index of marital adjustment, it is appropriate to ask whether early traumatic family experiences contribute disproportionately to marital problems. Although the numbers involved are small, the trend for all three groups is that those with early family traumatic backgrounds are over-represented in the samples of married men living apart from their wives. The percentage of drivers who were married, but currently living alone and who reported broken childhood homes was higher among the drinking accident drivers (35.0 percent) than among the not-drinking accident group (14.3 percent) or the controls (0.0 percent). Because of the small number of cases involved, the differences were not statistically significant. If these trends are confirmed, it would appear that the drinking accident population is selective of different subpopulations who are drinking in response to recent as well as remote sources of unhappiness.

Until confirmatory information is available, the most conservative inference to be drawn from the present data is that the drinking accident group draws most heavily from a population without immediate or local home ties. These are the individuals who are most likely to spend part of their leisure in varying combinations of drinking and driving. In this way they are most likely to become involved in an accident.

Still another area in which adjustment problems might be reflected is in relation to authority. Are the groups different in their prior experiences of nonconformity? To answer this question, the groups were compared with reference to preaccident

TABLE 13

DISCIPLINARY HISTORY: ALL INFRACTIONS[1]

Disciplinary History	Accident Drivers: Drinking Prior to Accident (N = 89) %	Accident Drivers: Not Drinking Prior to Accident (N = 49) %	Control Drivers (N = 100) %
Reported one or more infractions[2]	87.6	73.5	50.0
Reported no infractions	12.4	26.5	50.0
Total	100.0	100.0	100.0

[1]Includes civil jail incarceration, moving vehicle violation, article 15, and/or court martial. Disciplinary actions resulting from the present accident were not included.
[2]Percentage of drinking accident drivers who committed infractions significantly high than percentage among: not-drinking accident drivers (CR = 2.1, p = 0.04) or contro (CR = 5.5, p = 0.0001). Similarly, the not-drinking accident group had a higher proportion of offenders than the controls (CR = 2.7, p = 0.007).

civil jail incarcerations, motor vehicle (moving) violations, minor military infractio (Article 15), and major military infractions (courts martial). The results are presented in Table 13.

With few exceptions group differences were not significant for any single class of infractions. However, the general trend was consistent. For each class of infractions, the drinking driver accident group exhibited: (a) a greater percentage of persons who had committed the infraction than either the not-drinking accident group or the controls; and (b) a higher number of infractions per man than either of the other groups. The not-drinking driver accident group was generally equal to, or only sligh ly more often involved than the control group. Consequently, if authority conflict is not limited to specific classes of infractions, but rather is assumed to be reflected i all kinds of infractions, then it is the total disciplinary history that is relevant.

DISCUSSION

There are two characteristics of this study which suggest caution in accepting the findings:

1. Although the present investigation utilized more case histories, obtained by lengthy qualitative interviews, than is characteristic of studies in the accident field, the numbers involved by other standards are small.
2. This report presents only a portion of the information collected. Findings hav been selected which appear relevant to the drinking-accident problem. Most of these findings are statistically significant. However, through selection from a mass of da it is possible to be misled into assuming that all statistically significant findings are replicable. This may not be true.

For these reasons this study needs to be followed up. It is believed desirable tha further studies include personnel from the other two services as well.

It should be noted that this sample of accident cases does not represent all types o automobile accidents, but rather a specific class of accidents having special properties of medical interest—injuries to Airmen, resulting in loss of duty time for 24 hou or more as a result of privately-owned vehicle accidents. Accidents with these properties "select" individuals with certain other characteristics. This group is at leas occupationally different from Airmen having accidents in government-owned vehicles

It has been shown that if single-vehicle accidents had been studied, there would have been a higher proportion of drinking-accidents, etc. What has been described in quantitative terms are some of the accident-correlated properties of a group which this class of accidents selects.

It is clear that the group is more heterogeneous than homogeneous.

The findings of this study are consistent with results reported by Tillman (27) and Canty (21), both of whom have stressed the social difficulties of the chronic offender. The social difficulties seem to characterize not only the chronic offender, but a disproportion of all personal injury accident drivers.

There are other important implications from the findings of the present study. The data suggest that some part, or all, of the relationship between biographical data or personality measures and accidents reported in other studies owes its existence to drinking as an intervening variable. The validity and importance of previously reported findings are not in question. Rather, the position is taken that, if the nature of the processes that lead to accidents is to be understood, it is important to clarify the inter-relations between psychic trauma, drinking, and accidents.

There are at least three possibilities:

1. The accident is in some way related to some personality trait or psychic trauma. Drinking is incidental to the accident though it may also be a consequence of the psychic trauma.
2. The accident is an outcome of heavy drinking. The drinking is used as a palliative for the psychic trauma.
3. The accident is selective of those who for reasons of trauma are sensitized to behave maladaptively behind a wheel even with a moderate amount of alcohol.

Admittedly, information on preaccident drinking is difficult to obtain. Nevertheless, it is important for future research on the relationship between personality and accidents to give particular attention to obtaining valid drinking data to avoid contaminating the properties of drinkers with other properties of those involved in accidents.

One other finding which is particularly important for countermeasure development is that problem drinking is more common among drivers who were drinking before the accident than among controls or among those who were not drinking at the time of the accident. There is a disproportionately high incidence of early and recent disruptions of home life among them. These facts suggest that this group has a greater dependency on drinking, perhaps as a tranquilizer. The dependency suggests, in turn, that logical appeals to dissuade drinkers from driving, or vice versa, would have limited value. Other approaches are indicated. Those which involve surveillance and punitive action have already been discussed in Part I. The findings in this study would suggest that some form of psychiatric assistance might be useful.

Consideration has been given recently to the prospect of treating alcoholism in the services as an illness, that is, medically rather than as a crime to be dealt with punitively. If this change were to come about, one of the adventitious consequences might be a reduction in lost-time automobile accidents.

Another approach might be to use group therapy among drivers to reduce tensions which lead to drinking. Any mass approach of this kind, although it might be justified on the grounds of morale or efficiency, would require more convincing evidence than is currently available that it reduces accidents. Research on group psychotherapy with chronic offenders, currently being conducted by Tillman may provide leads on the value of this approach.

Because of the scarcity of adequately trained psychiatrists, any approach using psychiatric personnel must be highly selective. Perhaps such selectivity could be achieved if psychiatric screening (and therapy, if indicated) were applied only to drivers of vehicles involved in injury producing accidents. However, the data indicate that roughly three-quarters (73.3 percent) of these accidents are the driver's first since entering the service. Assuming that each driver would receive psychiatric attention at the time of his first accident after entering the service, and assuming further that this attention completely prevented any future accidents among these drivers, it would at most reduce lost-time accidents by only 26.7 percent.

These facts suggest that efficiency and economy of psychiatric intervention can be obtained only if the military psychiatrist functions in a nontraditional role. With this in mind, the authors devised a psychiatrically oriented countermeasure which involved the psychiatrist both in the conventional role of diagnostician and therapist and as a group behavior modifier. The latter was attempted through an educational program to undercut the social tolerance and even support that young men give each other in relation to drinking and speeding. This countermeasure was put into operation at Lackland AFB for a year for experimental evaluation. The results of the experiment are described elsewhere (19).

SUMMARY

This study compares some background correlates of the three groups of Airmen: (a) 89 drivers who had been drinking prior to a lost-time accident in a privately owned automobile, (b) 49 drivers who had not been drinking prior to a similar accident, and (c) 100 driver controls who had not been involved in an accident for at least a year.

1. There were no significant differences in the accident histories of the three groups prior to the current accident.
2. Drinking at the time of the accident was not an isolated event. (a) The percentage of those who drank more than once a week was significantly higher among the drinking accident drivers than among the not-drinking accident drivers or the controls. (b) The percentage of problem drinkers, using Goldberg's criteria of problem drinking, was significantly higher among the drinking accident drivers than among the not-drinking accident drivers or the controls.
3. None of the Airmen in any of the groups reported ever having been hospitalized for psychiatric reasons.
4. Members of the drinking accident group were more likely to be exposed to remote and/or recent disruptions of home life than either of the other groups. (a) The drinking accident group had a significantly higher incidence of broken homes in childhood than the not-drinking group. Drinking may be an important intervening variable in the relationship reported in the literature between accidents and childhood psychic trauma. (b) The drinking accident group had a significantly higher incidence of problem drinking parents than the other groups. (c) The drinking accident group contained a higher percentage of married Airmen living apart. (d) The drinking accident group contained a significantly higher percentage of single persons than the controls.
5. Both accident groups had a significantly higher incidence of involvement in disciplinary infractions than the controls.
6. Problems and prospects in the development of psychiatrically oriented methods for preventing accidents which involve problem drinkers were discussed.

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