

# DEPARTMENT OF TRAFFIC AND OPERATIONS

## The Lackland Accident Countermeasure Experiment

JOSEPH E. BARMACK<sup>1</sup>, *Principal Scientist, and*  
DONALD E. PAYNE, *Senior Scientist, Public Service Research Institute,*  
*Stamford, Conn.*

A countermeasure designed to reduce lost-time accidents in privately-owned vehicles was evaluated in a pilot study at Lackland Air Force Base.

The aim of the countermeasure was to change attitudes of tolerance toward airmen who drink and then drive recklessly. Such behavior was identified as symptomatic of disturbed, rather than masculine or brave, persons. The countermeasure program included educational, administrative, and psychiatric attributes.

During the year in which the countermeasure was applied, there was a significant reduction in accident experience (from 50 to 60 percent, depending on the criterion employed).

The reduction ran counter to rising national, state and city trends. It also ran counter to the experience at Randolph AFB, a nearby base.

An uncontrolled design contaminant was stepped-up on-base air police activity. The administrative cost of the counter-measure was light. Further research is suggested to determine which elements of the program were effective.

• THIS STUDY was part of a research program to develop and evaluate measures for the prevention of personal injury accidents among servicemen driving privately-owned motor vehicles. The first phase of the research was to identify those events occurring at the time of the accidents to which causal influence might be imputed. Biographical histories of the accident drivers were also collected. Comparable data on the driving habits and personal histories of a randomly selected group of controls were obtained.

Roughly two-thirds (64.5 percent)

of the accident drivers had been drinking prior to the accident, most of them heavily; that is, six or more drinks. Among the controls the comparable figure was 5.6 percent. This figure includes the proportion of times a driver was behind a wheel after drinking to the same criterion for any part of an hour, and for multiples of hours of exposure. Of the drinking accident drivers, 60 percent had 6 or more drinks. Only 30 percent of the drinking controls reported drinking as heavily (1). Com-

<sup>1</sup> Also Professor of Psychology, The City College of New York.

pared with not-drinking-accident drivers and control drivers the drinking accident drivers had significantly higher incidences of broken childhood homes, currently disrupted home life, legal and disciplinary conflict, problem drinking parents and personal problem drinking (2). The distributions of these characteristics showed substantial overlap among the three groups.

The problem of altering the drinking-driving pattern is a formidable one. For many young airmen even reckless driving following drinking has group tolerance. The existence of a sizable minority of problem drinkers in the accident sample suggested that posters and slogans probably would not be successful. A third (33.7 percent) of the drinking drivers involved in accidents met the criteria of problem drinking; that is, one or more previous convictions for offenses involving drinking, other than the drinking associated with the current accident.

Driver testing and license control are popular approaches, but there is no test currently available which would permit useful prediction of those who will have accidents. Biographical correlates of accidents also have low predictive effectiveness.

Since the injury-accident group was drawn primarily from among those airmen whose personal histories contained a variety of socially and emotionally traumatic experiences, an alternative to screening might be counseling. Unfortunately, there is no convincing evidence that counseling can prevent accidents. In addition, the cost of such a program would make it impractical. Some form of counseling or group psychotherapy might prove feasible if limited to extreme cases, for example, chronic violators or accident repeaters. This approach, for instance, is currently being studied by W. A. Tillmann. However, 73.3 percent of the accident drivers inter-

viewed had experienced a lost time automobile accident for the first time while in the service. Consequently, selective counseling (after the occurrence of an accident) would not reach the majority of airmen who are having accidents.

To sum up, neither screening nor counseling appears practical as a countermeasure for the class of accidents and accident drivers under consideration. Therefore, a special countermeasure was designed and instituted at Lackland AFB for preliminary evaluation.

The primary aim of the countermeasure was to undercut the favorable image that many young adults have toward "tanking up and taking off" in a car. Rather than view such behavior as an act of personal courage and daring or as a tolerable peccadillo, it was held up as an example of disturbed or "sick" behavior.

Statements to this effect, however, are not enough. It was believed necessary to back up this view with psychiatric and administrative support in order for the view to have impact.

The theme was first outlined by General Stillman, Base Commandant, in a memorandum announcing the start of the experimental countermeasure program November 3, 1958. Follow-up publicity included a series of articles in the base newspaper and special material prepared for commander's call meetings.

#### ADMINISTRATIVE SUPPORT

Any airman who became involved in a lost-time-injury accident while driving a privately-owned motor vehicle was, in effect, "tagged" for special attention. By having the accident, he exposed himself to a thorough review of his value to the service. The accident was not in itself considered evidence of ineffective behavior, but it set in motion a screen-

ing procedure to uncover evidence of ineffectiveness. The airman's record was investigated by his squadron commander, who requested special record reviews by the base provost marshal, the base surgeon, the base ground safety office, the airman's duty officer, etc.

When the review was completed, the squadron commander could recommend the airman for discharge if evidence of ineffectiveness was uncovered, or if not, he could refer the airman to the base psychiatrist for further evaluation. For the year in which the countermeasure was in operation, no one met the criteria in the regulations for discharge for inaptitude or unsuitability.

#### PSYCHIATRIC SUPPORT

Psychiatric treatment of the airmen drivers involved in lost-time injury accidents was important for two reasons: (a) As an overt indication of the earnestness of the point of view expressed in the educational program, that is, reckless driving after drinking is a sign of maladjustment; and (b) to provide psychiatric assistance to those airmen who might need it.

The circumstance of referral put the base psychiatrist in a somewhat unconventional role, a role which might be seen as threatening or punitive. It should be noted, however, that punitive action—if any were to be taken—preceded referral. There has been a growing awareness that psychiatric appraisal should be extended to persons involved in a variety of antisocial acts. For many, but by no means all classes of accident drivers, this approach would be equally pertinent.

During the countermeasure experiment, the base psychiatrist had three alternate courses of action open to him. Each driver referred to the psychiatrist was evaluated as thoroughly as, in the judgment of the

psychiatrist, the circumstances warranted. Following evaluation the psychiatrist could take the following actions:

1. Return the airman to duty without further recommendation.
2. Offer psychiatric assistance if the airman seemed in need of it.
3. Recommend discharge on medical grounds if appropriate.

#### THE EDUCATIONAL PROGRAM

Eighteen items were prepared for dissemination via commander's call meetings, bulletin boards, and the base newspaper. Of the 18 items, one gave the details of the program. Three comprised a factual series on social drinking, alcoholism, and alcohol and the road. Three others were of a general appeal type. Eleven were part of a series called "snatches of conversation with an accident victim from the notes of an accident investigator"—these were abstracted from case histories obtained at other bases, with the identity of the victim carefully disguised. An example of one of these is the following:

I have been court-martialled a couple of times. Once it was for AWOL. I got tired of the NCO riding me, so I took off. It was only a couple of days—they said eight. I got a summary court for that.

I got married once when I got drunk up. It didn't work out; I don't know where she is now.

Now it looks like this marriage is going to break up. She thinks I'm running around.

I was upset that day, because my wife went off to stay with some people. We had a fight. I went to a friend's house. We killed a fifth between four o'clock and seven o'clock. Maybe I had ten or twelve shots.

I was going back to the base. I was thinking about my wife. I saw the light changing from green to amber, but I thought I could make it. They say I hit a car coming through the intersection. They took me to the hospital, but I don't remember any of it. I woke up with a terrible headache.

I've been in accidents before, but never one where I got hurt.

I guess I should have been paying more attention.

One of the general appeal articles, titled "The Thin Line," began:

A new car, a straight and empty road, so let her go. Who is there who doesn't get a charge out of seeing the speedometer edging up to 80, 90, or more, maybe? It's normal to feel a thrill as the car surges forward. But would it still be normal behavior to drive at such speeds in rain, or on an icy road at night, or on a busy highway, or through crowded downtown streets? Where do we draw the line between what is normal behavior and what is emotionally disturbed behavior?

The article then went on to point out that the normal person is one who cares not only for his own welfare, but also for the welfare of others. The tendency of young people to take larger risks than more experienced people was singled out for special attention—as abnormal behavior when the risk is almost certain to result in serious harm to someone.

The article then reported the story of a young airman who, after a beer-drinking party with some buddies, ran off a serpentine mountain road at 120 mph. The article pointed out that alcohol did not cause the accident—but that it weakened the airman's shaky controls over emotionally disturbed behavior. It was pointed out that, at Lackland, this airman would be referred to a psychiatrist to determine the nature of his emotional disturbance.

The article concluded by urging Lackland drivers to stay on the right side of the thin line between normal and disturbed behavior. Airmen were urged: "If you must drink, don't drive. If you must drive, don't drink. If you must do both, drive as if your life depended on it. It does."

The countermeasure was installed at Lackland Air Force Base for the period of one year, from November 3, 1958, to November 2, 1959. The end of the countermeasure experiment was announced by the base com-

mander, and publicized in the base newspaper.

## RESULTS

To evaluate the impact of the countermeasure, accident data were collected for a 2-year period:

1. A control period—the year preceding the installation of the countermeasure (November 3, 1957 to November 2, 1958); and
2. The experimental period—the year during which the countermeasure was in operation<sup>2</sup> (November 3, 1958, to November 2, 1959).

The Lackland test of this countermeasure was restricted to lost-time accidents reportable on the AF Form 122. The criterion was injury resulting in more than 24 hours time lost from duty. This class of accidents is more reliably reported than the property damage type. It is also the class of accidents with which the services are most directly concerned.

The total number of lost-time accidents for each month during the control and experimental periods was recorded by the base ground safety office.

The measure of accident reduction should include some index of exposure. There are no completely satisfactory measures of exposure available for a large population operating private motor vehicles. As a compromise, the air training command uses a rate based on the number of accidents per 100,000 man-days of exposure. This rate adjusts for variations in manpower and days of the month. The same exposure index was used in the study. There is no assurance, of course, that true driving exposure corresponds entirely to the number of personnel stationed on any base at one time.

<sup>2</sup>A third year of data collection was included in the original research plan. It was hoped to determine whether the base accident rate would climb to previous levels after the countermeasure was terminated. Unfortunately, support for the project terminated before this could be accomplished.

The cumulative accident rates for Lackland Air Force Base during the control and experimental periods are shown in Figure 1. The cumulative accident rates represent successive monthly averages of the rates which accumulated in the experimental and control years. The rate during the countermeasure period did not begin to diverge from the rate during the control period until after the third month of the experiment. The difference became increasingly large thereafter until June. There was an increase in rate for the next two months and a decline toward the end. By the end of the experiment there had been one-half as many accidents during the countermeasure period as during the preceding year. There were 40 lost-time injury accidents during the control period, but only 19 during the countermeasure experiment, a 52.5 percent decline.

The fact that accidents began accumulating at approximately the same rate during the first three months of the countermeasure period

as they had during the equivalent period of the preceding year suggests that there was a lag between the time the countermeasure was first announced and the time it began to exert a detectable effect upon the base personnel. A similar lag was found by Irby and Jacobs (3) in a study which tested a patrol intensification countermeasure at a military base.

The lag between application and detectable effect could be accounted for in two ways. It is possible that the spread of information about the countermeasure is an accretive process which necessitates repeated announcements (for example, the series of articles in the base newspaper and in squadron meetings), and word-of-mouth communication until a substantial majority of the population becomes aware of the countermeasure. Equally tenable is the hypothesis that the information about the countermeasure spreads rapidly but has no effect until concrete actions have been taken with specific cases.

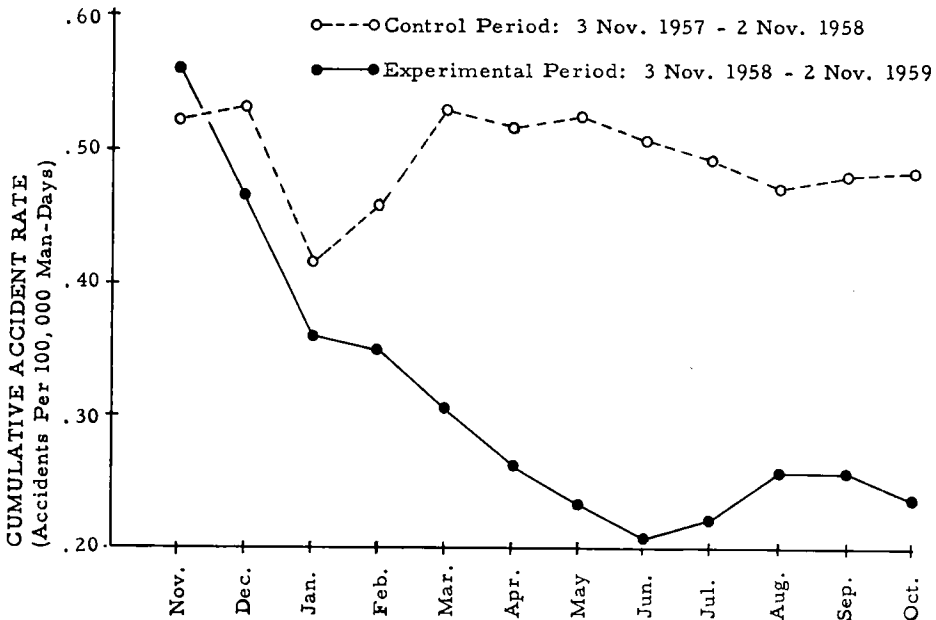


Figure 1. Cumulative accident rate during the experimental and control years.

The present data do not permit a test of these hypotheses, though further research would seem justified.

A statistical test of the difference in accident rate indicated that the rate during the experimental countermeasure period was significantly lower than the rate during the control period; the probability that the drop in accident rate was due merely to chance is less than one in a hundred. This value was obtained by a method analogous to the comparison of two frequencies from binomial populations given in Hald (4, pp. 705-711).

The trend in accident rates for the experimental and control periods (Fig. 1) represent the most conservative statement of the differences because: (a) they include the data of the first three months (that is, the lag time for the countermeasure to take effect); and (b) they are limited to the accident rate criterion. When other criteria are used, a somewhat more favorable difference is obtained.

Table 1 shows the differences for the two periods when other criteria are used, such as "military personnel injured" or "drivers injured." The percentage drop during the experimental period ranged from 50 to 60 percent. All of the differences were significant.

Having established that the differences are not due to chance, the next question was whether the extra-chance differences were due to the countermeasure or to other factors. Since the study was conducted in a natural environment it was not possible to control all relevant factors; it is possible however, to examine whether any of them could have produced the accident reduction.

### Accident Trends

The incidence of accidental injury varies from year to year in ways which cannot as yet be satisfactorily explained or predicted. Consequently, if the countermeasure experiment took place in a time or region characterized by a declining accident rate, the results might be credited to unidentified factors responsible for these general shifts. For the experimental period in question, the Lackland experience ran counter to national, state and local city trends. Figures published by the National Safety Council (5) indicate that, for the nation, 1959 as compared with 1958 was a year of increase. The motor vehicle death rate also increased in Texas. Records of the San Antonio police department indicate

TABLE 1  
ACCIDENT EXPERIENCE CRITERIA FOR CONTROL AND COUNTERMEASURE PERIODS

Criterion <sup>1</sup>	Period		Diff. (%)	p <sup>2</sup>
	Control	Counter-measure		
Number:				
Accidents . . . . .	40	19	-52.5	<0.01
Total injured . . . . .	54	24	-55.0	<0.001
Drivers injured . . . . .	33	13	-60.0	<0.01
Rate (per 100,000 man-days):				
Accidents . . . . .	0.48	0.24	-50.0	<0.001
Total injured . . . . .	0.65	0.30	-53.8	<0.001
Drivers injured . . . . .	0.40	0.16	-60.0	<0.001

<sup>1</sup> The criteria are not independent. Accidents and total injured (phi coefficient = +0.84), accidents and drivers injured (phi coefficient = +0.75), and total injured and drivers injured (phi coefficient = +0.75) are all related.

<sup>2</sup> Significance levels for number criteria estimated by  $\chi^2$  with theoretical frequencies equal for each period. Significance levels for rate criteria estimated by rate-method described previously (4).

that personal injury accidents within its jurisdiction increased from 184 per month to 198 per month.

The accident experience of the civilian drivers in the vicinity of Lackland might be different from the experience of military personnel for reasons quite independent of the countermeasure. Fortunately for this study there are two air training command bases in San Antonio—Lackland and Randolph. The lost-time injury accident experience of each base is shown in Table 2. At Lackland, where the countermeasure was applied, accidental injuries declined; at Randolph, where the countermeasure was not applied, accidental injuries increased, although the increase was not statistically significant.

The trend data warrant the conclusion that the decline in accidental injuries at Lackland cannot be attributed to unidentified causes affecting national, state or local accident experience.

#### *Civilian Police Activities*

State police patrol activities contain two primary classifications for recording violations: warnings and citations. State police records indicate that during the control period an average of 1,612 citations and 3,455 warnings were issued each month; during the experimental

period an average of 1,667 citations and 4,385 warnings were issued each month.

Since the state police issued more warnings and citations during the countermeasure period than they had during the control period, the possibility must be considered that the decline in accidents noted among Lackland personnel might have been the result of an intensified state police patrol campaign. There are two lines of evidence which suggest that the state police campaign was unrelated to the Lackland experience, as follows:

1. If the increase in the number of citations and warnings affected Lackland's experience, it should also have affected civilian accident experience—yet both violations and accidents increased. If increased state police activity were playing a major role, then as violations-issued increased, accidents should have decreased.

2. It might be argued that the state police activities affected Lackland personnel differently from civilian personnel. This would be the case, for instance, if the state police concentrated upon military personnel. However, there are two facts which suggest that this was not the case. First, if the state police had concentrated on military personnel then both Randolph and Lackland accidents should have declined.

TABLE 2  
COMPARISON OF LACKLAND AND RANDOLPH AFB

Determination	Base	Period		Diff. (%)	p <sup>1</sup>
		Control	Countermeasure		
Total accidents	Lackland	40	19	-52.5	<0.001
	Randolph	17	19	+11.8	0.42
Total injured	Lackland	54	24	-55.0	<0.001
	Randolph	22	23	+4.5	0.48
Drivers injured	Lackland	33	13	-60.0	<0.001
	Randolph	17	20	+17.6	0.32

<sup>1</sup> The significance of the difference between control period and countermeasure period was calculated using the rate-difference method described earlier (4). The exposure base was: control period—Lackland 8,274,973 man-days, Randolph 1,568,694 man-days; countermeasure period—Lackland 8,023,433 man-days, Randolph 1,333,688 man-days.

Randolph accidents did not decline. In the second place, courtesy reports (special reports prepared by the state police and sent to the base—including the names of all Lackland personnel who are apprehended committing off-base moving violations) sent by the state police to Lackland indicate that the average number of Lackland personnel who were cited for moving violations off-base declined (that is, from an average of 55 per month during the control period to an average of 51 per month during the countermeasure period).

The weight of evidence indicates that the decrease in accidents among Lackland personnel cannot be attributed to state police activities.

The records of the San Antonio police department were similar. Although the number of citations issued increased from 7,052 per month during the control period to 7,374 per month during the countermeasure period, the average number of injury-producing accidents per month also increased.

In short, the reduction in accidents which occurred during the countermeasure period cannot be accounted for by local law enforcement activities of the state or city police.

#### *Lackland Military Police Activities*

There is one activity which might affect the off-base accident experience at Lackland Air Force Base, that is, the on-base activities of the air police.

Quantitative information on air police activities were not available for the period before January 1958. Consequently, to provide comparable periods for analysis, control period data were limited to the January-October span of 1958 and experimental period data were limited to the same time span for 1959.

Shortly after the initiation of the countermeasure, a new provost mar-

shal was appointed. He had not been present at the staff briefing in which it was requested that no major changes in operating procedure be initiated. The new provost marshal expanded the number of on-base patrols and stepped up their activity. This intensified campaign continued until the end of June 1959. It was learned subsequently that during the control period 41 violations per month were issued by the air police; during the countermeasure period 74 violations per month were issued.

The stepped-up on-base air police activity is clearly a contaminant in the evaluation of the countermeasure. But this contaminant has positive as well as negative aspects. On the positive side, if it had any effect, it was to reinforce the earnestness with which the base commander viewed airmen's behavior behind the wheel. On the negative side, it adds another dimension or attribute to a countermeasure which already has other elements that require more detailed investigation. It can be said that the program worked and worked very well in reducing lost-time injury accidents. But it is not known which attribute or combination of attributes contributed to its effectiveness. Further research on these components is clearly indicated.

#### *Changes in Accident Reporting Criteria*

It is conceivable that the apparent effect of the countermeasure merely reflects concealment by airmen of their involvement in off-base injury-producing accidents. Whether this could have played a part is difficult to determine satisfactorily. Careful inquiry of the air police, the ground safety office, hospital staff and squadron commanders revealed no evidence that such concealment did in fact occur. However, in future research it is believed desirable to include both



lost time and property damage types of accidents as dependent variables and to monitor the classification procedure.

#### *Other On-Base Activities*

The base ground safety officer cooperated completely by keeping the nature and intensity of the activities of his staff during 1959 on a level comparable to that of 1958. Copies of the base newspaper were made available so that any major changes in types of personnel, pass or leave policies, or policies affecting private motor vehicles could be noted. No significant changes occurred which could account for the reduction in accidents.

#### PSYCHIATRIC EXPERIENCE

The decline in accidents resulted in relatively few cases available for psychiatric processing. The fear that an influx of a large number of accident drivers might impose an undue burden on the limited psychiatric facility proved groundless.

None of the drivers was recommended for discharge on medical grounds. In only two cases was psychotherapy felt to be desirable.

One of the two psychiatrists to whom these cases were referred found that the circumstances of the referral contributed to somewhat defensive attitudes on the part of the drivers. The other psychiatrist did not have this experience. But even when defensiveness was experienced the psychiatrist expressed the belief that it could be dissipated during the initial few hours of psychotherapy. Both psychiatrists who took part in the study concluded that the doctor-patient relationship had not been interfered with significantly by the referral procedure. The administrative and psychiatric burden was relatively light.

#### ACKNOWLEDGMENTS

This investigation was supported in part by the Office of the Surgeon General (Department of the Army), under the sponsorship of the Commission on Accidental Trauma of the Armed Forces Epidemiological Board, and in part by Research Grant-7025 from the National Institutes of Health, United States Public Health Service.

The opinions expressed are the authors', and should not be construed as reflecting the views or endorsement of the sponsors or the military services.

The authors are grateful to Major General Robert M. Stillman, Commander, Lackland AFB, and his staff, particularly Richard Prassel, Base Ground Safety Director; to Lt. Colonel Dasel C. Smith, Chief of Psychiatric Service, and Drs. Paul M. Grissom and Russell Canley, also of the Psychiatric Service, USAF Hospital, Lackland. The completion of the project would not have been possible without the continued support and interest of Major A. Cavallo and W. Barnett of the Ground Safety Office, Air Training Command Headquarters.

#### REFERENCES

1. BARMACK, J. E., and PAYNE, D. E., "Injury-Producing Private Motor Vehicle Accidents among Airmen. I. The Role of Drinking." HRB Bull. 285 (1961).
2. BARMACK, J. E., and PAYNE, D. E., "Injury-Producing Private Motor Vehicle Accidents among Airmen. II. Background Correlates of the Lost-Time Accident." HRB Bull. 285 (1961).
3. IRBY, T. S., and JACOBS, H. H., "An Epidemiological Approach to the Control of Automobile Accidents: Experimental Pa-

- trol Intensification at a Military Base." *Traffic Safety Research Review*, 4: 4-7 (1960).
4. HALD, A., "Statistical Theory with Engineering Applications," Wiley (Canada), pp. 705-711 (1952).
5. National Safety Council, "The Traffic Record." *Traffic Safety*, 55:37 (Oct. 1959).