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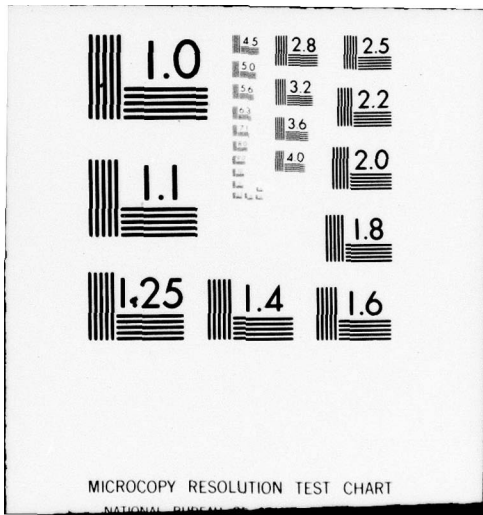
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J. Michael Polich, Bruce R. Orvis

A Project AIR FORCE report
prepared for the
United States Air Force

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> This report

Examines the nature and extent of alcohol-related problems among Air Force and comparable populations, based on special surveys, official records, and alcoholic beverage sales data. Two distinct types of alcohol problems are identified: *alcohol dependence*, a severe and chronic condition linked to alcoholism; and *adverse effects* of alcohol, such as health impairment, decreased productivity, or social disruption. 13.9 percent of Air Force personnel are estimated to be affected, with 4.6 percent among these classified as dependent. Results show that the patterns and rates of alcohol problems in the military services are similar to those found in comparable civilian groups. The analysis isolates important behavioral risk factors, such as frequent heavy drinking, intoxication, and social warnings, that may be used as precursory signals of more serious problems.

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June 1979

Alcohol Problems: Patterns and Prevalence in the U. S. Air Force

J. Michael Polich, Bruce R. Orvis

**A Project AIR FORCE report
prepared for the
United States Air Force**

Rand
SANTA MONICA, CA. 90406

PREFACE

The misuse of alcoholic beverages is being increasingly recognized throughout the United States as a significant public health problem. This recognition led the U.S. Air Force to institute a program of alcohol abuse control, including both prevention and treatment components. In 1976, the Air Force requested that Rand make a cost-benefit study of that program, including an assessment of the number of active-duty personnel affected by alcohol problems. This report documents the methodology and conclusions of that assessment, providing results as they affect both the Air Force and the field of alcohol research at large. The study was conducted under the Project AIR FORCE Manpower, Personnel, and Training Program, as one component of research on "The Cost-Effectiveness of the Air Force Substance Abuse Program."

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SUMMARY

This report describes a Rand study of the prevalence of alcohol problems in the United States Air Force. The study establishes policy-relevant definitions and corresponding prevalence rates, showing the numbers and types of military personnel affected by alcohol. The analysis also compares military and civilian behavior, shedding light on the nature of alcohol problems in general.

The primary source of data is a survey completed anonymously by a random sample of 3,148 active-duty Air Force personnel. The survey, which achieved a response rate of 89 percent, was administered by The Rand Corporation during site visits to 13 Air Force bases constituting a representative sample of Air Force installations worldwide. Additional sources of data were found to be in close agreement with the survey results. These data included police records of alcohol incidents, records of on-base beverage sales, and supervisors' estimates of work problems among their subordinates.

This report makes an important distinction between two types of alcohol problems: (1) *dependence on alcohol*, a severe and chronic pattern of addictive symptomatology; and (2) *adverse effects of alcohol*, any other type of serious consequence resulting from alcohol consumption. Both phenomena are measured by concrete symptoms or events that have affected the individual over the previous one-year period. The results show that 13.9 percent of Air Force personnel are affected by alcohol problems.

Among the 13.9 percent with alcohol problems, the analysis classifies 4.6 percent as "alcohol dependent." These people are identified by frequent and definite dependence symptoms, such as alcoholic withdrawal, blackouts, and inability to stop drinking. The great majority of them have also suffered serious impairment involving work, health, family, or law enforcement problems. Their typical rate of alcohol consumption is eight times greater than the norm, which places them within the range commonly found in alcoholic populations. Their alcohol-related working time losses are 27 times the norm.

The extent of damage is smaller among the 9.3 percent of the force identified as "adversely affected" but not dependent. The alcohol problems shown by this group are typically both less severe and less chronic. In particular, over half of those adversely affected have experienced only one alcohol incident in the past year, implying that their problems may not recur in the future.

These estimates of prevalence rates appear to be robust against possible sources of error in the data. Comparisons of official records against survey self-reports show that the survey responses are generally accurate; at most, the prevalence rates could be underestimated by 1 percentage point because of a modest tendency toward underreporting consumption. Analyses of the possible effects of errors from random sampling or nonresponse biases show that these effects are also unlikely to affect the prevalence rates by more than 1 percentage point. Naturally, the prevalence rates would vary with changes in definitions. However, several alternatives that were explored yielded problem rates clustering about the 14 percent mark, ranging in the extreme from 8 to 18 percent of Air Force personnel.

Alcohol problems tend to concentrate among males, among younger and more junior personnel, and among those unmarried or unaccompanied by spouses. Problem rates in such high-risk groups run two to three times the level in the comparison groups. There is also a modest tendency for higher problem rates to occur among personnel stationed overseas. These patterns are consistent with the results of other studies of both military and civilian populations. In fact, a reanalysis of comparable data bases from civilian, Navy, and Army samples revealed that such demographic and locational factors may explain most of the difference in problem rates between military personnel and civilians. Although the data showed higher problem rates for military personnel than for civilians, this divergence occurred in large measure because the military personnel were younger, less often married and accompanied, and more often stationed outside the United States. Still, the underlying rates make it clear that alcohol problems are potentially significant in both military and civilian populations.

This study identifies several types of behavior that place an individual at increased risk of alcohol problems. Risk appears to rise substantially when daily consumption exceeds six drinks per day or when heavy-drinking days (defined as days of consuming eight or more drinks) occur as often as once per month. Even more significant risk is associated with frequent intoxication and with receipt of warnings about drinking from associates. The onset of frequent intoxication and social warnings appears to represent an intermediate stage in problem development. This stage follows the beginning of heavy consumption and for some people eventually culminates in alcohol dependence or adverse effects. For these reasons, heavy consumption, frequent intoxication, and social warnings may be useful as indicators of groups for whom prevention efforts are appropriate.

ACKNOWLEDGMENTS

Many people have significantly contributed to this study throughout its development. In particular, continuing interest in and support for this study have come from the Air Force Deputy Chief of Staff for Manpower and Personnel, Gen. B. L. Davis, and from his staff in the Social Actions office (Col. William King and Maj. John Killeen). At Rand, the support and advice of Bernard Rostker, Robert Roll, and David Armor are gratefully acknowledged.

Special thanks go to all of the Air Force personnel who aided in the conduct of the field work—in particular, those working at the Social Actions Offices, Consolidated Base Personnel Offices, Officer and NCO Clubs, and the commanders of the 13 bases the authors visited. Useful data were kindly provided by Don Cahalan and Walter Clark of the Social Research Group, University of California, Berkeley. Detailed reviews of earlier drafts were given by Craig Moore and Albert Williams (Rand), and Jan de Lint (Addiction Research Foundation, Ontario). A great deal of credit for accurate and painstaking work goes to Marjorie Schubert, who acted as principal secretary for the project. Finally, gratitude is due to Josephine Platz, who conducted scores of survey sessions at local bases; and to Fred Finnegan, who conducted computer analyses with unmatched skill and dispatch.

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I. INTRODUCTION

OBJECTIVES OF THIS STUDY

It is widely recognized that misuse of alcoholic beverages constitutes a public health problem of substantial proportions in the United States. Although most people who use alcohol do so responsibly and without negative effects, many others get into serious trouble because of alcohol. The problems range from intoxication on isolated occasions all the way to chronic dependence on alcohol. These consequences are potentially very serious, not only because of their effects on those involved, but also because of the magnitude of the costs to society. This study reports methods developed for estimating the extent of such problems in the United States Air Force, and, by inference, in other populations.

The costs of alcohol problems are substantial. For example, a recent study conducted for the U.S. National Institute on Alcohol Abuse and Alcoholism estimated the total national cost of alcohol abuse at \$31 billion in 1971. Less than 2-1/2 percent of that figure represented costs associated with treatment; most were associated with health care, lost production, and motor vehicle accidents (Berry and Boland, 1977). The number of people affected by these problems is at least as difficult to fix as the total cost; but commonly cited estimates suggest that 5 percent of the population suffer from alcoholism or a similar very serious syndrome, and perhaps another 15 percent experience less serious problems with alcohol (Keller, 1975; Cahalan and Room, 1974).

Any problem that affects the general population so pervasively is also likely to affect the military forces. Recognizing this, the U.S. General Accounting Office (1976) recently dramatized the issue by suggesting that alcohol abuse in the U.S. military services may be more prevalent than drug abuse. The suggestion was that the \$16.7 million expended by defense agencies in FY 1976 to treat military alcohol problems may not be enough, given the apparent magnitude of the problem. This issue points to the crux of the matter: How large, in fact, is the prevalence of alcohol problems and how can prevalence be accurately estimated?

Our immediate concern is assessing prevalence in the United States Air Force, which sponsored this study. Air Force policy is naturally concerned with comparison of the size of the alcohol problem relative to the amount of effort and expenditures required to combat it. Like many federal agencies and private organizations, the Air Force perceives alcohol problems as potentially significant, and has instituted a program of alcohol abuse control, prevention, and rehabilitation. However, without baseline data on the extent and nature of alcohol problems, such counter-measure programs must deal with a phenomenon of unknown magnitude. This study was undertaken to collect such data, so that reliable prevalence rates may be obtained.

The results of this study are not limited to the U.S. Air Force or to the military environment. The types of alcohol problems that we have identified in the Air Force are essentially the same as those found elsewhere. Furthermore, our analysis of comparative data for other populations suggests that military and civilian environments have fundamental similarities in the patterns of behavior that constitute

misuse of alcohol. Therefore, the methods developed in this study have potential applicability to a broad range of populations.

RESEARCH QUESTIONS AND APPROACH

In pursuing our objectives, we have addressed a number of questions that are of general importance to the field of alcohol research, beginning with the most fundamental: How does one define an alcohol problem in the first place? Are there different types that should be distinguished? The determination of answers to those questions opens up a series of new issues: How can the various forms of alcohol problems best be measured when they occur? Can the familiar survey method of investigation be relied upon to give reasonably accurate and complete results? In what population subgroups are alcohol problems most prevalent? Are there identifiable patterns of drinking that, even though they have not yet caused a serious problem, suggest high risk of future problems? These questions are prominent on the agenda for this report.

Our approach to these questions departs from the single-minded emphasis on "alcoholism" that is often seen in public discourse on the matter. We recognize a severe core syndrome of alcohol dependence exhibiting many of the facets commonly ascribed to alcoholism. However, we also recognize that alcohol can cause many other less severe and less chronic adverse effects. Therefore, we have set out to distinguish alcohol dependence from other adverse effects, and to investigate the relationship between these two categories. In so doing we are attempting the empirical specification of a new conceptual framework that has been growing in scholarly influence and has recently been adopted by the World Health Organization (Edwards et al., 1977). This study begins with a review of that conceptual framework, as well as others that have been advanced by scholars seeking an understanding of alcohol-related behavioral disorders.

In order to estimate prevalence rates we have collected a large amount of systematic data on alcohol problems. Our data encompass both survey self-reports and other indicators (such as police reports and supervisors' estimates of performance). Since all sources of data are subject to possible errors and distortions, the task of controlling errors is crucial. Accordingly, we have sought to employ a variety of methods and to validate those methods wherever possible. In particular, we have paid special attention to issues concerning the validity of survey self-reports.

In examining alcohol problems in the Air Force, we have sought to place the Air Force within the larger framework of U.S. military and civilian environments. As useful as it may be to have measures of alcohol problems in the Air Force, they take on more meaning when they are compared with measures of other populations. We have therefore obtained and analyzed several existing survey data sets from the Army, Navy, and civilian populations.

Finally, our research has identified a number of factors that seem to predispose an individual toward having alcohol problems. Some of these are demographic, some are environmental, and some are involved with the individual's drinking pattern. These "risk factors" for alcohol problems are the subject of considerable analysis.

PLAN OF THE REPORT

Chapter II reviews the concepts related to alcohol problems as they have been used in previous research and in this study. In Chapter III, we explain the study design and data collection procedures. In Chapter IV, we report the specific types of alcohol problems that we have identified in the Air Force, and the prevalence rates for those types. In Chapter V, we compare survey self-reports with other data to investigate the validity of the responses. In Chapter VI, we use our definitions of the types of alcohol problems as a guide in searching for the characteristics of individuals that constitute risk factors for the development of alcohol problems, including demographic variables, location, military vs. civilian environment, and alcohol-related behavior. Chapter VII is a summary of our conclusions.

II. CONCEPTUAL DEFINITIONS OF ALCOHOL PROBLEMS

THE BACKGROUND OF PREVIOUS STUDIES

The scientific literature on alcohol problems contains a vast array of definitions, measures, and methods for counting and classifying the behaviors that fit the term. Virtually all definitions reflect a judgment that alcohol problems are "problems" because they are injurious; that is, because they damage or disrupt the individual or his associates. Apart from this, studies diverge on the question of what should be included under one heading.

A striking range of alcohol-related behaviors could be classified as injurious. At one extreme are behaviors that are clearly dangerous to health. In this class are such patterns as consuming alcohol at an extremely high rate over a long period, leading directly to liver disease. At the other extreme are behaviors that may have no determinate damaging consequences for the individual but are viewed as socially unacceptable by one's spouse, friends, or employers. Compounding this confusion is the fact that many kinds of alcohol-related behavior are viewed as injurious only in certain situations; for example, drinking any alcohol on the job is usually proscribed in the United States but not in many other countries.

These circumstances have led to a proliferation of definitions and doctrines on the subject of alcohol. No single interpretation is universally accepted. Indeed, there is intense debate over such basic definitional questions as whether the most serious manifestations of alcohol disorders should be treated as "diseases" (Keller, 1976; Robinson, 1972; Room, 1972). Some order may be brought into this confusion by distinguishing two main traditions in the prevalence literature: a tradition of studies of *clinical alcoholism*, and a sequence of more recent studies of *problem drinking*.

Clinical Alcoholism

Central Components of Alcoholism Definitions. Alcoholism, treated as a clinically observed syndrome of problems associated with alcohol, has a multiplicity of definitions arising from its long history as a focus of humanitarian, social, and medical concern. In earlier periods, many accounts simply treated "drunkenness" as a moral problem without differentiating individual instances of intoxication from more chronic or severe manifestations of a continuing disorder (Keller, 1976). In this simple model, amount of alcohol consumption and intoxication were the subjects of interest. By the early 20th century, however, medically and psychologically oriented researchers were beginning to construct a series of different criteria for an "alcohol illness." These observers were impressed with the apparent compulsion of certain heavy drinkers to continue excessive consumption of alcohol despite serious consequences and even despite their expressed intention and desire to stop. Because of an apparent overwhelming need, or a "morbid insatiable craving" for alcohol (Paredes, 1976), such drinkers could be described as possessed of a psychiatric condition, variously described as "dipsomania," alcoholism, or (slightly later)

alcohol addiction. Thus, the notion of *inability to control drinking* became a central part of the conception of alcoholism very early.

The other central component of most historical conceptions of alcoholism is the notion of *damage caused by alcohol*, especially physical damage leading to observable symptoms of functional impairment. Although clergymen, social workers, and psychologists have emphasized the social and behavioral damage excessive alcohol use can cause, medical doctors have exercised greater influence on definitional matters. Accordingly, many definitions of alcoholism concentrate on the physical sequelae of heavy alcohol consumption, such as liver disease and central nervous system disturbances. That this conception is still as powerful as ever may be seen from the "definition of alcoholism" recently offered in the *Annals of Internal Medicine*, which states succinctly that alcoholism "is characterized by tolerance and physical dependency or pathological organic changes, or both—all the direct or indirect consequences of the alcohol ingested" (National Council on Alcoholism, 1976). Obvious in this formulation is the primary role played by physical consequences of alcohol consumption. This emphasis on alcoholism's effects rather than on the behavior that constitutes alcoholism is frequently found in medically oriented research.

Addiction and Loss of Control. Elements of these primary components were interwoven into the theoretical formulation of the most influential author in the field, E. M. Jellinek. In proposing the "disease concept of alcoholism," Jellinek (1960) suggested that alcoholism might be treated as a disease with a biological basis in certain physiological alterations. Jellinek described these alterations as increased tolerance to the drug, adaptive cell metabolism, and the appearance of withdrawal symptoms when the drug is no longer taken. The crucial signal of the disorder was "loss of control"—the alcoholic's inability to moderate or stop drinking despite the most sincere desire to do so. In this view, the ingestion of any alcohol begins a reaction in which a physical demand or need for alcohol is felt ever more strongly.

These ideas, supplemented with informal data from Alcoholics Anonymous members, were the basis of Jellinek's elaborate theory, a notable aspect of which was the postulation of phases of alcoholism development. These were thought to begin with alcoholic blackouts and preoccupation with alcohol, to lead through the development of loss of control, and to end in a final stage characterized by physical deterioration, unemployment, loss of family and friends, and other adverse consequences associated with clinical alcoholism. Even though Jellinek proposed this theory as a working hypothesis, it immediately became the preeminent model for definition and diagnosis of alcohol problems.

Conceptions of Dependence. The notion of "alcohol dependence" was introduced partly as a euphemism for "addiction," as the criterion for the most severe alcohol syndrome. It achieved a new status when the World Health Organization (1952) adopted it in its definition of alcoholism. Partly at Jellinek's instigation, the WHO at that time declared:

Alcoholics are those excessive drinkers whose dependence upon alcohol has attained such a degree that it shows a noticeable mental disturbance or an interference with their bodily and mental health, their interpersonal relations, and their smooth social and economic functioning, or who show the prodromal signs of such development.

In this view, then, alcoholics are a special subset of "excessive drinkers" (any drinkers whose drinking deviates from the community norms in quantity, frequency, or circumstance). The peculiar feature of alcoholics, setting them off from other excessive drinkers, is their dependence on alcohol. Although it has never been entirely clear, in this usage the term "alcoholics" would seem to include only those dependent people who actually experience adverse effects ("interference with bodily or mental health," etc.). Thus, this influential definition appears to require three elements for alcoholism: deviant drinking, dependence, and adverse effects of drinking.

The most nebulous concept in this formulation is the notion of dependence. Deviant drinking and adverse effects can be observed, however relative they may be in different social environments; but dependence lacks a clear measure. If the definition of dependence is not to rest almost exclusively on the subject's self-report that he desires alcohol, such a measure is essential. In recent years an increasingly popular measure has been that of *physical dependence*, characterized by the appearance of a withdrawal syndrome when alcohol use is reduced or terminated. The symptoms of alcohol withdrawal are gross tremor, hallucinations, seizures, and delirium tremens in acute cases; milder cases have many other less specific symptoms (e.g., nervousness and sleeplessness). Recent physiological research suggests that the attainment of high blood alcohol concentration is a crucial aspect in the process of developing physical dependence and withdrawal symptoms (Gross, 1977). Thus, the concept of physical dependence on alcohol is a useful criterion for alcoholism, and the occurrence of withdrawal symptoms is a serviceable indicator in empirical studies.

Dependence is closely linked to another physiological phenomenon, *tolerance*, which refers to the body's ability to function in an outwardly normal manner even in the presence of high concentrations of ethanol (absolute alcohol). The most widely distributed diagnostic scheme, that proposed by the National Council on Alcoholism (1972), treats as a "classical" and "definite" indication of alcoholism *either* the appearance of withdrawal symptoms *or* the evidence of tolerance. According to this scheme, tolerance is indicated by a blood alcohol concentration of .15 without obvious intoxication. The judgment of what constitutes intoxication, however, is so subjective that this criterion has not as yet received much use in the empirical literature.

Other Indications of Alcoholism. We have discussed only the indicators that are most important for conceptions of the nature of alcoholism and alcohol dependence. Other indicators are frequently used in practice because of their status as strong correlates of alcoholism. Most prominent among these are various disease complications linked to alcohol consumption (e.g., alcoholic hepatitis or cirrhosis) and "blackouts" (memory lapse about events occurring during drinking the day or night before). Filstead et al. (1976) reported the ratings of such indicators, in terms of their usefulness for diagnosis, given by a sample of 362 physicians belonging to a U.S. medical society concerned with alcoholism. Over two-thirds of the group endorsed both the disease complications and the occurrence of blackouts as definite indicators of alcoholism. In the same sample, a similar proportion recognized all of the other criteria of dependence mentioned above (tremors, tolerance, subjective loss of control, etc.).

Definitions Based on Consumption. In all of these recent conceptions the

actual amount of alcohol consumed by the individual plays a fairly minor role. The narrow context of the Jellinek theory makes this apparent anomaly comprehensible, because Jellinek was at pains to distinguish addicted drinkers ("real" alcoholics) from other excessive drinkers. Not being addicted, other excessive drinkers could be controlled through normal social mechanisms of education, law enforcement, etc.; but the addicted drinker, by definition, could not control his consumption and hence was unreachable by traditional sanctions. In this black-and-white world, amount of consumption made little difference. The addicted alcoholic taking just one drink was in much more danger than the "chronic habitual excessive drinker" taking ten drinks.

Partly because of the divergence between this conception and the empirical evidence on alcohol consumption patterns, a school of thought has emerged recently that seeks to reemphasize the importance of amount of consumption (Schmidt, 1976). Loosely known as the "single-distribution" model, the theory advanced by this group derives its force from the strong aggregate correlations between cirrhosis mortality rates and mean per capita alcohol consumption in many populations. Numerous studies treating both cross-sectional and longitudinal international comparisons have shown that the level of mortality due to cirrhosis in a population is strongly related to the mean per capita alcohol consumption in the same population.

Many survey studies have found that the distribution of alcohol consumption among individuals follows the lognormal distribution with a near-constant variance, despite wide variation in the mean across different populations studied. This implies that the proportion of people at the high end of the consumption distribution can be accurately predicted simply from knowledge of the mean (i.e., per capita consumption, which is easily available from alcoholic beverage sales records). Therefore, a strong relationship can be demonstrated among mean per capita consumption, the number of heavy drinkers in a population, and the mortality rate from cirrhosis in the population (Bruun et al., 1975). This in turn implies that a context of high average drinking may lead to more frequent heavy drinking and hence to high rates of cirrhosis and other adverse consequences that are usually thought of as indicators of "alcoholism." Therefore, the "single-distribution" theory seems to suggest that there is no discontinuity between alcoholics, or addicted drinkers, and others. Moreover, in this conception alcohol consumption, and not loss of control or dependence, assumes a primary role in the system.

These notions are not based solely on aggregate data correlations. A substantial body of literature links heavy drinking to "alcoholism" consequences for individuals. For example, numerous mortality studies have demonstrated that varied samples of heavy drinkers (whether labeled "alcoholic" or not) show elevated mortality rates, especially due to cirrhosis, cancer of the upper digestive tract, accidents, and suicides (Schmidt and de Lint, 1972; Bruun et al., 1975). Experimental studies show that the total amount of alcohol consumption (quantity of ethanol consumed per day) is a primary direct determinant of cirrhosis and other liver pathologies (Lelbach, 1974; Rubin and Lieber, 1974). Indeed, the degree of risk of cirrhosis attached to specific levels of alcohol consumption has been established (Lelbach, 1974; Wallgren and Barry, 1970). Finally, the rate of consumption suggested by the single-distribution theorists as a dangerous level—about 5 fluid ounces per day (Schmidt and de Lint, 1970)—characterizes most members of a clinical alcoholic population.

The "single-distribution" theory has been used primarily to argue that the rate of "chronic excessive consumption" can be reduced by controlling the mean per capita consumption rate in the whole population. However, its implications for the definition of alcohol problems are also very important. It implies that at certain levels of consumption, serious adverse consequences become quite likely. Whether people showing those levels should be termed "alcoholics" is a semantic question. Nevertheless, it is clearly important to distinguish such people because of the adverse effects they are likely to experience.

Dependence, Adverse Effects, and High Consumption. Given these diverse definitions and viewpoints, what can we conclude about the proper criteria for severe alcohol problems? First, we should emphasize that there are at least three important and conceptually independent factors in drinking behavior that have historically been confused or combined:

1. *Alcohol dependence*, recognized primarily by physical dependence (withdrawal symptoms and/or tolerance) and loss of control;
2. The other *adverse effects* of heavy alcohol consumption, such as physical diseases (cirrhosis, hepatitis, cerebellar degeneration, etc.) and psychological and social impairments (unemployment, loss of family and friends, trouble with police, etc.); and
3. *Alcohol consumption*, the total quantity of ethanol consumed per day.

We have tried to separate these in the discussion. The original Jellinek formulation emphasizes dependence, although adverse effects are also mentioned. The 1952 WHO definition requires all three—dependence, adverse effects, and heavy (or at least deviant) consumption. The NCA diagnostic criteria accept any manifestation of either dependence or serious adverse effects, especially medical effects. Finally, the single-distribution school emphasizes heavy consumption, but perhaps admits serious medical conditions as well.

Several recent writers have recognized the conceptual confusion of this area and have pleaded for a clear distinction between the *condition* of alcohol dependence and the *harm* caused by either heavy consumption or dependence. Davies (1976) suggests that alcoholism be defined as alcohol use that results in either dependence or substantial harm. Edwards (1976) also argues for defining dependence separately from the harmful consequences of alcohol use. Both commentaries avoid the term "alcoholism," which has been used in so many diverse ways that it has taken on excess meaning. Such a view finds increasing acceptance. The most recent evidence of the trend in this direction is the report of a new expert committee on definitions for the World Health Organization (Edwards et al., 1977). The committee explicitly avoided a definition of the term "alcoholism," preferring to talk instead about manifold "alcohol-related disabilities."

In this committee's view, the central disability related to alcohol is that of dependence—a chronic reliance on alcohol characterized by alterations of behavior away from normal patterns in consumption, subjective state, and physical state. Apart from dependence, the committee saw no particular commonality among all of the other disabilities that alcohol can cause. In particular, it emphasized that empirical evidence does not warrant an assumption that nondependent people with some "drinking problems" will necessarily progress into full-blown dependence (Edwards et al., 1977).

Our view is very much in sympathy with the conceptual distinctions advanced by this most recent WHO committee. The notions of alcohol dependence and the harmful consequences of alcohol are conceptually independent dimensions and should be addressed separately. Serious consequences can exist without any apparent dependence, and vice versa (Davies, 1976). This fact is obscured if a group of "alcoholics" is defined to be coterminous with one of the categories (or if the definition contains only their intersection). Scientific research is better served by an examination of the various phenomena and the interrelations among them.

All the definitions discussed above were developed through clinical experience, emphasizing alcohol dependence and its associated disabilities. Because these are the most serious manifestations of alcohol problems, this emphasis may be justified from a clinical point of view. In a study of prevalence rates, however, the sizes of various groups are of primary importance, and the alcohol-dependent group is very small. Many more people in any population are affected by alcohol problems of the nondependent kind than are affected by dependence. An assessment of the extent of alcohol problems in any population must therefore examine the other ways in which people get into trouble because of alcohol use.

Problem Drinking

The syndrome of clinical alcoholism is near the upper end of severity in the distribution of alcohol problems. However, many types of serious consequences due to alcohol do not fit clinical experience or the theoretical definitions of acute alcoholism. In fact, it was in an attempt to step beyond the clinical environment and to measure the prevalence of alcohol problems in the general population that the second major tradition of thinking in the field emerged. Although this tradition might be labeled by a variety of terms, it is generally known as the study of "problem drinking."

With the advent of survey research as the primary tool for assessment of all sorts of behaviors in the general population, it was natural that alcohol researchers should turn to the survey. In contrast to clinical experience, the survey's detailed standardized data and its well-defined sampling techniques make it especially appropriate for generalization to the total household population. The most detailed of these surveys have been those conducted in the United States by the Social Research Group now located at the University of California, Berkeley (Cahalan, 1970; Cahalan, Cisin, and Crossley, 1969; Cahalan and Room, 1974). The picture shown by these studies is quite different from that shown by clinical populations.

First, most of the elements of the alcoholism syndrome are visible only in rare instances in the general population. Fully developed withdrawal symptoms are seldom reported, liver damage and other serious health consequences are extremely infrequent, and even instances of damaged social relationships are few and far between. For example, in a comprehensive national survey, only 2 percent reported that a spouse had left or threatened to leave because of drinking, arrests because of drinking were confined to 4 percent, and specific instances of health problems were also infrequent.¹ Yet the aggregate of all people affected by drinking problems

¹ Derived from reanalysis of the 1969 U.S. Survey data, provided by Don Cahalan and Walter Clark. The survey is documented in Cahalan and Room (1974).

of any type ranges from about 14 to 20 percent of the population, depending on the stringency of the definition imposed.

Second, these drinking problems fail to hold together into any coherent "syndrome" resembling clinical alcoholism. Not only are the problems diverse and fragmented, but they are not highly correlated. For example, those who have experienced health problems related to drinking are often not the same as those who report family disturbances because of drinking, nor are they the same as those who have been arrested for drinking-related offenses. Researchers in this area have commented on the stark difference that appears between this picture of fairly mild disjunctive problems and the clinical picture of alcoholism, calling the two views "the two worlds of alcohol problems" (Room, 1977).

The failure to find drinking patterns like those observed clinically is not explained by a lack of trying. These studies have searched with a wide net for alcohol-related problems in the general population. They have identified fairly serious problems such as health, work impairment, or arrests; and they have also included a scale of such incidents as financial problems, fights or arguments ("belligerence"), losing friendships, binges, and many others.

Two additional features of these studies are important to mention because of the different light they place on conceptions of alcohol problems. First, these studies cast doubt on the notion that alcoholism is a chronic and progressive disease. Many of the problems characteristic of "problem drinkers" tend to be intermittent, infrequent, and inclined to disappear over time. A four-year follow-up of people identified as problem drinkers earlier found, in fact, a very large proportion who had no problems (i.e., were "in remission") at the later point (Roizen, Cahalan, and Shanks, 1978). This suggests that any comprehensive definition of alcohol problems must take into account a large group of people who experience "alcohol incidents": those for whom drinking has led to a serious consequence once or perhaps a few times, but for whom the experience is not a chronic pattern. Second, many of the incidents reported in national problem drinking surveys are associated with episodes of acute intoxication rather than with continual heavy alcohol consumption. Such studies show that a large group of people drink heavily (to intoxication) on occasion but drink only moderately the rest of the time. Such short, occasional periods of intoxication are not as physically dangerous as chronic heavy intake. Hence, they are not generally viewed as a manifestation of alcoholism. Nevertheless, the chances of an "alcohol incident" clearly are increased when occasional intoxication becomes more frequent. The prominence of this pattern in national surveys suggests that we should distinguish this group and examine its behavior.

Military Studies

Although there has been no large-scale study of alcoholism in the military services, a few studies have covered "drinking problems." The same researchers who conducted the national problem drinking surveys conducted similar surveys of the Army in 1972 and of the Navy in 1974 (Cahalan et al., 1972; Cahalan and Cisin, 1975). The results viewed alone are startling. According to a standard index, between 35 and 40 percent of the enlisted men in the Army and Navy were classified as problem drinkers (because of one or more incidents referring to the past three years). Moreover, the studies also showed that civilian populations had rates considerably lower than those found in the military. For example, a comparison group

of civilian males of the same age distribution as enlisted Navy men exhibited a rate of 24 percent problem drinkers.

These results do not necessarily apply to the Air Force, and the time frames are different from the present. Furthermore, these studies do not differentiate severe problems, such as alcohol dependence, from other problems. For our purposes it is important to maintain such policy-relevant distinctions between different types or patterns of alcohol problems. In our view, moreover, these studies have been overly inclusive in the nature of behaviors or incidents that they identify as "drinking problems." The lowest severity-level of problems on individual subscales, for example, includes such items as being "told to cut down" by a friend, having a spouse "show concern" about one's drinking, and "spending too much money on drinks or after drinking." As unfortunate as these experiences may be, they do not appear to us to be serious enough to warrant government intervention for rectification, unless they occur in combination with something more serious. This is particularly true when one notes that the time span on which these reports are based includes the *past three years*; that is, any occurrence of a problem during that period would be counted. Again, this is overly inclusive for the purpose of estimating the prevalence (current rate) of alcohol problems.

None of the previous military studies has estimated the rate of alcoholism or alcohol dependence in the services, nor are there any other systematic data available to provide such an estimate. Many unique features of the military make the collection of such data more difficult. Cirrhosis deaths are extremely rare, perhaps nonexistent, among the active-duty forces, so the cirrhosis-based prevalence estimation methods cannot be used. Even if one could identify all such deaths in the active-duty or veteran population, the data would refer to a variety of periods of drinking spread throughout the life cycle, because most deaths occur after the person has left the service and would be scattered among civilian hospitals, Veterans Administration facilities, and military hospitals where retirees obtain treatment. These considerations suggest that assessment of alcoholism rates will require development of new methodologies.

CONCEPTUAL APPROACH OF THIS STUDY

The approach of this study has much in common with the literature just cited, but it also has a somewhat different emphasis. Our objective is not to isolate a particular clinical syndrome, nor is it to describe any and all types of alcohol problems that Air Force personnel may have encountered. Rather, we intend to isolate and identify groups of people who are *seriously affected by alcohol to the extent that official intervention may be appropriate*. The effect may be one that harms or seriously threatens to harm the individual, his immediate family, or the Air Force. Alcohol dependence, damage done to the person's health, accidents he may have, family problems, lowered productivity, or the necessity for increased law enforcement are instances of alcohol problems that fall under our purview, because all imply possible intervention.

Unlike many previous studies, this one attempts explicitly to distinguish two basic types of alcohol problems as follows:

- *Alcohol Dependence.* A chronic behavioral pattern indicating that the individual consumes high amounts of alcohol and relies on alcohol in everyday functioning.
- *Adverse Effects of Alcohol.* Any type of serious consequence of drinking not reflected under alcohol dependence if it results in concrete and serious damage or disruption to the individual's life or to the Air Force.

In general, we expect that people identified as "alcohol dependent" will show much higher levels of alcohol consumption, physical damage, work impairment, and chronicity of the condition. In contrast, those identified as having "adverse effects" should show lower rates of these problems and more intermittence in the condition. Alcohol-dependent people will be those for whom intensive treatment may be most appropriate.

In developing criteria to distinguish these two groups from the remainder of the Air Force population, we are guided by two considerations. First, we propose to use criteria that are concrete and minimally dependent on individual variations in attitudes and values. We do not, for example, wish to define as an "adverse effect" a behavior that does not cause serious trouble for the individual even though his spouse or his friends may object mildly to his drinking (or to any drinking). Our criteria are to be confined to *prima facie* evidence of damage (e.g., alcohol consumption at levels high enough to cause liver damage or that clearly interferes with work); or those that are so repugnant to the community that outsiders take drastic action (e.g., neighbors call police or spouses leave the subject because of drinking). Second, we propose to use policy-relevant criteria. At a minimum, the categories we distinguish should imply different intervention strategies to correct the problem. The criteria should not rest exclusively upon subjective or introspective judgments by the individual. Finally, the criteria should be generally useful in diagnosis, identification, or classification.

III. DESIGN OF THE STUDY

The variety of research questions for this study dictated that the design contain a number of different facets and a series of data collection activities. This chapter describes the specific research questions addressed, the design that was developed to deal with those questions, and the types of data that were collected.

OVERVIEW OF DESIGN

A number of important questions are opened as soon as one begins to consider the question of prevalence rates for alcohol problems. What are the predominant patterns of alcohol problems as they appear in the subject population? How large are the prevalence rates for each of those patterns? How may the rates be most reliably measured? What confidence may one place in the rates obtained? Does the subject population resemble other relevant populations? Before we go into the details of the study design and the methods used to answer these questions, an overview of the study is appropriate, as shown in Table 1. Details on each component of the study will be provided in later sections.

Our research questions break down into three broad categories of research topics. The most immediate question is that of the *prevalence* of patterns of alcohol problems in the Air Force—that is, the types of such problems and the numbers of people suffering from those problems. The answers to this question require detailed data on each individual in a large sample. The only practical method of collecting such information is by survey, using “self-reports” based on detailed, probing questions. Accordingly, the primary source of data on this topic was a large-scale survey of active-duty Air Force personnel at a set of randomly selected Air Force bases. A Rand research team visited the bases and conducted group sessions with the personnel selected to be given the questionnaire. The on-site presence of the research team permitted a great many additional controls, observations, and data collection activities, which are normally impossible in survey studies.

The use of survey self-reports in alcohol problems immediately raises more questions: Can the self-reports be relied upon? What is the likelihood that under-reporting or covering up may distort the results? In this instance, the procedures of sampling and administration were carefully designed to protect the confidentiality of subjects and to minimize response biases. Nonetheless, this question (technically referred to as the *validity* of self-reports) is important enough that three additional sources of data were included to assess validity, as shown in Table 1. Each of these additional sources provided an external measurement of alcohol-related problems that was independent of the data given by survey self-report. These data were obtained specifically to be compared against the survey self-reports in the areas of law-enforcement incidents, work-related alcohol problems, and alcoholic beverage consumption.

A third important question concerns the comparison of the Air Force with other populations. For this purpose, our 13-base survey was inappropriate, because it contained many new items not compatible with those used in other studies. There-

Table 1

RESEARCH TOPICS AND SOURCES OF DATA

Research Topic	Sources of Data	Sample	Date
Prevalence of alcohol problems in the Air Force	Group-administered survey questionnaires, 13 bases ^a (self-report)	3148 active-duty personnel, 13 bases	March-September 1977
Validity of self-report data	Security Police records of alcohol incidents	1604 incidents, 13 bases (100% sample of records for one year)	March-September 1977
	Supervisor ratings of alcohol problems	1231 supervisors from prevalence survey of 13 bases	
	Records of base alcoholic beverage sales	All sales transactions, 7 bases (count of transactions for 2-4 weeks at time of survey)	March-September 1977
Comparison of Air Force and other populations	Air Force-wide mail survey, ^b compatible with Army, Navy, and civilian surveys	1407 active-duty personnel, 123 bases, worldwide	June 1977
	Army-wide survey	9828 active-duty male personnel	1972
	Navy-wide mail survey	9506 active-duty personnel	1974
	U.S. civilian survey (personal interview)	978 males, age 21-60	1969
Assessment of survey method effects	Air Force-wide mail survey compatible with 13-base survey ^a	6487 active-duty personnel, 197 bases, worldwide	June 1977

^aQuestionnaire reproduced in Appendix A.^bQuestionnaire reproduced in Appendix B.

fore, to provide a basis for comparison, we also requested that the Air Force undertake an *Air Force-wide* survey. This survey used an instrument containing problem-drinking questions compatible with those used by the studies in the Navy, the Army, and the U.S. civilian population. For feasibility purposes, it was conducted through Air Force channels with forms and answer sheets distributed and returned through the mail by local base personnel offices.

The Air Force-wide survey could not be conducted under the same strict procedures of control that were possible in the 13-base survey because no research team could visit or contact the hundreds of bases involved. This smaller degree of control, combined with use of official Air Force channels for data collection, could conceivably result in sampling or response biases. Nonetheless, mail surveys of this kind are almost invariably used because they can produce timely data covering all geographical areas at low cost. To investigate possible biases in such surveys, we arranged for a second, separate Air Force-wide survey to use the same questionnaire as the 13-base survey. The results can be compared with the results of the 13-base survey to examine possible biases arising in routine large-scale surveys.

DESIGN OF THE 13-BASE SAMPLE

The 13 bases where Rand conducted site visits form the primary source of information for this study. Both the group-administered survey and the validity data are drawn exclusively from these 13 bases, which were selected to represent the major commands of the U.S. Air Force. These bases together constitute the first stage of a multistage cluster sample of Air Force personnel for the group-administered survey. It is therefore important to outline the base selection procedures.

All personnel in the Air Force are assigned to a major command, and these commands enjoy a substantial amount of autonomy in their daily affairs. Although alcohol abuse control policy is generally set for all commands at the Air Staff level, there are significant variations among commands in the way that policies are interpreted. For example, at the time of the sample design for this study (January 1977) the Military Airlift Command (MAC) had pursued an aggressive policy of alcohol abuse identification resulting in higher identification rates than most other commands. The command therefore represented a potentially important source of variation in alcohol policy that was partially controlled for by stratifying the sample by command. The largest commands in the Air Force are shown in Table 2, which also shows command missions and strengths.

The eight largest commands account for almost 80 percent of Air Force personnel. The remaining commands are numerous and quite small. They were therefore excluded from the sampling frame. Among the eight major commands, the desired sample was divided in rough proportion to the number of personnel assigned to each command.

Stratifying by command provides an effective control on several other factors beside the possible administrative differences among commands. One important factor is the geographical location of personnel (whether they are stationed in the Continental United States or elsewhere). There is anecdotal evidence that drinking problems are more prevalent in overseas stations, owing to the cultural environment, expense and difficulty of obtaining entertainment, administrative restric-

Table 2
 COMMANDS IN THE U.S. AIR FORCE

Command	Abbreviation	Mission	Total Strength (June 1976)	Percent of Air Force Total
Strategic Air Command	SAC	Nuclear and strategic strike force (long-range aircraft and missiles)	113,000	20
Tactical Air Command	TAC	Air support and defense (fighter aircraft)	76,200	14
Military Airlift Command	MAC	Airlift of personnel and materiel	66,700	12
Air Training Command	ATC	Initial and continuing training of all personnel	71,700	13
Air Force Systems Command	AFSC	Research and management information	25,500	5
Air Force Logistics Command	AFLC	Supply of materiel and base maintenance	9,100	2
United States Air Forces, Europe	USAFE	Defense of European theater	45,800	8
Pacific Air Forces	PACAF	Defense of Asian theater	22,800	4
All other commands	—	—	118,900	22
Total	USAF	—	549,700	100

tions on being accompanied by one's spouse, etc. Partly because this hypothesis is so widely believed, we included a disproportionately large sample for the European and Pacific commands; if we had not, the sample sizes might have precluded effective analysis.

Within each command, two bases were selected at random, as shown in Table 3, and a random sample of personnel was drawn at each base.¹ The aggregation of these 13 bases thus constitutes a random sample of all bases and personnel within the eight commands listed. Because there is no reason to believe that the other commands are systematically different from the eight major commands, we treated the 13-base sample as representative of the entire Air Force (covering, as it does, a random sample of 78 percent of the force).²

It is possible to check the representativeness of the 13-base sample on certain characteristics. In Table 4, we show these characteristics of the total Air Force compared with the total population at the 13 selected bases. These characteristics

¹ An exception is the combined AFSC/AFLC "command." Neither AFSC nor AFLC could have been represented if each had required a separate base (or two bases). As it happens, Wright-Patterson AFB contains large groups from both commands, so that base was selected to cover both.

² Even if the nonrepresented commands should be systematically different, the difference would have to be very large to affect the representativeness of the 13-base results. For example, if the eight commands have a rate of .15 on some characteristic (say, the alcohol problem rate), the true Air Force-wide rate would be only .167 even if the rate in the nonrepresented commands were 50 percent higher than the rate in the eight commands.

Table 3
13-BASE SAMPLE

Command	Base	Base Strength	Percent of Total Cases Planned for Survey
SAC	March AFB, California	4704	11
	Minot AFB, North Dakota	6169	11
TAC	Seymour Johnson AFB, North Carolina	5258	7
	Nellis AFB, Nevada	7680	7
MAC	Scott AFB, Illinois	5255	7
	Little Rock AFB, Arkansas	6869	7
ATC	Sheppard AFB, Texas	9686	7
	Mather AFB, California	5150	7
AFSC/AFLC	Wright-Patterson AFB, Ohio	4039	7
USAFE	Hahn AB, Germany	3080	7
	RAF Bentwaters, England	3420	7
PACAF	Clark AB, Philippines	8893	7
	Osan AB, Korea	3996	7

have been shown in other studies of alcohol behavior to be the background factors most strongly related to alcohol problems: pay grade (rank), sex, age, education, and marital status. The data show that the population of the 13 bases is close to the total Air Force within extremely low tolerances. In the third column, Table 4 shows the *respondents* to the 13-base survey (those who were drawn for the sample and returned questionnaires). These results suggest that the 13-base sample is similar to the total Air Force on those factors that are most important in predicting alcohol problems. There is a slight bias in the direction of making the respondent sample younger, less educated, and less often married than the total Air Force. This difference is small, however, and does not materially affect our findings.

DATA COLLECTION IN THE 13-BASE SAMPLE

A Rand research team visited each of the 13 selected bases between March and September 1977. Each visit lasted between two and three days, time enough to permit administration of the survey, follow-up of survey nonrespondents, and collection of the records of base beverage sales and police incidents. During the visit the team also interviewed the Security Police commander, Social Actions personnel, the wing commander, the base commander, and the heads of the Officer and NCO Clubs, to collect observations on the unique features of each base and other nonsystematic information that might affect interpretation of the data (beverage sales and police data can vary greatly from base to base).

Table 4
 REPRESENTATIVENESS OF 13-BASE SAMPLE

Characteristic	Percent of Group with the Characteristic		
	Total Air Force (population) ^a	Total 13 Bases (population) ^a	13-Base Sample Respondents
Pay grade			
O4-O6	6.5	6.5	5.3
O1-O3	10.5	12.0	10.0
E7-E9	8.3	7.6	9.1
E5-E6	26.4	25.6	26.2
E1-E4	48.3	48.2	49.4
Sex			
Male	93.1	93.2	92.6
Female	6.9	6.8	7.4
Age			
17-20	13.0	12.7	16.6
21-24	27.8	28.4	28.5
25-30	25.8	26.8	25.1
31-39	23.5	22.8	21.3
40-48	9.1	8.7	8.0
49-60	0.7	0.7	0.5
Education			
Non-high school graduate or GED	3.1	3.3	7.0
High school graduate (diploma)	78.8	77.3	75.5
College degree	18.1	19.4	17.5
Marital status			
Currently married	66.9	66.2	63.8
Not married	33.1	33.8	36.2
(N)	(565,684)	(74,199)	(3,148)

^aJune 1977.

Survey Procedures

Before our arrival on base, the consolidated base personnel office (CBPO) completed sampling and notification of selected individuals for the survey. Each CBPO drew an appropriate number of people from its master computer file, selecting cases by the random terminal digits of Social Security Account Number. The specific digits to be used were selected and predetermined by the Manpower Personnel Center at Randolph AFB, so that bases were unable to affect the selection of cases. The CBPO was responsible for establishing the schedule for six to eight group sessions and for notifying the unit commanders of the personnel selected from their units. Commanders were not allowed to substitute other personnel for those selected and were instructed to ensure that all of their personnel attended as scheduled.³ In a few instances (less than 3 percent of the sample), the unit commander insisted upon keeping the individual at work rather than give up his time for the survey, but by and large the commanders were cooperative.

³ See App. C for details of the sampling, scheduling, and administration of survey sessions.

Table 5 exhibits the response data and overall response rates for the 13-base survey. Certain people in the sample were designated "ineligible" for various reasons and were excluded from our population of generalization. These are, for the most part, people who were not actually working on base at the time of the survey. For example, people who were away from the base on temporary duty assignment were ineligible, as were those sick and not at work. Certain groups were ineligible because they should not have been included in the sampling frame but could not be excluded in advance for administrative reasons; in this group are people who had already been permanently moved elsewhere (but not in the computer file) and people whose personnel records were kept on that particular base but in fact were stationed at another location over 30 miles away. In general, these exclusions do not hamper our ability to generalize; the main omission is those on TDY or leave. Because everyone in the Air Force goes on leave or TDY from time to time, being absent for that reason is likely to be a random event, and these omissions constitute random deletions from the sampling frame.

The overall response rate was a very satisfactory 89 percent. Among the 11 percent not responding, about one-fourth were absent because their work was too valuable to be sacrificed at the time of the survey—a group that, if anything, might be disproportionately *nonalcoholic*. However, the other main group of nonrespondents is the "no-shows," who might well be particularly subject to alcohol problems. Every effort was made to obtain these individuals. If a subject failed to attend a session for which he was originally scheduled, the CBPO recontacted the unit

Table 5

13-BASE SURVEY RESPONSE RATES

Item	Number of Cases, 13-Base Total
Names drawn for sample	4451
Ineligible (not on base and working)	924
TDY elsewhere ^a	267
PCS elsewhere ^b	208
On leave	271
Located at another station ^c	70
Other off-base ^d	78
Sick, confined	30
Eligible	3527
Completed forms	3148
Unusable ^e	61
Refused	16
Not located ("no-shows")	210
Excused for duty	92
Response rate (completed, as percentage of eligible)	89%

^aTDY = assigned to Temporary Duty (usually for a few days or weeks).

^bPCS = Permanent Change of Station.

^cRecords are maintained by this base, but the individual is physically located at another place (generally over 30 miles away).

^dMostly personnel still in the computer files but actually discharged, not yet arrived on station, etc.

^eForms partially blank or invalid on items used in prevalence estimation.

commander and rescheduled the individual for a make-up session. The CBPOs obtained an accounting for each person who did not attend but who claimed an excuse. This procedure was often repeated twice. As a result, the nonrespondent group is so small in relation to the total that the effect of nonresponse is unlikely to be very large.⁴

Each group survey session lasted about 45 minutes. The sessions were conducted entirely by Rand personnel, not by Air Force personnel, and were generally held on "neutral" ground (usually in a recreation center or NCO Club, *not* in a facility connected with alcohol abuse programs). The survey was explained as a scientific study of drinking practices. A Rand representative would begin by explaining that (1) the survey was being conducted as Rand research for the Air Force, (2) results would be used for statistical research purposes only and no individual results would be given to the Air Force, and (3) no names or other individual identifiers were to be put on the answer sheets, thus preventing identification of an individual. Each respondent was given a survey-question booklet and an optically scannable answer sheet for recording answers. (The questionnaire booklet is reproduced in App. A; instructions to respondents are shown in App. C.)

Informal interviews with respondents suggest that this procedure was effective in avoiding what some view as a probable inclination for military personnel to understate any negative information about themselves in an official setting. Certainly the refusal rates were very low. That this procedure worked evenly across all bases is shown by Table 6; at every base the response rate was in the neighborhood of 90 percent. Moreover, visual examination of the answer sheets, coupled with computer analysis of inconsistencies and possible response sets, showed that only about 2 percent were filled out erroneously or carelessly; these unusable forms were omitted from the analysis.

Table 6
RESPONSE RATES BY BASE

Command	Base	Response Rate (Percent)	Number of Cases Obtained
SAC	March	90	297
	Minot	83	260
TAC	Seymour Johnson	88	229
	Nellis	92	209
MAC	Scott	92	227
	Little Rock	93	261
ATC	Sheppard	88	263
	Mather	94	234
AFSC/AFLC	Wright-Patterson	88	223
USAFE	Hahn	87	226
	RAF Bentwaters	92	244
PACAF	Clark	88	259
	Osan	87	216

⁴ An analysis of possible effects of nonresponse bias is given in App. F.

Other Data Collection Procedures

Two important types of official-record data were collected at the bases for use in assessing the validity of survey self-reports. In an interview with the Security Police Commander, we discussed the local procedures, laws and regulations, and operating styles of both on-base and off-base police. Particular attention was given to procedures and standards for DWI apprehensions (Driving While Intoxicated). In the United Kingdom, for example, the blood alcohol concentration (BAC) limit for legal intoxication is lower than that in the United States, and the particular BAC level for each apprehension had to be ascertained; similarly, in some U.S. jurisdictions a distinction is made between DWI (usually a .10 BAC level) and "Driving Under the Influence" (DUI, usually a .05 BAC level). Finally, each base provided a complete count of the numbers and types of driving-related and nondriving-related apprehensions in which alcohol was involved. We also obtained all records of off-base DWI apprehensions (by civilian police) in the files. This information was believed to be fairly complete, but in some instances there were known delays in coverage or outright inability to obtain coverage of civilian apprehensions in certain jurisdictions; where noncoverage was judged probable, it was almost always a case where the incident occurred far from the base and the person did not report his military status to the officer or court. Most of the police officers believed their off-base records to be fairly complete for local incidents, but they felt that a small number of remote off-base incidents could be unrecorded in their files.

The second type of record collection was gathering information on total alcoholic beverage sales on base. This information was designed to be compared with survey self-reports of alcohol consumption, adjusted by survey reports of on-base versus off-base purchases and other similar factors. This proved to be a major undertaking, because alcoholic beverage outlets do not generally keep records of the requisite information (e.g., volume of each type of beverage sold). Moreover, most bases had several outlets requiring coverage: usually an Officers' Club and an NCO Club each with one or more bars; one or more package stores, often connected with a Club; Base Exchanges and other food outlets selling beer but no wine or liquor; and assorted minor outlets such as gas stations, snack bars, and bowling alleys. Many of these operations cater to retirees as well as active-duty personnel, so that some method had to be devised to distinguish beverage sales to the various types of buyers.

The methods for collection of such information varied from base to base, reflecting the unique features of the base's beverage outlets, including the completeness of their records. (For example, a few bars maintained meters counting each ounce dispensed of each beverage, whereas a few others could provide historical data only for total dollar sales, not disaggregated by beverage type or quantity.) In general, the procedures included three parts. First, a running total of sales in the package store was kept over a two-to-four week period immediately after the survey. Sales were counted separately for the quantity of each beverage and for active-duty personnel versus all others (mostly retirees). Second, either an inventory check or a running count of bar sales was made for a similar period. It was infeasible to maintain a separate count of individual bar sales to active-duty versus other personnel because of the large number of sales. Instead, the total quantities of bar sales were reduced by an estimate of the fraction consumed by nonactive-duty members (see Chapter V). Third, total quantity of sales for other outlets was obtained for the

relevant period. In some cases we could obtain only total dollar sales, and we converted dollars to approximate ounces of beverages using the mean retail prices and sales quantities of beverages.

These activities were not possible at all 13 bases. In the end, we collected the beverage sales data for seven of the 13 bases, principally because the mechanisms had to be developed during site visits to the first several bases. At those bases where the data were gathered, the coverage appears to be nearly complete. In a few instances, minor beverage outlets may have escaped our notice (e.g., a golf course snack bar or a few vending machines), but the main stores and bars, accounting for almost all of the sales, were certainly included.

AIR FORCE-WIDE SURVEYS

In addition to the activities at the 13 sample bases, the two Air Force-wide surveys, covering practically all major Air Force installations, were undertaken during the same period (June 1977). Both Air Force-wide surveys used a self-administered questionnaire and optical-scan answer sheet. Like any other survey, these were sent out through official Air Force channels and distributed by local CBPOs. Two nonoverlapping, independent samples were drawn by the local CBPO, one for the survey comparable to surveys conducted in the Navy, Army, and civilian populations (Form B, shown in App. B), and one for the survey compatible with the Rand 13-base questionnaire (Form A, shown in App. A). All respondents were assured of anonymity and none was identified. The questionnaire forms were returned to the CBPO and then sent to a central collection point for optical scanning. Both forms bore the official Air Force survey insignia and were returned through the Air Force channels, not through Rand. Although all individuals were assured of anonymity, it is possible that the Air Force's direct involvement in the data collection could have influenced some sample members to decline to respond or to understate their actual involvement with alcohol. We therefore investigated these possible sources of bias.

For the Form B questionnaire, 2,500 forms were sent out and 1,407 returned; for the Form A questionnaire, 12,500 forms were sent out and 6,487 returned. No specific accounting of the target sample was made in terms of personnel on TDY, moved away, discharged, etc. However, these samples were selected by the same CBPOs in the same way and at the same time as the 13-base samples. Hence the accounting for the 13-base samples showing eligibles and ineligibles (Table 5) is applicable. This indicates that about 15 percent of the original sample would be ineligible for an Air Force-wide survey.⁵ When these people are removed from the gross sample, the net response rates may be calculated as being 66 percent for Form B and 61 percent for Form A. These rates are quite respectable for mail surveys, although they are low enough to imply that results based only on the respondents could be biased downward if nonresponse is correlated with alcohol problem experience. There does not appear to be any significant bias on background factors. Comparisons shown in App. F suggest that the Air Force-wide surveys are reason-

⁵ Air Force mail surveys cover a longer time period (usually a few weeks) than the 13-base site visits (2-3 days). Hence some people counted as ineligible for the 13-base sample would be able to respond to a mail survey. The 15 percent estimate assumes that one-third of those on TDY and half of those on leave, sick, or at another station would be in this group.

ably close to the Air Force population on most important demographic factors, except that the younger enlisted personnel are slightly less likely to be found in the respondent group than in the underlying population.

Because the Form A questionnaire used items identical to those in the more controlled 13-base survey, a direct comparison of prevalence rates can be made between them to estimate the level of bias. The results of our analysis of this complex issue are shown in App. F, which deals with the methods for projecting total Air Force prevalence rates from survey data. That analysis shows that, indeed, the Air Force-wide survey produced a bias, underestimating the 13-base prevalence rate by an absolute level of 2.9 percentage points. Whether such a level of error is considered acceptable depends on the degree of precision required for the particular purpose. In our judgment, such a bias is not so great as to preclude the use of large-scale mail surveys in assessing the approximate level of alcohol problems. Hence we have used the results of the Form B Air Force survey for comparison with Army, Navy, and civilian data, recognizing that a small amount of error may be present in any of them. However, we have not used the Air Force-wide survey data in our analyses of Air Force prevalence rates, because we have the methodologically superior 13-base survey available for that purpose.

IV. THE PREVALENCE OF ALCOHOL PROBLEMS

THE NATURE OF ALCOHOL PROBLEMS

Alcohol problems constitute a large and diverse body of phenomena. They vary in duration, chronicity, seriousness of effect, and nature. Some represent physical pathologies, some have psychological components, and some reflect social, legal, or other environmental factors. In this chapter we examine these diverse problems and classify them into categories with specific prevalence rates.

Basic Categories of Alcohol Problems

Our eventual objective is to distinguish two broad classes of alcohol problems: *alcohol dependence* and other *adverse effects* of alcohol. Following some recent work of the World Health Organization (Edwards et al., 1977), we view alcohol dependence as the core syndrome of alcohol-related disorders. Dependence is typified by heavy use of alcohol, the appearance of withdrawal symptoms when alcohol use is interrupted, and a keenly felt, subjective need for alcohol. Adverse effects, in contrast, refer to any other serious problems, impairments, or consequences stemming from alcohol use. Whereas alcohol dependence is chronic and pervasive throughout all areas of life, adverse effects may be acute, occasional, or limited to one area of life.

The distinction between alcohol dependence and adverse effects parallels a distinction often made in treatment policy between "alcoholism" on the one hand and "problem drinking" or "alcohol abuse" on the other. Dependence appears to be the core characteristic of people who are labeled "alcoholic" or "addicted to alcohol" by treatment practitioners. The literature reviewed in Chapter II shows that this criterion is sometimes explicit but more often implicit or confused. The most prominent source of confusion arises when alcoholism is defined not simply by dependence but also by the gross physical or behavioral effects of heavy alcohol use (e.g., intoxication, liver disorder, unemployment, loss of family). In agreement with the WHO, we wish to avoid this mixture of the underlying dependence phenomenon with its effects. Therefore, we have adopted the term "dependence" instead of attempting to restrict the term "alcoholism" to a more specific meaning.

The second classification, which we have called "adverse effects," is also known by other names in clinical practice. The most common phrases are "problem drinking" and "alcohol abuse," intended to convey the notion of a moderately serious problem without the levels of severe impairment or dependence typical of "alcoholics."¹ We prefer the "adverse effects" terminology for two reasons. First, it avoids some of the excess meaning, often pejorative, carried by "abuse" and similar words. The nature of this difficulty has been fully examined elsewhere (Keller and McCormack, 1968). Second, the adverse effects that we intend to distinguish are considera-

¹ The Air Force uses the term "problem drinker" to refer to people entered into a treatment program but not diagnosed as alcoholic (AF Regulation 30-2). Similarly, the nationwide network of Alcohol Safety Action Programs for drinking drivers, sponsored by the U.S. Department of Transportation, attempts to deal primarily with diagnosed "mid-range problem drinkers" rather than with "social drinkers" or more severe problem groups (DOT, 1974).

bly more serious than many of those included under the heading of problem drinking. It is our view, as noted in Chapter II, that the notion of "problem drinking" as originally defined (Cahalan, 1970) is too inclusive for the treatment policy purposes of the Air Force.

It is important to bear in mind the purposes of the two categories. Those in the "dependent" category are expected to be experiencing a very serious, chronic, and pervasive problem. The chronicity suggests that the condition may be difficult to ameliorate and that intensive intervention may be required. Education or persuasion may not be enough, as dependent people often continue their use of alcohol regardless of external admonition or negative consequences. The category of "adverse effects," in contrast, is reserved for those who are *not* dependent but who have otherwise experienced serious trouble because of drinking alcoholic beverages. The particular trouble is likely to be easily observable by authorities, so they are probable candidates for some formal rehabilitation or education intervention. However, the nature of the intervention required may be different from that indicated for the alcohol-dependent group. The particular intervention best suited to each group is an empirical question not to be answered by this prevalence study. Nevertheless, the categories are defined in part to be useful for this sort of policy purpose.

The conceptual relationship between these two categories of alcohol problems is shown in the accompanying set diagram (Fig. 1). The circles representing dependence and adverse effects are independently defined. The extent to which the

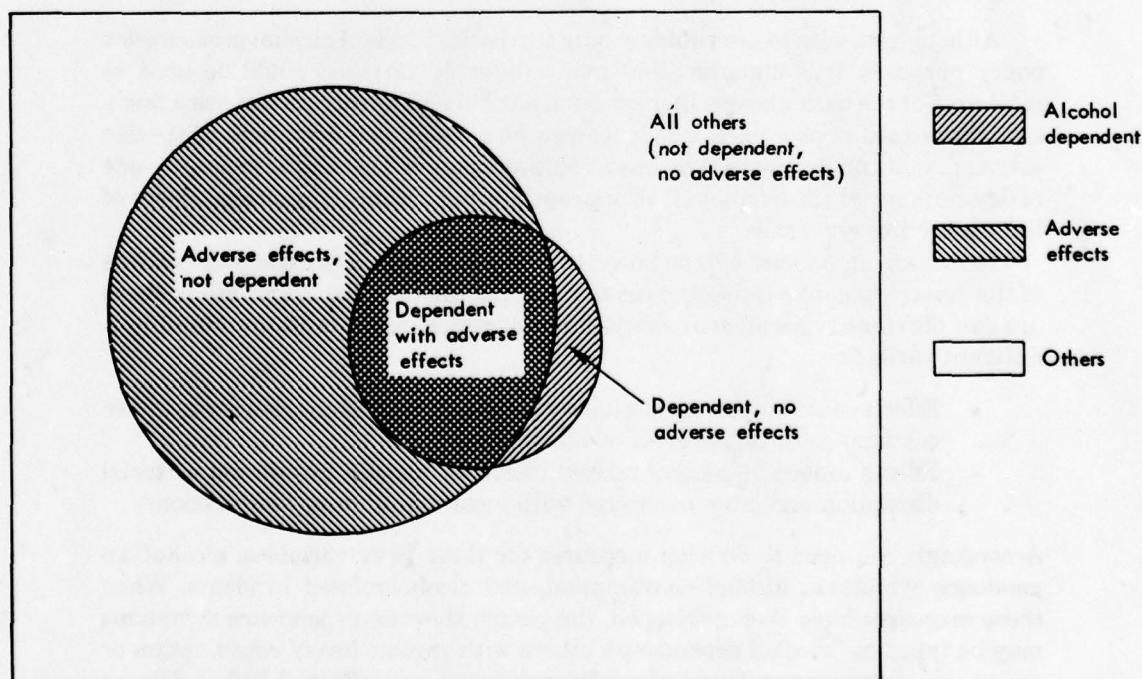


Fig. 1—Conceptual relationship between alcohol dependence and adverse effects of alcohol

two categories may overlap is thus an empirical question. Although alcohol dependence is considered a more serious condition than the occurrence of an adverse effect, it is *not* true that dependence implies an adverse effect. In practice, one would expect that anyone with alcohol dependence is also highly likely to have experienced serious adverse consequences of drinking; nonetheless, the connection will not be present in every case. Therefore, Fig. 1 shows that most but not all dependent people also have adverse effects. Dependence, being the more serious condition, covers fewer people and hence is represented by the smaller of the two circles. This leaves a very large number of people who have experienced adverse effects but who are not dependent on alcohol.

This high degree of probable overlap has an important bearing on our definition of alcohol-problem categories. In developing a classification of people with problems, we shall first examine those with alcohol dependence (those represented by the smaller circle). These people will form the first and most serious problem group. Then we shall look at those in the shaded area of the diagram who are *not* dependent. This second group, people with "adverse effects, nondependent," will form our second problem category.

This diagram represents only a conceptual approximation to reality, based on expectations and experience. The exact size of the various sets and the relations among them are matters to be determined by the data. The diagram simply lays the foundation for analysis and gives a framework for consideration of our basic variables and measurement procedures.

Measures of Alcohol Problems

Although we wish to discriminate only two basic classes of alcohol problems for policy purposes, it is apparent that many different variables could be used as indicators of the basic classes. In measuring alcohol *dependence* we can use a fairly straightforward approach. Dependence can be treated as a syndrome of specific elements that can be assessed by observable symptoms. The task is primarily one of determining which symptoms are appropriate and practical for measurement of the underlying syndrome.

In measuring *adverse effects*, however, the situation is more complex because of the diverse negative consequences that alcohol can produce. As we see it, there are two different types of such effects, each of which ought to be measured by a different variable:

- Effects caused by heavy alcohol consumption, usually manifested as physical damage or impairment of function; and
- Effects caused by alcohol-related incidents, usually manifested as social disruption and often connected with instances of acute intoxication.

Accordingly, we need to develop measures for three basic variables: alcohol dependence symptoms, alcohol consumption, and alcohol-related incidents. When these measures have been developed, the people showing dependence symptoms may be typed as "alcohol dependent"; others with chronic heavy consumption or serious incidents may be typed as experiencing "adverse effects." Before delving into the measurement procedures for these variables, we shall summarize their characteristics, their roles in our conception of alcohol problems, and the terminolo-

gy we shall use. We discuss them in order of their conceptual status, beginning with the most fundamental aspect of alcohol behavior, consumption, and ending with the most advanced disorder, dependence.

1. *Alcohol Consumption.* The consumption of alcoholic beverages is basic to all types of alcohol problems. Consumption varies by beverage type, by number of occasions, by quantity per occasion, and in numerous other ways that affect the experience of alcohol problems. We shall use consumption primarily as a measure of overall alcohol intake. A high intake level can be used as an indicator of presumptive physical damage (e.g., liver degeneration). Consumption will also be used as a putative risk factor for alcohol problems.
2. *Serious Alcohol Incidents.* Most alcohol problems come to the attention of authorities and treatment personnel—and indeed to the person affected—in the form of “incidents” that harm the person or impair his physical, psychic, or social functioning. Absenteeism from work, family quarrels, accidents, and arrests for drunkenness are prominent in this category. These incidents will be used as *prima facie* evidence of an adverse effect of alcohol whenever alcohol dependence is not present.
3. *Alcohol Dependence.* The core dependence syndrome is the most severe condition of all those we shall consider. It may be assessed through the symptomatology that it presents, such as withdrawal problems or uncontrolled drinking. Individuals will be classified as alcohol dependent whenever they report such dependence symptoms at an appropriate degree of severity and frequency.

INDICATORS OF ALCOHOL CONSUMPTION

Consumption of alcoholic beverages is a regular practice for the majority of the U.S. population and is almost universal among young males. Moreover, heavy drinking among civilians is much more frequently found among young males than among other groups (Cahalan and Room, 1974). Therefore, the Air Force population, which is 93 percent male and 45 percent between ages 18 and 24, should present a pattern of frequent drinking.

Frequency and Quantity of Consumption

Some basic information on the frequency and quantity of alcohol consumption among Air Force personnel is shown in Table 7. In this table the 3,148 respondents to the 13-base survey are classified according to their consumption of the three principal types of alcoholic beverages (beer, wine, and distilled spirits or “hard liquor”). These respondents were asked to describe their consumption of such beverages over the “past 30 days” (the 30 days before the survey). This technique has been used in several national surveys conducted for the U.S. National Institute on Alcohol Abuse and Alcoholism (Harris, 1975) and in the national alcoholism treatment center monitoring system supported by NIAAA (Armor, Polich, and Stambul, 1978). Each respondent reports the *frequency* with which he has drunk

Table 7

FREQUENCY AND QUANTITY OF ALCOHOL CONSUMPTION
(Percentage distribution)

Item	Beverage Type		
	Beer	Wine	Liquor
Frequency of drinking^a			
None	26	58	52
1-3 days per month	29	30	31
1-2 days per week	23	8	11
3-4 days per week	12	2	4
5 or more days per week	10	2	3
(N)	(3148)	(3148)	(3148)
Quantity of drinking^b (on a typical drinking day)			
1-2 drinks	51	60	48
3-4 drinks	29	23	34
5-7 drinks	14	12	12
8 or more drinks	6	5	6
(N)	(2331)	(1325)	(1510)

^aDuring the past 30 days; questions 51,56, and 61.

^bDuring the past 30 days, among drinkers of that beverage (questions 52,57, and 62). One drink was reported by most respondents as one 12-ounce can of beer, one 4-ounce glass of wine, or one shot of liquor (1.0 ounces).

a particular beverage over the past 30 days, then the *quantity* he has drunk on a typical drinking day.

The main utility of these questions lies in their value in calculating an index of alcohol consumption across all beverages, as will be shown shortly. However, certain aspects of the data in Table 7 are worth noting. First, frequent or daily drinking of alcoholic beverages is not the norm in the Air Force. More than half of the force reported no wine or hard liquor consumption during the previous 30 days. Beer was the most favored beverage, being consumed by 74 percent of the force; but even for beer, only 10 percent of the force approaches a frequency of daily drinking (five or more days per week). Second, the quantity of drinking (on drinking days) varies considerably by individuals. Whatever the beverage, about half of the respondents report consuming only one or two drinks in a day, and nearly 20 percent report consuming five or more drinks (e.g., a six-pack of beer). These self-reports, like any survey data, are potentially subject to distortion or underestimation. However, as will be shown in Chapter V, our companion data from military records of alcoholic beverage sales suggest that the survey self-reports are not very far off.

Constructing a Total Consumption Index

The data summarized in Table 7 constitute the basic information by which an individual's overall amount of drinking may be gauged. To assess the effect of drinking on physical or psychological functioning, this information must be translated into the amount of ethanol (absolute alcohol) ingested through the drinking. For illustrative purposes, Table 8 displays the factors that influence the ethanol

Table 8

ETHANOL CONTENT OF TYPICAL DRINKS

Item	Beer	Wine	Liquor
Size of typical drink (fluid ounces)	12.0	4.0	1.0
Ethanol content per ounce	.04	.12 ^a	.43
Ethanol content of 1 drink (fluid ounces)	.48	.48	.43

^aWhere fortified wine (sherry, port, etc.) was the person's usual wine, the content was assumed to be .18 rather than .12.

content of the drinks reported by respondents. Most respondents reported quantities in terms of 12-ounce cans of beer, 4-ounce glasses of wine, or 1-ounce shots of hard liquor (although other frames of reference were possible and were used by some respondents). Combined with our assumptions of standard ethanol content of the three beverages, this implies that, in rough terms, a single drink equals a little less than one-half ounce of ethanol regardless of the type of beverage. The resulting ratio—two drinks to one ounce of ethanol—may be used to interpret the following analysis.

There is ample evidence in the literature that the *total volume* of ethanol consumption per day is a major risk factor for important physical pathologies associated with heavy drinking (Wallgren and Barry, 1970). The total volume appears to be the determining factor rather than the frequency of drinking, the spacing of drinks, alternation between heavy-drinking binges and periods of non-drinking, etc. Accordingly, we have combined the Air Force respondents' reports shown in Tables 7 and 8 into a total volume index of alcohol consumption, measured in ounces of ethanol consumed per day.

An illustration will show the mechanics of this calculation. Suppose a typical Air Force member drinks beer once or twice a week during a 30-day period, and consumes three drinks each day that he drinks. Suppose he drinks no wine but drinks hard liquor two days in the period, consuming two drinks each drinking day. His overall ethanol consumption per day would be calculated as:

Beer: $(1.5 \text{ drinking days/week}) \times (3 \text{ drinks per day}) \times (.48 \text{ ounces per drink}) / (7 \text{ days per week}) = .309 \text{ ounces of ethanol per day.}$

Liquor: $(2 \text{ drinking days/month}) \times (2 \text{ drinks per day}) \times (.43 \text{ ounces per drink}) / (30 \text{ days total per month}) = .057 \text{ ounces of ethanol per day.}$

Total volume: $.309 + .057 = .366 \text{ ounces of ethanol per day.}$

This simple calculation does not take into account certain *atypical* days when the individual may have consumed more than he would on a "typical" or modal day. In the extreme case, a person could drink very small amounts on 16 days in a month, but drink heavily (say, 5 ounces of ethanol or ten drinks) on the other 14 days. The simple algorithm demonstrated above would then underestimate that individual's total consumption. To deal with this possibility, we have also factored into the total volume index a correction for such atypical, heavy-drinking days (see App. D). Thus, the final index of total alcohol consumption is intended to represent

the individual's typical and atypical ethanol intake patterns. The distribution of this index is shown in Table 9.

There are two important points to observe about Table 9. First, the distribution is highly skewed toward the upper end. Although most Air Force personnel drink at levels that would seem low to moderate by any standard (less than one ounce per day, covering 73 percent of the sample), a small group consumes very large amounts. For example, 3.6 percent of the sample drink over 5 ounces per day. In general, the distribution follows very closely the proportions that would be expected from a lognormal distribution with this particular mean (see App. E). In this respect the Air Force data closely agree with a wide variety of other data sources that have shown that the amount of alcohol consumption in many diverse populations follows the lognormal distribution. The apparently invariant character of this distribution, combined with the high correlations between alcohol-related mortality and high-consumption behavior, has led one school of authors to suggest that the 5-ounce point (about 15 centiliters) should be adopted universally as the threshold for "chronic excessive alcohol consumption" (de Lint and Schmidt, 1976).

There is also compelling experimental evidence for concluding that the group consuming over 5 ounces is practicing "excessive consumption." Results from a number of studies have established convincingly that such high consumption rates are directly toxic to the liver. In particular, consumption at a rate of 5 ounces per day leads to very high risk of cirrhotic or precirrhotic conditions (Lelbach, 1974; Wallgren and Barry, 1970). Below 5 ounces, the risk subsides substantially, al-

Table 9

DISTRIBUTION OF TOTAL ALCOHOL CONSUMPTION

Level of Alcohol Consumption ^a (ounces of ethanol per day)	Percent Reporting ^b	
None	15.5	
0.1 - 0.5	42.8	
0.6 - 1.0	14.4	
1.1 - 2.0	13.6	
2.1 - 3.0	5.9	
3.1 - 4.0	2.6	
4.1 - 5.0	1.6	} Presumptive Adverse Effects ^c
5.1 - 7.0	1.1	
7.1 -10.0	0.9	
Over 10.0	0.9	
Summary Statistics	Ounces of Ethanol	
Mean, all cases	1.021	
Median, all cases	.351	
Median, drinkers only	.485	

^aExpressed in ounces of ethanol (pure alcohol), derived from the ethanol content of beer, wine, and liquor and from the quantity and frequency of consumption reported for each beverage. See App. D for details of scale construction.

^bBase N = 3075.

^cThis consumption rate implies extreme risk of adverse effects on the liver.

though some authorities state that even levels of about 3 ounces carry a significant risk of certain types of liver pathology such as fatty liver or hepatitis.

It is for these reasons that we have selected the 5-ounce point as a boundary for a "presumptive adverse effect" of alcohol due simply to heavy consumption. We do not mean to imply that slightly lower levels of consumption are "safe" or "healthy." Research has not established any such safe drinking limit, and the possible risks to bodily systems other than the hepatic system have not been assessed. Nonetheless, we do not wish to impute an "adverse effect" of alcohol to behaviors that are ambiguous or perhaps harmless. For this reason we shall not treat lower levels of consumption *per se* as evidence of an adverse effect. However, when a person reports consumption at the level of 5 ounces per day, he will be automatically assumed to be damaging his liver, hence experiencing an "adverse effect" of drinking.

An important question, but one difficult to answer, is whether the Air Force consumption patterns are different from those in the general U.S. population. Recent data for total U.S. beverage sales suggest that about 2.78 gallons of ethanol per year are consumed by each American age 15 and over (NIAAA, 1978). This would imply about .975 ounces of ethanol per day (per capita), slightly under the self-reported Air Force mean of 1.021. However, the U.S. beverage sales data are not directly comparable to the Air Force population, because the U.S. per capita figure includes a large number of abstainers, females, and older people. Without a method for disaggregating total sales by age and sex, it is difficult to make meaningful comparisons.

As an alternative method, one may seek survey data covering the general U.S. civilian population, with measures comparable to those in the Air Force study. There is, unfortunately, no U.S. survey with all of the components of the total volume index, but there are surveys with certain components available. For these components (as shown in App. E, Table E.2), the Air Force and civilian populations appear almost the same when groups of similar age-sex distributions are compared. One noticeable difference is that among young females. Members of this group, who constitute about 5 percent of the total Air Force, are less likely to be total abstainers than are young females in the civilian population. Generally, however, consumption among Air Force personnel is similar to consumption among civilians of the same age and sex.

INDICATORS OF ALCOHOL INCIDENTS

The adverse effects of alcohol are by no means limited to effects on the liver. As described in Chapter II, previous research on "problem drinking" has identified a wide range of alcohol-related events that might be judged as adverse, socially disruptive, or abusive. The far-reaching character of these drinking problems has been described exhaustively in the national survey work of Cahalan and his associates (Cahalan, 1970; Cahalan and Room, 1974). Such "drinking problems" vary greatly in their severity. A problem can be something as weighty as losing a spouse or being fired from a job, but it also can be something as fleeting (and widespread) as spending too much on drinks or having a hangover. In our view, the "drinking problem" construct is too broad for use in guiding treatment decision policy. Be-

cause many minor problems do not reappear naturally (there is "natural remission"), some problems may not even be suitable for prevention programs. Accordingly, we have sought to discriminate incidents that produce serious damage or disruption in the individual's life. When such incidents occur, we are prepared to label them as "adverse effects," with the potential to warrant intervention.

Serious Alcohol Incidents

Most serious incidents take the form of specific events that are likely to be highly disruptive for the individual affected. A list of such events is shown in Table 10, segregated into three main areas of possible effect: work impairment, physical damage, and social disruption. Inspection of the list shows that these are events with quite serious probable effects on the person's life and career. They include such drinking-related events as receiving official punishment (judicial or Article 15); receiving a lower performance rating on an official report; experiencing illness, hospitalization, or a serious accident; being arrested; or experiencing serious marital problems (spouse leaving or threatening to leave). Few individuals have experienced these serious incidents at any time in their lives (5-10 percent of the sample). Even fewer have experienced a particular event during the past year.

Because of the importance of possible work-related effects of alcohol, we have also examined alcohol-related events affecting work performance that do not cluster into a single dramatic incident. Such events might include *days lost from work*, lateness, or impaired performance due to hangovers, headaches, and similar conditions. These consequences of excessive drinking may require a considerable amount of time, coupled with a repetitive pattern, to produce clear and definite damage or disruption in the individual's life. They are nevertheless harmful to society and to the Air Force over the entire period when they occur.

Table 11 shows several such measures, with the intention of tapping longer-term effects relating to job performance and productivity. These results are derived from questions that asked the *number of duty days* on which the respondent experienced various types of work impairment due to alcohol. To provide a common metric for the impairment of productivity, each item is measured in terms of working days lost. For example, "missing a duty day" because of drinking or a hangover implies one full day's production lost. Arriving late or working at a lower level of performance (say, because of a hangover) on a given day seems to imply considerably less than a full day lost. In Table 11 these two items are counted as implying one-fourth of a day lost for each daily occurrence.² In addition, we have included instances where the respondent reported being "high from alcohol while on duty." This item is even more subjective and difficult to interpret because people may vary greatly in the type of behavior they call "high." Because of the probable overlap between a report of "being high" and a report of "working at lower productivity," the instances of being high have been counted only to the extent that days reported as "high" exceed days reported working at lower productivity; then, each excess day is scored as one-fourth of a day.

These scoring procedures are necessarily imprecise, but they convey some notion of the impact of alcohol problems on work in the Air Force. This effect

² This estimate is supported by results from surveys of Air Force personnel, in which respondents reported an average of .24 to .32 days lost for such incidents.

Table 10
SERIOUS ALCOHOL INCIDENTS

Incident ^a	Question Number	Percent Reporting (past year) ^b			
		Never	Happened but not Past Year	Happened Once Past Year	Happened More than Once Past Year
Work Impairment					
Received judicial or nonjudicial punishment	96	95.5	2.5	1.2	0.7
Received lower performance rating (efficiency or performance report)	95	96.7	1.7	1.0	0.5
Physical Damage					
Had an illness keeping him/her off duty for one week or longer	93	97.7	1.1	0.5	0.7
Was hospitalized two days or more	129	95.2	2.9	1.0	0.8
Visited a physician twice or more	130	94.4	4.1	0.5	1.0
Had an accident causing self-injury	108	94.4	4.0	0.9	0.6
Had an accident causing injury to others or property damage	109	94.2	3.9	1.2	0.7
Social Disruption					
Spouse left	112	97.4	2.0	0.1	0.5
Spouse threatened to leave but did not leave	110	98.5	0.8	0.4	0.3
Was arrested for driving while intoxicated	103	94.5	3.6	1.2	0.6
Was arrested for nondriving offense	104	95.5	3.2	0.6	0.7
Spent time in jail	106	95.1	3.3	1.1	0.5
Got into fights ^c	116,117	96.5	(d)	1.8	1.7

^aAll incidents were specified in the questionnaire as caused by or related to alcohol and occurring within the past 12 months.

^bBase N = 3148.

^cFor those whose frequency of fighting while drinking exceeds frequency of fighting while not drinking.

^dCould not be estimated.

Table 11

ALCOHOL-RELATED WORK EVENTS

Item ^b	Percent Reporting (past year) ^a		Estimated Days Lost Per Person ^c
	Any Occurrence	Occurrences Costing 3 Duty Days or More	
Missed an entire duty day	3.1	0.8	.085
Arrived late or left early ^d	11.4	0.8	.117
Worked at lower level of performance than normal ^d	19.2	2.2	.288
Was "high" on duty ^e	4.7	0.9	.104
Days lost from any item above	25.4	4.5	.594

^aEach questionnaire item asked about duty days on which the incident occurred *because of drinking* (questions 89, 88, 87, and 91).

^bBase N = 3148.

^cTotal numbers of days lost, divided by total sample size.

^dOne day's occurrence estimated as loss of 25 percent of a working day.

^eOne day's occurrence estimated as loss of 25 percent of a working day. Counted only to the extent that days "high on duty" exceed days of "lower performance" for that person, under the assumption that those with lower performances may also report themselves as "high."

appears to be fairly widespread; 25 percent of all personnel reported some work impairment due to alcohol. However, our estimate of the total lost working time is modest: about 0.6 days per person in the force (per year). Based upon a year with 240 working days, this represents much less than 1 percent of total time lost because of alcohol impairment. This appears to be considerably less than the amount of time lost by a typical person because of other medical reasons.

To summarize these work-impairment and other incidents related to drinking, Table 12 shows several statistics bearing on their prevalence. No single incident dominates the total category. In all, 12.1 percent of the sample reported at least one incident during the past year. Among these, more than half (7.3 percent of the force) have only one incident. The single incident that contributes the most cases is "loss of working days" followed closely by "fights." But even if "loss of working days" were deleted from the list, only 2.5 percent of the force would drop from the category of one or more incidents. This suggests, in general, that the category of people affected by these incidents is heterogeneous, not composed of any particular type of person or identified by any particular type of problem or disability. Therefore, no one type of problem may be taken as a defining characteristic of the group.

These diverse alcohol incidents could be combined into an additive scale counting the number of incidents occurring in the past year. Instead, we have chosen to distinguish those with one or more serious incidents from those with none.³ This is partly because the occurrence of multiple reported incidents (e.g., arrest and accident) could reflect only a single actual event, and partly because empirically those with two or more incidents are not dramatically different on other measures from those with only one incident. In effect, our treatment identifies a single, undifferentiated group consisting of those who have recently gotten into problems

³ See App. E for inter-item correlations and the distribution of such an additive scale.

with alcohol. The group is somewhat heterogeneous, with respect to both the types and the numbers of problems reported by its members. In this our data agree with the opinion advanced by the WHO working group (Edwards et al., 1977), which held that "drinking problems" are highly diverse, sometimes unrelated, and highly subject to natural remission when dependence is not present.

Warning Incidents

The 14 serious incidents in Table 12 were selected because of their *prima facie* indication of a substantial amount of damage or disruption in the individual's life. Many other events are not as serious but might be taken as a warning of more serious things to come. Although we do not wish to use "warning signs" as indicators of serious alcohol problems, it is instructive to examine them as less serious problem items. In doing so, we can determine how sensitive our definition of adverse effects is with regard to changes at the margin of severity.

Table 13 shows five questionnaire items that we construe as warning incidents. These are mainly specific instances where some other person cautioned the respondent against continuing his drinking pattern (e.g., "a physician said I should cut

Table 12

SUMMARY OF SERIOUS ALCOHOL INCIDENTS

Serious Incident ^a	Percent Reporting Occurrence, Past Year	Percent Reporting Occurrence of This Incident But No Others
Work Impairment		
Official punishment	1.9	0.1
Lower performance rating	1.5	0.2
Loss of 3 working days ^b	4.5	2.5
Physical Damage		
Illness lasting one week	1.2	0.2
Hospitalization	1.8	0.7
Visits to physician	1.5	0.5
Accident with self-injury	1.5	0.3
Accident with injury to others or property damage	1.9	0.3
Social Disruption		
Spouse left	0.6	0.1
Spouse threatened to leave	0.7	0.2
DWI arrest	1.8	0.2
Nondriving arrest	1.3	0.0
Jail	1.6	0.1
Fights	3.5	1.9
Total	12.1^c	7.3^d

^aCounted as one or more occurrences during the past 12 months, except as noted below.

^bHaving three or more total days lost from missing work, being late, working at lower performance, or being high on duty.

^cPercent of sample with one or more serious incidents.

^dPercent of sample with one and only one serious incident.

Table 13
WARNING INCIDENTS RELATED TO ALCOHOL

Item	Question Number	Percent Reporting ^a		
		Did Not Happen Past Year	Happened One Time Past Year	Happened Two or More Times Past Year
Physician said cut down on drinking	97	97.7	1.5	0.8
Co-workers said cut down on drinking	99	96.7	1.6	1.7
Spouse said cut down on drinking	98	91.4	2.9	5.7
Police warned about drinking	102	96.8	2.1	1.1
Drinking may have hurt promotion chances	94	97.9	1.4	0.7

^aBase N = 3148.

down on drinking"; "a policeman warned me, but did not arrest me, because of my drinking"). If these warning incidents are serviceable as indicators of less serious alcohol problems, they ought to be strongly associated with our serious incident measures. Table 14 shows some evidence on this, using rough indices that count the number of serious incidents and warning incidents. Although there is a substantial correlation between having a serious incident and having received a warning in the past, the relation is by no means universal. In particular, only about half of those with a serious incident in the past year report that they have ever received a warning. In short, warning and serious incidents are related, but one is neither a necessary nor a sufficient condition for the other.⁴

For these reasons, our approach here will be to maintain warning incidents as independent indicators of possible or potential alcohol problems rather than to combine them with the serious incidents. In this way, the category of definite adverse effects (serious incidents) is kept as clear as possible, because many of the warnings are ambiguous as problem indicators. (For example, a spouse could advise a person to cut down on drinking because of the spouse's opinions on drinking.) Nonetheless, we shall continue to show information about warning incidents in several analyses to indicate the sensitivity of results to modest changes in definition.

Alcohol Incidents and Consumption

It could be argued that the occurrence of these alcohol incidents is primarily socially determined, so that it is questionable whether they ought to be used at all as indicators of alcohol problems. It is possible, for example, that a person who does not drive, is not married, and works under little supervision could escape exposure to most of the incidents that would tag him as having an adverse effect. People with the same high levels of alcohol consumption or other problem behavior might be

⁴ Despite the modest level of association between warnings and serious incidents, certain analyses do suggest a stronger relation between the two concepts. The factor analysis shown in App. E demonstrates that warnings and serious incidents fall on the same factor, as distinct from other alcohol problem behaviors.

Table 14
SERIOUS ALCOHOL INCIDENTS BY WARNING INCIDENTS
(In percent)

Number of Serious Incidents, Past Year	Number of Warning Incidents			
	None Ever	None Past Year, One or More Previous Years	One in Past Year	Two or More in Past Year
None	93.4	88.5	70.1	49.3
1	5.3	9.1	15.0	18.8
2 or more	1.3	2.4	15.0	32.0
(N)	(2356)	(373)	(147)	(272)

"caught" in a strict environment but "missed" in a more permissive one. If this were so, there should be only a weak relationship between having an incident and any variable that taps underlying behavior (say, alcohol consumption).

Table 15 shows that this is not so; the relationship between incidents and alcohol consumption is quite strong. The higher the level of daily consumption, the higher the probability of experiencing an incident. The probability rises from about 6.5 percent at the lowest consumption levels (0 to 1 ounce per day) up to 52.2 percent at the highest consumption levels (over 5 ounces per day). Moreover, the same relationship holds even if warning incidents are included. Thus, the risk of adverse effects rises monotonically with increasing consumption. Although variation in the permissiveness of environments may account for some of the variance in adverse effects, it is clear that the underlying drinking behavior plays a major role. This in turn reinforces the apparent validity of both the consumption and the consequence measures.

There are two discontinuities in the probability of experiencing an incident as consumption rises. The risk rises considerably between the 0-1 ounce level and the 1-2 ounce level. Then there is another slight discontinuity as the person consumes

Table 15
ALCOHOL INCIDENTS BY TOTAL CONSUMPTION LEVEL
(Percent with designated number of incidents)

Total Consumption Level	No Serious Incidents			At Least One Serious Incident			(N)
	No Warning Incidents	1 Warning Incident	2 or More Warning Incidents	1 Serious Incident	2 or More Serious Incidents	Total, 1 or More Serious Incidents	
0.1-1.0	87.9	3.0	2.7	4.4	2.1	6.5	1761
1.1-2.0	62.4	6.2	9.8	13.6	7.9	21.5	418
2.1-3.0	57.4	6.1	12.7	16.6	7.2	23.8	181
3.1-4.0	46.8	3.8	6.3	24.1	19.0	43.1	79
4.1-5.0	46.9	8.2	4.1	24.5	16.3	40.8	49
Over 5.0	34.2	4.5	9.0	22.5	29.7	52.2	111

more than 3 ounces, which raises the question of whether any particular level of consumption should be designated as "high-risk" by virtue of the rate of consequences. (We have already designated the level of 5.0 ounces as a presumptive adverse effect, because of the high risk of liver damage.) This pattern also raises the question of whether certain *patterns* of consumption, such as heavy or binge drinking on weekends, may be the factor that the consumption measure is tapping. These questions will be examined in Chapter VI along with other possible risk factors.

INDICATORS OF ALCOHOL DEPENDENCE

Alcohol can adversely affect an individual in diverse ways. On the face of it, one would not be led to conclude that those who have experienced any of these effects are necessarily suffering from a single disorder. Nor would one conclude that their condition is necessarily chronic. However, certain experiences, taken together, do suggest an underlying chronic condition. Whether labeled as alcoholism, alcohol addiction, or alcohol dependence, this condition has struck observers over the years as a core syndrome with distinct characteristics.

Elements of the Dependence Syndrome

The notion of alcohol dependence as used in contemporary work grows out of experience with physical dependence, a phenomenon commonly observed with many drugs. The regular use of many drugs results in several changes in bodily functioning. One is increased tolerance (ability to function normally despite abnormally high concentrations of the drug, which in normal persons would result in dysfunction). For our purposes, a more important and more easily measured result is the development of a "need" for the drug. Objectively, the need may be manifested by appearance of a physical reaction when the drug is absent. With alcohol this appears as a characteristic withdrawal syndrome, presenting such symptoms as delerium tremens in acute cases, or morning tremors ("shakes") in subacute cases. It is often observed in clinical practice that tremors appear in the morning when blood alcohol concentrations have declined during sleep; drinking in the morning on awakening is therefore often an indication that the drinking is being undertaken to forestall or suppress the withdrawal symptoms. Some alcoholics may also be observed to "top up" at intervals during the day to maintain a blood alcohol concentration that prevents distress. For these reasons questionnaire items inquiring about manifestations of "the shakes" or "morning drinking" present an easily used and fairly effective assessment of acute or subacute withdrawal.

The subjective side of the "need" represented by dependence is also an important element, especially in lay interpretations of alcoholism. This subjective need is almost invariably expressed as "loss of control," the inability to stop drinking or to resist taking a first drink. Especially in North America (less so in Europe), and in circles adhering to the "disease model," loss of control is taken as the *sine qua non* of alcoholism. Jellinek made it a necessary and sufficient condition for his two "true" types of alcohol addiction. Unfortunately, the notion of loss of control has numerous conceptual and measurement difficulties. Many attempts to document its occurrence have been made, but they have not been notably successful (Pattison et

al., 1977; Lloyd and Salzberg, 1975), so that the proper method for measuring the phenomenon is unclear. In our opinion, the best method available is to rely upon the individual's subjective report.

To put these various ideas together, an expert committee of the World Health Organization has set forth a series of suggestions for diagnosis of dependence and for assessment of other "alcohol-related disabilities" (Edwards et al., 1977). In its view, the term "alcohol dependence" should be reserved for those who, regardless of particular adverse effects, evidence a pattern of symptoms and behavior suggesting daily reliance on alcohol for regular functioning. Three types of symptoms classically associated with alcoholism may be used as indicators of dependence:

1. *Physical withdrawal symptoms*, such as tremors, hallucinations, convulsions, delirium tremens, and the milder (subacute) phenomena, such as nervousness, sleeplessness, or morning drinking, which occur when alcohol is withdrawn from a dependent person. The appearance of such symptoms implies that the processes of alcohol tolerance and physical dependence are fairly far advanced; if the level of blood alcohol concentration drops, the individual will experience serious impairment of normal functioning because of the symptoms.
2. *Impairment of control*, the subjective experience of being unable to stop drinking once started, unable to resist taking a drink in the first place, or unable to control drinking behavior despite a desire to do so or the knowledge that adverse effects will follow.
3. *Deviant drinking behavior*, consumption of alcohol in amounts that are much greater than is "normal" in the surrounding population, or in circumstances where such consumption is contrary to custom.

Constructing a Dependence Symptom Scale

We have attempted to incorporate the WHO suggestions, to the extent possible with our data, into our procedures for measuring alcohol dependence. Table 16 shows the distribution of four questionnaire items that tap certain areas of alcohol dependence just outlined. All of these items took the form of statements referring to the individual's behavior during the past year (e.g., "I had the shakes because of drinking"), where the answers indicate the symptom's frequency.

The first two symptoms listed in Table 16 are withdrawal symptoms. Two items were used for tremors, with slightly different wordings ("I had the shakes" vs. "My hands shook a lot") to ensure that the symptom would be reported even by those who did not recognize the colloquial terminology common among problem drinkers and alcoholics. The last two symptoms (loss of control and blackouts) tap other dependence-related areas. The loss of control item ("I could not stop drinking") is phrased as a purely subjective experience, presuming that the individual actually attempted to exercise control during the drinking occasion. The "blackouts" item refers to memory lapse, the experience of being unable to remember what was done during a drinking bout. The inclusion of blackouts stems mainly from their long history of prominence among symptoms of alcoholism, notably as indicators of a pre-alcoholic stage in Jellinek's theory of phases of alcoholic addiction (1960). Moreover, any occurrence of blackouts is also listed as a major criterion for physiological dependence in the NCA diagnostic guidelines (1972) and is widely recognized as a

Table 16
SYMPTOMS OF ALCOHOL DEPENDENCE

Symptom	Item Wording ^b	Never	Has Happened But Not in Past Year	Percent Reporting (Past Year) ^a				
				1-2 Times per Year	3-11 Times per Year	1-3 Times per Month	1-4 Times per Week	5-7 Times per Week
Tremors ("shakes")	I had the "shakes" because of drinking	82.3	8.8	4.1	2.3	0.8	1.3	0.4
	My hands shook a lot in the morning after drinking	82.6	8.3	3.9	2.4	0.8	1.5	0.5
Morning drinking	I took a drink the first thing when I got up in the morning	86.3	6.1	3.0	2.3	0.7	0.9	0.6
Impaired control	I could not stop drinking before becoming intoxicated	82.6	7.2	3.5	3.0	1.0	2.0	0.7
	I awakened the next day not being able to remember some of the things I had done while drinking	61.9	17.6	10.8	5.1	2.6	1.6	0.4

^aBase N = 3148.

^bQuestions numbered 126, 123, 122, 124, and 118.

definite indicator of alcoholism among clinical practitioners (Filstead et al., 1976). Empirically, blackouts, morning drinking, and tremors have been shown to be the three best discriminators of alcoholic and nonalcoholic groups, performing almost as well as an exhaustive list of symptoms drawn from the NCA guidelines (Ringer et al., 1977).

It is clear from Table 16 that the great majority of Air Force personnel report they have never experienced these symptoms. A small group (6 to 18 percent) report that they have experienced a symptom sometime in the past, but not in the past year. Even fewer people report the experience of these symptoms at a frequency great enough to indicate chronic alcohol dependence (for example, once a week). The most commonly reported symptom at this frequency is loss of control, affecting only 2.7 percent of the sample as often as once a week. A complete assessment, of course, would require that we consider the simultaneous occurrence of multiple symptoms—e.g., the number of total symptoms experienced and the number of different symptoms reported. This suggests combining the four symptoms into an overall scale.

The information contained in Table 17 suggests that there is ample justification for such a combination, treating the four symptoms as alternative measures of a single underlying construct of "dependence." The entries above the diagonal are product-moment correlations, quite high for survey data.⁵ The entries below the diagonal show the proportion of people with one particular symptom who also report another; for example, 69 percent of those with tremors also report blackouts, 72 percent of those reporting loss of control also report blackouts, etc.

When several variables are highly correlated as these are and they tap the same conceptual domain (as these do), much is to be gained by combining them into a scale for measuring the construct. We have done this by constructing an alcohol dependence symptom scale from the sum of the frequencies of symptom reports, as shown in Table 18.⁶ For example, a person who reports no loss of control, no blackouts, morning drinking twice a month (24 times per year) and tremors once or twice a week (78 times per year) would receive a symptom score of 102. The total score may be loosely interpreted as the number of days during which a person experiences a symptom, if each symptom occurs on a separate day. Thus, a person

Table 17

RELATIONS AMONG ALCOHOL DEPENDENCE SYMPTOMS^a

	Tremors	Morning Drinking	Inability to Stop	Blackouts
Tremors	—	.590	.694	.524
Morning drinking	.405	—	.450	.485
Inability to stop	.518	.551	—	.523
Blackouts	.691	.722	.719	—

^aAbove the diagonal the entry is the product-moment correlation. Below the diagonal the entry is the proportion of people reporting the column variable who also report the row variable (base N = 2882).

⁵ The estimated reliability (Cronbach's alpha) for a composite scale based on these four items is .83.

⁶ For the details of coding the symptom items and the scale construction, see App. D.

Table 18
ALCOHOL DEPENDENCE SYMPTOM SCALE

Approximate Yearly Frequency of Symptom-Days	Score Range on Symptom Scale ^a	Percent of Sample Within Range ^b	
None	0	73.0	
Less than once per month	1-11	18.4	
Once per month, less than twice	12-23	1.1	
2-3 times per month	24-47	2.6	
Once per week	48-77	0.6	} Alcohol Dependence
2-3 times per week	78-181	1.5	
Every other day	182-365	1.3	
Every day or more often	366 or More	1.5	
(N)		(3148)	

^aScore on scale = sum of daily frequency reports for four items (tremors, morning drinking, inability to stop drinking, and blackouts). For scoring details, see App. D.

^bBase N = 3148 cases.

with a symptom score of 48 or more is reporting at least one symptom per week, two symptoms every other week, etc. Establishing a precise cutting point for the boundary between "dependence" and "nondependence" is somewhat arbitrary with this scale. Our procedure will be to accept, tentatively, all those with symptom scores of 48 or more (loosely, once per week) as alcohol dependent.

It is possible, of course, that a person could report only a single symptom at a very high rate (say 365 blackouts per year, perhaps in error). In that case the "diagnosis" of alcohol dependence would be more convincing if at least two different symptoms had to be reported at some nonzero frequency to confirm a dependence diagnosis. This question is investigated in App. E. Only 11 people among the 155 identified as alcohol dependent by our criterion were identified by only one symptom. Among those, examination of individual case questionnaires confirmed that such a diagnosis was warranted in every case, based on a judgment considering all the other questionnaire information.

Relation of Dependence to Other Variables

Ideally, alcohol dependence should be diagnosable by an independent criterion, so that our symptom items could be validated by comparing symptom reports against outside-criterion diagnoses. The state of alcohol research is not far enough advanced, unfortunately, to permit such a diagnosis by external criteria. Nonetheless, we can investigate the appropriateness of our scale and the cutting point we have selected by examining the correlations of the dependence scale with other related variables, such as alcohol consumption and consequences. Table 19 shows the relationship between alcohol consumption level and dependence symptoms. There is a substantial correlation. Dependence occurs at a rate of only 1.3 percent for those reporting very low consumption (0.1 to 1.0 ounces) ranging monotonically up to a rate of 47.7 percent for those with consumption levels over 5.0 ounces. Moreover, there is a discontinuous jump in the dependence rate occurring at about the 5-ounce consumption level. This suggests that our cutting point for dependence

Table 19
DEPENDENCE SYMPTOMS BY TOTAL CONSUMPTION LEVEL
(In percent)

Total Consumption Level	Dependence Symptom Score (percent scoring within range)					182 or More	Percent Dependent (total scoring 48 or more)	(N)
	0	1-23	24-47	48-181	182 or More			
0.1-1.0	81.7	16.1	0.9	0.7	0.6	1.3	1761	
1.1-2.0	51.0	36.4	5.3	3.9	3.6	7.5	418	
2.1-3.0	38.1	42.5	10.5	5.6	3.3	8.9	181	
3.1-4.0	32.9	40.5	10.1	6.4	10.1	16.5	79	
4.1-5.0	22.4	44.9	12.2	10.2	10.2	20.4	49	
Over 5.0	18.9	24.3	9.0	15.3	32.4	47.7	111	

(48 symptom-days or more) is quite sensitive to excessive consumption levels, as it should be.

If dependence is the core of alcohol-related problems, not only should it correlate with high consumption, it also ought to lead to a high risk of serious consequences. Dependence implies frequent, chronic heavy drinking, which theoretically should imply higher risks. Table 20 shows that is indeed the case. There is a strong relationship between dependence and the other variable tabulated, and again there is a discontinuity in the relation. When the dependence score reaches 48, the rate of serious incidents abruptly increases from about 38 percent to 66 percent. These results confirm that our measure of alcohol dependence behaves precisely as a proper measure should, lending credibility to both the construct of dependence and our particular measure of it.

In the development thus far, we have not paid any attention to the nature of drinking behavior itself, even though deviant drinking behavior was advanced as a primary indication of dependence by the WHO committee. Table 21 shows why this is the case. When alcohol dependence is defined by the presence of frequent

Table 20
ALCOHOL INCIDENTS BY DEPENDENCE SYMPTOMS
(Percent with designated number of incidents)

Dependence Symptom Score	No Serious Incidents			At Least One Serious Incident			(N)
	No Warning Incidents	1 Warning Incident	2 or More Warning Incidents	1 Serious Incident	2 or More Serious Incidents	Total, 1 or More Serious Incidents	
0	90.6	2.0	2.4	3.9	1.0	4.9	2298
1-23	62.2	7.8	9.0	15.5	5.5	21.0	614
24-47	45.7	2.5	13.6	14.8	23.5	38.3	81
48-181	19.4	4.5	10.4	29.9	35.8	65.7	67
182 or More	18.2	3.4	5.7	18.2	54.5	72.7	88

Table 21
 DEVIANT DRINKING BEHAVIOR AMONG
 ALCOHOL-DEPENDENT PERSONS

Type of Deviant Drinking Behavior Reported	Number of Cases	Percent of Alcohol Dependent Cases
High amount of drinking ^a Frequent intoxication, ^b without high amount of drinking reported	134	86.4
Other deviant drinking ^c	17	11.0
	4	2.6
Total alcohol dependent	155	100.0

^aConsumption of 4 ounces of ethanol (8 or more drinks) at least once per month.

^bBeing drunk or sick from drinking at least once per month.

^cIn two cases, being high on duty at least 15 days in the past year. In two other cases, reports of infrequent events (1-6 times past year) from at least four of the following areas: consuming 8 or more drinks in one day; being drunk; being sick from drinking; skipping meals because of drinking; and driving just after consuming 5 or more drinks.

symptoms, as we have done, the data show that deviant drinking behavior is universally present. Of the 155 members of our sample who reported sufficient dependence symptoms to meet our classification rule for dependence, 86 percent also reported drinking amounts that by any contemporary standard would be viewed as deviant (eight drinks or more in a day). Of the remaining 14 percent, all reported drinking behaviors confirming a deviant drinking pattern, usually frequent gross intoxication. Such deviant drinking patterns go hand in hand with dependence symptomatology. The appearance of deviant drinking may provide a clinical clue for uncovering dependence, but it does not appear to be strictly necessary as a criterion for epidemiological assessment of dependence.

PREVALENCE RATES FOR ALCOHOL PROBLEMS

Discriminating the Basic Problem Categories

Our objective in this chapter was to define three basic categories: people dependent on alcohol, those adversely affected but nondependent, and those not affected. The discussion thus far has provided three criteria to be used for this purpose. The definitional strategy will be, first, to isolate those who show symptoms that we have linked to alcohol dependence and then to isolate among the others those who have experienced adverse effects of alcohol in the past year. Figure 2 shows the logic of this procedure.

The total sample may first be broken into the dependent and nondependent groups. (Dependence is indicated by a dependence symptom-score of 48 or more.)

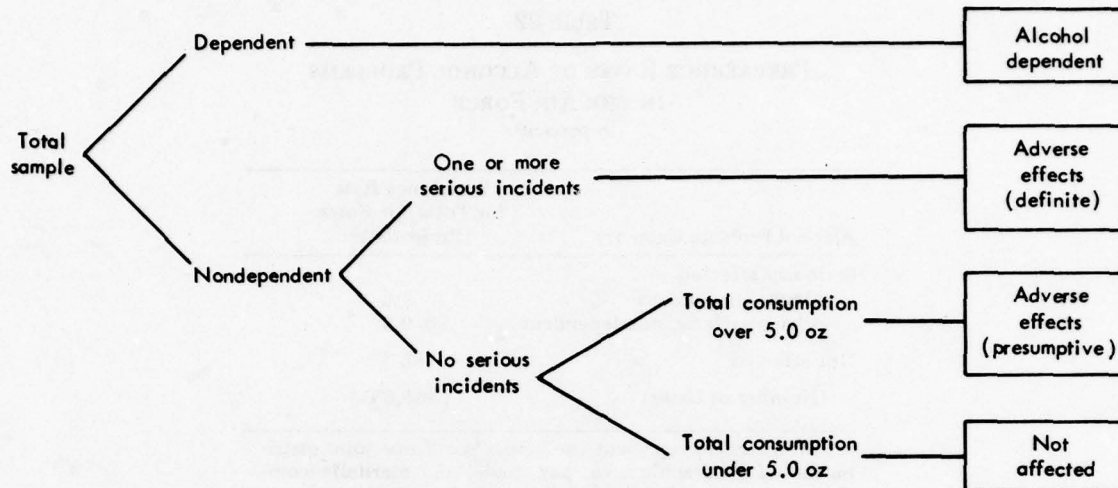


Fig. 2—Criteria for dependence and adverse effects of alcohol

Among the nondependent, two further criteria determine those who are nondependent but suffering "adverse effects." The first criterion is the number of serious alcohol incidents reported in the past year; anyone reporting one or more such incidents is classified as having an adverse effect. Among those without such incidents, a further check is made to determine total alcohol consumption; those with consumption levels over 5.0 ounces of ethanol per day are designated as having an adverse effect, on the presumption that such high levels produce physical damage. The remaining group—those without dependence, serious alcohol incidents, or alcohol consumption over 5.0 ounces—are termed "not affected" by alcohol.

Establishing Prevalence Rates

These definitions provide the methodology necessary for estimating the prevalence rates for alcohol problems in the Air Force. These rates are shown in Table 22. When sample data are projected to the total Air Force, 4.6 percent of the Air Force may be termed dependent on alcohol. An additional 9.3 percent have been adversely affected by alcohol in the past year, but are not dependent. Altogether, then, 13.9 percent of the force are seriously affected. This leaves 86.1 percent not seriously affected by alcohol problems, based on experiences in the past year.⁷

The simplicity of these three categories obviously conceals a substantial amount of complexity shown in earlier tables. In particular, those classified as having "adverse effects" of alcohol are not a unitary type. Some persons are placed there by virtue of very heavy alcohol consumption; others by virtue of health problems due to alcohol; and still others by work problems, family difficulties, or

⁷ These rates are based on weights used to project the 13-base sample to the total Air Force population. Details of the weighting procedure, which was instituted to compensate for the deliberate oversampling of overseas areas, may be found in App. F.

Table 22
PREVALENCE RATES OF ALCOHOL PROBLEMS
IN THE AIR FORCE
(In percent)

Alcohol Problem Category	Prevalence Rate for Total Air Force (Projected) ^a
Seriously affected	
Alcohol dependent	4.6
Adverse effects, nondependent	9.3
Not affected	86.1
(Number of Cases)	(565,684)

^aWeighted to represent the actual Air Force joint distribution of geographic area, pay grade, and marital/accompaniment status. (See App. F for weighting procedure.)

The 99 percent confidence interval estimates for the percentages for the two problem groups are 4.6 ± 0.8 , and 9.3 ± 1.1 .

alcohol-related incidents involving police, accidents, and social disruption. Most of these people do not have a large cluster of serious alcohol problems, nor do they have a level of chronicity suggesting a complete involvement with alcohol, as is so common among clinical alcoholics. What they have in common is that they have done something during the past year that constitutes serious trouble for themselves, usually something that results in costs for the Air Force.

In contrast, the people labeled as "alcohol dependent" suffer from an identifiable, tightly integrated syndrome that in the aggregate amounts to a serious impairment of normal functioning. All of them report frequent appearance of gross tremors, morning drinking, inability to control drinking, or alcoholic blackouts; in almost all cases, they suffer from more than one such symptom. This syndrome suggests a fundamental alteration of physical functioning, to the point where ingestion of substantial amounts of alcohol has become an essential activity in their lives. The existence of this dependence also implies that cessation of heavy drinking will not be easy and that the condition is likely to be chronic. In these essential respects—the physical alteration and the chronicity of the condition—the alcohol-dependent group constitutes a category with much more serious problems than those prevalent among the adverse effects group.

Characteristics of the Problem Categories

The three basic categories shown in Table 22 are obviously a simplification of a more complex set of groups formed by our criteria of dependence, serious incidents, and alcohol consumption. Table 23 shows the interrelations of these criteria and the way in which they cross-cut each other to form the alcohol problem categories. The cells of the table are the eight groups formed by the cross-classification of the three binary criteria; each cell contains the percent of the Air Force falling in that cell according to our projection from the sample. (The unweighted sample

Table 23

INTERRELATIONS OF ALCOHOL PROBLEMS
(Percent of total Air Force)^a

Total Alcohol Consumption (ounces per day)	Number of Serious Incidents	Dependence Status	
		Nondependent	Dependent
Consumption 0.0-5.0	No serious incidents	86.1 (85.2)	0.9 (1.0)
	1 or more serious incidents	7.7 (8.0)	2.1 (2.2)
Consumption over 5.0	No serious incidents	1.0 (1.2)	0.5 (0.5)
	1 or more serious incidents	0.6 (0.7)	1.1 (1.2)

^aBase Sample N = 3148. Upper entry is percent of total Air Force, weighted to adjust for the sample's deliberate overrepresentation of Pacific areas. (See App. F for weighting procedure.)

Lower entry (in parentheses) is the raw sample (unweighted) percent.

percents are shown in parentheses; the projection is only slightly different from the raw sample results.)

In the right column are people classified as alcohol dependent. Among the total of 4.6 percent of the Air Force who are dependent, four-fifths have also experienced serious adverse effects of alcohol in the past year. (That is, 3.7 percent of the total population have either a serious alcohol incident or consumption over 5.0 ounces per day.) In other words, the great majority of alcohol-dependent people experience significant damage and disruption in their lives because of alcohol.

In the left-hand column of Table 23 are those without definite indications of alcohol dependence. Among these, the lower three cells include those who, even though not dependent, have some sort of adverse effect of alcohol—either a serious incident or high consumption. Among these three cells, constituting in total 9.3 percent of the Air Force, the great majority fall there because of serious alcohol incidents rather than high consumption. Most of the problems traceable to alcohol are manifested through gross incidents of troublesome behavior rather than through steady heavy consumption. Such problems may be principally the result of instances of acute intoxication, although the data cannot be used to test this point definitively. The frequency of heavy consumption is also remarkable for its difference between the dependent and nondependent groups; among dependents, 35 percent show heavy consumption, but among the adverse-effects group, only 17 percent do so.

As expected, there is a very large overlap between alcohol dependence and adverse effects. This overlap can be seen numerically in Table 23 and visually in Fig. 3, which can now be filled in to show the percentage of the Air Force falling

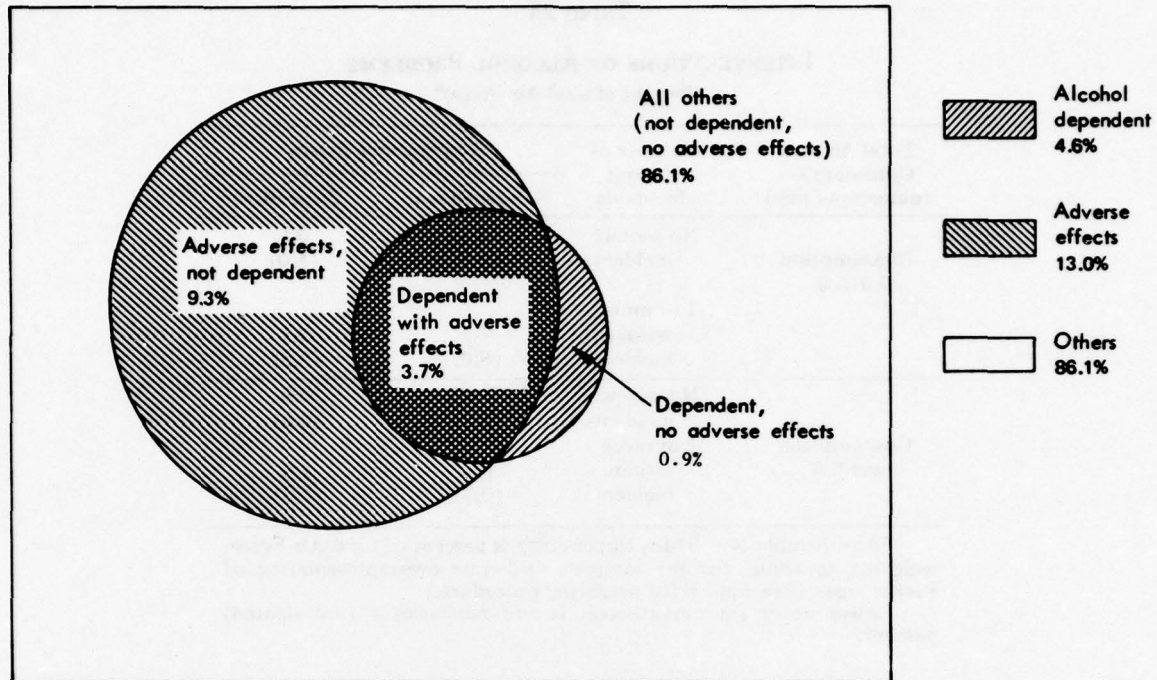


Fig. 3—Empirical relationship between alcohol dependence and adverse effects of alcohol

in the various shaded areas. Clearly, the condition of dependence implies a very high risk of adverse effects. However, many people experience adverse effects without dependence, as shown by the substantial amount of the large circle not overlapping with the small circle. This reinforces once again the impression we have received of alcohol dependence as a *syndrome* of problems. It is not necessary to include either heavy drinking or adverse effects of drinking as definitional components of alcohol dependence; among people with dependence symptoms, heavy drinking and adverse effects appear to be nearly universal concomitants because of the chronic excessive drinking patterns implied by dependence.

The stark differences in alcohol-related behavior among these three categories are exhibited by the data in Table 24. To be sure, some of these differences are partly constrained by the definitions of the categories. For example, by definition all of those "not affected" must have a zero rate of arrests, accidents, and spouse problems. Nevertheless, there is no definitional reason for the two problem categories to differ so strongly on such measures. For example, drinking-related arrests are more than twice as frequent among dependent people as among those adversely affected; alcohol-related accidents are almost three times as frequent. Similarly, dependent people drink eight times as much alcohol as the normal group and two-thirds more than those adversely affected. The *average* amount of alcohol consumption for the dependent group is almost enough (4.8 ounces) to warrant a strong presumption of liver damage.

Two other points may be observed in Table 24. First, as one changes from normal to alcohol dependent, the frequency of heavy drinking (days when eight or more drinks are consumed) rises dramatically, from an average of 0.6 days per year among those not affected by alcohol to an average of almost 100 days per year among those dependent on alcohol. Consuming eight drinks implies the attainment of a substantial blood alcohol concentration; a 160-pound male drinking over a four-hour period, for example, would attain a BAC around .12, in excess of the legal level of intoxication for driving offenses in most states. Both the alcohol-dependent group and the adverse-effects group are exposed to these risks at vastly higher frequencies than are other drinkers.

The line reporting "days lost from work" shows just as dramatically the damage done to the individual's job performance, and to Air Force productivity, by alcohol problems. Those with adverse effects report more than 18 times as much time lost per capita as people not affected, and the alcohol-dependent group reports more than 27 times as much. Even among those not seriously affected by alcohol, the aggregate effect of lost time is still substantial because of the large number of cases. Nonetheless, the large differences among the categories underline the extent to which alcohol interferes with the productive lives of the problem groups.

Even the high rate of work impairment shown by alcohol dependents in the Air Force is not especially high by comparison with certain civilian groups impaired by alcohol. Civilian studies of alcoholics brought into clinical treatment suggest that perhaps 50 percent are unemployed and that among those who hold jobs absenteeism is frequent (Armor, Polich, and Stambul, 1978). That alcohol-dependent people in the Air Force show only about four days off work per person per year

Table 24

DRINKING CHARACTERISTICS OF PROBLEM CATEGORIES

Characteristic	Problem Category		
	Not Affected	Adverse Effects, Nondependent	Dependent
Alcohol consumption (ounces of ethanol, mean)	0.6	2.9	4.8
Heavy drinking days (number of days 8 or more drinks, median)	0.6	30.3	99.0
Being "drunk" at least once per month (percent)	11.0	48.1	87.7
Days lost from work for drinking (mean)	0.15	2.72	4.16
Arrested for drinking (percent)	0.0	12.6	27.1
Involved in accident because of drinking (percent)	0.0	11.0	31.0
Spouse left or threatened leaving because of drinking (percent)	0.0	5.5	12.3
(Number of Cases)	(2683)	(310)	(155)

probably indicates that they do not yet have problems as severe as clinical alcoholics. This is also suggested by the level of consumption reported by the alcohol-dependent group; although 4.8 ounces per day is very high, it is actually close to the lower end of the consumption spectrum typically found in civilian alcoholism treatment facilities (Schmidt and de Lint, 1970). Whatever their problems, Air Force personnel are still employed, with all of the stabilizing influences that employment entails. Moreover, many Air Force personnel who exhibit alcoholic behavior over many years eventually leave the force, so the cases at the highest end of the drinking continuum may be selected out.

Definitional Changes and the Variability of Prevalence Rates

A final point that may be made about these categories concerns the degree to which the prevalence rates may vary if changes are made in the cutting points used in the definitions. On all three criteria used for definitions, certain semi-arbitrary boundaries had to be established. For consumption, the limit was set at 5 ounces of ethanol per day. For dependence, a score of 48 or more was used, corresponding roughly to one symptom per week. For alcohol incidents, even one serious incident was accepted, but warning incidents were not accepted as adverse effects. What would happen if these arbitrary boundaries were moved up or down? What if only 4 ounces per day were used to indicate liver damage, or if two or more alcohol incidents were required to constitute an adverse effect of alcohol?

The answers to such questions constitute a sensitivity analysis of the definitions, as shown in Table 25. The table exhibits the rates of alcohol problems under the existing definition, and then shows what those rates would be if specific criteria were strengthened or relaxed. For example, dependence could be defined more liberally, to include anyone with a symptom-score of 24 or higher, rather than 48 or higher. This would increase the dependence rate from 4.6 percent to 7.1 percent. However, many of those newly included "dependents" would have suffered adverse effects; in fact, such people constitute 0.9 percent of the force, so the size of the "adverse effects, nondependent" group would drop to 8.4 percent. The overall result would be a new problem rate of 15.5 percent, slightly above the existing estimate of 13.9 percent.⁶

The data in Table 25 show that, by and large, the rate of alcohol problems is not terribly sensitive to such definitional changes. The largest effect would be found if one were to restrict the category of definite adverse effects to those with *two or more* serious incidents in the past year. (The criterion for alcohol consumption would remain at 5.0 ounces.) This would be tantamount to insisting upon chronic problem behavior in order to diagnose a serious problem, because the individual would have to experience multiple incidents or chronic heavy consumption to be placed in the problem category. Tightening the definition would cause the overall problem rate to drop from 13.9 percent to 8.2 percent. In the other direction, the largest increase in the rates shown in Table 25 would be found if adverse effects were expanded to include not only a single serious alcohol incident but also the

⁶ The rates in this table are taken from the detailed cross-classification of alcohol consumption, incidents, and dependence symptoms shown in App. E. Using that detailed classification, one may examine other adjustments in one or more of the criteria we have used, either singly or simultaneously.

Table 25

SENSITIVITY OF PROBLEM RATES TO DEFINITIONAL CHANGES

Definitional Change	Resulting Problem Rate (percent of Air Force)		
	Alcohol Dependent	Adverse Effects, Nondependent	Total Problem Rate
Existing definition	4.6	9.3	13.9
Define dependence as score of 24 or more on symptom scale	7.1	8.4	15.5
Define dependence as score of 78 or more on symptom scale	4.1	9.8	13.9
Define definite adverse effects as 2 or more serious incidents	4.6	3.6	8.2
Define definite adverse effects as 2 or more warn- ing incidents or any one serious incident	4.6	13.0	17.6
Define presumptive adverse effect (damaging consump- tion) as consumption of 4.0 ounces per day	4.6	10.2	14.8
Define presumptive adverse effect (damaging consump- tion) as consumption of 3.0 ounces per day	4.6	11.5	16.1

occurrence of two or more warning incidents in the past year. This would change the overall problem rate from 13.9 to 17.6 percent.

In general, the problem rates we have established for the Air Force are not specific point values. Like other estimates, they will vary depending on the stringency of criteria imposed. Our judgment is that the rate of 13.9 percent corresponds to criteria that are reasonable and consistent with experience in this field. However, other limits could easily be imposed and defended. For these limits, the rates would fall somewhere between about 8 and 18 percent, with most estimates clustering within 1 or 2 points of our own.

V. VALIDITY OF ALCOHOL PROBLEM MEASURES

The prevalence rates for alcohol dependence and adverse effects as shown by the survey results reported in Chapter IV could stand alone. However, such data take on added significance when they can be compared with other data. In this chapter we present three types of such comparisons:

1. Self-reports of alcohol-related arrests with official police records,
2. Self-reports of alcohol-related job problems with supervisor reports, and
3. Self-reports of alcohol consumption with alcoholic beverage sales records.

These comparisons focus on the issue of survey validity. That is, to what extent can we have confidence in descriptions of drinking behavior and of adverse effects resulting from such behavior when the data consist of survey self-reports? There is legitimate concern about the accuracy of results derived from such data. Moreover, the possibility that Air Force personnel may understate their alcohol-related problems seems, intuitively, to be at least as great as in other populations. Despite regulations to the contrary, a sizable minority of the Air Force population believes that serious damage may be done to the careers of those whose misuse of alcohol becomes publicly known.¹ Unfortunately, good validity data in alcohol research are generally absent. The need for such information and the possibility of underreporting of drinking problems in the present study led us to collect supplemental, nonself-report data. These data were used to assess the accuracy of the self-reported drinking behaviors and adverse effects.

The validity analyses of the self-reports obtained by our surveys may be divided into two conceptual areas: the obtained rates of adverse effects due to drinking and the reported level of consumption of alcoholic beverages. Under ideal conditions, it would have been helpful to collect validity data for consumption and for each of the symptoms and adverse effects defined in our study. However, constraints on time and on the availability of reliable supplemental data bases made this impractical. Rather, we chose to concentrate on those behaviors with the greatest potential impact on the Air Force and on the evaluation of Air Force programs. Among this subset, we selected behaviors for which there are reliable external measures (where possible, official records). These considerations limited our validity analyses to arrests for Driving While Intoxicated (DWI), arrests for nondriving alcohol-related incidents, lower objective job performance (as reflected by a lower performance evaluation), perceived work impairment (based on duty time lost because of drinking), and the level of consumption of alcoholic beverages.

From the perspective of the Air Force, alcohol-related behaviors requiring police intervention or involving poor job performance are among the most important consequences of the misuse of alcohol. For example, although the breakup of a marriage because of drinking is certainly a serious event, the possibility of injury or death to oneself or to others resulting from driving an automobile while intoxicated makes the latter behavior seem more serious. Furthermore, in designing

¹ This finding was obtained from our survey (q. 27).

assessments of the effectiveness of prevention and treatment programs intended to combat alcohol problems, it is of great importance to determine the level of confidence that may be placed in self-reported consumption levels. The discussion of the validity of self-reports that follows will focus first on alcohol-related arrests, next on alcohol-related job problems, and, finally, on alcohol consumption itself.

SELF-REPORTS OF ALCOHOL-RELATED ARRESTS

During the site visits of the Rand research team to each of the 13 bases, detailed information concerning alcohol-related arrests made in 1976 and 1977 (up to the time of the site visit) was obtained from the base Security Police. The information was compiled for us from official Air Force records (forms 1569 and 1408), and consisted of monthly totals of Security Police arrests of Air Force personnel for DWI and nondriving alcohol-related offenses (e.g., public intoxication), and parallel figures for DWI arrests made by civilian police.² The chief of the base Security Police was also interviewed at length to ascertain local enforcement procedures and the level of cooperation and information-exchange between the civilian and Air Force police. These interviews suggested that the records of Security Police apprehensions were essentially complete. The rates of these arrests for DWI and for nondriving alcohol-related incidents are presented for each of the 13 bases in Table 26. The rates indicated are the number of apprehensions per hundred population during the 12 months before the site visit. The figures in Table 26 suggest a reasonably uniform rate of arrests for each offense across the 13 bases. Moreover, information obtained in the interviews suggests that some of the fluctuation in rates that is present may be due to differences in enforcement policies at the bases. A comparison of the mean apprehension rates for the two offenses (over all bases) shows that the numbers of arrests made by base Security Police for DWI and nondriving alcohol-related incidents are similar.

The mean rates of driving and nondriving alcohol-related arrests for the 13-base sample, when augmented to include arrests made by civilian police, are presented in the last panel of Table 26. The records of DWI arrests made by civilian police appear to be generally complete. Some police commanders did express concern about their ability to acquire DWI information when the apprehension was made at a considerable distance from the base. However, the number of such unrecorded arrests was believed to be small compared with the number of recorded arrests. We conclude that the true rate may be somewhat higher than indicated but certainly of the same order of magnitude.

Obtaining information about nondriving arrests made by civilian police proved more difficult. Detailed information concerning arrests for nondriving alcohol-related incidents was provided by only one of the 13 installations. It indicated equivalent rates of infractions occurring on and off base; therefore, our estimated figure for all nondriving arrests in Table 26 is twice the number of Security Police arrests. Admittedly, this is a crude estimation procedure, but the relative numbers of on- and off-base DWI arrests suggest that the figure is approximately correct.

² DWI arrests required a BAC of .1 or higher. The alcohol-relatedness of nondriving arrests is a judgment on the part of the arresting officer.

Table 26

ALCOHOL-RELATED POLICE INCIDENTS BY BASE

Base	Rate of Incidents per Hundred Personnel ^a	
	DWI Incidents	Nondriving Incidents
March	0.5	0.4
Seymour Johnson	0.6	(b)
Scott	0.7	0.4
Wright-Patterson	0.8	(b)
Sheppard	0.4	0.6
Mather	0.5	0.4
Nellis	0.7	0.4
Minot	1.5	2.0
Little Rock	0.4	1.4
Hahn	0.4	1.8
Bentwaters	0.3	1.2
Clark	1.4	2.1
Osan	0.2	1.5
Rate, all bases	0.7	1.1
Rate, all bases, including inci- dents observed by civilian police	1.1	2.2

^aApprehensions made by Security Police in one-year period before survey.

^bNot available.

Table 27 compares these estimates of DWI and nondriving arrest rates with the rates obtained from the self-reports of our respondents at the same 13 bases. Each subject was asked whether he had been "arrested for drinking and driving" and whether he had been arrested for "drinking not related to driving." For each of the two types of incidents, the respondent indicated whether he had been arrested three or more times in the past year, twice in the past year, once in the past year, more than a year ago, or never. A response of "three or more times in the past year" was coded as three arrests, "twice" as two, and "once" as one arrest in the past year. The numbers of arrests were then added together and divided by the number of respondents to the 13-base survey, yielding the rate of arrests for the given offense.

The results presented in Table 27 provide no evidence of underreporting of alcohol-related arrests by our survey respondents. If anything, the estimated rates of DWI and nondriving alcohol-related arrests obtained from survey self-reports appear to be somewhat more complete than those obtained from the official records of base Security Police.

SELF-REPORTS OF ALCOHOL-RELATED JOB PROBLEMS

In addition to alcohol-related behaviors requiring police intervention, poor job performance constitutes a serious manifestation of alcohol problems. The negative

Table 27
**SELF-REPORT AND OFFICIAL RECORD ESTIMATES
 OF ALCOHOL-RELATED POLICE INCIDENTS**

Type of Incident	Estimated Incident Rate per Hundred Personnel	
	Self-Report (Survey)	Official Records ^a (Security Police)
DWI	2.6	1.1
Nondriving	2.3	2.2

^aAlcohol-related incidents during year before survey (both on-base and off-base incidents known to Security Police).

effect of poor performance applies not only to potential damage to the individual's career, but also to increased job-related costs incurred by the Air Force. The accurate assessment of such costs constitutes a central component in policy research. Although it was not possible to collect official records concerning alcohol-related poor job performance, we were able to obtain relevant information from the supervisors responding to our survey instrument. Roughly speaking, the information obtained from supervisors constitutes collateral data bearing on the validity of self-reported job problems.

Table 28 presents estimated rates of alcohol-related job problems among Air Force personnel. The numbers in the left column were obtained from survey self-reports. The numbers in the right column were obtained from supervisors' reports concerning the performance of their subordinates. In the top row of Table 28, the self-reported rate of receiving a lower score on an efficiency report or performance rating because of drinking is compared with the rate of giving a lower performance rating because of alcohol problems reported by supervisors. The self-report and supervisor report data yield almost identical rates of 2.2 and 2.1 individuals per hundred personnel during the past year. In the second row of Table 28, the number of individuals (per hundred personnel) reporting that their drinking caused them to lose three or more days of work in the past year (work impairment) is compared with the number of individuals (per hundred subordinates) having a "drinking problem that affected their work" during the past year, according to supervisors' reports. Again, the rates obtained from self-reports and supervisor reports are in close agreement.

The measures of work impairment in the second row of Table 28 are somewhat less objective than reports of receiving or giving lower performance ratings. Moreover, supervisor reports are, in general, more judgmental than official police records, so that the supervisors' reports presented in Table 28 are not as "hard" as the official police records presented in Table 27. Nonetheless, both sets of data strongly suggest the same conclusion: There is no evidence that the occurrence of adverse effects was underreported by our survey respondents.

Table 28

**SELF-REPORT AND SUPERVISOR ESTIMATES OF
ALCOHOL-RELATED JOB PROBLEMS**

Job Problem Measure	Estimated Rate of Job Problems per Hundred Personnel	
	Self-Report	Supervisor Report
Lower OER/APR ^a	2.2	2.1
Work impairment ^b	4.5	5.1

^aSelf-reports of receiving lower OER or APR (rating of job performance) compared with supervisors' reports of giving such ratings (because of alcohol problems that affected work performance).

^bSelf-reports of loss of 3 or more working days because of drinking, compared with supervisors' estimates of number of individuals with a drinking problem that affected their work.

SELF-REPORTS OF ALCOHOL CONSUMPTION

There is little doubt that information concerning the level of consumption of alcoholic beverages is an important component in the evaluation of education and treatment programs designed to deter damaging alcohol-related behaviors. Such information is vital not only with respect to assessing behavior changes among those entered into these programs, but also in regard to ascertaining the proportion of the population for which intervention may be advisable (those who have experienced alcohol-related problems or who are at high risk of experiencing them). Therefore, it is important for us to know the level of confidence that may be placed in self-reported consumption levels.

There is a widespread belief in the field of alcohol research that true consumption is substantially higher than self-reported levels. Studies comparing self-report with beverage sales data often find that consumption estimates based on self-reports account for only 40 to 60 percent of beverage sales (Pernanen, 1974). Yet there are at least three reasons other than underreporting that could account for this discrepancy. First, studies using household sampling techniques are likely to seriously underrepresent very heavy drinkers. Although such people do not constitute a substantial portion of the civilian population, their effect on *mean* consumption estimates is probably considerable. Second, indices of consumption that assess an individual's typical drinking behavior fail to account for *atypical* days on which he may consume larger amounts of alcohol. Ignoring such atypical days, even if they are fairly infrequent, can contribute materially to underestimating the individual's total consumption of alcoholic beverages. Third, comparisons involving subgroups of the population (e.g., males or females) need to account for the portion of the group's beverage purchases that are consumed by other people. For example, if we wish to estimate consumption among married men, it is not tenable to *assume* that the portion of husbands' purchases that is consumed by wives is equal to the portion of wives' purchases that is consumed by husbands. In this case the proper comparison between sales and self-report estimates must adjust the amount of beverage sales made to the individual for the portion of these purchases that are

consumed by the spouse. In a parallel fashion, self-reported consumption must be adjusted for the portion of the individual's consumption that results from beverages purchased by the spouse.

It is unlikely that our sample of the Air Force population seriously underrepresented very heavy drinkers. There are two reasons for this conclusion. First, heavy drinkers who experience substantial impairment of their daily functioning are likely to leave the Air Force. Second, our 13-base survey had a response rate of 89 percent (with a substantial portion of nonrespondents having valid duty excuses for not attending the survey sessions). Therefore, in comparing beverage sales and self-reported consumption, we did not attempt to measure the extent of such underrepresentation and its possible effect on the comparison. However, as discussed earlier, our consumption measure did assess atypical as well as typical drinking behavior. Moreover, a correction was made for the portion of an individual's beverage purchases that is likely to be consumed by others. We made this last correction because the Air Force population is over 90 percent male and the majority are married; therefore, it is likely that a substantial portion of base beverage sales made to active-duty personnel are consumed by the spouses of these purchasers.

The logic of our comparison of base beverage sales with self-reported consumption of alcoholic beverages is presented in Fig. 4. The quantity being estimated is the portion of mean daily ethanol consumption per active-duty military person that is attributable to alcoholic beverages purchased on base by Air Force personnel. As shown in Fig. 4, base beverage sales figures and survey self-report data can each be used to estimate this quantity. A detailed discussion of the comparison is presented in App. G.

It was not possible to include all of the 13 bases in the comparison of beverage sale and self-report estimates of alcohol consumption. Four base visits were required to develop reliable procedures. Furthermore, information obtained during

Quantity estimated (E): Mean daily ethanol consumption per military person attributable to alcoholic beverages purchased on base by active-duty personnel.

Sales estimate:

$$E = \left(\begin{array}{c} \text{Ounces of ethanol} \\ \text{sold on base per} \\ \text{day per military} \\ \text{person} \end{array} \right) \left[1 - \left(\begin{array}{c} \text{Proportion of ethanol} \\ \text{sold to Air Force} \\ \text{personnel accompanied} \\ \text{by spouses} \end{array} \right) \left(\begin{array}{c} \text{Proportion of} \\ \text{couples' ethanol} \\ \text{consumption} \\ \text{accounted for} \\ \text{by spouses} \end{array} \right) \right]$$

Survey estimate:

$$E = \left(\begin{array}{c} \text{Ounces of ethanol} \\ \text{consumed per day} \\ \text{per military person} \end{array} \right) \left(\begin{array}{c} \text{Proportion of ethanol} \\ \text{consumed by Air Force} \\ \text{personnel that is} \\ \text{purchased by Air Force} \\ \text{personnel} \end{array} \right) \left(\begin{array}{c} \text{Proportion of} \\ \text{ethanol purchased} \\ \text{by Air Force per-} \\ \text{sonnel that is} \\ \text{purchased on base} \end{array} \right)$$

Fig. 4—Conceptual diagram of beverage sales—consumption comparison

interviews with club managers and other representatives at two of the nine remaining bases suggested that the amount of active-duty purchases intended for consumption by people not in the Air Force could not be reliably estimated. Thus, in the end, the complete data collection procedure and analysis were performed for seven of the 13 installations.³ For each of these seven bases, two estimates of the per capita consumption of alcohol were computed (in terms of ounces of ethanol per day). The first estimate was derived from the beverage sales data and the second from the self-reports of our survey respondents at the given base. These estimates for the seven bases are presented in Table 29.

The data shown in Table 29 are separated according to whether they pertain to the base beverage sales or survey self-report consumption estimates. The first column of data pertaining to the base beverage sales estimate shows the mean ounces of ethanol sold daily per military person. In the second column, these figures have been reduced by the portion of such sales that is estimated to be consumed by the purchasers' spouses. This adjustment results in only a modest decrease, amounting to approximately 10 percent of the on-base sales made to active-duty personnel.

Turning to the data pertaining to the self-report consumption estimate, we find the total daily volume consumed per active-duty person listed in the first column. The mean of the total consumption figures (1.008) makes it clear that the seven bases included in the comparison do not differ in consumption from the six bases excluded (the mean consumption figure for the 13 bases is 1.021). In the next column, the consumption figures have been adjusted to reflect only the portion of ethanol consumed that was purchased by military personnel. Comparison of the

Table 29

BEVERAGE SALES AND SELF-REPORTED CONSUMPTION DATA^a

Base	Base Sales Records		Survey Self-Report		
	Sales to Air Force Personnel	Sales to Air Force Personnel for Personal Consumption	Total Consumption	Consumption of Beverages Purchased by Air Force Personnel	Consumption of Beverages Purchased by Air Force Personnel on Base
Bentwaters	1.35	1.24	1.21	1.12	.89
Hahn	1.15	1.06	1.53	1.37	.85
Little Rock	.58	.51	.86	.78	.53
Mather	.62	.53	.68	.60	.32
Minot	.42	.35	.76	.69	.41
Nellis	.46	.42	.96	.86	.23
Sheppard	.62	.60	1.05	.96	.69
Mean, 7 Bases ^b	.743	.670	1.008	.911	.559

Ratio, Self-Report/Sales = .559/.670 = .834.

^aMean daily ounces of ethanol per active-duty military person.

^bAll computations were done using three significant digits but are presented above with only two decimal places for simplicity.

³ Self-reported consumption at these seven bases was nearly identical to that at the six other bases.

mean consumption figure in this column with that in the preceding column makes it apparent that Air Force personnel purchase the vast majority of ethanol they consume. Finally, in the third column, the consumption figures have been further adjusted to reflect only the portion of ethanol consumed that was purchased by military personnel from on-base beverage outlets. A comparison of the mean in this column with the preceding one shows that this adjustment is substantial, indicating that more than one-third of our survey respondents made their last purchase of an alcoholic beverage off base.

As discussed earlier (see Fig. 4), the mean for sales made to Air Force personnel and that for self-reported consumption constitute two estimates of the same quantity: mean daily ethanol consumption per military person attributable to alcoholic beverages purchased on base by active-duty personnel. By computing the ratio of these estimates, we see that self-reported consumption captured about 83 percent of "true" consumption (beverage sales). The 17 percent rate of underreporting the consumption of alcoholic beverages suggested by the data in Table 29 is considerably smaller than corresponding estimates in the U.S. population. We attribute this to the completeness of our sampling frame, response rate, and measurement of total volume.⁴ Nevertheless, there does appear to be some degree of underreporting. Therefore, we conducted a sensitivity analysis to determine the potential effect of underreporting consumption on the obtained alcohol problem rate.

The results of this analysis are shown in Table 30. The data indicate that if the self-reported consumption level of each individual were inflated by 10 percent (e.g., from 1 to 1.1 ounces of ethanol per day), the problem rate would increase from 13.9 percent to 14.4 percent. If the self-reported level were inflated by 20 percent, the problem rate would increase to 14.7 percent, and so forth.⁵ In sum, the beverage sales estimate of true consumption presented in Table 29 suggests that self-reported levels of alcohol consumption may need to be adjusted upward by as much as 20 percent (1/.834) to capture true consumption. However, Table 30 shows that such an adjustment would make only a trivial difference in the problem rate.

The possibility of underreporting alcohol-related behavior in our 13-base survey sample has been investigated in three domains. First, official police records of DWI and nondriving arrests were compared with self-reported rates for the same incidents. Second, supervisors' reports of giving lower performance ratings and

⁴ According to Room (1971), data from the Cahalan consumption questions "might be expected to cover at least two-thirds of the sales statistics consumption." Our special Air Force-wide survey (Form B) included both Cahalan questions and those used in the computation of our total alcohol volume index (see App. D). These data suggest that mean consumption according to our measure is about 17 percent greater than mean consumption according to the Cahalan measure. Thus, the difference between our coverage rate (83 percent) and Room's estimate (67 percent) seems to be due primarily to the greater coverage yielded by our total volume index.

⁵ This adjustment assumes a constant proportion of underreporting for all individuals. That is, the value of true consumption (t) is estimated by the linear model $t = cs$, where s is self-reported consumption and c is the constant inflation factor necessary to make mean self-reported consumption match mean true consumption ($c = 1.1, 1.2, \text{ or } 1.3$ as shown in Table 30). Alternatively, the amount of underreporting may be assumed to increase exponentially as consumption increases. For this model the value of true consumption would be estimated as

$$t = s + (e^{as} - 1),$$

where a is a constant chosen such that the mean of t is equal to c times the mean of s . This second model would result in slightly larger adjustments to the problem rate than those yielded by the linear model. The greatest discrepancy between the two models, that resulting from assuming $c = 1.3$, would increase the problem rate by an additional 0.3 percentage points over the adjustment resulting from the linear model.

Table 30

**SENSITIVITY ANALYSIS FOR
ADJUSTMENTS IN CONSUMPTION**
(In percent)

Adjustment to Consumption ^a	Resulting Problem Rate
+10	14.4
+20	14.7
+30	14.8

^aHypothetical percent increase in self-reported consumption level.

observing work impairment were compared with subordinates' self-reported rates for the same phenomena. Third, alcoholic beverage sales records were compared with survey self-reports of ethanol consumption.

The first two comparisons, those involving police records and supervisor reports, provide little evidence that adverse effects were underreported by our respondents. Although the third comparison does suggest that self-reported consumption might have to be inflated by up to 20 percent to reach the true level, sensitivity analysis shows that even a full 20 percent inflation would cause only a trivial increase in the problem rate. These validity analyses, then, indicate that the survey data are substantially accurate and that our estimates of alcohol problem prevalence are affected very little by whatever response biases may reasonably be assumed to be present.

VI. ENVIRONMENTAL AND BEHAVIORAL FACTORS IN ALCOHOL PROBLEMS

THE NATURE OF FACTORS AFFECTING ALCOHOL PROBLEMS

The determination of reliable prevalence rates is an important enterprise, but it does not by itself provide a complete picture of the scope and distribution of alcohol problems. As soon as a prevalence estimate is established, new questions naturally arise. What groups are most susceptible to the problems? Where are the problems most frequently experienced, in terms of both geographical location and social characteristics? Are significant environmental factors associated with alcohol problems? Perhaps most important, what alcohol-related behaviors presage the development of future serious problems? These questions may be approached through an analysis of the types of factors associated with alcohol problems.

We distinguish two analytic types of factors affecting alcohol problems. First, there are *environmental and background factors*, meaning such variables as demographic characteristics, location, and living in military rather than civilian environments. These variables are presumably of some causal significance as they are frequently found to be correlated with alcohol problems. For example, unmarried males almost invariably exhibit higher rates of alcoholism, dependence, and adverse effects. We shall attempt to disentangle the effects of the numerous factors of this type that appear to predispose an individual to alcohol problems. Such factors help to establish prognosis and therefore can aid those engaged in identification and treatment.

Second, we shall examine *behavioral factors*, characteristics of the individual's typical functioning that seem to predispose him to alcohol problems. Such factors include pattern of alcohol consumption, frequency of intoxication, motivations that precipitate drinking, and similar variables. These kinds of factors can serve practical purposes similar to those listed above—indicating the likelihood that a given person may develop a more serious problem in the future. In addition, these behavioral factors may provide clues about the sequence of events that result in serious adverse effects or alcohol dependence. If so, analysis of such factors can be a guide for developing better understanding of the process by which alcohol problems develop.

ENVIRONMENTAL AND BACKGROUND FACTORS

Numerous studies of various populations have established that certain types of people are more likely than others to develop problems with alcohol. To some extent the problems may be socially determined; e.g., people in a "dry" region of the country may be more subject to being "caught" with a drinking problem than people in a "wet" region because of varying social expectations in the different regions. Certain drinking patterns in a dry region may evoke disapproval or even legal sanctions, whereas the very same behavior would cause no notice in a wet

region (Cahalan and Room, 1974). Similarly, people of lower rank or fewer resources may be disproportionately subject to sanctions that we have used as indicators of a "problem" (e.g., arrest or adverse evaluation by a supervisor). Despite these social influences on the definition of alcohol problems, research evidence from other studies suggests that different demographic groups engage in quite different patterns of alcohol-related behavior independently of the evaluation that others place on the behavior.

Demographic and Social Factors

All of the background characteristics commonly found to be relevant in social surveys—age, sex, and social status—are also important in the analysis of drinking behavior. Table 31 shows the percent distribution of our alcohol problem categories for these factors in the Air Force. Each of these factors distinguishes groups with substantially different risk levels. For example, younger Air Force members (age 24 or less) have problem rates about twice as great as the oldest group, males have

Table 31
ALCOHOL PROBLEM RATES BY BACKGROUND CHARACTERISTICS

Background Characteristic	Problem Category (percent)			Total Problem Rate	(N)
	Not Affected	Adverse Effects, Nondependent	Dependent		
Age					
17-20	81	12	7	19	(517)
21-24	82	13	5	18	(889)
25-30	88	8	4	12	(785)
31-60	92	5	3	8	(938)
Sex					
Male	86	9	5	14	(2881)
Female	92	7	1	8	(231)
Marital Status					
Not currently married	80	13	7	20	(1131)
Married	90	7	3	10	(2017)
Education					
Non-high school graduate	78	16	6	22	(216)
High school graduate	84	11	5	16	(2182)
College	93	4	3	7	(749)
Pay Grade					
E1-E4	82	12	6	18	(1571)
E5-E6	87	9	4	13	(795)
E7-E9	92	6	2	8	(277)
O1-O3	95	3	2	5	(310)
O4-O6	97	2	1	3	(163)
Marital/Accompaniment Status					
Not currently married	80	13	7	20	(1131)
Married, spouse not present at duty station	80	14	6	20	(174)
Married, spouse present at duty station	90	7	3	10	(1843)

rates twice as great as females, and unmarried personnel have rates twice as great as married personnel. Amount of education is also correlated with alcohol problems. Those with some college have the lowest rate (7 percent), and high school graduates have a rate over twice as high (16 percent). Consistent with the evidence for many types of disciplinary and behavioral problems in military service (Cooper, 1977), those who have not graduated from high school have the highest rates of all (22 percent).

The precise rates shown in Table 31 should be interpreted with some caution, since several of the subgroup sizes are fairly small. Naturally, as the size of a subgroup becomes smaller, the confidence interval for the associated problem rate increases. For example, the 95 percent confidence interval for the problem rate of non-high school graduates is about ± 6 percent, compared with a confidence interval of about ± 1 percent for the total sample. However, all of the differences cited above are statistically significant at the .05 level (Chi-square test, $p < .05$) and they have important implications. The most immediate is that any analysis seeking to compare diverse groups (say, personnel overseas with those at home, or military with civilian groups) should ensure that differences in background factors are controlled for if inferences are to be sound.

The two bottom panels of Table 31 display the problem category relationships for two important military background variables that overlap with the fundamental demographic factors just noted. The results show that pay grade (military rank) and the absence of a military member's spouse are of considerable significance. The bulk of the alcohol problems, proportionate to group size, are concentrated in the lower enlisted grades. The problem rates decline from a high of 18 percent in grades E1-E4, to 13 percent in grades E5-E6, and down to much lower levels in higher grades.

The dominance of the lower grades becomes even greater when the sizes of these groups are taken into account for the purpose of counting the number of people suffering from alcohol problems. Of all those represented in the alcohol-problem group, 66 percent are in grades E1-E4; if grades E5-E6 are added, about 90 percent of alcohol-problem cases are accounted for. Junior enlisted personnel dominate the rate of the alcohol problems in the Air Force. In this respect our data are consistent with every other survey analysis of which we are aware, including surveys of other military services (Cahalan and Cisin, 1975; Cahalan et al., 1972). The primary alcohol-problem groups straddle the first-term/career line; that is, both first-termers (primarily E1-E4) and career-force members (E5 and higher) have significant problem rates. This implies that alcohol-related problems are not confined to those who come into the service and leave without reenlisting. It is also important to observe that there is an obvious and strong correlation between pay grade and the other demographic variables; the junior enlisted members are often young, unmarried, high school educated, etc. In fact, age is so strongly related to grade that the effects of the two variables are difficult to disentangle. Nonetheless, for administrative purposes it is useful to know the distribution of problems by pay grade.

The second important aspect of military status shown in this table is the effect of being *unaccompanied by one's spouse* at a duty station. The 174 sample members who reported this status (about 5.5 percent of the total) had problem rates just as high as those who were not married at all. One possible interpretation is that people

with severe alcohol problems are more likely to lose spouses—that is, to become unmarried or unaccompanied as a result of drinking. However, this pattern is usually found only in the most impaired clinical alcoholics, and we doubt that such people are present in our sample to any great extent. Rather, we conclude that people away from their spouses are apt to drink more and to get involved in trouble because of drinking. (In the Air Force, 93 percent of the unaccompanied are males away from their wives, thus compounding two significant risk factors.)

This interpretation does raise certain further questions, however. Is it perhaps the *location* where unaccompanied people are sent, rather than the actual experience of being unaccompanied, that explains this relationship? Or could it be that those without spouses are mostly the younger or more junior personnel? These questions are potentially significant for Air Force policy, because the issue of whether the government should pay for a family's move in this frequently mobile population is a perennial problem of balancing costs and benefits.

Table 32 helps to answer one of these questions. It is true that the junior enlisted personnel are more likely, if married, to be separated from their spouses than the senior enlisted or officer group. However, Table 32 shows that the effects of military grade and marital/accompaniment status are essentially independent. Whatever one's grade, being without a spouse results in substantially increased risk of experiencing alcohol problems.¹ This does not support the hypothesis that the higher problem rate for unaccompanied personnel can be attributed to higher proportions of junior personnel among them. It also documents the pervasive effect of marital and accompaniment status throughout these data. As we shall see, that effect arises frequently and may interact with other factors.

Table 32
ALCOHOL PROBLEM RATE BY PAY GRADE AND
MARITAL/ACCOMPANIMENT STATUS
(Percent affected by problems)^a

Marital/Accompaniment Status	Pay Grade			Total (all grades)
	Officers O1-O6	Enlisted E5-E9	Enlisted E1-E4	
Married, spouse present at duty station (N)	3.2 (363)	9.9 (844)	13.8 (615)	9.8
Married, spouse not present at duty station (N)	10.1 (20)	23.5 (69)	18.5 (83)	19.5
Unmarried (N)	8.4 (90)	20.6 (159)	21.5 (873)	20.3
Total	4.3	12.0	18.3	13.9

^aDependence or adverse effects.

¹ All of those considered as "married" in this table reported that they were currently married, not separated, divorced, widowed, or never married. Thus the effect of spouse's absence is not a concealed effect of marital discord or dissolution.

Geographical Location

The question of the effect of geographical location is slightly more complex because of the disproportionate sampling used in the 13-base survey. To facilitate analysis of the effects of overseas location, more personnel were sampled from overseas locations (Europe and the Pacific) than would be justified in a representative sample of Air Force personnel. For example, only about 7 percent of the Air Force is stationed in the Pacific, but about 15 percent of the sample was drawn from Pacific locations. This provides a sufficient number of cases for analysis but necessitates weighting to project to the total Air Force population.²

Table 33 shows the results when the sample is weighted and the various locations are compared. In the top panel, we show the basic alcohol problem rate for three areas—the Continental United States (CONUS), Europe, and the Pacific. The difference between CONUS and Europe is small and not statistically significant (Chi-square test, $p > .05$), but the Pacific is slightly (and statistically significantly) higher than CONUS. This does not mean, however, that all people sent to the Pacific area are necessarily exposed to greater risk of alcohol problems. The lower three panels of the table suggest that this increased risk is confined to people without spouses—both those unmarried and those not accompanied. Married, accompanied

Table 33

Type of Personnel	Location		
	Continental United States	Europe	Pacific
All personnel			
Problem rate ^a	13.3	14.9	17.2
(Proportion of AF) ^b	(.773)	(.108)	(.071)
Married, spouse present at duty station			
Problem rate	10.1	7.4	10.8
(Sample size) ^c	(1384)	(252)	(207)
(Proportion of AF)	(.477)	(.062)	(.037)
Married, spouse not present at duty station			
Problem rate	17.8	18.7	22.6
(Sample size)	(59)	(25)	(90)
(Proportion of AF)	(.020)	(.006)	(.008)
Unmarried			
Problem rate	18.7	26.1	24.9
(Sample size)	(760)	(193)	(178)
(Proportion of AF)	(.276)	(.040)	(.026)

^aPercent with dependence or adverse effects.

^bProportion of total Air Force in the cell.

^cNumber of sample cases in the cell.

² Details of the weighting procedure are explained in App. F.

persons show uniformly low rates regardless of location.³ In our view, the most notable aspect of the overall rates shown for the overseas areas and the United States is the modest size of the differences between them. Anecdotal information often suggests that groups in overseas areas are more likely to experience problems of adjustment and discipline, including alcohol problems. These data indicate that there does appear to be a slightly larger problem overseas but that this difference may be considerably smaller than many suppose.

Furthermore, the distribution of Air Force personnel stationed overseas suggests caution in acting on these findings. Any change in relocation policy designed to reduce problems by sending spouses overseas would be limited in its effect. The great majority of those overseas without a spouse are unmarried, not unaccompanied. For example, 37 percent of the Pacific forces are unmarried, while only 11 percent are married but unaccompanied. Suppose that relocation policy were altered so that 50 percent of the spouses of those currently unaccompanied would go to the area, halving the unaccompaniment rate. If the problem rates shown in Table 33 held constant, this change would reduce the overall Pacific rate of alcohol problems by 0.6 percentage points, and it would reduce the total Air Force rate by only 0.05 percentage points. The corresponding reductions for a similar change in the European forces would be even smaller, because fewer personnel would be affected and the differential rate between accompanied versus unaccompanied is less in Europe. These calculations suggest that reductions in the size of the unaccompanied group can have, at best, a very small effect on the aggregate level of alcohol problems in the Air Force.

Joint Effects of Background Factors

The comparisons presented up to this point have been controlled for only one or two variables if at all. It is therefore technically possible that some of the effects discussed above could be spurious, in the sense that one may be due to confounding with another variable. All of the effects shown may be simultaneously tested through regression analysis, the results of which are exhibited in Table 34. In this analysis, the factors previously discussed have been entered as binary (dummy) variables. Thus, sex is represented by a variable that has the value 1 if the person is male and 0 if the person is female. Education is measured at three levels (not a high school graduate, high school graduate, and college graduate), represented by two binary variables (indicating not a high school graduate and high school graduate compared with college graduate). Other factors are similarly represented exclusively by binary variables. In this model, the regression coefficients may be interpreted as the increase in the problem rate, on a scale from 0 to 1, because of the attribute the variable represents.⁴

These results confirm that the demographic background factors have independent and significant effects. Sex, education, marital/accompaniment status, and age

³ Because they are weighted, these results are already adjusted for any differences among the groups in terms of pay grade. Effectively, this means that age is also controlled for, as it is very highly associated with grade.

⁴ The military pay grade variables are not used in this analysis because they are very highly correlated with age and hence are ill-suited for this regression. The prominence of age in civilian studies and in analyses not shown here suggests that age rather than grade probably explains most of the effects associated with these two factors.

Table 34

**REGRESSION MODEL OF ALCOHOL PROBLEMS
BASED ON BACKGROUND^a**

Background Variable ^b	Regression Coefficient	T-statistic ^c
Sex (male)	.107	4.46
Non-High school graduate	.130	4.74
High School graduate	.058	3.69
Marital/accompaniment status (unaccompanied)	.081	5.85
Age (under 25)	.046	3.17
Pacific location	.053	2.97
European location	.013	0.74

^aOrdinary least squares model with binary independent variables (background) predicting a binary dependent variable (problem vs. non-problem). Base N = 3148, $R^2 = .045$.

^bAll binary variables scored 1 or 0 as follows: male vs. female; non-high school graduate or high school graduate vs. college graduate; unmarried or unaccompanied by spouse vs. all others; age under 25 vs. age 25 or more; Pacific duty station or European duty station vs. CONUS duty station.

^cThe coefficient for European location is not significant at the .05 level; all others are significant at the .001 level.

are prominent as predictors of alcohol problems. Location in the Pacific area also makes a significant difference in the problem rate. The variable representing location in the European area is not significant by any standard; hence it appears that personnel stationed in Europe are not more subject to alcohol problems than personnel in the Continental United States when other characteristics are controlled for. This pattern of effects reinforces the earlier indications that there are somewhat more problems with alcohol in the Pacific area and that the demographic or military characteristics of Pacific personnel do not entirely explain this increased level. Indeed, this model suggests that, when all demographics are controlled for, the effect of Pacific location is slightly larger than appeared in the uncontrolled analyses. However, even here the difference is moderate; Pacific location increases the problem rate by about 5 percentage points (.053), other things being equal.

A number of additional regression analyses not shown here suggest that the effects of these background factors are robust regardless of the other variables included. The one significant exception is concerned with the effect of location in the Pacific. If one introduces an interaction term representing Pacific location and being unmarried/unaccompanied, the interaction term is highly significant and the main effect for all Pacific personnel becomes nonsignificant. This suggests that the higher rates in the Pacific are derived from the higher rates of unaccompanied personnel in that area. The strongest effect is that for lacking a high school diploma; the rate for such people is elevated by 13.0 percentage points over the rate for college graduates. Sex is also a strong effect, with the male rates estimated to be 10.1 points above the female rate, other things being equal. The other effects, such as those of Pacific location, are in the range of 5 to 8 percentage points. These differences together explain only a small part of the total variation in problem rates

(as shown by the R^2 , which is only .045). However, the baseline problem rate is fairly small, being 13.9 percent. Therefore, an absolute difference of 13 percentage points, as for those without a high school diploma, implies a rate that is nearly double the average.

COMPARISONS WITH CIVILIAN AND OTHER MILITARY POPULATIONS

The results presented thus far are quite consistent with those of other studies. For example, the Army and Navy studies conducted by Cahalan and his associates also showed that age and education were substantially correlated with problem drinking rates and that these correlations should be taken into account when comparing civilian and military groups (Cahalan and Cisin, 1975). These findings point to an important question regarding the Air Force data: Are there any fundamental differences in drinking behavior between the Air Force and the other military or civilian populations? If so, what portion of these differences can be ascribed to demographic differences in the populations concerned? It has already been noted (Chapter IV and App. E) that rates of self-reported alcohol consumption in the Air Force are very similar to those in civilian samples when age and sex are controlled for. Nonetheless, it is possible that other alcohol-related behaviors (e.g. frequent job problems or driving under the influence) could be more prevalent in one context than in another. To address this issue, it is desirable to examine many types of alcohol problems.

Related to these issues is the question of whether there might be an overall "military" effect on problem behavior. Such an effect is posited by many observers, noting the environmental conditions of military service, such as being stationed overseas and away from family. That issue is of vital importance for interpreting the Air Force data. If there were some fundamental difference in problem behavior between civilians and military personnel, the generalizability of the Air Force data would be limited. However, if the military and civilian populations appear to be basically similar except for demographic or environmental factors, the results of this study may be seen as broadly applicable to all alcohol-related human behavior.

Types of Comparative Data

At the time the Air Force study was designed, three surveys using similar versions of the Cahalan "problem drinking" measure had been conducted over a period of five years in the civilian population (1969), the Army (1972), and the Navy (1974). The results of these studies, based on univariate controls for age and education, suggested that the problem rates for military personnel might be considerably higher than those in the civilian population (Cahalan and Cisin, 1975). This finding led us to request an Air Force-wide survey using a special questionnaire with items identical to those in the Navy study, as described in Chapter III. The questionnaire was quite different from the form used in our 13-base study, but it provides an Air Force measure of the Cahalan problem drinking index that can be directly compared with the other samples. This Air Force-wide survey was returned by 1,407 respondents, a response rate of approximately 66 percent. (This rate is slightly lower than the rates reported for the civilian, Army, and Navy studies, 73, 77, and

76 percent respectively.)⁵ The data from the Air Force and from the other surveys were computer-coded to produce the same standard problem drinking index across all four data bases.⁶

The difference in time periods when these surveys were conducted could introduce trend-related errors in the analysis. This possibility is particularly troublesome for the civilian survey, which was the earliest (eight years before the Air Force survey). However, both national beverage sales statistics and national surveys show that there has been no significant trend in alcohol consumption among civilians over the period from 1971 to 1976 (Department of Health, Education, and Welfare, 1978). If the rate of overall alcohol problems in a population is highly related to aggregate alcohol consumption, as argued by the single-distribution school (Schmidt and de Lint, 1970), the absence of any trend in consumption should also imply no trend in the overall problem rate. In fact, some restricted measures from very recent surveys show no discernible trend (Department of Health, Education, and Welfare, 1978). Taken together, these considerations lead us to the conclusion that the differences in time periods are unlikely to have much effect on our civilian-military comparisons. The nature of possible trend-induced errors within the military surveys is less clear, but the fact that the military surveys were conducted within a more restricted set of dates (1972 to 1977) suggests that they are also unlikely to be unduly affected.

Before we discuss the effect of controlling for demographic differences on the problem drinking rates in the four samples, a general comment must be made concerning the rates themselves. In the tables that follow, the "problem drinking" rates calculated for *all four groups* are higher than the "alcohol problem" rates that we have described in our previous analyses. The higher rates shown by the Cahalan problem drinking index may be attributed to two features that distinguish it from our own measure. First, the index combines problems varying considerably in their severity, making it possible for a person to be classified as a "problem drinker" even though the level of the problems he has experienced is not what we have called "serious."⁷ To take an extreme example, a respondent indicating that his drinking was "very displeasing to a relative" and that he had any other problem (such as "spent too much money on drinks or after drinking") would be classified as a problem drinker by this index. Second, the index taps problems occurring at any time during the *past three years*. This time frame is longer than the one-year standard we have used.

Analysis of Comparisons

The problem drinking rates computed for males aged 21-59 in the Air Force,

⁵ The Air Force response rate is based on estimating the characteristics of the Air Force-wide target sample from those of the 13-base sample, which was drawn in a similar way (see Chapter III). The Army and Navy response rates are estimated by averaging the reported enlisted and officer rates in the proper proportions of enlisted and officer personnel.

⁶ The civilian data tape was provided by Don Cahalan and Walter Clark, University of California, Berkeley. The Army and Navy data tapes were provided by those military services. To create the Cahalan problem drinking index, 14 scores (representing 13 types of alcohol problems and an overall score for "Combined Tangible Consequences") were computed for each respondent. More details on the Cahalan index and Air Force problem scores may be found in App. H.

⁷ Classification as a "problem drinker" refers to obtaining a high "Tangible Consequences" score. See App. H for scoring details.

Navy, Army, and civilian samples are presented in Table 35.^a For comparative purposes, the rates for the military services are listed separately for male enlisted and officer personnel. The overall figures imply that problem rates are higher in the military than in civilian life. The "enlisted" and "officer" columns suggest that the highest problem rates are present in the enlisted group. Indeed, a simple comparison with the total civilian rate would imply that the enlisted rates are much higher than those for civilians, whereas the officer rates are slightly lower. This implication is consistent with the analysis presented in the Navy and Army reports (Cahalan and Cisin, 1975; Cahalan et al., 1972).

A direct comparison of enlisted or officer personnel with the entire civilian population, however, is not satisfying. There is no way to categorize civilians on rank. Hence, the groups being compared are not really comparable. In particular, they are different on educational status; over 90 percent of the officers have attended college, but fewer than half of the enlisted force and the civilian sample have done so. For this reason, the rightmost portion of Table 35 shows the four samples disaggregated by education rather than by military rank. This parallel disaggregation of the military and civilian samples helps to clarify two points. Although the differences are still considerable, the divergence in problem drinking rates among the high school groups is smaller than the divergence among the enlisted and total civilian groups. More important, although it first appeared that officers have lower rates than civilians, controls for education reveal that in fact the officers have appreciably higher rates than the college-educated civilians.

Such comparisons within the high school and college groups, if considered alone, paint a consistent picture suggesting greater problem rates in the military.

Table 35

**PROBLEM DRINKING RATES FOR MILITARY AND
CIVILIAN SAMPLES WITHOUT STANDARDIZATION**

Sample (N)	Total ^a	Rank		Education ^b	
		Enlisted	Officer	High School	College
Air Force (1135)	21.9	23.9	13.8	27.0	17.9
Navy (6675)	31.3	34.3	18.5	35.1	20.7
Army (8711)	30.1	33.3	16.5	34.4	19.4
Civilian (978)	18.7	(c)	(c)	23.5	10.8

^aAll males age 21-59. Rates for military services are weighted to reflect the proper proportions of enlisted and officer personnel because officers were oversampled.

^bHighest level of education attained (high school diploma or less versus college level).

^cInappropriate for civilians.

^a The exclusion of data for females and males 17-20 or over 59 years of age was necessary because these groups were omitted in the civilian survey.

If the four populations had similar demographic characteristics within each level of education, these comparisons of problem drinking rates could be accepted without further controls. However, this is not the case, as shown in Table 36. The age difference between the military and civilian populations is striking, even with education controlled for. In the "high school" group, the proportion of military personnel 21-24 years old is about three times as great as among civilians. Moreover, the proportion of military personnel without spouses is higher *within* each age group than the same proportion among civilians. Similar but somewhat attenuated differences may be seen between military personnel and civilians among the college-educated. As one would expect, then, military samples have proportionately more younger and unmarried people. Because both of these characteristics predispose a person toward the development of alcohol problems, a thorough analysis should standardize for these two characteristics as well as for education.

The results of standardizing the obtained problem drinking rates for education, age, and marital status are presented in Table 37.⁹ The successive lines of this table show what happens to the problem drinking rates as additional variables are standardized (controlled for). In the top line, nothing has been standardized; that is, the problem drinking rates are those for the total groups, the same as shown in Table 35. Such an uncontrolled comparison would suggest that the Navy and Army rates are considerably higher than the other rates, but this impression is misleading. When educational characteristics are standardized (second row), the rates for the other populations decrease relative to the Air Force rate. This decrease occurs

Table 36
AGE AND MARITAL CHARACTERISTICS
WITHIN LEVEL OF EDUCATION^a
(In percent)

Level of Education	Age, Marital/ Accompaniment Status	Sample			
		Air Force	Navy	Army	Civilian
High school	21-24, No spouse	19.0	20.7	19.5	3.4
	21-24, Spouse	18.6	11.0	13.9	7.6
	25-59, No spouse	11.0	16.9	17.5	8.4
	25-59, Spouse	51.4	51.4	49.1	80.6
	Total High School	100.0	100.0	100.0	100.0
College	21-24, No spouse	10.7	11.8	15.2	8.4
	21-24, Spouse	8.5	6.8	13.0	8.7
	25-59, No spouse	14.1	17.8	13.6	9.5
	25-59, Spouse	66.7	63.6	58.2	73.4
	Total College	100.0	100.0	100.0	100.0

^aMales 21-59 years of age. Highest level of education attained: high school and lower levels versus college level. Accompaniment status: single or not living with spouse versus living with spouse.

⁹The standardization procedure is discussed in App. H. Essentially, it adjusts all samples so that they have the same distribution as the Air Force on age, education, and marital/accompaniment status.

Table 37
**PROBLEM DRINKING RATES ACCORDING TO
 LEVEL OF STANDARDIZATION^a**
 (In percent)

Variables Standardized	Sample			
	Air Force	Navy	Army	Civilian
None ^b	21.9	31.3	30.1	18.7
Education	21.9	27.1	26.0	16.4
Education, age	21.9	27.5	25.8	19.9
Education, age, marital status ^c	21.9	26.6	25.1	20.8
Education, age, marital status, location ^d	20.6	25.1	24.7	20.4

^aMales 21-59 years of age. Standardizations made on Air Force sample proportions of education (high school or lower versus at least some college), age (21-24 versus 25-59), and marital (spouse in home versus no spouse in home) characteristics.

^bMilitary rates weighted to reflect proper enlisted-officer composition of the forces.

^cReliability considerations required a slightly modified disaggregation of the civilian sample for this standardization. See App. H.

^dComparison restricted to respondents with permanent residences in the United States.

NOTE: The 99 percent confidence intervals for the fully standardized rates are, from left to right: ± 3.4 , 2.3, 1.3, and 3.8 percent. The Navy and Army rates are significantly different from the others, $p < .01$ (z-test).

because the Air Force has a greater proportion of college-educated people than the other populations. In the next row of the table, the problem rates have been standardized for age as well as for education. Owing to the much younger makeup of the military services (seen in Table 36), the age standardization causes the problem rate for civilians to rise sharply. This reflects the intuitively obvious fact that if the civilian population were sampled from a disproportionately young group, like a military population, the sample would contain more problem drinkers than the parent population. In the fourth row, the problem rates are further standardized according to whether the respondent lives with a spouse, resulting in a modest further convergence among the four groups.

Standardizing the samples on age, education, and marital/accompaniment status considerably reduces the rate differences among them. However, at least one other characteristic of military populations differentiates them from civilians and is relevant here: namely, location of residence. Assignment to work overseas or at sea is obviously very uncommon among civilians but common in the services; it also affects problem drinking, as shown by both our previous analyses and the Navy study (Cahalan and Cisin, 1975). To determine the effect of this factor on the military-civilian differences we have gone one step further in the bottom panel of Table 37, restricting the military samples to personnel located within the United States. The rates in this line reflect the results one would find if the three other populations resided in the United States and were distributed on age, education,

and marital/accompaniment status as is the Air Force U.S. subsample.¹⁰ These percentages in the bottom panel of Table 37 show even further, although modest, convergence.

Comparison of the percentages shown for any two of the four groups in the bottom panel with those for the same pair before standardization indicates that the difference in problem drinking rates has diminished by at least 50 percent in each case. Thus, the available data suggest that most of the differences in the problem drinking rates can be explained by the demographic rather than idiosyncratic characteristics of these four groups. In short, the picture painted after simultaneous standardization is one of relative homogeneity, in contrast to the impression created by considering the raw sample rates alone.

We are reluctant to place any strong interpretation on the small (but significant) discrepancy between the Navy and Army rates versus those shown for the Air Force and civilians in the bottom panel. First, the surveys spanned eight years, and there were somewhat varying response rates such that the samples with the lowest response rates also have lower problem rates. The conventional wisdom in the field of alcoholism research (Moos and Bliss, 1978) is that the rate of alcohol problems is higher among nonrespondents than among respondents. Second, the civilian survey used a household sample, which probably fails to locate (or excludes from the sampling universe) a disproportionate number of people with drinking problems. It is therefore possible that the rates listed for civilians and Air Force personnel are somewhat lower than they should be.¹¹

In sum, although close interpretation of the variation remaining after standardization is probably unwarranted, the available data strongly imply that the differences among military and civilian groups are in large measure attributable to the different demographic characteristics of these groups. This does *not* indicate that, per capita, there are equal rates of problem drinkers in military and civilian life; if random groups of civilians and military personnel were examined, one would be more likely to find problem drinkers among the military group. Rather, the data imply that the principal reason for this discrepancy is that military personnel more frequently have the risk factors that are known to predispose all people to alcohol problems; they are younger, less often married and accompanied, and more often stationed in remote locations.

RISK FACTORS RELATED TO ALCOHOL BEHAVIOR

Environmental and background factors such as location are important in the process of developing alcohol problems, but they operate at a distance that is fairly remote from the actual events of drinking, adverse effects, and alcohol dependence. We now turn toward an analysis of actual behaviors and behavioral predispositions that directly precede alcohol problems. The purpose is to isolate and assess the behavioral patterns, if any, that imply immediate risk of experiencing serious trouble because of alcohol. The most fundamental of all alcohol-related behaviors is consuming alcoholic beverages, and that is where we begin.

¹⁰ The slight decrease in the civilian rate in this line may be attributed to small increases in the Air Force U.S. subsample in the proportions of individuals living with a spouse or having attended college.

¹¹ Further caution could be warranted because the four surveys used somewhat different data collection procedures.

Patterns of Alcohol Consumption

The analysis reported in Chapter IV provides a clue to the importance of alcohol consumption pattern as a risk factor. The level of total alcohol consumption, expressed in ounces of ethanol per day, was strongly related both to alcohol dependence and to experiencing alcohol-related incidents. Our purpose here is to refine that analysis by examining different patterns of consumption reflecting the spacing of periods of heavy drinking.

It is a common observation that many alcoholics and people with lesser alcohol problems do not drink continuously. Indeed, Jellinek (1960) distinguished certain categories of alcoholism from others primarily by chronicity vs. intermittence. In his formulation of the notion of loss of control, there are two separate varieties: (1) inability to stop drinking once started (which would be consistent with long periods of abstinence followed by a heavy drinking "binge" or "slip"); and (2) inability to abstain (which would imply chronic daily high consumption). Some authors suggest that the first variety typifies a "binge-drinking" type of alcoholism prevalent in North America, whereas the second variety typifies the steady heavy ethanol intake prevalent in the wine-drinking countries of Europe. These two consumption patterns, if empirically distinguishable, would be of more than academic interest, for they imply different consequences. The intermittent variety would imply the likelihood of such alcohol incidents as arrest or intermittent absenteeism from work, whereas the steady variety would suggest greatly increased chances of pathology of the liver and other organs.

It is therefore important to investigate the alcohol-related consequences and behaviors relevant to different consumption patterns. Figure 5 shows the relationship between our measure of total alcohol problems and two basic variables that reflect consumption pattern. The graph on the left shows visually the same information as portrayed in Table 15—that increasing rates of total ethanol consumption imply successively higher risks of alcohol problems. As soon as the individual's consumption rises even as high as three or four drinks per day (up to about 2.0 ounces of ethanol), the probability of some problem is increased by more than a factor of 2. The most elevated risks, however, are found in the ranges of seven or more drinks (about 3.5 ounces of ethanol or more per day).

The graph on the right in Fig. 5 displays a different aspect of consumption, what we call the "frequency of heavy consumption." This means simply the number of days when the individual reports drinking as many as eight drinks in a single day. This amount, if consumed over less than five hours, is sufficient to imply legal intoxication in a male of typical weight (165 pounds). Because eight drinks are the lower limit specified, many of the people so identified are in fact drinking much more than eight drinks on the day in question. The graph shows the monotonic relationship between the frequency of such heavy drinking and the experience of alcohol problems. For this variable, elevated risk levels occur in conjunction with a frequency of once per month (12-23 times per year). A person who consumes eight or more drinks in a day as frequently as once per month has a 20 percent probability of experiencing serious alcohol problems—a rate about five times as high as those who never drink that heavily. Thus, the relative and the *absolute* risks are considerable. A pattern of intermittent heavy drinking can imply consequences just as well as a pattern of steady high consumption.

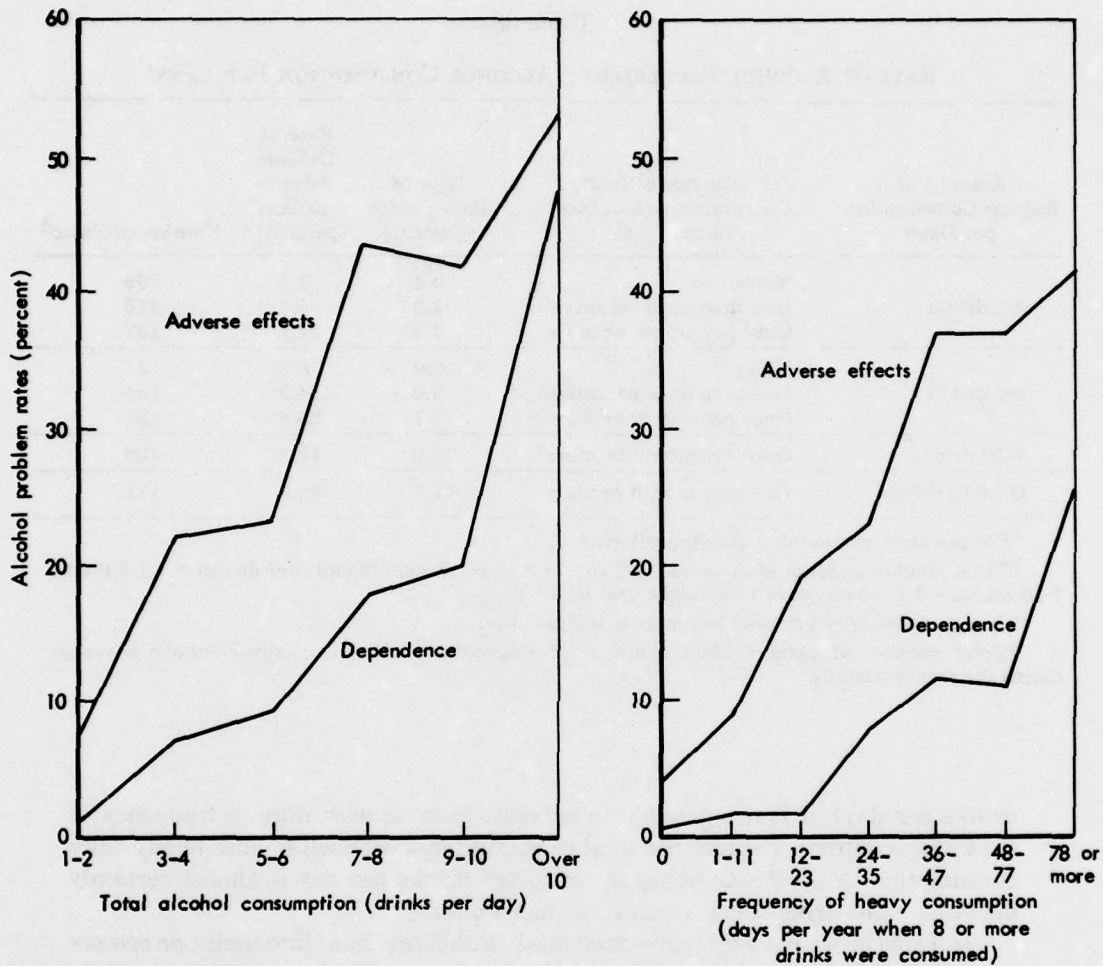


Fig. 5—Alcohol problem rates by consumption measures

These two patterns of consumption are highly correlated with each other. Some of the people drinking eight or more drinks once per month are drinking six or seven drinks on the other days of the month, which would result in a high total consumption average. Therefore, it is useful to examine the joint distribution of these two variables for evidence of alcohol problems when one is high and the other is low. Unfortunately, the relationship between the two is so high that there are few of these "off-diagonal" cases.¹² However, our sample size is sufficiently large that certain crucial groups may be distinguished, as shown in Table 38. In this table the members of the Air Force sample are categorized according to their total consumption level, and within consumption levels according to the frequency of heavy consumption. For the two highest total consumption levels (seven or more

¹² For a tabulation of the number of such cases and the alcohol problem rates within the individual cells, see App. E.

Table 38

RATE OF ALCOHOL PROBLEMS BY ALCOHOL CONSUMPTION PATTERNS^a

Amount of Regular Consumption per Day ^b	Frequency of Heavy Consumption (8 or more drinks in a day)	Rate of Dependence (percent)	Rate of Definite Adverse Effects (percent) ^c	Number of Cases ^d
1-2 drinks	Never	0.3	3.1	709
	Less than once per month	1.2	6.1	815
	Once per month or more	4.2	17.7	237
3-6 drinks	Never	2.9	8.8	34
	Less than once per month	3.0	14.2	134
	Once per month or more	9.7	25.8	431
7-10 drinks	Once per month or more	18.0	42.2	128
Over 10 drinks	Once per month or more	47.7	52.3	111

^aFor the most commonly occurring patterns.

^bTotal alcohol consumption index: 1-2 drinks = 0.1-1.0 oz. ethanol; 3-6 drinks = 1.1-3.0 oz.; 7-10 drinks = 3.1-5.0 oz.; over 10 drinks = over 5 oz.

^cOne or more serious alcohol incidents in the past year.

^dTotal number of cases = 2599 (number of respondents who drank any alcoholic beverage during the survey period).

drinks per day), it is not possible to subclassify cases according to frequency of heavy consumption, because the total consumption level itself implies heavy daily consumption. A person drinking seven to ten drinks per day is almost certainly drinking eight drinks once a month or more often.¹³

In Table 38 we have disaggregated total alcohol problems into their two components: dependence and adverse effects. If dependence and adverse effects are truly conceptually independent, as we have maintained, they ought to be connected with alcohol consumption in different ways. Specifically, the probability of dependence ought to be small regardless of intermittent heavy drinking, until overall consumption rises to a high level. This is hypothesized because dependence is conceived of as a chronic condition manifested by a continual need for alcohol. Adverse effects, however, may occur because of isolated or sporadic instances of gross intoxication, disinhibition, etc. Therefore, a low level of regular consumption coupled with intermittent heavy consumption should lead to an elevated rate of adverse effects. This line of reasoning is borne out by the data. For regular consumption levels of six drinks per day or less, alcohol dependence is observed at rates lower than 10 percent; on the average, the rate is about 2.7 percent for these groups. As consumption climbs above six drinks per day, the alcohol dependence rates are increased to levels that are almost seven times that rate. In contrast, *adverse effects* occur with a substantial frequency (17.7 percent rate) even among those who drink as little as one or two drinks per day, provided they show heavy consumption at least once per month.

¹³ This is supported by detailed tabulations shown in App. E.

The striking character of the increasing risks as consumption patterns change may be seen visually in Fig. 6. This graph shows the rates of dependence and adverse effects for the patterns of consumption listed in Table 38. To provide a reference point, the total-sample rates of dependence and adverse effects are shown as horizontal dotted lines extended across the graph. The rate of alcohol dependence does not increase sharply until total alcohol consumption reaches seven or more drinks on a daily basis. Alcohol dependence, then, is clearly linked to regular, chronic consumption of large amounts of alcohol. Although the evidence is not conclusive, it suggests strongly that daily heavy alcohol intake, rather than sporadic incidents or bouts of heavy drinking, may be a primary factor in the development of alcohol dependence. The graph also illustrates that sporadic incidents of heavy drinking play a more significant role in the development of adverse effects. This is empha-

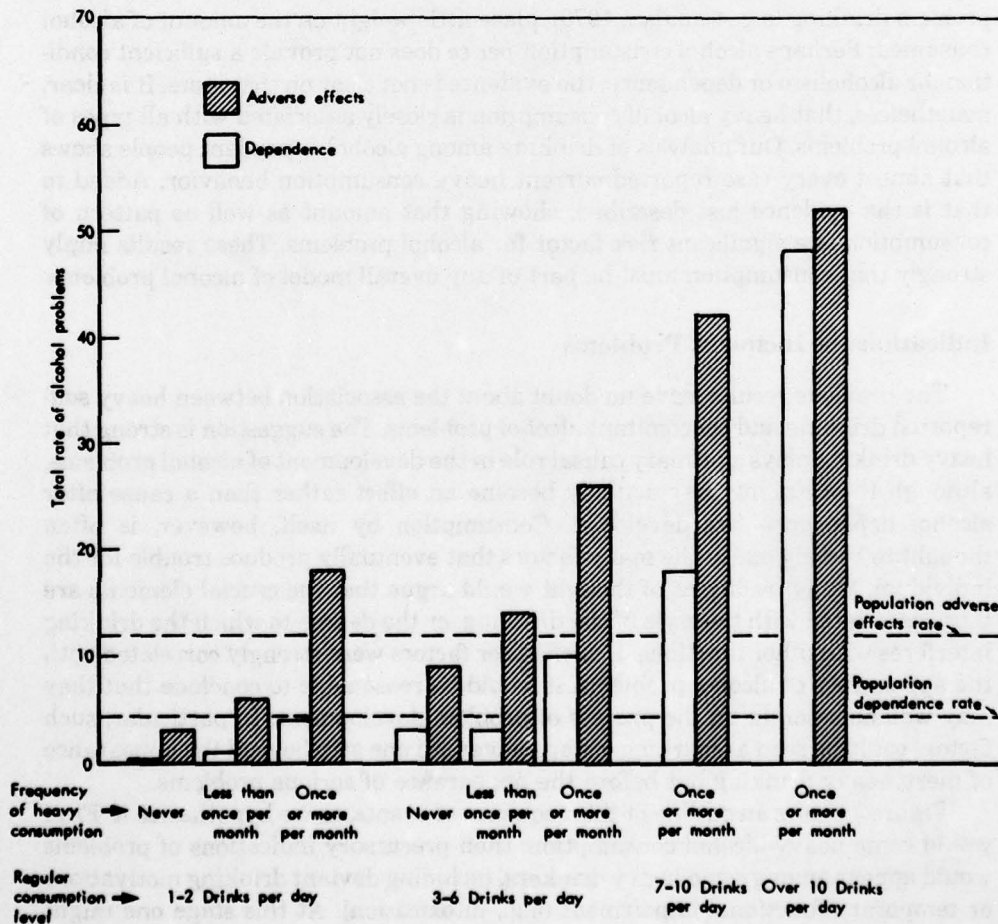


Fig. 6—Alcohol problem rates by consumption patterns

sized by the bar located at the point of regular consumption of "1-2 drinks per day" and heavy consumption of "once or more/month." Even when combined with otherwise quite moderate consumption levels (one or two drinks per day), sporadic incidents of heavy drinking may imply increased risks.

Certain obvious practical guidelines follow from this analysis. Whenever an individual reports regularly drinking over six drinks per day, further investigation is highly desirable to determine whether alcohol dependence may be present. When regular drinking is at lower levels, the principal concern may properly be placed on the issue of whether the individual drinks heavily on certain days despite his normal moderation. As we have seen, even occasional instances when eight or more drinks are consumed can lead to significant risks of serious alcohol problems.

These findings may seem predictable, but they are by no means necessary according to many widely held views of alcoholism. In the most prominent interpretations of alcoholism, such as those supported by the U.S. National Council on Alcoholism (1972), amount of alcohol consumption plays a minor role. Especially in North America, the theoretical emphasis has been placed on the development of addiction, particularly on loss of control. Many accounts of alcoholism, and even of problem drinking (e.g., Cahalan, 1970), place little weight on the amount of alcohol consumed. Perhaps alcohol consumption *per se* does not provide a sufficient condition for alcoholism or dependence; the evidence is not clear on that issue. It is clear, nonetheless, that heavy alcohol consumption is closely associated with all types of alcohol problems. Our analysis of drinking among alcohol-dependent people shows that almost every case reported current heavy consumption behavior. Added to that is the evidence just described, showing that amount as well as pattern of consumption is a significant risk factor for alcohol problems. These results imply strongly that consumption must be part of any overall model of alcohol problems.

Indications of Incipient Problems

The previous results leave no doubt about the association between heavy self-reported drinking and concomitant alcohol problems. The suggestion is strong that heavy drinking plays a primary causal role in the development of alcohol problems, although the drinking may actually become an effect rather than a cause after alcohol dependence has developed. Consumption by itself, however, is often thought to be only one of the many factors that eventually produce trouble for the individual. Many traditions of thought would argue that the crucial elements are those associated with the style of the drinking, or the degree to which the drinking *interferes with other functions. If such other factors were strongly correlated with the appearance of alcohol problems, it would be reasonable to conclude that they may well be essential in the process of problem development. In particular, such factors could be seen as marking a stage advanced one step beyond the appearance of mere heavy drinking but before the appearance of serious problems.*

Figure 7 shows an outline of this sequence of events, as we hypothesize it. First would come heavy alcohol consumption; then precursory indications of problems would appear among some heavy drinkers, including deviant drinking motivations or temporary functional impairment (e.g., intoxication). At this stage one might also expect to see warnings from social peers. Finally, among those with these precursory indications, some subset would develop full-blown patterns of de-

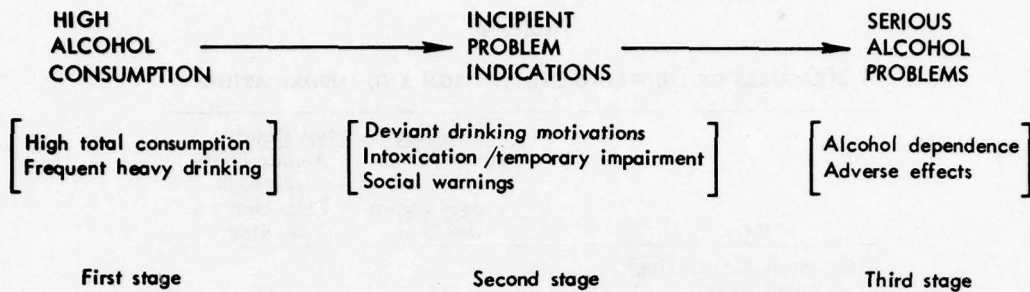


Fig. 7—Hypothetical sequence of alcohol problem development

pendence or chronic alcohol incidents (e.g., repeated DWI violations). It should be emphasized that this is a theoretical sequence only. We do not have the longitudinal data necessary to test this sequence fully. We can, however, determine whether such a process is supported by the correlations in our data. If deviant drinking motivations are important in the development of alcohol problems, for example, we should find that such motivations are strongly correlated with alcohol problems in our sample. Below we shall examine this issue, attempting to measure and evaluate the factors at the second stage in this sequence. To the extent that such factors are shown to be important, they may be reasonable indicators of incipient alcohol problems. Such indicators would be more proximate to alcohol problems than alcohol consumption alone. Therefore, they might be expected to serve better than consumption as direct forecasts of adverse effects and dependence.

Incipient Problem Measures. In Chapter IV we introduced the concept of "warning incidents." The index of warning incidents covers social warnings from a physician, spouse, coworker, supervisor, or policeman. We used this as an indicator of "less-serious" alcohol incidents for the purpose of estimating the sensitivity of our prevalence rates to differing definitions. However, warning incidents were not included in the definition of dependence or adverse effects, and they are measured independently. Accordingly, they are available to be used here as possible indicators of incipient problems.

Table 39 shows the survey items that represent two other areas of incipient problems. We have named these two areas "motivations for drinking" and "behavioral indicators of intoxication." The first area, represented by five items, is essentially a distillation of "bad reasons" for drinking used in many other studies. In one study they were termed indicators of "escape drinking" (Cahalan et al., 1969). They were adopted in another article as survey measures appropriate for alcoholism prevalence estimation on grounds that "escape drinking" could be similar to alcoholism (Keller, 1975). In the most recent work of Cahalan and his associates, they are treated as measures of "psychological dependence" on the assumption that they represent a psychologically based "need to drink" to function in the presence of unpleasant circumstances (Cahalan and Room, 1974). This construct, however named, has also appeared frequently in lay accounts of alcoholism development. We include it as a test of the hypothesis that certain motivational elements are important determinants of alcohol problem development.

Table 39

MEASURES OF DRINKING MOTIVATION AND INTOXICATION

Item	Alcohol Problem Rate ^a	
	Among Those with Low Frequency on the Item	Among Those with High Frequency on the Item
Motivation for drinking^b		
Forget worries	14	46
Cheer up when in a bad mood	13	27
Help when depressed or nervous	14	49
Relax	13	50
Increase self-confidence	15	45
Behavioral indicators of intoxication^c		
Being drunk	7	49
Being sick from drinking	12	83
Missing meals because of drinking	10	63
Driving after 5 or more drinks	10	66

^aPercent with dependence or definite adverse effects.

^bQuestions 79-82, 85. Low frequency = drinking for the reason "sometimes" or "rarely"; high frequency = drinking for the reason "most of the time."

^cQuestions 115, 125, 119, 127. Low frequency = reporting the event less than once per month; high frequency = reporting the event once per month or more often.

The second area represented in Table 39 is one associated, in the main, with gross intoxication and its immediate concomitants. The four items included may all be seen as correlative symptoms of intoxication. A self-report of "being drunk" is simply the most direct assessment of the condition. We argue that, in a general population, being sick from drinking and missing meals because of drinking are primarily additional indications that gross intoxication has taken place. On face value, the "driving after 5 drinks" item is less immediately related to intoxication, but the connection is present because the specification is that the five drinks were consumed within two hours. This ensures that a state of legal intoxication or near-intoxication was reached. (A 165-pound male would attain a blood alcohol concentration of nearly .100 after drinking five drinks in two hours.) All of these indicators have in common that intoxication is highly likely if an affirmative answer is given.

Empirical analysis shows that these two groups of items do indeed cluster together into two independent factors. Each item is highly correlated with others in the same set; factor analysis shows that the drinking motivation items load on one factor, and the intoxication items load on a different factor.¹⁴ Hence there is

¹⁴ Details of the factor analysis may be found in App. E, Table E.11.

justification in the data for combining each of the two sets of items into a composite scale. These two scales were therefore created so we could conduct further analysis.

Prediction of Alcohol Problems. With the development of the two new scales, there are now three indicators of incipient alcohol problems that may be tested: warning incidents, drinking motivations, and intoxication. These constitute the measures appropriate for the hypothetical second stage in the sequence diagrammed in Fig. 7. We may add to these the two previously discussed measures of alcohol consumption: total alcohol consumption and the frequency of heavy consumption. These two represent the variables from the first stage of the hypothetical sequence. Altogether, these five variables span a wide range of patterns of alcohol use, and one would expect that they would figure prominently in the model. Accordingly, we entered them into a regression model to determine which ones constitute effective predictors of alcohol problems. At the least, such a model can help us to select predictors that are pragmatically useful for giving a prognosis for a particular person. In addition, such a model may provide evidence about the validity of the sequence depicted in Fig. 7.

Table 40 shows the product-moment correlations among these five variables and the two measures of alcohol problems. In the top panel, the intercorrelations of the alcohol use patterns show two notable characteristics. First, drinking motivation seems not to be closely connected with any other measure; its correlations with other variables are uniformly low compared with those of the other alcohol use patterns. Second, intoxication correlates fairly strongly with all of the other measures, suggesting that intoxication may be a central variable in the process. In the bottom panel of the table, the prospective importance of intoxication is especially apparent in respect to its relation with alcohol dependence. Intoxication, even by itself, would serve well as a risk factor for predicting dependence. It also happens to be moderately correlated with adverse effects, but the relationship is not nearly

Table 40
CORRELATIONS AMONG ALCOHOL USE PATTERNS AND ALCOHOL PROBLEMS
(Product-moment correlations)^a

Item	Total Alcohol Consumption	Frequency of Heavy Consumption	Drinking Motivation	Intoxication Symptoms	Warning Incidents
Alcohol use patterns					
Total alcohol consumption	1.000	.782	.344	.577	.344
Frequency of heavy consumption ^b	.782	1.000	.315	.581	.362
Drinking motivation ^c	.344	.315	1.000	.326	.252
Intoxication symptoms ^c	.577	.581	.326	1.000	.481
Warning incidents	.344	.362	.252	.481	1.000
Alcohol problems					
Alcohol dependence	.411	.430	.285	.665	.464
Definite adverse effects ^d	.315	.339	.244	.439	.412

^aBase N = 3148.

^bNumber of days during past year when 8 or more drinks were consumed.

^cIndex based on five items; for details see App. D.

^dOccurrence of one or more serious alcohol incidents in the past year.

so strong. For adverse effects, warning incidents provide an alternative risk factor of about equal association. Many of these variables have skewed distributions (a few people very far out on the right-hand tail of the distribution), which could lead to artificially high correlations. For this reason all of the correlation and regression analyses were run with logarithmic transformations of the skewed variables to make them more normal. The results were nearly the same as results without such transformations, and therefore we are presenting the untransformed results, which can be more readily interpreted.

Table 41 shows the results when all five variables are entered in a regression model predicting alcohol problems. Two separate regressions are presented, one predicting alcohol dependence and one adverse effects. The proportion of variance explained is considerably different between the two; almost half the variance in alcohol dependence can be explained by the five independent variables, whereas about one-fourth of the variance in adverse effects can be explained. This may indicate that the phenomenon of dependence is a well-defined and coherent entity, but adverse effects are by definition diverse and derived from many sources.

Both regressions show that the factors of primary importance are the first two (intoxication and warning incidents). These have by far the largest standardized regression coefficients and the largest t-statistics as well. (The standardized coeffi-

Table 41
REGRESSION MODEL OF SERIOUS ALCOHOL
PROBLEMS BASED ON ALCOHOL USE PATTERNS

Independent Variable ^a	Standardized Regression Coefficient	T-statistic ^b
Predicting Alcohol Dependence ^c		
Intoxication scale	.547	31.13***
Warning incidents	.177	11.88***
Drinking motivation	.054	3.85***
Frequency of heavy consumption	.048	2.23*
Total alcohol consumption	-.022	-1.00
Predicting Definite Adverse Effects ^d		
Intoxication scale	.252	12.06***
Warning incidents	.243	13.68***
Drinking motivation	.076	4.55***
Frequency of heavy consumption	.086	3.34***
Total alcohol consumption	-.006	-0.25

^aStandardized so that all variables have means of zero and variances of unity.

^bThree asterisks signify a probability less than .001; one asterisk signifies a probability between .05 and .01. Base N = 3148, df = 3142.

^cDependent variable = 1 if subject is dependent, 0 otherwise. $R^2 = .473$.

^dDependent variable = 1 if the subject reports one or more serious alcohol incidents during the past year, 0 otherwise. $R^2 = .256$

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ALCOHOL PROBLEMS: PATTERNS AND PREVALENCE IN THE U.S. AIR FORCE--ETC(U)

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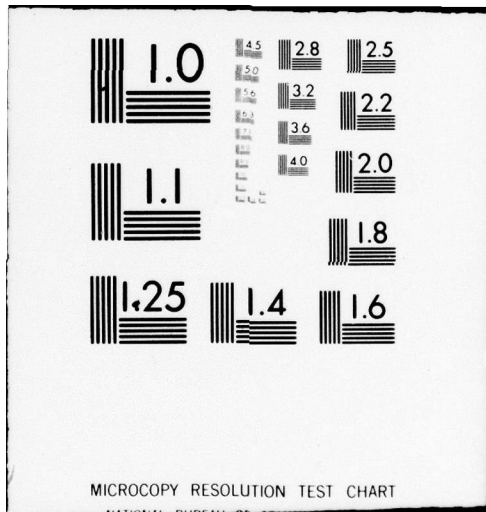
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cients represent the actual regression coefficients after rescaling to transform all variables so that they have equivalent units of measurement and hence can be interpreted with comparability.)¹⁵ By comparison, the importance of the last three factors is minor. Indeed, the coefficient for total alcohol consumption fails to reach even a minimal level of statistical significance, and the coefficients for drinking motivation and frequency of heavy consumption are quite modest. Because of these considerations, one may usefully investigate the properties of a system in which only intoxication and warning incidents are considered. The regression results are affected very little by the omission of the last three variables. In particular, the values for R^2 drop only slightly (from .473 to .469 for dependence and from .256 to .245 for adverse effects). Let us therefore examine just how powerful these two variables are in predicting the level of alcohol problems.

Table 42 shows the rates of alcohol problems within specific categories of those reporting different levels of warning incidents and intoxication. The rate of alcohol dependence is shown separately from the rate of adverse effects for each level of the two predictor variables. The results are striking and even more dramatic in Fig. 8. They demonstrate that intoxication and warning incidents are better predictors of problems than are alcohol consumption measures, because the discrimination among categories here is better than that shown in the risk table for alcohol consumption (Table 38).

Taking the rates of alcohol dependence first, one can see that the risk is uniformly low as long as the intoxication score remains below 48 (loosely speaking, a frequency of once per week, because the frequencies on all four items in the intoxi-

Table 42
RATE OF SERIOUS ALCOHOL PROBLEMS FOR
PRINCIPAL RISK FACTORS

Warning Incidents	Intoxication Scale Score				
	0	1-11	12-47	48-181	182 or More
Rate of Alcohol Dependence (percent)					
None	0.1	0.1	0.6	11.9	46.2
1	0.0	0.0	0.0	16.1	50.0
2 or more	0.0	0.0	5.1	25.9	76.3
Rate of Adverse Effects (percent)					
None	1.7	5.1	12.6	26.1	52.6
1	0.0	16.7	27.9	48.4	50.0
2 or more	21.4	19.7	45.8	55.2	80.0
Number of Cases					
None	1184	957	334	176	78
1	11	42	43	31	20
2 or more	14	61	59	58	80

¹⁵ The standardized regression coefficients shown are coefficients corrected so that all variables have means of zero and variances of unity. This was done because many of these scales have arbitrary scoring systems that do not permit easy interpretation. The standardized coefficients allow direct comparisons of the magnitudes of coefficients without concern for the differing variances of the underlying variables.

cation index are summed). When the intoxication indicator rises beyond 48, the risk of dependence also rises precipitously. Moreover, when intoxication frequency is moderate or high, the presence of two or more warning incidents also increases the risk significantly. The same patterns are present for the risk of adverse effects, except that the importance of warning incidents is even greater. For predicting adverse effects, the appearance of two warning incidents suggests a substantial risk even when no intoxication has been reported. When at least one instance of intoxication has been reported, the appearance of even a single warning incident more than doubles the rate of adverse effects. For example, with intoxication scores of 12 to 47, people without any warnings may be expected to show a 12.6 percent rate, very close to the population average; if even one warning has been reported, this rate rises to 27.9 percent.

The high rates shown in the bottom right cells of this table suggest that there may be a substantial group of Air Force personnel whose behavior, manifested in intoxication and warning incidents, is placing them at "increased risk" of dependence or an adverse effect. Such people would be those who have a high level of intoxication or warning incidents but who have not (as yet) experienced the level of problems that would place them in one of our "alcohol problem" categories. If we judge by the rates in this table, such an increased-risk group would comprise

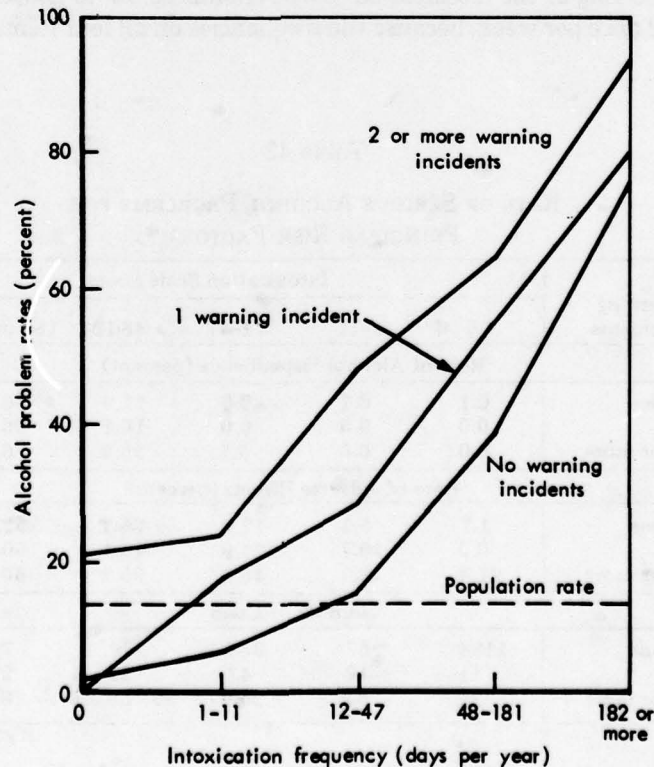


Fig. 8—Total alcohol problem rates by intoxication and warning incidents

all of the people not included in the alcohol-problem categories but (1) located in the rightmost two columns (intoxication score of 48 or more) or (2) located in the third column (intoxication score of 12-47) provided they have experienced at least one warning incident in the past year. This group projects to 7.2 percent of the Air Force. By this definition, then, one can conclude that in addition to the 13.9 percent who have been identified as having experienced an alcohol problem, 7.2 percent of the Air Force report behavioral patterns sufficient to indicate significant risks.

Implications for the Process of Alcohol Problem Development

These results are not just useful as a means of predicting who is at high risk of alcohol problems; they can also be used as a first step in outlining a model by which alcohol problems develop. This analysis was begun with a three-stage sequence in which heavy alcohol consumption starts a process leading eventually to problems. In that formulation, the indicators of incipient problems (warnings, intoxication, and drinking motivations) occupied an intermediate stage between heavy consumption and actual problem occurrence. The regression results reported in Table 41 provide some empirical support for the three-stage formulation, but they also suggest certain revisions. We recognize that these ideas cannot be fully tested with the one-time, cross-sectional data currently available. Nevertheless, we think the results of the preceding analyses are provocative, and they may provide a point of departure for future research to test these ideas more definitively.

Figure 9 shows a representation of a revised model for the development of alcohol problems. Arrows are drawn in where the regression results suggest that substantial effects are present. (Whether such effects are truly causal or merely correlational cannot, of course, be ascertained at this point.) A dotted-line arrow represents a lesser effect that, in our judgment, has some possible importance. These lesser effects include drinking motivation, which turned out to be a marginal

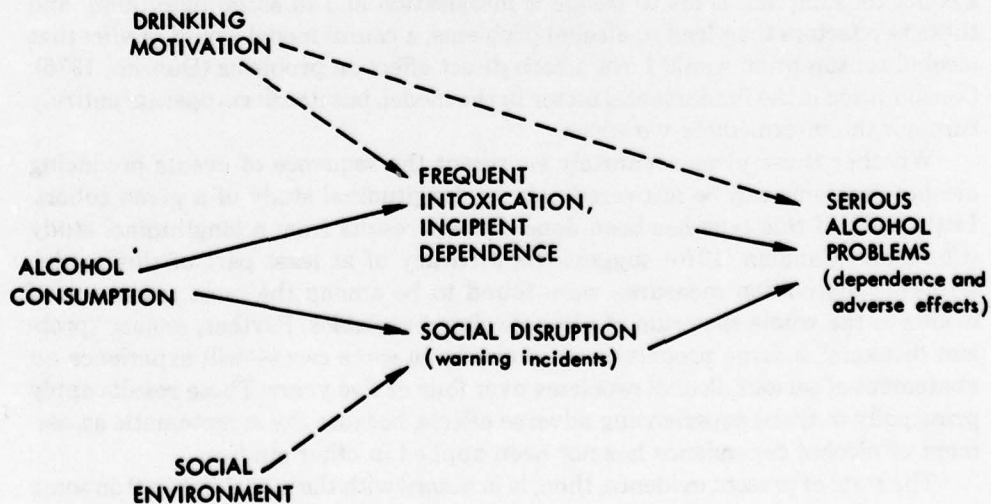


Fig. 9—Hypothetical sequence for development of alcohol problems

variable at best. It was not strongly correlated with other variables, nor did it have an important contribution to the explanation of the dependent variables. Motivations for drinking, as described by respondents, are simply not very important determinants of alcohol problems. Actual drinking behavior is much more important.

Both frequent intoxication and the occurrence of social warnings were strong predictors of alcohol problems. Accordingly, there is reason to consider them as important factors in the development of alcohol problems. In the case of intoxication, the behavior of being intoxicated itself may well be a causal mechanism for developing dependence. There is considerable experimental evidence consistent with this hypothesis, indicating that high blood alcohol concentrations typical of intoxication (say, a level of .15 or higher) can produce withdrawal symptoms (Gross, 1977). Furthermore, frequent intoxication may be seen as more than a manifestation of high consumption or BAC level; it may be an event or condition in its own right, such that it reinforces the heavy use of alcohol as a means of coping with everyday life. Thus intoxication may predispose the individual primarily toward dependence but also, to a lesser extent, toward adverse effects.

The role that social warnings may play is not as clear. Warnings do not cause serious alcohol incidents or dependence, so they must simply be associated with other more basic variables. We interpret the warnings to be indicating the orientation of the individual's social environment toward his drinking behavior. This in turn reflects the degree his drinking behavior oversteps the limits of acceptable conduct according to his associates—the degree to which the drinker is disrupting his social environment at work, at home, while driving a car, and so forth. Warnings may also represent the extent to which he is disrupting his bodily functioning by drinking, as indicated in the case of a physician's warning.

It may seem puzzling that these two variables occupy such a prominent position, whereas alcohol consumption, which might appear to be the basic driving factor in the system, has no direct effect. This situation is not anomalous: It is what would be expected if the causal sequence were as depicted in Fig. 9. That is, if alcohol consumption leads to frequent intoxication and to social disruption, and these two factors then lead to alcohol problems, a causal model would *predict* that alcohol consumption would have a zero direct effect on problems (Duncan, 1975). Consumption is the fundamental factor in the model, but its effects operate entirely through the intermediate variables.

Whether these ideas accurately represent the sequence of events producing alcohol problems can be answered only by longitudinal study of a given cohort. Little work of this type has been done. Recent results from a longitudinal study (Clark and Cahalan, 1976) suggest the accuracy of at least part of this model. Drinking motivation measures were found to be among the most transitory of events in the whole spectrum of alcohol-related variables. Further, among "problem drinkers" a large proportion—a majority in some cases—will experience an abatement of serious alcohol problems over four or five years. These results apply principally to those experiencing adverse effects, because the symptomatic assessment of alcohol dependence has not been applied in other studies.

The state of present evidence, then, is in accord with the model in Fig. 9 on some counts and neutral on others. The progression outlined here probably applies to a small group; most people do not "get worse" as would be the case for a person who

progressed through all three stages and stayed there. In contrast to Jellinek's theory, general-population studies indicate that the theoretical progression of malign symptoms leading to alcoholism or alcohol dependence is not a necessary sequence of events. Exactly what forces govern the process and exactly what events mark those who are in transition to more serious problems are questions not yet answered. Our results imply that the appearance of high daily alcohol consumption or frequent intoxication may be significant markers of a transition to alcohol dependence. When these indications are absent, the appearance of social warnings about drinking or occasional heavy drinking days may forecast significant alcohol incidents in the offing. Apart from these suggestions, the specification of the precise sequence of events leading to alcohol dependence or to experiencing adverse consequences of alcohol use remains a task for future research.

VII. CONCLUSIONS

The principal objective of this study has been to estimate the rate of alcohol problems in the United States Air Force. However, our analysis has not been limited to consideration of the Air Force alone; rather, we have sought to place our concepts and definitions in the context of general knowledge about the nature of alcohol problems, adapting them from the experience of alcohol research in many environments. Indeed, our analysis has shown that alcohol-related behavior in the Air Force is very much like that in a comparable civilian population. Therefore, although the specific rates we shall cite apply to the Air Force in particular, the conclusions drawn should be considered to have greater generality.

The rates we have endeavored to estimate are technically termed "prevalence" rates—the number of cases of a disorder existing in a population during a given time period.¹ Casting the problem in this way raises a fundamental issue: the definition of a "case." From this definitional issue flow the numerous research questions that we have addressed: What are the principal types of alcohol problems, and how do they vary in severity? How do the different types of alcohol problems relate to each other? In what ways do these problems affect the Air Force? How valid are the measures available to assess the extent of such problems? Finally, what are the characteristics (both in background and behavior) of those who are prone to developing problems with alcohol?

PATTERNS OF ALCOHOL PROBLEMS

The first research question—that of the types of alcohol problems and their severity—may be addressed from diverse perspectives. The scientific literature abounds with hypotheses concerning "types" of problems but provides no definitive answers. We have distinguished two broad traditions of research within this literature, each having its own definition of what constitutes an alcohol problem. The first tradition has been concerned with clinical alcoholism and *alcohol dependence*. Various symptoms have been used to measure alcohol dependence, all involving the notion that the dependent person has an overwhelming "need" to consume alcohol. Among indicators that have been used, three are prominent: withdrawal symptoms, subjectively perceived inability to control drinking, and memory lapses (blackouts).

In contrast to such conceptions of dependence, the second tradition we have distinguished focuses on drinking problems or *adverse effects of alcohol*. It argues that for most people the principal problems caused by alcohol are not those of dependence, but those that damage or disrupt the individual's regular functioning—health problems, impairment of productivity at work, arrests, family discord, and the like. Indeed, proponents of this view come close to denying that alcohol de-

¹ This is to be distinguished from an "incidence" rate, which refers to the number of new cases arising in the population during a given time period.

pendence (or alcoholism) exists, at least in the chronic progressive form described by authors in the first tradition.

MEASUREMENT OF PREVALENCE RATES

Our approach has been to integrate these two traditions. Unlike previous studies, ours has constructed detailed measurement procedures for assessing *both* alcohol dependence and the adverse effects of alcohol use. As we see it, it is necessary to measure three basic dimensions of alcohol-related behavior in order to assess dependence and adverse effects. First, one must be able to diagnose *alcohol dependence* itself. Second, one must assess the diverse types of *serious alcohol incidents* that may befall both dependent and nondependent people. Third, one must measure *consumption*, because many physiological complications of excessive drinking derive from the daily ingestion of large amounts of alcohol. These fundamental variables (and many others) were measured in a series of on-site surveys using representative samples of active-duty personnel stationed at 13 Air Force bases worldwide. The 13-base survey obtained 3,148 completed questionnaires, constituting a response rate of 89 percent of the eligible sample. This was our principal data source for detailed analysis. The high response rate and the many controls that were exercised imply that this data base is of high quality. Indeed, comparisons of survey results against official records suggest that the survey responses are valid.

To supplement the 13-base survey information, this study constructed several other data bases. During site visits to each installation, our study team collected official records of alcohol-related police incidents, obtained a detailed accounting of alcoholic beverage sales made on base, and interviewed key personnel responsible for alcohol abuse control policies. In addition, two Air Force-wide surveys were conducted through the regular survey mechanism (local personnel offices); one utilized a questionnaire similar to those used in studies of other populations (Army, Navy, and civilians), the other used the same questionnaire as the 13-base survey. Thus, a variety of data sources was available for comparative analysis, including both survey and nonsurvey information. These resources permitted us to estimate the extent of alcohol problems in the Air Force, and to compare the Air Force with other populations.

Our analysis of these data shows that 4.6 percent of the Air Force may be classified as dependent on alcohol. An additional 9.3 percent of the force may be classified as not being dependent but having experienced a serious adverse effect of alcohol during the past year. Altogether, then, our estimate shows that 13.9 percent of the Air Force experiences a serious alcohol problem over a period of one year.

The definition of dependence used in these estimates rests on self-reported symptoms experienced at a rate of at least one per week. The symptoms include gross tremor, morning drinking (on awakening), loss of control (inability to stop drinking), and blackouts (inability to remember behavior when drinking). The definition of adverse effects includes either of two conditions: (1) experiencing one of 14 serious incidents during the past year (e.g., receiving a lower performance evaluation, being arrested, or having a spouse leave because of drinking); or (2)

reporting regular alcohol consumption at a rate of ten or more drinks per day (5 ounces of ethanol), which implies high risk of physical damage.

Naturally, the problem rate of 13.9 percent would vary if the threshold levels in our definition were changed; however, the problem rate is not unduly sensitive to such changes. For example, a sensitivity analysis showed that even substantial changes of this sort would produce prevalence rates of 8 to 18 percent of the total Air Force, clustering around 14 percent. Moreover, analysis of the individual components of the definition showed that no single symptom or indicator dominated the total problem group; if any particular measure were dropped from the definition, the total problem rate would drop by at most one or two percentage points.

CHARACTERISTICS OF PROBLEM GROUPS

As would be expected, there are striking differences among the groups that are classified as being alcohol dependent, adversely affected, and not affected. In particular, the alcohol dependent group shows most of the characteristics commonly associated with clinical alcoholism. First, 80 percent of the dependent group report that, in addition to experiencing frequent symptoms, they have also experienced some adverse effects in the past year. Second, dependent people report consumption levels eight times as great as levels reported by people in the "not affected" group. In fact, mean ethanol consumption in the dependent group is close to the 5-ounce threshold for high risk of physical damage. The disparities in work impairment are even greater, with dependent people reporting an average of 27 times as much work lost as those without alcohol problems. These characteristics of the alcohol dependent group bear out the expectation that the occurrence of dependence symptoms implies chronic and frequent difficulties.

By comparison, the occurrence of adverse effects without dependence appears less serious. On the above characteristics, "adversely affected" people exhibit rates that are considerably elevated above the norm but not nearly as extreme as the dependent group. In particular, over half of the adverse effects group have experienced only one alcohol incident in the past year. It is therefore possible that for some of these people their "alcohol problem" was a one-time occurrence that will not be repeated. In short, although there are some persons with chronic patterns of alcohol problems in this group, there are many others who do not appear to misuse alcohol habitually. This would suggest that various types of interventions may be appropriate, with education or persuasion targeted for single-incident people and more prolonged therapeutic intervention targeted for those with repetitive problems.

The contrast between dependence and adverse effects recalls the "two worlds" of alcohol problems cited by Room (1977). On the one hand, alcohol dependence appears to constitute a tightly integrated set of disabilities. The symptoms of dependence we examined were highly intercorrelated; a person who exhibited dependence by virtue of one symptom was very likely to show other symptoms as well. Moreover, dependent people universally reported deviant heavy drinking and frequently displayed other "alcoholic" characteristics, including multiple alcohol incidents. This picture suggests that alcohol dependence, when it exists, is at the core of a large set of serious alcohol problems. On the other hand, the adverse

effects experienced by *nonddependent* people show only loose interconnections and show less linkage to high daily consumption or frequent heavy drinking. These contrasting patterns help to explain why the two major traditions in the literature appear so divergent: each tradition has focused on one pattern of behavior. In reality, both patterns should be recognized to present a complete picture of alcohol problems.

VALIDITY OF SELF-REPORTS

An important conclusion of this study is embodied in our finding that survey self-reports, as given in our 13-base survey, appear to be reasonably valid as indicators of overall problem rates. We undertook several analyses to investigate possible bias in self-reports—the extent to which survey respondents might deny or underestimate their actual alcohol problems. We were not able to examine the validity of all our measures. However, we *were* able to obtain official police records of DWI and nondriving arrests, supervisor reports of alcohol-related work problems and lower performance evaluations given because of such problems, and detailed counts of alcoholic beverage sales. The police and supervisor data (when compared with data derived from *self-reports*) provide no evidence that respondents underreported their alcohol problem behavior. The alcoholic beverage sales data show that self-reported alcohol consumption, in the aggregate, accounted for about 83 percent of total beverage purchases, after proper adjustments are made. This 83 percent rate represents considerably greater coverage than that obtained in several prominent civilian studies. We attribute our higher figure to obtaining a more complete sample and instituting a more thorough measurement procedure for assessing consumption. Although the 83 percent rate suggests that self-reported consumption might have to be inflated by as much as 20 percent to match true consumption, a sensitivity analysis demonstrated that even a full 20 percent adjustment would cause only a trivial increase in the estimated alcohol problem rate.

ENVIRONMENT AND MILITARY CONTEXT

In common with other surveys, this study found that certain demographic and background characteristics are important correlates of alcohol problems. Males, younger people, unmarried people, and those with lower levels of education were found to experience higher rates of alcohol problems than their opposites. The problem rates for these groups were typically two to three times as great as for the comparison groups. Lower ranking personnel also exhibited higher problem rates. The rate of alcohol problems for pay grades E1-E4, for example, was 18 percent, compared with 4 percent for officers. However, these higher rates for junior enlisted personnel appear to be explained by the combined effects of age, education, and marital status.

An important point that helps to interpret the effect of marital status is our finding that personnel who are married but not accompanied by their spouses have problem rates just as high as those of unmarried personnel. The meaning of this finding is fully revealed when our results concerning overseas location are consid-

ered. Personnel stationed in the Continental United States have the lowest alcohol problem rates, those in Europe slightly higher rates, and those in the Pacific theater the highest rates. None of these differences is as great as five percentage points, but the significant pattern is that the differences among locations are derived *solely* from the fact that unmarried and unaccompanied personnel show higher rates overseas. In contrast, married personnel have a uniformly low rate of problems regardless of location. This suggests that the presence of a spouse or family is a stabilizing influence in all environments, perhaps particularly so when the person is in a foreign country. Unfortunately, this fact does *not* mean that more liberal accompaniment policies would be an effective remedy for alcohol problems. Because few people are unaccompanied, even large reductions in the proportion of unaccompanied personnel overseas would reduce the total Air Force problem rate by less than 1 percent.

These effects emphasize the importance of controlling for differences in background characteristics in a comparison of diverse populations. The issue is also raised by our comparisons of alcohol problem rates among the Air Force, the other military services, and the civilian population. These comparisons were based on results obtained by previous surveys and on an Air Force-wide survey using a special comparable questionnaire. The analysis showed that the military services reported higher rates of drinking problems than the civilian sample. However, investigation revealed that this difference was due in large measure to the different demographic characteristics of the military and civilian populations. Members of the military services are younger, less likely to be married and accompanied, and more likely to be located overseas. When these different characteristics are statistically controlled for, the groups' drinking problem rates converge considerably. The largest remaining differences shown by these data are on the order of a few percentage points, with the Air Force and civilian rates being essentially the same. Methodological considerations, including differences in the time periods of the surveys, dictate caution in accepting the precise sizes of these differences. However, the overall analysis strongly suggests that the higher problem rates in the services are due largely to demographic factors rather than to anything unique about the military.

RISK FACTORS IN ALCOHOL BEHAVIOR

Several significant conclusions can be drawn from the analysis assessing the link between various behaviors and the risk of alcohol problems. First, high alcohol consumption itself substantially increases risk. Higher rates of steady heavy consumption were closely linked to both dependence and adverse effects. In contrast, intermittent heavy drinking (drinking heavily on a given day but not on every day) resulted in increased risk of adverse effects but *not* of dependence. These patterns further indicate that there is a substantial difference in chronicity between the two types of alcohol problems.

Certain other behaviors had effects even stronger than those of alcohol consumption. Two behavioral patterns—measured by an intoxication index and a social warning index—were the best predictors of alcohol problems among a set of five alcohol-related variables including consumption. After intoxication and social

warnings were taken into account, neither alcohol consumption nor a measure of drinking motivations had much effect on problem rates. Accordingly, we conclude that for pragmatic purposes there are two principal risk factors worth identifying: the frequency with which an individual becomes intoxicated, and the occurrence of warnings about his drinking from his associates. The combination of these two factors is very powerful in determining the risk of both alcohol dependence and adverse effects. This result suggests that frequent intoxication and the appearance of social warnings about drinking may be important markers of an individual's arrival at a second stage, in a progression from heavy alcohol consumption (stage one) to actual dependence or adverse effects (stage three). Frequent intoxication and warnings should therefore act as signals suggesting possible intervention.

The results of this study, taken in their totality, suggest that alcohol dependence and adverse effects of alcohol use are significant problems for the Air Force, as they are for the United States in general. There is considerable substance in a problem that affects almost 5 percent of the population to the point of dependence and affects a total of 14 percent annually in some significant way. However, the magnitude of the problem should not be overstated. The great majority of Air Force personnel appear to be free of any significant impact of alcohol on their work and lives, and the problems are less frequent in the higher ranks where greater responsibility is lodged. Moreover, our analysis suggests that to the extent alcohol problems are present, they mirror the same prevalence rates in all of American society. These rates are not overly alarming, but they do suggest that effective action to reduce alcohol problems is a goal worthy of effort.

Appendix A
13-BASE SURVEY

AIR FORCE SURVEY

The Rand Corporation
Santa Monica, California

PURPOSE OF THE STUDY

The Rand Corporation is conducting a scientific study of drinking practices in the Air Force. The purpose of the study is to evaluate and improve Air Force policies in this area. Your participation in the survey will help Rand and the Air Force learn more about drinking practices and their effects on people.

You have been selected at random as part of a sample which represents all types of people in the Air Force. Any answers you give will be strictly confidential and will be used for research purposes only. No individual information will be given to the Air Force or to anyone outside the Rand research team. The results will be used for statistical summaries only.

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, Air Force Privacy Program, the following information about this survey is provided:

- a. Authority. 10 U.S.C., 8012, Secretary of the Air Force: Powers and Duties, Delegation by.
- b. Principal purpose. The survey is being conducted to collect opinions and behavioral information relating to current and future Air Force policies and programs.
- c. Routine use. The survey data will be converted to statistical information for use by The Rand Corporation and the Air Force in evaluating and planning programs and policies.
- d. Participation in this survey is voluntary.
- e. No adverse action of any kind may be taken against any individual who elects not to participate in this survey.

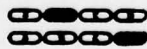
Instructions for Completing Survey

Select only one answer to each question. Mark your answers on the separate answer sheet. Please do not make any marks on this questionnaire form. Do not write your name or SSAN on the answer sheet or the questionnaire form.

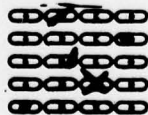
Mark your answers carefully so that you enter them next to the answer sheet number corresponding to the survey question number.

Be sure that your answer sheet marks are heavy and that you blacken the oval-shaped space completely. Use only a No. 2 pencil.

Right way to mark answer sheet



Wrong way to mark answer sheet



DO NOT STAPLE OR OTHERWISE DAMAGE THE ANSWER SHEET.

RECORD ANSWERS TO QUESTIONS A AND B IN THE NUMERIC GRID AT THE RIGHT SIDE OF THE ANSWER SHEET.

A. MARK SPACES 1-5 TO SHOW YOUR DUTY AFSC (AIR FORCE SPECIALTY CODE).

WRITE THE FIVE DIGITS OF YOUR DUTY AFSC IN THE BOXES AT THE BOTTOM OF THE NUMERIC GRID. THEN BLACKEN THE OVALS THAT CORRESPOND TO THE DIGITS YOU WROTE IN THE BOXES.

INCLUDE ONLY THE 5 DIGITS OF YOUR AFSC. DO NOT INCLUDE ANY LETTERS, PREFIX, OR SUFFIX. FOR EXAMPLE, AFSC A43130C WOULD BE MARKED AS 43130. IF YOU DON'T KNOW, MARK 00000.

OFFICERS: RECORD THE 4 DIGITS OF YOUR DUTY AFSC IN SPACES 1-4 OF THE NUMERIC GRID. LEAVE SPACE 5 BLANK.

B. MARK SPACES 23-25 TO SHOW YOUR PRESENT DUTY STATION.

LOOK UP THE NUMBER CORRESPONDING TO YOUR DUTY STATION ON THE LIST BELOW. RECORD THAT NUMBER IN SPACES 23-25 OF THE NUMERIC GRID AT THE RIGHT OF THE ANSWER SHEET.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
001	Albrook AFS, Canal Zone
002	Almaden AFS, Calif.
003	Altus AFB, Okla.
004	Andersen AFB, Guam
005	Andrews AFB, Md.
006	Ankara AS, Turkey
007	Antigo AFS, Wis.
008	Arnold AFS, Tenn.
009	Athenai Airport, Greece
010	Aviano AB, Italy
011	Barksdale AFB, La.
012	Baudette AFS, Minn.
013	Beale AFB, Calif.
014	Bellows AFS, Hawaii
015	Bergstrom AFB, Tex.
016	Bitburg AB, West Germany
017	Blain AFS, Wash.
018	Blytheville AFB, Ark.
019	Bolling AFB, D.C.
020	Brooks AFB, Tex.
021	Bucks Harbor AFS, Me.
022	Calumet AFS, Mich.
023	Cambridia AFS, Calif.
024	Camp New Amsterdam, The Netherlands
025	Campion AFS, APO Seattle
026	Cannon AFB, N.M.
027	Cape Charles AFS, Va.
028	Cape Canaveral AFS, Fla.
029	Cape Lisburne AFS, APO Seattle
030	Cape Newenham AFS, APO Seattle
031	Cape Romanzof AFS, APO Seattle
032	Carswell AFB, Tex.
033	Castle AFB, Calif.
034	Caswell AFS, Me.
035	Chanute AFB, Ill.
036	Charleston AFB, S.C.
037	Charleston AFS, Me.
038	Clark AB, Phillipines
039	Cold Bay AFS, APO Seattle
040	Columbus AFB, Miss.
041	Craig AFB, Ala.
042	Cudjoe Key AFS, Fla.
043	Dauphin Island AFS, Ala.
044	Davis-Monthan AFB, Ariz.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
045.....	Dobbins AFB, Ga.
046	Dover, AFB, Del.
047	Duluth International Airport, Minn.
048	Dyess AFB, Tex.
049	Edwards AFB, Calif.
050.....	Eglin AFB, Fla.
051	Eielson AFB, Alaska
052	Ellsworth AFB, S.D.
053	Elmendorf AFB, Alaska
054	Empire AFS, Mich.
055.....	England AFB, La.
056	Ent AFB, Colo.
057	Fairchild AFB, Wash.
058	Finland AFS, Minn.
059	Finley AFS, N.D.
060.....	Fort Fisher AFS, N.C.
061	Fort Lee AFS, Va.
062	Fort Yukon AFS, APO Seattle
063	Fortuna AFS, N.D.
064	Francis E. Warren AFB, Wyo.
065.....	Frankfurt, West Germany
066	Gentile AFS, Ohio
067	George AFB, Calif.
068	Gibbsboro AFS, N.J.
069	Glasgow AFB, Mont.
070.....	Goodfellow AFB, Tex.
071	Goose AB, Labrador, Canada
072	Grand Forks AFB, N.D.
073	Griffis AFB, N.Y.
074	Grissom AFB, Ind.
075.....	Gunter AFS, Ala.
076	Hahn AB, West Germany
077	Hancock Field, N.Y.
078	Havre AFS, Mont.
079	Hickam AFB, Hawaii
080.....	Hill AFB, Utah
081	Holoman AFB, N.M.
082	Homestead AFB, Fla.
083	Howard AFB, Canal Zone
084	Hurlburt Field, Fla.
085.....	Incirlik AB, Turkey
086	Indian Mountain AFS, APO Seattle
087	Indian Spring AF Auxiliary Field, Nev.
088	Iraklion AS, Crete
089	Izmir, Turkey
090.....	K.I. Sawyer, AFB, Mich.
091	Kaala AFS, APO San Francisco
092	Kadena AB., Okinawa
093	Kalispell AFS, Mont.
094	Keesler AFB, Miss.
095.....	Keflavik Airport, Iceland
096	Kelley AFB, Tex.
097	Keno AFS, Oregon
098	Kicheloe AFB, Mich.
099	King Salmon Airport, Alaska
100.....	Kingsley Field, Ore.
101	Kirtland AFB, N.M.
102	Klamath AFS, Calif.
103	Kotzebue AFS, APO Seattle
104	Kunsan AB, South Korea
105.....	Kwangju AB, South Korea
106	Lackland AFB, Tex.
107	Lajes Field, Azores
108	Lake Charles AFS, La.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
109	Langley AFB, Va.
110	Laughlin AFB, Tex.
111	Laurence G. Hanscom AFB, Mass.
112	Lindsey AS, West Germany
113	Little Rock AFB, Ark.
114	Lockport AFS, N.Y.
115	Loring AFB, Me.
116	Los Angeles AFS, Calif.
117	Lowry AFB, Colo.
118	Luke AFB, Ariz.
119	Mac Dill AFB, Fla.
120	Makah AFS, Wash.
121	Malmstrom AFB, Mont.
122	March AFB, Calif.
123	Martinsburg AFS, W. Va.
124	Mather AFB, Calif.
125	Maxwell AFB, Ala.
126	McChord AFB, Wash.
127	McClellan AFB, Calif.
128	McConnell AFB, Kan.
129	McGuire AFB, N.J.
130	Mica Peak AFS, Wash.
131	Mill Valley AFS, Calif.
132	Minot AFB, N.D.
133	Minot AFS, N.D.
134	Misawa AB, Japan
135	Montauk AFS, N.Y.
136	Moody AFB, Ga.
137	Moron AB, Spain
138	Mountain Home AFB, Idaho
139	Mt. Hebo AFS, Oregon
140	Mt. Laguna AFS, Calif.
141	Murphy Dome AFS, Alaska
142	Myrtle Beach AFB, S.C.
143	Nellis AFB, Nev.
144	Newark AFS, Ohio
145	Niagara Falls International Airport, N.Y.
146	No. Bend AFS, Oregon
147	No. Charleston AFS, S.C.
148	No. Truro AFS, Mass.
149	Norton AFB, Calif.
150	Offutt AFB, Neb.
151	Oklahoma City AFS, Okla.
152	Opheim AFS, Mont.
153	Osan AB, South Korea
154	Osceola AFS, Wis.
155	Othello AFS, Wash.
156	Patrick AFB, Fla.
157	Pease AFB, N.H.
158	Peterson Field, Colo.
159	Pillar Point AFS, Calif.
160	Plattsburgh AFB, N.Y.
161	Point Arena AFS, Calif.
162	Pope AFB, N.C.
163	Port Austin AFS, Mich.
164	Punamano AFS, FPO Hawaii
165	Ramstein AB, West Germany
166	Randolph AFB, Tex.
167	Reese AFB, Tex.
168	Rhein-Main AB, West Germany
169	Richards-Gebaur AFB, Mo.
170	Richmond AFS, Fla.
171	Rickenbacker AFB, Ohio
172	Roanoke Rapids AFS, N.C.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
173	Robins AFB, Ga.
174	RAF Alconbury, United Kingdom
175.....	RAF Bentwaters, United Kingdom
176	RAF Chicksands, United Kingdom
177	RAF Lakenheath, United Kingdom
178	RAF Mildenhall, United Kingdom
179	RAF Sculthorpe, United Kingdom
180.....	RAF Upper Heyford, United Kingdom
181	RAF Wethersfield, United Kingdom
182	RAF Woodbridge, United Kingdom
193	San Antonio AFS, Tex.
184	San Pedro Hill AFS, Calif.
185.....	San Vito dei Normanni AS, Italy
186	Saratoga Springs AFS, N.Y.
187	Sault Sainte Marie AFS, Mich.
188	Savannah AFS, Ga.
189	Scott AFB, Ill.
190.....	Selfridge AGB (ANG), Mich.
191	Sembach AB, West Germany
192	Seymour Johnson AFB, N.C.
193	Shaw AFB, S.C.
194	Shemya AFB, Alaska
195.....	Sheppard AFB, Tex.
196	Shu-Lin-Kou AS, Taiwan
197	Sondrestrom AB, Greenland
198	Spangdahlem AB, West Germany
199	Sparrevohn AFS, APO Seattle
200.....	St. Albans AFS, Vt.
201	St. Louis AFS, Mo.
202	Sunnyvale AFS, Calif.
203	Tachikawa AB, Japan
204	Taegu AB, South Korea
205.....	Tainan AS, Taiwan
206	Tatalina AFS, APO Seattle
207	Tempelhof Airport, Berlin, Germany
208	Thule AB, Greenland
209	Tin City AFS, APO Seattle
210.....	Tinker AFB, Okla.
211	Tonopah AFS, Nev.
212	Torrejon AB, Spain
213	Travis AFB, Calif.
214	Truax Field, Wis.
215.....	Tyndall AFB, Fla.
216	Vance AFB, Okla.
217	Vandenberg AFB, Calif.
218	Warren AFB, Wyo.
219	Watertown AFS, N.Y.
220.....	Webb AFB, Mo.
221	Westover AFB, Mass.
222	Wheeler AFB, Hawaii
223	Whiteman AFB, Mo.
224	Wiesbaden AB, West Germany
225.....	Williams AFB, Ariz.
226	Wright-Patterson AFB, Ohio
227	Wurtsmith AFB, Mich.
228	Yokota AB, Japan
229	Zaragoza AB, Spain
230.....	Zweibrucken AB, West Germany

NOW TURN THE ANSWER SHEET UPRIGHT AND ANSWER THE REMAINING QUESTIONS IN THE LETTER GRID BEGINNING WITH QUESTION 1. CHOOSE THE ONE ANSWER THAT COMES CLOSEST TO YOUR EXPERIENCE OR OPINION FOR EACH QUESTION AND BLACKEN ONLY ONE OVAL FOR THE CORRESPONDING NUMBER ON THE ANSWER SHEET.

1. How long have you been at your present duty station?
(Count only the time in your present tour.)

A. Less than 3 months	F. 2 years (24-35 months)
B. 3-6 months	G. 3 years (36-47 months)
C. 7-9 months	H. 4-5 years (48-71 months)
D. 10-11 months	I. 6-8 years (72-107 months)
E. 12-23 months	J. 9 years or more

2. What is the name of your current major command?

A. AAC	F. AFSDC	K. ATC	P. HQ USAF FLD EXT	U. USAFA
B. ACIC	G. AFLC	L. AU	Q. MAC	V. USAFE
C. ADC	H. AFRES	M. HQ COMD	R. PACAF	W. USAF SO
D. AFAFC	I. AFSC	N. HQ COMD SPEC ACTY	S. SAC	X. USAFSS
E. AFCS	J. ARPC	O. HQ USAF	T. TAC	Y. Other

3. What is your present active duty pay grade?

Officer/Officer Trainee

Enlisted

A. O-6	I. E-9
B. O-5	J. E-8
C. O-4	K. E-7
D. O-3	L. E-6
E. O-2	M. E-5
F. O-1	N. E-4
G. W-1 thru W-4	O. E-3
H. Officer trainee	P. E-2
	Q. E-1

4. What is your age?

A. 17 or under	F. 22-24	K. 37-39	P. 52-54
B. 18	G. 25-27	L. 40-42	Q. 55-57
C. 19	H. 28-30	M. 43-45	R. 58-60
D. 20	I. 31-33	N. 46-48	S. 61-63
E. 21	J. 34-36	O. 49-51	T. 64 or over

5. Are you male or female?

A. Male
B. Female

6. How much do you weigh?

A. 100 lbs. or less	F. Between 181 and 200 lbs.
B. Between 101 and 120 lbs.	G. Between 201 and 220 lbs.
C. Between 121 and 140 lbs.	H. Between 221 and 240 lbs.
D. Between 141 and 160 lbs.	I. Over 240 lbs.
E. Between 161 and 180 lbs.	

7. Which one of the following do you consider yourself?

A. American Indian
B. Spanish background (Mexican American, Puerto Rican, Cuban, etc.)
C. White (but not Spanish background)
D. Black
E. Oriental American
F. Other

8. What is your highest level of education NOW? (Include accepted GED credits.)
- | | |
|--|--|
| A. No high school | G. College degree (BA, BS, or equivalent) |
| B. Some high school | H. Graduate study but no graduate degree |
| C. GED certificate or high school equivalency | I. Master's degree |
| D. High school graduate | J. Doctor's degree (Ph.D., M.D., LL.B., Ed.D., etc.) |
| E. One or two years of college or vocational school (include Associate Degree) | |
| F. More than two years of college | |
9. What is your marital status?
- | | |
|--------------|------------------|
| A. Married | D. Widowed |
| B. Separated | E. Never married |
| C. Divorced | |
10. How many dependents do you have? (Do not include yourself.)
- | | |
|-----------------|-------------------------|
| A. None | E. 4 dependents |
| B. 1 dependent | F. 5 dependents |
| C. 2 dependents | G. 6 dependents |
| D. 3 dependents | H. 7 or more dependents |
11. Is your spouse with you at your present duty station?
- A. Yes, my spouse is with me
 B. No, my spouse is not with me
 C. I am not currently married
12. Have you ever been stationed in a place where you had to be separated from your spouse for 3 months or more?
- A. Yes, I have been stationed in such a place
 B. No, I have never been stationed in such a place
 C. I have not been married while in the Air Force
13. Where did you live during most of the time while you were growing up, before you were 16 years old?
- A. Middle Atlantic (New Jersey, New York, Pennsylvania)
 B. New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont)
 C. East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin)
 D. West North Central (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota)
 E. South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia)
 F. East South Central (Alabama, Kentucky, Mississippi, Tennessee)
 G. West South Central (Arkansas, Louisiana, Oklahoma, Texas)
 H. Mountain (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming)
 I. West Coast (California, Oregon, Washington)
 J. Alaska, Hawaii
 K. Puerto Rico, other U.S. territories
 L. Europe
 M. Asia
 N. Pacific
 O. Africa
 P. Other Latin America
 Q. Canada
 R. Other overseas location
14. When you were growing up, until about the age of 16, did your father or stepfather drink frequently or heavily?
- A. Did not live with a father or stepfather
 B. Yes
 C. No

15. When you were growing up, until the age of 16, did your mother or stepmother drink frequently or heavily?
- A. Did not live with a mother or stepmother
 B. Yes
 C. No
16. How long have you been on active duty? (If you had a break in service, count current time and time in previous tours.)
- A. Less than 3 months F. 2 years (24-35 months) K. 12-15 years (144-191 months)
 B. 3-6 months G. 3 years (36-47 months) L. 16-19 years (192-239 months)
 C. 7-9 months H. 4-5 years (48-71 months) M. 20-24 years (240-299 months)
 D. 10-11 months I. 6-8 years (72-107 months) N. 25-29 years (300-359 months)
 E. 12-23 months J. 9-11 years (108-143 months) O. 30 years or more
17. What type of quarters do you have at present?
- A. On base with dependents
 B. -On base barracks or nondependent quarters
 C. Off base government housing
 D. Off base civilian housing
18. How many overseas assignments of a month or longer have you had since you have been in the Air Force? (Include Alaska and Hawaii.) Count your present tour if you are now overseas.
- A. No overseas assignments E. 4 assignments
 B. 1 assignment F. 5 assignments
 C. 2 assignments G. 6 assignments
 D. 3 assignments H. 7 or more assignments
19. In what term of enlistment are you currently serving?
- A. First term F. Sixth term
 B. Second term G. Seventh term
 C. Third term H. Eighth term
 D. Fourth term I. Ninth or later term
 E. Fifth term J. Does not apply, I am an officer.
20. How soon will you complete your current term of enlistment?
- A. 1-3 months F. 25-36 months
 B. 4-6 months G. 37-48 months
 C. 7-9 months H. 49-60 months
 D. 10-12 months I. More than 60 months
 E. 13-24 months J. Does not apply, I am an officer.
21. Do you intend to reenlist when your present term of service is completed?
- A. Yes D. No
 B. Undecided, but probably yes E. Will retire at end of present term of service
 C. Undecided, but probably no F. Does not apply, I am an officer.
22. When you finally leave the Air Force, how many total years of service do you expect to have?
- A. 1 year F. 8 years K. 20 years
 B. 2 years G. 9-11 years L. 21-25 years
 C. 3 years H. 12-14 years M. 26-29 years
 D. 4 years I. 15-17 years N. 30 years or more
 E. 5-7 years J. 18-19 years

23. How satisfied are you with your military job?

- A. Very satisfied
- B. Satisfied
- C. Neither satisfied nor dissatisfied
- D. Dissatisfied
- E. Very dissatisfied

24. How satisfied are you with your location and assignment?

- A. Very satisfied
- B. Satisfied
- C. Neither satisfied nor dissatisfied
- D. Dissatisfied
- E. Very dissatisfied

GO RIGHT ON TO THE NEXT PAGE.

Here are some statements people have made about drinking. Please mark for each statement whether you strongly agree, agree, are neutral, disagree, or strongly disagree.

	<u>Strongly</u> <u>Agree</u>	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>	<u>Strongly</u> <u>Disagree</u>
25. Liquor is more expensive in civilian life than in the Air Force.	A	B	C	D	E
26. There is really no cure for alcoholism.	A	B	C	D	E
27. Entering an Air Force alcohol abuse program will permanently damage your career.	A	B	C	D	E
28. Alcoholism is basically a sign of moral weakness.	A	B	C	D	E
29. A party isn't a party unless alcoholic drinks are served.	A	B	C	D	E
30. Many of the people in my unit think there is something wrong with a person who doesn't drink.	A	B	C	D	E
31. Even a moderate amount of drinking damages the body.	A	B	C	D	E
32. If an alcoholic expects to get better, he/she must stop drinking entirely.	A	B	C	D	E
33. The Air Force tries to help those who have a drinking problem.	A	B	C	D	E
34. It's all right to get drunk once in a while as long as it doesn't get to be a habit.	A	B	C	D	E
35. It's a good thing that the Air Force has started a policy to deglamorize alcohol.	A	B	C	D	E
36. Every military man should know how to hold his liquor.	A	B	C	D	E
37. If Air Force personnel enter into the Air Force program for alcohol abuse, it will reflect unfavorably on their units.	A	B	C	D	E
38. It's all right to have a drink or two at lunch on duty days.	A	B	C	D	E
39. Drinking together helps keep up the spirit and morale of a unit.	A	B	C	D	E

Here are some statements about the effects of alcohol and of Air Force policy concerning alcohol abuse. Please mark for each statement whether you believe it is true or false.

	<u>TRUE</u>	<u>FALSE</u>
40. Drinking too much liquor quickly can kill a person.	A	B
41. Forgetting what happened while drinking is a sign of alcoholism.	A	B
42. One can of beer has about the same amount of alcohol as one shot of whiskey.	A	B
43. Drinking black coffee and dousing your head with cold water will help you sober up quickly.	A	B
44. As long as you eat a balanced diet, drinking won't damage your body.	A	B
45. A person can become physically addicted to alcohol.	A	B
46. If you turn yourself in to the Air Force for drinking problems, disciplinary action will be taken against you.	A	B
47. It is Air Force policy to discharge alcoholics.	A	B
48. It is Air Force policy that alcohol abuse information is made a permanent part of the person's record.	A	B
49. The best cure for a hangover is a drink.	A	B

HERE ARE SOME QUESTIONS ABOUT YOUR OWN DRINKING.

50. How long has it been since your last drink of beer, wine, or hard liquor?

- | | |
|---------------------------------|---|
| A. Today | F. 2-3 months ago (60-119 days ago) |
| B. 1-7 days ago | G. 4-6 months ago |
| C. 8-14 days ago | H. 7-12 months ago |
| D. 15-30 days ago | I. More than one year ago |
| E. 1 month ago (31-59 days ago) | J. Never drank any beer, wine, or hard liquor |

SKIP TO QUESTION 131 IF YOU NEVER DRANK ANY BEER, WINE, OR HARD LIQUOR.

51. During the past 30 days, how often did you drink beer?

- | | |
|-------------------------|--|
| A. Every day | E. 2-3 times during the past 30 days |
| B. Nearly every day | F. Once during the past 30 days |
| C. 3-4 times a week | G. Didn't drink any beer in the past 30 days (SKIP TO QUESTION 56) |
| D. Once or twice a week | |

52. How much beer did you drink on a typical day (in which you drank beer) during the past 30 days?

- | | |
|-----------------------|---------------------------------------|
| A. 1 can (or bottle) | F. 6 cans |
| B. 2 cans | G. 7 cans |
| C. 3 cans (one quart) | H. 8-11 cans (3 or 4 quarts) |
| D. 4 cans | I. 12-17 cans (5 or 6 quarts) |
| E. 5 cans (2 quarts) | J. 18 or more cans (7 or more quarts) |

53. How large are the cans or bottles that you usually drink?
- | | |
|--|--|
| A. Standard 12-oz. cans or bottles | D. Less than 12-oz. cans or bottles |
| B. 16-oz. (half quart) cans or bottles | E. More than 32-oz. cans or bottles |
| C. 32-oz. (full quart) cans or bottles | F. Don't drink cans or bottles of beer |
54. Think about the last time you drank any beer. Did you buy this beer yourself or did someone else buy it?
- | |
|---------------------------|
| A. I bought it myself |
| B. My spouse bought it |
| C. Someone else bought it |
55. Think about the last time you personally bought any beer. Where did you buy this beer?
- | | |
|---|--|
| A. Bar or restaurant off base | E. Package store on base |
| B. Liquor store or market off base | F. PX |
| C. Other place off base | G. Other place on base |
| D. Bar or restaurant on base (including Officer's Club, NCO Club, or Airman's Club) | H. Didn't buy any beer in the last 30 days |
56. During the past 30 days, how often did you drink wine?
- | | |
|-------------------------|--|
| A. Every day | E. 2-3 times during the past 30 days |
| B. Nearly every day | F. Once during the past 30 days |
| C. 3-4 times a week | G. Didn't drink any wine in the past 30 days (SKIP TO QUESTION 61) |
| D. Once or twice a week | |
57. How much wine did you drink on a typical day (in which you drank wine) during the past 30 days?
- | | |
|--|---|
| A. 1 wine glass (4 oz.) | F. 6 wine glasses (24 oz.--about one fifth or bottle) |
| B. 2 wine glasses | G. 7 wine glasses |
| C. 3 wine glasses (12 oz.--about half a fifth or bottle) | H. 8-11 wine glasses |
| D. 4 wine glasses | I. 12 wine glasses (48 oz.--about two fifths) |
| E. 5 wine glasses | J. More than 12 wine glasses or more than two fifths |
58. During this period, did you usually drink a regular wine or a fortified wine such as sherry, vermouth, port, or Dubonnet?
- | |
|--|
| A. A regular wine |
| B. A fortified wine (like sherry, vermouth, port, or Dubonnet) |
59. Think about the last time you drank any wine. Did you buy this wine yourself?
- | |
|---------------------------|
| A. I bought it myself |
| B. My spouse bought it |
| C. Someone else bought it |
60. Think about the last time you personally bought any wine. Where did you buy this wine?
- | | |
|---|--|
| A. Bar or restaurant off base | E. Package store on base |
| B. Liquor store or market off base | F. BX |
| C. Other place off base | G. Other place on base |
| D. Bar or restaurant on base (including Officer's Club, NCO Club, or Airman's Club) | H. Didn't buy any wine in the past 30 days |
61. During the past 30 days, how often did you drink hard liquor?
- | | |
|-------------------------|---|
| A. Every day | E. 2-3 times during the past 30 days |
| B. Nearly every day | F. Once during the past 30 days |
| C. 3-4 times a week | G. Didn't drink any hard liquor during the past 30 days (SKIP TO QUESTION 66) |
| D. Once or twice a week | |

How much hard liquor did you drink in a typical day (in which you drank hard liquor) during the past 30 days?

62. Number of drinks

- | | | |
|-------------|-------------|----------------------|
| A. 1 drink | E. 5 drinks | I. 9-11 drinks |
| B. 2 drinks | F. 6 drinks | J. 12-14 drinks |
| C. 3 drinks | G. 7 drinks | K. 15-16 drinks |
| D. 4 drinks | H. 8 drinks | L. 17-24 drinks |
| | | M. 25 drinks or more |

63. About how many ounces of hard liquor are there in your average drink?

- | | |
|----------------------------|---------------------|
| A. One ounce (one shot) | E. 3 ounces |
| B. 1.25 ounces | F. 4 ounces |
| C. 1.5 ounces (one jigger) | G. 5 or more ounces |
| D. 2 ounces | |

64. Think about the last time you drank any hard liquor. Did you buy this hard liquor?

- A. I bought it myself
 B. My spouse bought it
 C. Someone else bought it

65. Think about the last time you personally bought any hard liquor. Where did you buy this hard liquor?

- | | |
|---|---|
| A. Bar or restaurant off base | E. Package store on base |
| B. Liquor store or market off base | F. BX |
| C. Other place off base | G. Other place on base |
| D. Bar or restaurant on base (including Officer's Club, NCO Club, or Airman's Club) | H. Didn't buy any hard liquor in the past 30 days |

NOW THINK ABOUT THE PERIOD OF THE PAST YEAR--FROM TODAY BACK TO ONE YEAR AGO

66. During the past year, how often did you have 8 or more cans of beer in a single day (3 quarts or more)?

- | | |
|----------------------------------|-----------------------------------|
| A. Every day or nearly every day | E. 7-11 times in the past year |
| B. 3-4 times a week | F. 3-6 times in the past year |
| C. Once or twice a week | G. Once or twice in the past year |
| D. 1-3 times a month | H. Never in the past year |

67. During the past year, how often did you have 8 or more glasses of wine in a single day (more than a fifth)?

- | | |
|----------------------------------|-----------------------------------|
| A. Every day or nearly every day | E. 7-11 times in the past year |
| B. 3-4 times a week | F. 3-6 times in the past year |
| C. Once or twice a week | G. Once or twice in the past year |
| D. 1-3 times a month | H. Never in the past year |

68. During the past year, how often did you have 8 or more drinks of hard liquor in a single day (a half pint or more)?

- | | |
|----------------------------------|-----------------------------------|
| A. Every day or nearly every day | E. 7-11 times in the past year |
| B. 3-4 times a week | F. 3-6 times in the past year |
| C. Once or twice a week | G. Once or twice in the past year |
| D. 1-3 times a month | H. Never in the past year |

69. About how many times in the past year have you been high on alcohol for more than 24 hours in a row?

- A. 5 or more times
- B. 4 times
- C. 3 times
- D. 2 times
- E. Once
- F. Never in the past year, but sometime before that
- G. Never in my life

During the past year, how often would you say you have had some alcoholic beverage in each of the following situations?

	Every day or nearly every day	3 to 4 times a week	Once or twice a week	1 to 3 times a month	Less than once a month	Never
70. At a bar or restaurant off base	A	B	C	D	E	F
71. At a club, happy hour, or bar on base	A	B	C	D	E	F
72. At lunch on duty days	A	B	C	D	E	F

NOW THINK ABOUT THAT PERIOD OF TIME WHEN YOU WERE DRINKING THE MOST.

73. When was that period when you were drinking the most?

- A. In the past 30 days
- B. More than 30 days ago, but within the past year
- C. More than one year ago, but within the past 3 years
- D. More than 3 years ago, but within the past 5 years
- E. More than 5 years ago

74. During that period when you were drinking the most, how often did you have 8 or more cans of beer in a single day (3 quarts or more)?

- A. Every day or nearly every day
- B. 3-4 times a week
- C. Once or twice a week
- D. 1-3 times a month
- E. Less than once a month
- F. Never

75. During that period, how often did you have 8 or more glasses of wine in a single day (more than a fifth)?

- A. Every day or nearly every day
- B. 3-4 times a week
- C. Once or twice a week
- D. 1-3 times a month
- E. Less than once a month
- F. Never

76. During that period, how often did you have 8 or more drinks of hard liquor in a single day (a half pint or more)?

- A. Every day or nearly every day
- B. 3-4 times a week
- C. Once or twice a week
- D. 1-3 times a month
- E. Less than once a month
- F. Never

People drink wine, beer, or whiskey for different reasons. Here are some statements people have made about why they drink. On those days when you do drink, how often would you say you drink for each of the following reasons? IF YOU DON'T DRINK NOW, ANSWER IN TERMS OF THE PAST WHEN YOU WERE DRINKING.

	<u>Most of the time</u>	<u>Some of the time</u>	<u>Rarely or Never</u>
	A	B	C
77. I drink to be sociable	A	B	C
78. I drink because I like the taste	A	B	C
79. I drink to forget my worries	A	B	C
80. I drink to relax	A	B	C
81. A drink helps cheer me up when I am in a bad mood	A	B	C
82. A drink helps me when I am depressed or nervous	A	B	C
83. I drink when I am bored and have nothing to do	A	B	C
84. I drink when I'm thirsty	A	B	C
85. I drink to increase my self-confidence	A	B	C
86. If you knew you had an alcohol problem, would you volunteer for treatment offered by the Air Force?			
A. Yes			
B. No			
C. I don't know			

Listed below are a number of things connected with drinking that sometimes affect people on their duty days. Please indicate those things that have happened to you. If they have happened in the past year, please indicate on how many duty days they occurred.

87. I was on duty, but did not work at my normal level of performance because of drinking or a hangover.
- A. Never happened to me on a duty day
 B. Has happened, but not in past year
- Has happened in past year:
- C. Happened on 1 duty day in the past year
 D. 2 duty days
 E. 3 duty days
 F. 4-6 duty days
 G. 7-11 duty days
 H. 12-20 duty days
 I. 21-39 duty days
 J. 40 duty days or more in the past year

88. I was late to work or left early because of drinking or a hangover.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21-39 duty days
- J. 40 duty days or more in the past year

89. I was off duty because of drinking, a hangover, or an illness caused by drinking.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21-39 duty days
- J. 40 duty days or more in the past year

90. I had a drink 2 hours or less before going on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21-39 duty days
- J. 40 duty days or more in the past year

91. I was high from drinking while on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21-39 duty days
- J. 40 duty days or more in the past year

92. I drank on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21-39 duty days
- J. 40 duty days or more in the past year

GO RIGHT ON TO THE NEXT PAGE.

Below is a list of experiences that people have reported, some in connection with drinking. For each experience, please mark one answer to indicate how often, if at all, you had this experience.

- A. Happened 3 or more times in the past year
- B. Happened twice in the past year
- C. Happened once in the past year
- D. Happened, but not in the past year
- E. Never happened in my life

Please take your time on this, so your answers will be as accurate as possible.

	Happened 3 or more times in the past year	Happened twice in the past year	Happened once in the past year	Happened but not in the past year	Never Happened
93. I had an illness connected with drinking which kept me from duty for a week or longer	A	B	C	D	E
94. My drinking may have hurt my chances for a promotion or a better assignment	A	B	C	D	E
95. I got a lower score on my efficiency report or performance rating because of drinking	A	B	C	D	E
96. I received judicial or non-judicial punishment because of my drinking	A	B	C	D	E
97. A physician said I should cut down on drinking	A	B	C	D	E
98. My spouse said I should cut down on drinking	A	B	C	D	E
99. People I work with said I should cut down on drinking	A	B	C	D	E
100. My drinking caused me to lose a friend	A	B	C	D	E
101. I stayed intoxicated for several days at a time	A	B	C	D	E
102. I was warned about my drinking, but not arrested, by a policeman (civilian or military)	A	B	C	D	E
103. I was arrested for drinking and driving	A	B	C	D	E
104. I was arrested for drinking not related to driving	A	B	C	D	E
105. I was arrested for reasons <u>unrelated to drinking</u>	A	B	C	D	E
106. I spent time in jail because of my drinking	A	B	C	D	E

	<u>Happened 3 or more times in the past year</u>	<u>Happened twice in the past year</u>	<u>Happened once in the past year</u>	<u>Happened but not in the past year</u>	<u>Never Happened</u>
107. I spent time in jail for reasons <u>unrelated to drinking</u>	A	B	C	D	E
108. My drinking contributed to my getting hurt in an accident	A	B	C	D	E
109. My drinking contributed to an accident where others were hurt or property was damaged	A	B	C	D	E
110. My spouse threatened to leave me because of my drinking	A	B	C	D	E
111. My spouse threatened to leave me for <u>other</u> reasons	A	B	C	D	E
112. My spouse left me because of my drinking	A	B	C	D	E
113. My spouse left me for <u>other</u> reasons	A	B	C	D	E

Below are some more experiences that people report, some in connection with drinking. For each experience, please indicate how often you had this experience, if at all, in the past year.

- A. Every day or nearly every day
- B. 3-4 times a week
- C. Once or twice a week
- D. 1-3 times a month
- E. 7-11 times in the past year
- F. 3-6 times in the past year
- G. Once or twice in the past year
- H. Happened over a year ago
- I. Never happened

I had this experience:

	<u>Every day or nearly every day</u>	<u>3-4 times a week</u>	<u>Once or twice a week</u>	<u>1-3 times a month</u>	<u>7-11 times in past year</u>	<u>3-6 times in past year</u>	<u>Once or twice in past year</u>	<u>Happened over a year ago</u>	<u>Never Happened</u>
114. I got high on alcohol	A	B	C	D	E	F	G	H	I
115. I was drunk	A	B	C	D	E	F	G	H	I
116. I got into a fight where I hit someone when I was drinking	A	B	C	D	E	F	G	H	I
117. I got into a fight where I hit someone when I was not drinking	A	B	C	D	E	F	G	H	I
118. I awakened the next day not being able to remember some of the things I had done while drinking	A	B	C	D	E	F	G	H	I

	Every day or nearly every day	3-4 times a week	Once or twice a week	1-3 times a month	7-11 times in past year	3-6 times in past year	Once or twice in past year	Happened over a year ago	Never Happened
119. I skipped regular meals while I was drinking	A	B	C	D	E	F	G	H	I
120. I tossed down several drinks fast, to get a quicker effect from them	A	B	C	D	E	F	G	H	I
121. I took a few quick drinks before going to a party to make sure I had enough	A	B	C	D	E	F	G	H	I
122. I took a drink the first thing when I got up in the morning	A	B	C	D	E	F	G	H	I
123. My hands shook a lot in the morning after drinking	A	B	C	D	E	F	G	H	I
124. I could not stop drinking before becoming intoxicated	A	B	C	D	E	F	G	H	I
125. I was sick because of drinking (nausea, vomiting, severe headache, etc.)	A	B	C	D	E	F	G	H	I
126. I had the "shakes" because of drinking	A	B	C	D	E	F	G	H	I
127. I drove a car just after I had 5 or more drinks in a two hour period	A	B	C	D	E	F	G	H	I
128. Have you ever had professional counseling or treatment, or joined a group (such as AA) to get help for a drinking problem?									
	A. Yes, in an Air Force program B. Yes, in a non-Air Force program C. Yes, both in an Air Force and non-Air Force program D. Never								
129. Have you ever been in a hospital or infirmary for an illness or accident connected with drinking? If yes, how many days altogether were you hospitalized in the past year?									
	A. Has never happened B. Happened but not in the past year <u>Has happened in past year:</u> C. 1 day in a hospital connected with drinking in the past year D. 2 days E. 3 days F. 4-6 days G. 7-13 days H. 14-26 days I. 27 days or more in the past year								

130. Have you ever seen a physician as an outpatient for an illness or accident connected with drinking? If yes, how many visits connected with drinking did you make in the past year?

- A. Never have seen a physician for illness or accident connected with drinking
- B. Have visited a physician but not in past year

Have visited a physician in past year:

- C. 1 visit to a physician connected with drinking in the past year
- D. 2 visits
- E. 3 visits
- F. 4-5 visits
- G. 6-10 visits
- H. 11-15 visits
- I. 16 or more visits in the past year

Here are some questions about your close friends.

131. How many close friends would you say you have at the present time?

- A. None
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5
- G. 6
- H. 7
- I. 8 or more close friends

132. Of your close friends, how many would you say drink some beer, or wine, or hard liquor on at least 3 days per week?

- A. None
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5
- G. 6
- H. 7
- I. 8 or more close friends

133. Of your close friends, how many would you say drink frequently or heavily?

- A. None
- B. 1
- C. 2
- D. 3
- E. 4
- F. 5
- G. 6
- H. 7
- I. 8 or more close friends

134. Thinking of your close friend who drinks the most--how often during the past year would you say that friend had 8 or more cans of beer (or 8 or more glasses of wine, or 8 or more drinks of hard liquor) in a single day?

- A. Every day or nearly every day
- B. 3-4 times a week
- C. Once or twice a week
- D. 1-3 times a month
- E. 7-11 times in the past year
- F. 3-6 times in the past year
- G. Once or twice in the past year
- H. Never in the past year

135. Now think of the five co-workers of yours that you know best. How many of these five co-workers would you say drink some beer, or wine, or hard liquor on at least 3 days per week?

- A. 5 co-workers
- B. 4
- C. 3
- D. 2
- E. 1
- F. None of my co-workers

136. Of these 5 co-workers, how many would you say drink frequently or heavily?
- | | |
|-----------------|--------------------------|
| A. 5 co-workers | D. 2 |
| B. 4 | E. 1 |
| C. 3 | F. None of my co-workers |
137. Thinking of your co-worker (among these 5) who drinks the most--how often during the past year would you say that co-worker had 8 or more cans of beer (or 8 or more glasses of wine, or 8 or more drinks of hard liquor) in a single day?
- | | |
|----------------------------------|-----------------------------------|
| A. Every day or nearly every day | E. 7-11 times in the past year |
| B. 3-4 times a week | F. 3-6 times in the past year |
| C. Once or twice a week | G. Once or twice in the past year |
| D. 1-3 times a month | H. Never in the past year |
138. Is this co-worker the same person as your close friend who drinks the most (the friend you answered about in question 134)?
- A. Yes
B. No
139. Think about your immediate supervisor--the person who most often checks your work or reviews your performance on the job.
- How often have you had a drink with your immediate supervisor in the past year?
- | | |
|----------------------------------|-----------------------------------|
| A. Every day or nearly every day | E. 7-11 times in the past year |
| B. 3-4 times a week | F. 3-6 times in the past year |
| C. Once or twice a week | G. Once or twice in the past year |
| D. 1-3 times a month | H. Never in the past year |
140. How much would you say your immediate supervisor drinks--much more than you do, somewhat more than you, about the same as you, somewhat less than you, or much less than you?
- | | |
|---|--|
| A. Supervisor drinks much more than you | E. Supervisor drinks much less than you |
| B. Supervisor drinks somewhat more than you | F. Supervisor doesn't drink at all |
| C. Supervisor drinks about the same as you | G. Don't have any idea how much your supervisor drinks |
| D. Supervisor drinks somewhat less than you | |
141. How many people (in total) have you supervised during the past year (people for whom you prepared an OER or APR)?
- | | |
|---------|-----------------|
| A. None | E. 4-6 |
| B. 1 | F. 7-11 |
| C. 2 | G. 12-20 |
| D. 3 | H. 21-30 |
| | I. More than 30 |

IF YOU HAVE BEEN A SUPERVISOR DURING THE PAST YEAR (IF YOU HAD AT LEAST ONE PERSON WHOSE OER OR APR YOU PREPARED), CONTINUE.

IF YOU HAVE NOT BEEN A SUPERVISOR DURING THE PAST YEAR, YOU ARE FINISHED.

ANSWER THE FOLLOWING QUESTIONS ABOUT THE PEOPLE YOU HAVE SUPERVISED IN THE PAST YEAR (PEOPLE WHOSE OER'S OR APR'S YOU PREPARED).

142. In your opinion, how many of the people you supervised during the past year had a drinking problem that affected their work?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
143. How many of the people you supervised during the past year did you tell to cut down on their drinking?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
144. How many of the people you supervised during the past year did you refer to an Air Force treatment program for alcohol abuse?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
145. How many of the people you supervised during the past year did you refer to civilian treatment for alcohol abuse?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
146. How many of the people you supervised during the past year did you give lower performance ratings because of alcohol abuse that affected their work?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
147. For how many of those you supervised during the past year did you recommend that disciplinary action be taken because of their alcohol abuse?
- | | |
|---|----------------------------------|
| A. None, ever | E. 3 in the past year |
| B. At least 1, but not in the past year | F. 4 in the past year |
| C. 1 in the past year | G. 5 in the past year |
| D. 2 in the past year | H. 6-10 in the past year |
| | I. More than 10 in the past year |
148. For the people you supervised during the past year, how many man days (in total) would you say were lost per month because of absenteeism due to alcohol abuse?
- | | |
|--------------|------------------------|
| A. None | F. 5 |
| B. 1 man day | G. 6 |
| C. 2 | H. 7-9 |
| D. 3 | I. 10 or more man days |
| E. 4 | |

149. For the people you supervised during the past year, how many man hours (in total) would you say were lost per month because of reduced efficiency on the job due to alcohol abuse?

- A. None
- B. 1 man hour
- C. 2
- D. 3
- E. 4
- F. 5
- G. 6-7
- H. 1-2 man days
- I. More than 2 man days

150. During the past year, what is the average amount of time per month you spent dealing with alcohol-related problems of people you supervised?

- A. Spent no time on these problems
- B. 1 hour or less per month
- C. 2 hours
- D. 3 hours
- E. 4 hours
- F. 5 hours
- G. 6 hours
- H. 7 hours
- I. 1 or more work days per month

Appendix B
AIR FORCE-WIDE SURVEY

United States Air Force



USAF SCN 77-76

(Form B)

AFMPC/DPMYP
RANDOLPH AFB, TEXAS

SCN EXPIRES 31 July 1977

PURPOSE OF THE STUDY

The Rand Corporation is conducting a scientific study of drinking practices in the Air Force. The purpose of the study is to evaluate and improve Air Force policies in this area. Your participation in the survey will help Rand and the Air Force learn more about drinking practices and their effects on people.

You have been selected at random as part of a sample which represents all types of people in the Air Force. Any answers you give will be strictly confidential and will be used for research purposes only. No individual information will be given to the Air Force or to anyone outside the Rand research team. The results will be used for statistical summaries only.

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, Air Force Privacy Program, the following information about this survey is provided:

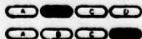
- a. Authority. 10 U.S.C., 8012, Secretary of the Air Force: Powers and Duties, Delegation by.
- b. Principal purpose. The survey is being conducted to collect opinions and behavioral information relating to current and future Air Force policies and programs.
- c. Routine use. The survey data will be converted to statistical information for use by The Rand Corporation and the Air Force in evaluating and planning programs and policies.
- d. Participation in this survey is voluntary.
- e. No adverse action of any kind may be taken against any individual who elects not to participate in this survey


Instructions for Completing Survey

Select only one answer to each question. Mark your answers on the separate answer sheet. Please do not make any marks on this questionnaire form. Do not write your name or SSAN on the answer sheet or the questionnaire form.

Mark your answers carefully so that you enter them next to the answer sheet number corresponding to the survey question number.

Be sure that your answer sheet marks are heavy and that you blacken the oval-shaped space completely. Use only a No. 2 pencil.

Right way to mark answer sheet 

Wrong way to mark answer sheet 

DO NOT STAPLE OR OTHERWISE DAMAGE THE ANSWER SHEET.

RECORD ANSWERS TO QUESTIONS A AND B IN THE NUMERIC GRID AT THE RIGHT SIDE OF THE ANSWER SHEET. DO NOT RECORD YOUR NAME OR DATE OF BIRTH ANYWHERE.

A. MARK SPACES 1-5 ~~TO~~ SHOW YOUR DUTY AFSC (AIR FORCE SPECIALTY CODE).

WRITE THE FIVE DIGITS OF YOUR DUTY AFSC IN THE BOXES AT THE BOTTOM OF THE NUMERIC GRID. THEN BLACKEN THE OVALS THAT CORRESPOND TO THE DIGITS YOU WROTE IN THE BOXES.

INCLUDE ONLY THE 5 DIGITS OF YOUR DUTY AFSC. DO NOT INCLUDE ANY LETTERS, PREFIX, OR SUFFIX. FOR EXAMPLE, AFSC A43130C WOULD BE MARKED AS 43130. IF YOU DON'T KNOW, MARK 00000.

OFFICERS: RECORD THE 4 DIGITS OF YOUR DUTY AFSC IN SPACES 1-4 OF THE NUMERIC GRID. LEAVE SPACE 5 BLANK.

B. MARK SPACES 23-25 TO SHOW YOUR PRESENT DUTY STATION.

LOOK UP THE NUMBER CORRESPONDING TO YOUR DUTY STATION ON THE LIST BELOW. RECORD THAT NUMBER IN SPACES 23-25 OF THE NUMERIC GRID AT THE RIGHT OF THE ANSWER SHEET.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
001	Albrook AFS, Canal Zone
002	Almaden AFS, Calif.
003	Altus AFB, Okla.
004	Andersen AFB, Guam
005	Andrews AFB, Md.
006	Ankara AS, Turkey
007	Antigo AFS, Wis.
008	Arnold AFS, Tenn.
009	Athenai Airport, Greece
010	Aviano AB, Italy
011	Barksdale AFB, La.
012	Baudette AFS, Minn.
013	Beale AFB, Calif.
014	Bellows AFS, Hawaii
015	Bergstrom AFB, Tex.
016	Bitburg AB, West Germany
017	Blaine AFS, Wash.
018	Blytheville AFB, Ark.
019	Bolling AFB, D.C.
020	Brooks AFB, Tex.
021	Bucks Harbor AFS, Me.
022	Calumet AFS, Mich.
023	Cambria AFS, Calif.
024	Camp New Amsterdam, The Netherlands
025	Campion AFS, APO Seattle
026	Cannon AFB, N.M.
027	Cape Charles AFS, Va.
028	Cape Canaveral AFS, Fla.
029	Cape Lisburne AFS, APO Seattle
030	Cape Newenham AFS, APO Seattle
031	Cape Romanzof AFS, APO Seattle
032	Carswell AFB, Tex.
033	Castle AFB, Calif.
034	Caswell AFS, Me.
035	Chanute AFB, Ill.
036	Charleston AFB, S.C.
037	Charleston AFS, Me.
038	Clark AB, Philippines
039	Cold Bay AFS, APO Seattle
040	Columbus AFB, Miss.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
041	Craig AFB, Ala.
042	Cudjoe Key AFS, Fla.
043	Dauphin Island AFS, Ala.
044	Davis-Monthan AFB, Ariz.
045	Dobbins AFB, Ga.
046	Dover AFB, Del.
047	Duluth International Airport, Minn.
048	Dyess AFB, Tex.
049	Edwards AFB, Calif.
050	Eglin AFB, Fla.
051	Eielson AFB, Alaska
052	Ellsworth AFB, S.D.
053	Elmendorf AFB, Alaska
054	Empire AFS, Mich.
055	England AFB, La.
056	Ent AFB, Colo.
057	Fairchild AFB, Wash.
058	Finland AFS, Minn.
059	Finley AFS, N.D.
060	Fort Fisher AFS, N.C.
061	Fort Lee AFS, Va.
062	Fort Yukon AFS, APO Seattle
063	Fortuna AFS, N.D.
064	Francis E. Warren AFB, Wyo.
065	Frankfurt, West Germany
066	Gentile AFS, Ohio
067	George AFB, Calif.
068	Gibbsboro AFS, N.J.
069	Glasgow AFB, Mont.
070	Goodfellow AFB, Tex.
071	Goose AB, Labrador, Canada
072	Grand Forks AFB, N.D.
073	Griffis AFB, N.Y.
074	Grissom AFB, Ind.
075	Gunter AFS, Ala.
076	Hahn AB, West Germany
077	Hancock Field, N.Y.
078	Havre AFS, Mont.
079	Hickam AFB, Hawaii
080	Hill AFB, Utah
081	Holloman AFB, N.M.
082	Homestead AFB, Fla.
083	Howard AFB, Canal Zone
084	Hurlburt Field, Fla.
085	Incirlik AB, Turkey
086	Indian Mountain AFS, APO Seattle
087	Indian Springs AF Auxiliary Field, Nev.
088	Iraklion AS, Crete
089	Izmir, Turkey
090	K.I. Sawyer AFB, Mich.
091	Kaala AFS, APO San Francisco
092	Kadena AB, Okinawa
093	Kalispell AFS, Mont.
094	Keesler AFB, Miss.
095	Keflavik Airport, Iceland
096	Kelley AFB, Tex.
097	Keno AFS, Oregon
098	Kincheloe AFB, Mich.
099	King Salmon Airport, Alaska
100	Kingsley Field, Ore.
101	Kirtland AFB, N.M.
102	Klamath AFS, Calif.

<u>Duty Station Number</u>	<u>Duty Station Name</u>
103	Kotzebue AFS, APO Seattle
104	Kunsan AB, South Korea
105	Kwangju AB, South Korea
106	Lackland AFB, Tex.
107	Lajes Field, Azores
108	Lake Charles AFS, La.
109	Langley AFB, Va.
110	Laughlin AFB, Tex.
111	Laurence G. Hanscom AFB, Mass.
112	Lindsey AS, West Germany
113	Little Rock AFB, Ark.
114	Lockport AFS, N.Y.
115	Loring AFB, Me.
116	Los Angeles AFS, Calif.
117	Lowry AFB, Colo.
118	Luke AFB, Ariz.
119	MacDill AFB, Fla.
120	Makah AFS, Wash.
121	Malmstrom AFB, Mont.
122	March AFB, Calif.
123	Martinsburg AFS, W. Va.
124	Mather AFB, Calif.
125	Maxwell AFB, Ala.
126	McChord AFB, Wash.
127	McClellan AFB, Calif.
128	McConnell AFB, Kan.
129	McGuire AFB, N.J.
130	Mica Peak AFS, Wash.
131	Mill Valley AFS, Calif.
132	Minot AFB, N.D.
133	Minot AFS, N.D.
134	Misawa AB, Japan
135	Montauk AFS, N.Y.
136	Moody AFB, Ga.
137	Moron AB, Spain
138	Mountain Home AFB, Idaho
139	Mt. Hebo AFS, Oregon
140	Mt. Laguna AFS, Calif.
141	Murphy Dome AFS, Alaska
142	Myrtle Beach AFB, S.C.
143	Nellis AFB, Nev.
144	Newark AFS, Ohio
145	Niagara Falls International Airport, N.Y.
146	No. Bend AFS, Oregon
147	No. Charleston AFS, S.C.
148	No. Truro AFS, Mass.
149	Norton AFB, Calif.
150	Offutt AFB, Neb.
151	Oklahoma City AFS, Okla.
152	Opheim AFS, Mont.
153	Osan AB, South Korea
154	Osceola AFS, Wis.
155	Othello AFS, Wash.
156	Patrick AFB, Fla.
157	Pease AFB, N.H.
158	Peterson Field, Colo.
159	Pillar Point AFS, Calif.
160	Plattsburgh AFB, N.Y.
161	Point Arena AFS, Calif.
162	Pope AFB, N.C.
163	Port Austin AFS, Mich.
164	Punamano AFS, FPO Hawaii
165	Ramstein AB, West Germany

<u>Duty Station Number</u>	<u>Duty Station Name</u>
166	Randolph AFB, Tex.
167	Reese AFB, Tex.
168	Rhein-Main AB, West Germany
169	Richard-Gebaur AFB, Mo.
170	Richmond AFS, Fla.
171	Rickenbacker AFB, Ohio
172	Roanoke Rapids AFS, N.C.
173	Robins AFB, Ga.
174	RAF Alconbury, United Kingdom
175	RAF Bentwaters, United Kingdom
176	RAF Chicksands, United Kingdom
177	RAF Lakenheath, United Kingdom
178	RAF Mildenhall, United Kingdom
179	RAF Sculthorpe, United Kingdom
180	RAF Upper Heyford, United Kingdom
181	RAF Wethersfield, United Kingdom
182	RAF Woodbridge, United Kingdom
183	San Antonio AFS, Tex.
184	San Pedro Hill AFS, Calif.
185	San Vito dei Normanni AS, Italy
186	Saratoga Springs AFS, N.Y.
187	Sault Sainte Marie AFS, Mich.
188	Savannah AFS, Ga.
189	Scott AFB, Ill.
190	Selridge AGB(ANG), Mich.
191	Sembach AB, West Germany
192	Seymour Johnson AFB, N.C.
193	Shaw AFB, S.C.
194	Shemya AFB, Alaska
195	Sheppard AFB, Tex.
196	Shu-Lin-Kou AS, Taiwan
197	Sondrestrom AB, Greenland
198	Spandahlem AB, West Germany
199	Sparrevohn AFS, APO Seattle
200	St. Albans AFS, Vt.
201	St. Louis AFS, Mo.
202	Sunnyvale AFS, Calif.
203	Tachikawa AB, Japan
204	Taegu AB, South Korea
205	Tainan AS, Taiwan
206	Tatalina AFS, APO Seattle
207	Tempelhof Airport, Berlin, Germany
208	Thule AB, Greenland
209	Tin City AFS, APO Seattle
210	Tinker AFB, Okla.
211	Tonopah AFS, Nev.
212	Torrejon AB, Spain
213	Travis AFB, Calif.
214	Truax Field, Wis.
215	Tyndall AFB, Fla.
216	Vance AFB, Okla.
217	Vandenberg AFB, Calif.
218	Warren AFB, Wyo.
219	Watertown AFS, N.Y.
220	Webb AFB, Tex.
221	Westover AFB, Mass.
222	Wheeler AFB, Hawaii
223	Whiteman AFB, Mo.
224	Wiesbaden AB, West Germany
225	Williams AFB, Ariz.
226	Wright-Patterson AFB, Ohio
227	Wurtsmith AFB, Mich.
228	Yokota AB, Japan
229	Zaragoza AB, Spain
230	Zweibrucken AB, West Germany

NOW TURN THE ANSWER SHEET UPRIGHT AND ANSWER THE REMAINING QUESTIONS IN THE LETTER GRID BEGINNING WITH QUESTION 1. CHOOSE THE ONE ANSWER THAT COMES CLOSEST TO YOUR EXPERIENCE OR OPINION FOR EACH QUESTION AND BLACKEN ONLY ONE OVAL FOR THE CORRESPONDING NUMBER ON THE ANSWER SHEET.

1. How long have you been at your present duty station? (Count only the time in your present tour.)

- | | |
|-----------------------|------------------------------|
| A. Less than 3 months | F. 2 years (24-35 months) |
| B. 3-6 months | G. 3 years (36-47 months) |
| C. 7-9 months | H. 4-5 years (48-71 months) |
| D. 10-11 months | I. 6-8 years (72-107 months) |
| E. 12-23 months | J. 9 years or more |

2. What is the name of your current major command?

- | | | |
|----------|------------|-----------|
| A. AAC | G. AFSC | M. MAC |
| B. USAFA | H. ATC | N. PACAF |
| C. ADC | I. AU | O. SAC |
| D. USAFE | J. AFOSI | P. TAC |
| E. AFAFC | K. HQ USAF | Q. USAFSS |
| F. AFLC | L. AFAA | R. AFCS |
| | | S. OTHER |

3. What is your present active duty pay grade?

- | <u>Officer/Officer Trainee</u> | <u>Enlisted</u> |
|--------------------------------|-----------------|
| A. O-6 | I. E-9 |
| B. O-5 | J. E-8 |
| C. O-4 | K. E-7 |
| D. O-3 | L. E-6 |
| E. O-2 | M. E-5 |
| F. O-1 | N. E-4 |
| G. W-1 thru W-4 | O. E-3 |
| H. Officer trainee | P. E-2 |
| | Q. E-1 |

4. What is your age?

- | | | | |
|----------------|----------|----------|---------------|
| A. 17 or under | F. 22-24 | K. 37-39 | P. 52-54 |
| B. 18 | G. 25-27 | L. 40-42 | Q. 55-57 |
| C. 19 | H. 28-30 | M. 43-45 | R. 58-60 |
| D. 20 | I. 31-33 | N. 46-48 | S. 61 or over |
| E. 21 | J. 34-36 | O. 49-51 | |

5. Are you male or female?

- A. Male
B. Female

6. How much do you weigh?

- | | |
|-----------------------------|-----------------------------|
| A. 100 lbs. or less | F. Between 181 and 200 lbs. |
| B. Between 101 and 120 lbs. | G. Between 201 and 220 lbs. |
| C. Between 121 and 140 lbs. | H. Between 221 and 240 lbs. |
| D. Between 141 and 160 lbs. | I. Over 240 lbs. |
| E. Between 161 and 180 lbs. | |

7. Which one of the following do you consider yourself?

- | | |
|---|----------|
| A. American Indian | |
| B. Spanish background (Mexican American, Puerto Rican, Cuban, etc.) | |
| C. White (but not Spanish background) | |
| D. Black | |
| E. Oriental American | F. Other |

8. What is your highest level of education NOW? (Include accepted GED credits.)
- | | |
|--|--|
| A. No high school | G. College degree (BA, BS, or equivalent) |
| B. Some high school | H. Graduate study but no graduate degree |
| C. GED certificate or high school equivalency | I. Master's degree |
| D. High school graduate | J. Doctor's degree (Ph.D., M.D., LL.B., Ed.D., etc.) |
| E. One or two years of college or vocational school (include Associate Degree) | |
| F. More than two years of college | |
9. What is your marital status?
- | | |
|--------------|------------------|
| A. Married | D. Widowed |
| B. Separated | E. Never married |
| C. Divorced | |
10. How many dependents do you have? (Do not include yourself.)
- | | |
|-----------------|-------------------------|
| A. None | E. 4 dependents |
| B. 1 dependent | F. 5 dependents |
| C. 2 dependents | G. 6 dependents |
| D. 3 dependents | H. 7 or more dependents |
11. Is your spouse with you at your present duty station?
- A. Yes, my spouse is with me
 B. No, my spouse is not with me
 C. I am not currently married
12. Have you ever been stationed in a place where you had to be separated from your spouse for 3 months or more?
- A. Yes, I have been stationed in such a place
 B. No, I have never been stationed in such a place
 C. I have not been married while in the Air Force
13. Where did you live during most of the time while you were growing up, before you were 16 years old?
- A. Middle Atlantic (New Jersey, New York, Pennsylvania)
 B. New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont)
 C. East North Central (Illinois, Indiana, Michigan, Ohio, Wisconsin)
 D. West North Central (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota)
 E. South Atlantic (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia)
 F. East South Central (Alabama, Kentucky, Mississippi, Tennessee)
 G. West South Central (Arkansas, Louisiana, Oklahoma, Texas)
 H. Mountain (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming)
 I. West Coast (California, Oregon, Washington)
 J. Alaska, Hawaii
 K. Puerto Rico, other U.S. territories
 L. Europe
 M. Asia
 N. Pacific
 O. Africa
 P. Other Latin America
 Q. Canada
 R. Other overseas location

14. When you were growing up, until about the age of 16, did your father or stepfather drink frequently or heavily?
- A. Did not live with a father or stepfather
 - B. Yes
 - C. No
15. When you were growing up, until about the age of 16, did your mother or stepmother drink frequently or heavily?
- A. Did not live with a mother or stepmother
 - B. Yes
 - C. No
16. How long have you been on active duty? (If you have a break in service, count current time and time in previous tours.)
- | | | |
|-----------------------|--------------------------------|---------------------------------|
| A. Less than 3 months | F. 2 years (24-35 months) | K. 12-15 years (144-191 months) |
| B. 3-6 months | G. 3 years (36-47 months) | L. 16-19 years (192-239 months) |
| C. 7-9 months | H. 4-5 years (48-71 months) | M. 20-24 years (240-299 months) |
| D. 10-11 months | I. 6-8 years (72-107 months) | N. 25-29 years (300-359 months) |
| E. 12-23 months | J. 9-11 years (108-143 months) | O. 30 years or more |
17. What type of quarters do you have at present?
- A. On base with dependents
 - B. On base barracks or nondependent quarters
 - C. Off base government housing
 - D. Off base civilian housing
18. How many overseas assignments of a month or longer have you had since you have been in the Air Force? (Include Alaska and Hawaii.) Count your present tour if you are now overseas.
- | | |
|----------------------------|--------------------------|
| A. No overseas assignments | E. 4 assignments |
| B. 1 assignment | F. 5 assignments |
| C. 2 assignments | G. 6 assignments |
| D. 3 assignments | H. 7 or more assignments |
19. In what term of enlistment are you currently serving?
- | | |
|----------------|-------------------------------------|
| A. First term | F. Sixth term |
| B. Second term | G. Seventh term |
| C. Third term | H. Eighth term |
| D. Fourth term | I. Ninth or later term |
| E. Fifth term | J. Does not apply, I am an officer. |
20. How soon will you complete your current term of enlistment?
- | | |
|-----------------|-------------------------------------|
| A. 1-3 months | F. 25-36 months |
| B. 4-6 months | G. 37-48 months |
| C. 7-9 months | H. 49-60 months |
| D. 10-12 months | I. More than 60 months |
| E. 13-24 months | J. Does not apply, I am an officer. |
21. Do you intend to reenlist when your present term of service is completed?
- | | |
|--------------------------------|--|
| A. Yes | D. No |
| B. Undecided, but probably yes | E. Will retire at end of present term of service |
| C. Undecided, but probably no | F. Does not apply, I am an officer. |

22. When you finally leave the Air Force, how many total years of service do you expect to have?

- A. 1 year
- B. 2 years
- C. 3 years
- D. 4 years
- E. 5-7 years
- F. 8 years
- G. 9-11 years
- H. 12-14 years
- I. 15-17 years
- J. 18-19 years
- K. 20 years
- L. 21-25 years
- M. 26-29 years
- N. 30 years or more

23. How satisfied are you with your military job?

- A. Very satisfied
- B. Satisfied
- C. Neither satisfied nor dissatisfied
- D. Dissatisfied
- E. Very dissatisfied

24. How satisfied are you with your location and assignment?

- A. Very satisfied
- B. Satisfied
- C. Neither satisfied nor dissatisfied
- D. Dissatisfied
- E. Very dissatisfied

GO RIGHT ON TO THE NEXT PAGE.

Here are some statements people have made about drinking. Please mark for each statement whether you strongly agree, agree, are neutral, disagree, or strongly disagree.

	<u>Strongly Agree</u>	<u>Agree</u>	<u>Neutral</u>	<u>Disagree</u>	<u>Strongly Disagree</u>
25. Liquor is more expensive in civilian life than in the Air Force.	A	B	C	D	E
26. There is really no cure for alcoholism.	A	B	C	D	E
27. Entering an Air Force alcohol abuse program will permanently damage your career.	A	B	C	D	E
28. Alcoholism is basically a sign of moral weakness.	A	B	C	D	E
29. A party isn't a party unless alcoholic drinks are served.	A	B	C	D	E
30. Many of the people in my unit think there is something wrong with a person who doesn't drink.	A	B	C	D	E
31. Even a moderate amount of drinking damages the body.	A	B	C	D	E
32. If an alcoholic expects to get better, he/she must stop drinking entirely.	A	B	C	D	E
33. The Air Force tries to help those who have a drinking problem.	A	B	C	D	E
34. It's all right to get drunk once in a while as long as it doesn't get to be a habit.	A	B	C	D	E
35. It's a good thing that the Air Force has started a policy to deglamorize alcohol.	A	B	C	D	E
36. Every military man should know how to hold his liquor.	A	B	C	D	E
37. If Air Force personnel enter into the Air Force program for alcohol abuse, it will reflect unfavorably on their units.	A	B	C	D	E
38. It's all right to have a drink or two at lunch on duty days.	A	B	C	D	E
39. Drinking together helps keep up the spirit and morale of a unit.	A	B	C	D	E

HERE ARE SOME QUESTIONS ABOUT YOUR OWN DRINKING.

40. How long has it been since your last drink of beer, wine, or hard liquor?

- | | |
|---------------------------------|---|
| A. Today | F. 2-3 months ago (60-119 days ago) |
| B. 1-7 days ago | G. 4-6 months ago |
| C. 8-14 days ago | H. 7-12 months ago |
| D. 15-30 days ago | I. More than one year ago |
| E. 1 month ago (31-59 days ago) | J. Never drank any beer, wine, or hard liquor |

SKIP TO QUESTION 127 IF YOU NEVER DRANK ANY BEER, WINE, OR HARD LIQUOR.

41. If you had just participated in a happy hour or cocktail party that lasted two hours, how much could you drink and feel safe driving an automobile?
- | | |
|--|------------------------|
| A. I don't drink | G. 5 drinks |
| B. 0 drinks | H. 6 drinks |
| C. 1 drink (a shot, regular mixed drink,
a beer, a glass of wine) | I. 7 drinks |
| D. 2 drinks | J. 8 drinks |
| E. 3 drinks | K. 9 drinks |
| F. 4 drinks | L. 10 drinks |
| | M. More than 10 drinks |
42. Think of all the alcoholic beverages (including all the beer, wine, and liquor) you bought during the past 30 days.
- Of all the alcoholic beverages you bought during that period, how much would you say you bought off base?
- | | |
|---------------------------------|---|
| A. None off base | E. About three-fourths off base |
| B. Almost none off base (1-10%) | F. Almost all off base (90% or more) |
| C. About a fourth off base | G. All off base |
| D. About half off base | H. Didn't buy any alcoholic beverages
during that period |
43. During the past 30 days, how often did you drink beer?
- | | |
|-------------------------|---|
| A. Every day | E. 2-3 times during the past 30 days |
| B. Nearly every day | F. Once during the past 30 days |
| C. 3-4 times a week | G. Didn't drink any beer in the past 30
days (SKIP TO QUESTION 46) |
| D. Once or twice a week | |
44. How much beer did you drink on a typical day (in which you drank beer) during the past 30 days?
- | | |
|-----------------------|---------------------------------------|
| A. 1 can (or bottle) | F. 6 cans |
| B. 2 cans | G. 7 cans |
| C. 3 cans (one quart) | H. 8-11 cans (3 or 4 quarts) |
| D. 4 cans | I. 12-17 cans (5 or 6 quarts) |
| E. 5 cans (2 quarts) | J. 18 or more cans (7 or more quarts) |
45. How large are the cans or bottles that you usually drink?
- | | |
|--|--|
| A. Standard 12-oz. cans or bottles | D. Less than 12-oz. cans or bottles |
| B. 16-oz. (half-quart) cans or bottles | E. More than 32-oz. cans or bottles |
| C. 32-oz. (full quart) cans or bottles | F. Don't drink cans or bottles of beer |
46. During the past 30 days, how often did you drink wine?
- | | |
|-------------------------|---|
| A. Every day | E. 2-3 times during the past 30 days |
| B. Nearly every day | F. Once during the past 30 days |
| C. 3-4 times a week | G. Didn't drink any wine in the past 30
days (SKIP TO QUESTION 49) |
| D. Once or twice a week | |
47. How much wine did you drink on a typical day (in which you drank wine) during the past 30 days?
- | |
|--|
| A. 1 wine glass (4 oz.) |
| B. 2 wine glasses |
| C. 3 wine glasses (12 oz.--about half a fifth or bottle) |
| D. 4 wine glasses |
| E. 5 wine glasses |
| F. 6 wine glasses (24 oz.--about one fifth or bottle) |
| G. 7 wine glasses |
| H. 8-11 wine glasses |
| I. 12 wine glasses (48 oz.--about two fifths) |
| J. More than 12 wine glasses or more than two fifths |

48. During this period, did you usually drink a regular wine or a fortified wine such as sherry, vermouth, port, or Dubonnet?

- A. A regular wine
- B. A fortified wine (like sherry, vermouth, port, or Dubonnet)

49. During the past 30 days, how often did you drink hard liquor?

- A. Every day
- B. Nearly every day
- C. 3-4 times a week
- D. Once or twice a week
- E. 2-3 times during the past 30 days
- F. Once during the past 30 days
- G. Didn't drink any hard liquor during the past 30 days (SKIP TO QUESTION 53)

How much hard liquor did you drink in a typical day (in which you drank hard liquor) during the past 30 days?

MARK EITHER ANSWER 50 (Number of drinks) OR ANSWER 51 (Number of ounces), WHICHEVER IS EASIER FOR YOU TO ESTIMATE.

50. Number of Drinks

OR

51. Number of Ounces

- A. 1 drink
- B. 2 drinks
- C. 3 drinks
- D. 4 drinks
- E. 5 drinks
- F. 6 drinks
- G. 7 drinks
- H. 8 drinks
- I. 9-11 drinks
- J. 12-14 drinks
- K. 15-16 drinks
- L. 17-24 drinks
- M. 25 drinks or more

- A. 1 ounce
- B. 2 ounces
- C. 3 ounces
- D. 4 ounces
- E. 5 ounces
- F. 6 ounces
- G. 7 ounces
- H. 8 ounces (half pint)
- I. 9-11 ounces
- J. 12-14 ounces
- K. 15-16 ounces (one pint)
- L. 17-24 ounces
- M. 25 ounces or more

52. IF YOU ANSWERED IN DRINKS: About how many ounces of hard liquor are there in your average drink?

- A. One ounce (one shot)
- B. 1.25 ounces
- C. 1.5 ounces (one jigger)
- D. 2 ounces
- E. 3 ounces
- F. 4 ounces
- G. 5 or more ounces

The next five questions concern your use of alcoholic beverages over the past 12 months. Although the answers provided here may look very exact, we just want your best estimate. Select the one answer that comes closest to describing your drinking during the past 12 months - that is, since this time last year.

In these questions, a "drink" includes beer, wine, whiskey, or any other kind of drink containing alcohol. If you "can't say" because of variations in your drinking during the past 12 months, answer for the months when you drank the most.

53. Think of all the times in the past 12 months when you had something to drink--how often have you had some kind of beverage containing alcohol, whether it was wine, beer, whiskey or any other drink?

- A. Usually twice a day, or more often
- B. Usually once a day, sometimes twice
- C. Only once a day
- D. Nearly every day
- E. 3 or 4 times a week
- F. Once or twice a week
- G. 2 or 3 times a month
- H. About once a month
- I. 6-11 times a year
- J. 1-5 times a year
- K. Less than once a year
- L. Never in the past 12 months

54. About how often during the past year would you say you had at least 12 drinks during any 12-hour period? (Remember a drink includes beer, wine, whiskey, or any other kind of drink containing alcohol.)
- | | |
|-------------------------|--------------------------------|
| A. Every day | E. 2-3 times a month |
| B. Nearly every day | F. Once a month |
| C. 3 or 4 times a week | G. 6-11 times a year |
| D. Once or twice a week | H. 1-5 times a year |
| | I. Never in the past 12 months |
55. How often during the past year would you say you had between 8 and 11 drinks during any 12-hour period?
- | | |
|-------------------------|--------------------------------|
| A. Every day | E. 2-3 times a month |
| B. Nearly every day | F. Once a month |
| C. 3 or 4 times a week | G. 6-11 times a year |
| D. Once or twice a week | H. 1-5 times a year |
| | I. Never in the past 12 months |
56. How often during the past year would you say you had between 4 and 7 drinks during any 12-hour period?
- | | |
|-------------------------|--------------------------------|
| A. Every day | E. 2-3 times a month |
| B. Nearly every day | F. Once a month |
| C. 3 or 4 times a week | G. 6-11 times a year |
| D. Once or twice a week | H. 1-5 times a year |
| | I. Never in the past 12 months |
57. How often during the past year would you say you had between 1 and 3 drinks during any 12-hour period?
- | | |
|-------------------------|--------------------------------|
| A. Every day | E. 2-3 times a month |
| B. Nearly every day | F. Once a month |
| C. 3 or 4 times a week | G. 6-11 times a year |
| D. Once or twice a week | H. 1-5 times a year |
| | I. Never in the past 12 months |
58. About how often do you get high or tight, on the average?
- | | |
|---|-----------------------------------|
| A. Never high or tight | E. 2 or 3 times a month |
| B. Less than once a year | F. Once or twice a week |
| C. Less than once a month, but at least once a year | G. 3 or 4 times a week |
| D. About once a month | H. Nearly every day or more often |
59. About how many times in the past 3 years have you been high or tight on alcohol for more than 24 hours in a row?
- | | |
|---|------------------------------|
| A. Five or more times in the past 3 years | D. 2 times |
| B. 4 times | E. 1 time |
| C. 3 times | F. Never in the past 3 years |
60. Some people worry about their drinking even though they may not be really heavy drinkers. How much do you worry about your drinking--a lot, some, a little, or not at all?
- | |
|---------------|
| A. A lot |
| B. Some |
| C. A little |
| D. Not at all |

Below is a list of experiences that many people have reported in connection with drinking. For each experience, please mark one answer to indicate the most recent time you had this experience, as follows.

- A. Happened within the past 6 months
- B. Happened more than 6 months ago, but within the past year
- C. Happened more than 1 year ago, but within the past 3 years
- D. Happened more than 3 years ago
- E. Never happened in my life

Please take your time on this, so your answers will be as accurate as possible.

The most recent time I had this experience was:

	<u>Within the past 6 months</u>	<u>More than 6 months ago, but within the past year</u>	<u>More than 1 year ago, but within the past 3 years</u>	<u>More than 3 years ago</u>	<u>Never</u>
61. My drinking was very displeasing to a relative (other than my spouse)	A	B	C	D	E
62. Felt aggressive or cross	A	B	C	D	E
63. Got into a fight	A	B	C	D	E
64. Got into a heated argument	A	B	C	D	E
65. Stayed away from duty because of a hangover	A	B	C	D	E
66. My spouse indicated I should cut down on my drinking	A	B	C	D	E
67. Some other relative indicated I should cut down on drinking	A	B	C	D	E
68. Friends indicated I should cut down on drinking	A	B	C	D	E
69. My drinking was involved in losing a friendship or drifting apart from a friend	A	B	C	D	E
70. Neighbors indicated I should cut down on drinking	A	B	C	D	E
71. People I served with indicated I should cut down on drinking	A	B	C	D	E
72. Have gotten high or tight when on the job	A	B	C	D	E
73. I was afraid I might be an alcoholic or thought I might become one	A	B	C	D	E
74. Drinking may have hurt my chances for a promotion or a better assignment	A	B	C	D	E
75. Got a lower score on my efficiency report or performance evaluation because of drinking	A	B	C	D	E

The most recent time I had this experience was:

	<u>Within the past 6 months</u>	<u>More than 6 months ago, but within the past year</u>	<u>More than 1 year ago, but within the past 3 years</u>	<u>More than 3 years ago</u>	<u>Never</u>
76. Received judicial punishment (general, special, or summary court martial) because of my drinking	A	B	C	D	E
77. Received non-judicial punishment (Article 15 UCMJ) because of my drinking	A	B	C	D	E
78. A physician suggested I should cut down on drinking	A	B	C	D	E
79. Had an illness connected with drinking which kept me from duty for a week or longer	A	B	C	D	E
80. Was in some kind of hospital or infirmary for an illness connected with drinking	A	B	C	D	E
81. Spent too much money on drinks or after drinking	A	B	C	D	E
82. Spent money on drinks which was needed for essentials like food, clothing, or payments	A	B	C	D	E
83. A policeman (civilian or military) questioned or warned me because of my drinking	A	B	C	D	E
84. Had trouble with the law about driving after drinking	A	B	C	D	E
85. Had trouble with the law about drinking, when driving was not involved	A	B	C	D	E
86. My drinking contributed to my getting hurt in an accident	A	B	C	D	E
87. My drinking contributed to getting involved in an accident in which someone else was hurt or property (such as an auto) was damaged	A	B	C	D	E
88. I stayed intoxicated for several days at a time	A	B	C	D	E
89. Once I started drinking it was difficult for me to stop before I became completely intoxicated	A	B	C	D	E
90. Have awakened the next day not being able to remember some of the things I had done while drinking	A	B	C	D	E
91. Skipped a number of regular meals while I was drinking	A	B	C	D	E

The most recent time I had this experience was:

	Within the past 6 months	More than 6 months ago, but within the past year	More than 1 year ago, but within the past 3 years	More than 3 years ago	Never
92. Tossed down several drinks pretty fast, to get a quicker effect from them	A	B	C	D	E
93. Had a quick drink or so when no one was looking	A	B	C	D	E
94. Took a few quick drinks before going to a party to make sure I had enough	A	B	C	D	E
95. Often took a drink the first thing when I got up in the morning	A	B	C	D	E
96. My hands shook a lot the morning after drinking	A	B	C	D	E
97. Sometimes got high or tight when drinking by myself	A	B	C	D	E
98. Often drank in order to change the way I felt	A	B	C	D	E
99. Sometimes kept on drinking after I had promised myself not to	A	B	C	D	E

Was there ever a time when you felt that your drinking had a harmful effect on... (MARK THE LAST TIME IT HAPPENED)

	Within the past 6 months	More than 6 months ago, but within the past year	More than 1 year ago, but within the past 3 years	More than 3 years ago	Never
100. Your friendships and social life?	A	B	C	D	E
101. Your health?	A	B	C	D	E
102. Your marriage or home life?	A	B	C	D	E
103. Your job and assignment?	A	B	C	D	E
104. Your financial position?	A	B	C	D	E
105. During the past 3 years, has your spouse shown any concern about your drinking?					
A. Yes					
B. No (SKIP TO QUESTION 107)					
C. Question does not apply to me (divorced, widowed, or separated more than 3 years) (SKIP TO QUESTION 107)					
106. During the past 3 years, did your spouse (husband or wife) ever get angry about it? (IF "YES") What happened--did your spouse get angry without threatening to leave <u>or</u> did he/she threaten to leave <u>or</u> did your spouse actually leave because of your drinking?					
A. No, never got angry					
B. Yes, got angry but without threatening to leave					
C. Yes, threatened to leave					
D. Yes, actually left me					

People drink wine, beer, or whiskey for different reasons. Here are some statements people have made about why they drink. How important would you say each of the following is (or was) to you as a reason for drinking? IF YOU DON'T DRINK NOW, ANSWER IN TERMS OF THE PAST WHEN YOU WERE DRINKING.

	<u>Very Important</u>	<u>Fairly Important</u>	<u>Not at all Important</u>
107. I drink to be sociable	A	B	C
108. I drink because I like the taste	A	B	C
109. A drink helps me to forget my worries	A	B	C
110. I drink to relax	A	B	C
111. A drink helps cheer me up when I am in a bad mood	A	B	C
112. I drink because I need it when tense and nervous	A	B	C
113. I drink when I am bored and have nothing to do	A	B	C
114. I drink when I'm thirsty	A	B	C
115. I drink when I want to forget everything	A	B	C
116. Drinking is an activity people say they find <u>helpful when they are depressed or nervous</u> . How helpful have you found it to be to have a <u>drink such as a highball or cocktail or some wine or beer when you are depressed or nervous?</u>			
A. Very helpful			
B. Fairly helpful			
C. Not at all helpful			
D. Never tried it for that purpose			
117. If you knew you had an alcohol problem, would you volunteer for treatment offered by the Air Force?			
A. Yes			
B. No			
C. I don't know			

Listed below are a number of things connected with drinking that sometimes affect people on their duty days. Please indicate those things that have happened to you. If they have happened in the past year, please indicate on how many duty days they occurred.

118. I was on duty, but did not work at my normal level of performance because of drinking or a hangover.
- A. Never happened to me on a duty day
B. Has happened, but not in past year
- Has happened in past year:
- C. Happened on 1 duty day in the past year
D. 2 duty days
E. 3 duty days
F. 4-6 duty days
G. 7-11 duty days
H. 12-20 duty days
I. 21 duty days or more in the past year

119. I was late to work or left early because of drinking or a hangover.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21 duty days or more in the past year

120. I was off duty because of drinking, a hangover, or an illness caused by drinking.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21 duty days or more in the past year

121. I had a drink 2 hours or less before going on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21 duty days or more in the past year

122. I was high from drinking while on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21 duty days or more in the past year

123. I drank on duty.

- A. Never happened to me on a duty day
- B. Has happened, but not in past year

Has happened in past year:

- C. Happened on 1 duty day in the past year
- D. 2 duty days
- E. 3 duty days
- F. 4-6 duty days
- G. 7-11 duty days
- H. 12-20 duty days
- I. 21 duty days or more in the past year

124. Have you ever had professional counseling or treatment, or joined a group (such as AA) to get help for a drinking problem?

- A. Yes, in an Air Force program
- B. Yes, in a non-Air Force program
- C. Yes, both in an Air Force and non-Air Force program
- D. Never

125. Have you ever been in a hospital or infirmary for an illness or accident connected with drinking? If yes, how many days altogether were you hospitalized in the past year?

- A. Has never happened
- B. Happened but not in past year

Has happened in past year:

- C. 1 day in a hospital connected with drinking in the past year
- D. 2 days
- E. 3 days
- F. 4-6 days
- G. 7-13 days
- H. 14-26 days
- I. 27 days or more in the past year

126. Have you ever seen a physician as an outpatient for an illness or accident connected with drinking? If yes, how many visits connected with drinking did you make in the past year?

- A. Never have seen a physician for illness or accident connected with drinking
- B. Have visited a physician but not in past year

Have visited a physician in past year:

- C. 1 visit to a physician connected with drinking in the past year
- D. 2 visits
- E. 3 visits
- F. 4-5 visits
- G. 6-10 visits
- H. 11-15 visits
- I. 16 or more visits in the past year

127. How many people (in total) have you supervised during the past year (people for whom you prepared on OER or APR)?

- | | |
|---------|-----------------|
| A. None | E. 4-6 |
| B. 1 | F. 7-11 |
| C. 2 | G. 12-20 |
| D. 3 | H. 21-30 |
| | I. More than 30 |

Here are some statements about the effects of alcohol and of Air Force policy concerning alcohol abuse. Please mark for each statement whether you believe it is true or false.

	<u>TRUE</u>	<u>FALSE</u>
128. Drinking too much liquor quickly can kill a person.	A	B
129. Forgetting what happened while drinking is a sign of alcoholism.	A	B
130. One can of beer has about the same amount of alcohol as one shot of whiskey.	A	B
131. Drinking black coffee and dousing your head with cold water will help you sober up quickly.	A	B
132. As long as you eat a balanced diet, drinking won't damage your body.	A	B
133. A person can become physically addicted to alcohol.	A	B
134. If you stick to drinking beer, you won't become an alcoholic.	A	B
135. If you turn yourself into the Air Force for drinking problems, disciplinary action will be taken against you.	A	B
136. It is Air Force policy to discharge alcoholics.	A	B
137. It is Air Force policy that alcohol abuse information is made a permanent part of the person's record.	A	B
138. The best cure for a hangover is a drink.	A	B

INTRODUCTION FOR SURVEY ADMINISTRATION

When all respondents had arrived for a given session and had been given the survey materials, the Rand representative in charge of the survey delivered the following instructions.

Good morning. I'm (name), and I work for The Rand Corporation. Rand is a nonprofit organization that conducts research studies for federal agencies, including the Air Force. The Air Force has asked us to perform a study of drinking practices among Air Force personnel. For this purpose, we randomly selected 13 bases to represent the various commands of the Air Force. We are here today because (name of base) was one of the 13 bases selected. At each base, we are asking about 200 individuals to complete the survey questionnaire you have been given. These 200 individuals, such as yourselves, have been randomly selected solely on the basis of their social security numbers.

The results of this survey will be used for statistical purposes only. Please do not write your name or any other identifier on the answer sheet. We want this survey to be completely anonymous. We will not attempt to identify any individuals in the study. To further protect your anonymity, no individual results such as the answer sheets will be given to the Air Force or to anyone else outside the Rand research team.

We feel that this is an important study, and I want to thank you for your cooperation. Let me also apologize for any inconvenience you may have experienced in being here today.

It will take you about 45 minutes to complete the questionnaire. Your answers should be recorded with a No. 2 pencil on the answer sheet provided. Before you begin using the questionnaire booklet, we would like you to record two items on your answer sheet. On the right side of your answer sheet you will find a numeric grid. Turn your answer sheet so that this grid is facing you. In boxes 23-25 at the bottom of the grid, please record the number of your present duty station. The number for (base name) is (number). After writing the number, please blacken the oval above each of the boxes that corresponds to the digit in that box. [Pause.] In boxes 1-5, please record the five digits of your Duty AFSC [Air Force Specialty Code]. Do not include any letters, prefix or suffix. If you are an officer, record the 4 digits of your Duty AFSC in spaces 1-4. Leave space 5 blank. If you do not remember your Duty AFSC, mark 5 zeros in spaces 1-5. Again, after writing the digits, please be sure to blacken the corresponding oval above each number. [Pause.]

Now, open your questionnaire booklet to page 1. Please read this page carefully. [Pause.] Be sure to fill out the answer sheet as shown in the instructions at the bottom of the page. That is, select only one answer to each question and blacken the corresponding oval on the answer sheet. Be sure that your answer sheet marks are heavy and that you blacken the ovals completely. Do not make any marks on the survey booklet. Please answer the questions completely and honestly. This is vital if your responses are to be meaningful.

If you have any questions at any time please raise your hand and I will be happy to answer them. Now, please turn to page 6 and begin with question number 1. You have already completed pages 2-5. Again, thank you for your cooperation.

At this point, the representative answered any questions, and continued to respond to questions throughout the session. Because participation in the survey was voluntary—in accordance with the privacy statement the respondents had been asked to read on page 1—any individual indicating at any time that he did not wish to complete the questionnaire was excused and credited for attending the session.

Appendix D

COMPUTATION OF MULTIPLE-ITEM INDICES

TOTAL VOLUME OF ALCOHOL CONSUMPTION

In the field of alcohol research there are at least two schools of thought concerning the measurement of total volume (of alcohol consumed). Indices consonant with the first line of reasoning assess consumption levels on typical drinking days and the number of days on which alcohol is consumed (Armor et al., 1978). The two figures are then multiplied to estimate total volume, called "QF." The second approach is to measure the number of days on which various amounts of alcohol are consumed (e.g., 4-7 or 8-11 drinks). Total volume is then estimated by summing the volume consumed at each drinking level. Typically, the first type of index measures drinking behavior over a short period of time to ensure accurate recall; the second type relies on longer time frames to capture episodic consumption patterns. We do not believe that the measurement of total volume should be an either-or proposition. Rather, it should incorporate the advantages of both approaches. Therefore, our total volume index measures both the typical drinking pattern of an individual (over the past 30 days) and his pattern of episodic higher consumption (during the past year).

Volume Resulting from Typical Drinking Days (QF)

Respondents indicating that they had not consumed any alcoholic beverage during the past 30 days (see q. 50, App. A) were assigned a typical volume of 0 ounces of ethanol per day. For the remaining respondents, daily volume was computed separately for beer, wine, and hard liquor, using parallel procedures. The first step in these calculations was to determine the frequency of consuming each beverage during the past 30 days (qs. 51, 56, and 61). Each frequency was computed in terms of the daily probability of consuming the given beverage. The response alternatives and corresponding frequency codes are listed in Table D.1.

The second step in computing daily volume resulting from typical drinking days was to determine the typical quantity of each beverage drunk during the past 30 days on days when the given beverage was consumed (qs. 52, 57, and 62). The codes used for the number of cans of beer, glasses of wine, and drinks of hard liquor are self-apparent for the smaller quantities. For larger quantities, the value used was the mid-point of the indicated range; for example, 8-11 cans of beer was coded as 9.5 cans. The codes used for the highest quantity were 22 cans for beer, 15 glasses for wine, and 30 drinks for hard liquor. The size of a glass of wine was specified as four ounces (standard wine glass). However, additional questionnaire items were used to account for variations in the size of beer containers or strength of drinks containing hard liquor consumed by different individuals (qs. 53 and 63). In the case of beer, the respondent indicated whether the cans or bottles he usually drank contained 12, 16, 32, less than 12 (coded as 8), or more than 32 (coded as 64) ounces of beer. Missing responses or those indicating that the beer drunk did not come

Table D.1

FREQUENCY CODES FOR TYPICAL
DRINKING DAYS

Response Alternative ^a	Frequency Code (F)	Method of Calculation
Every day	1.000	7/7
Nearly every day	0.786	5.5/7
3-4 times a week	0.500	3.5/7
Once or twice a week	0.214	1.5/7
2-3 times	0.083	2.5/30
Once	0.033	1/30
0 days	0.000	0/30

^aFrequency of consumption of given beverage during past 30 days.

from cans or bottles were coded as 12-ounce containers. For liquor, the respondent indicated the number of ounces of hard liquor in his average drink. The alternatives were 1, 1.25, 1.5, 2, 3, 4, and 5 or more (coded as 5) ounces. Missing responses were coded as one ounce.

Using the measures described in the preceding paragraph, typical quantity for beer and hard liquor was determined by multiplying (1) the number of cans or drinks typically consumed by (2) the number of ounces of the given beverage they contained. Because the standard 4-ounce size was used for wine glasses, the typical quantity for wine was simply four times the number of glasses consumed on a typical day when the respondent drank wine. Once typical quantity had been determined for each beverage, it was multiplied by the frequency of drinking that beverage. The resulting product measures the number of ounces of the given beverage consumed daily as a result of the individual's typical drinking behavior.

The final step in measuring typical volume was to transform the number of ounces of beer, wine, and liquor consumed daily to ounces of ethanol for each beverage. The transformations were made by weighting ounces of beer by .04, wine by .12, and hard liquor by .43. These weights are determined by the standard alcohol content (by volume) of the three beverages. There was one exception to this weighting procedure. Because people consuming large quantities of wine on a regular basis often drink fortified wine, a question was included to measure the type of wine usually consumed by the respondent during the past 30 days (regular or fortified; see q. 58). If the respondent indicated fortified wine, the weight used for ethanol content was .18 (rather than .12).

A technical point concerning the handling of missing data should now be made. In general, if a respondent indicated that he had drunk during the past 30 days but failed to complete any question dealing with frequency or typical quantity (qs. 51, 52, 56, 57, 61, or 62), the three QF measures for that respondent were treated as missing data. To do otherwise would diminish the validity of our measures as parameter estimates of volume in the Air Force population. One exception was made to the exclusion of such individuals—namely, volume measures were computed for a respondent provided that: (1) He indicated he had consumed alcohol during the past 30 days; (2) he had valid, nonzero responses on the frequency and quantity

questions for at least one type of beverage; and (3) he did not partially answer the questions for any of the three beverages (answer the frequency but not the quantity question or vice versa). These cases were included on logical grounds because the pattern conforms to ignoring questions concerning types of beverages that were *not* consumed during the past 30 days while fully answering those pertaining to beverages that *were* consumed. Such cases were rare.

Volume Resulting from Atypical Drinking Days

The procedures described in detail above measure daily ethanol volume resulting from the individual's typical drinking days. However, most people will also experience atypical days on which larger quantities of alcohol are consumed. To the extent that the amounts consumed on those days are close to the individual's typical volume or that the number of atypical days is very small, the impact of such days on daily volume indices is minimal. However, as the quantity of alcohol consumed or the number of such days becomes large, these episodes of heavier drinking have a considerable effect on the individual's mean volume. Moreover, estimates of mean volume in the total population will be incomplete if they ignore the episodic consumption of such individuals.

In light of the importance of accounting for the volume of alcohol consumed on atypical days, we measured (for each beverage) the frequency of consuming eight or more cans of beer, glasses of wine, or drinks of hard liquor (qs. 66, 67, and 68). Because our intention was to measure episodic behavior, the frequency questions pertained to the past year (rather than the past 30 days, appropriate for measuring typical consumption). The quantity of ethanol consumed on such days was coded as 5 ounces (i.e., 10 cans, glasses, or drinks, each containing .5 ounces of ethanol). The response alternatives and corresponding frequency codes for these questions are listed in Table D.2. The sum of these three frequencies constitutes our measure of the "frequency of heavy consumption," discussed later.

Table D.2
FREQUENCY CODES FOR ATYPICAL HIGH
CONSUMPTION DAYS

Response Alternative ^a	Frequency Code (D)	Method of Calculation
Every day or nearly every day	312	6x52
3-4 times a week	182	3.5x52
Once or twice a week	78	1.5x52
1-3 times a month	24	2x12
7-11 times	9	9
3-6 times	4.5	4.5
Once or twice	1.5	1.5
Never	0	0

^aFrequency of atypical high consumption days for given beverage during past year.

Total Alcohol Consumption Measure

The volumes resulting from typical and atypical consumption days were combined in a straightforward manner. For each beverage, the number of days during the past year on which the beverage was consumed was estimated by multiplying the likelihood of consuming it on a given day (F) by 365. This number was then partitioned into the number of days on which atypical high consumption occurred (D ; according to the frequency codes in Table D.2) and the number of typical days ($365F$ minus the number of atypical days).¹ Each number of days was then multiplied by the ounces of ethanol consumed on such days (5 for atypical days and the typical quantity (Q) for typical days). These products were then summed and divided by 365. The resulting composite estimates mean daily volume for the given beverage. The formula may be written as:

$$\frac{5D + Q(365F - D)}{365},$$

where:

D is the number of atypical high consumption days (0 if Q is greater than or equal to 5 for the given beverage).

Q is the volume consumed on typical drinking days for the given beverage.

F is the probability of consuming the given beverage on a given day.

The composite volume measures for the three beverages were then summed, to equal the total volume measure. The following constraints were applied: (1) Respondents indicating no consumption of alcoholic beverages during the past year ($q. 50$) were given scores of 0 on the composite indices (for each beverage) and on the total volume measure, (2) the composite and total volume measures were not computed for individuals for whom typical volume could not be computed, and (3) the maximum value permitted for the composite and total volume measures was 30 ounces of ethanol per day.

ADDITIVE MULTIPLE-ITEM INDICES

In this section we briefly present the coding and index construction techniques for several additive indices that are used in the text.

Daily Occurrence Indices

Three indices used items that were presented in the questionnaire with daily

¹ If the respondent typically consumed eight or more drinks of the given beverage (had a $Q \geq 5$), the number of atypical days for that beverage was 0. If the number of atypical days was \geq the number of typical days, the term $365F - D$ was set to 0.

occurrence response categories. That is, for each item the respondent was asked to indicate the frequency with which an event had occurred on a scale that could be recoded into the number of days of occurrence during the past year. All such items were scored according to the frequency-scoring scheme presented in Table D.2. Missing data were treated as scores of zero.²

Frequency of Heavy Consumption. This index is computed as the sum of the frequency scores resulting from questions 66, 67, and 68. It represents the number of days during the past year when the respondent consumed eight or more drinks.

Alcohol Dependence. This index is computed as the sum of the frequency scores from four measures representing tremors, morning drinking, loss of control, and blackouts. The "tremors" measure is the maximum frequency given by the respondent for question 123 ("My hands shook a lot in the morning after drinking") or question 126 ("I had the shakes because of drinking"). The measures for morning drinking, loss of control, and blackouts are simply the frequencies given by the respondent in answer to questions 122, 124, and 118.

Intoxication. This index is computed as the sum of the frequency scores from four measures representing "being drunk," "being sick because of drinking," "skipping regular meals because of drinking," and "driving a car just after 5 or more drinks within two hours" (qs. 115, 125, 119, and 127).

Incident Indices

Two indices used items that were presented in the questionnaire with response categories recording the number of times the event had occurred during the past year. These were the two indices of "alcohol incidents."

Serious Alcohol Incidents. Altogether there were 14 serious alcohol incidents considered. Of these, ten were measured simply as the reported occurrence (one or more times during the past year) of the event. These are the following:

<i>Item</i>	<i>Question No.</i>
Lower performance rating	95
Official punishment	96
DWI arrest	103
Nondriving arrest	104
Jail	106
Accident with self-injury	108
Accident with injury to others	109
Spouse threatened to leave	110
Spouse left	112
Ill one week	93

² Each of these indices may be loosely interpreted as representing the "number of days" an event occurred. Technically, there can be some overlap among the items of each index, but it was not feasible to correct for the possible overlap. For example, an individual could drink eight or more cans of beer on two days and eight or more drinks of liquor on the same two days, yielding a score of four on the frequency of heavy consumption index. Similarly, multiple symptoms of dependence, or multiple indications of intoxication, could occur on the same day. Because of this situation, it may be more appropriate to interpret these indices as measures of the *intensity* of the phenomena than as measures of strict frequency.

The 11th and 12th incidents (physician visits and hospitalization because of drinking) were recoded from questions 130 and 129; each of these was counted as a "serious alcohol incident" if *two or more days* were cited by the respondent for that particular event (two visits to a physician or two days in the hospital). This was done because in our judgment a single visit to a physician or a single day in a hospital (without an overnight stay) does not reliably indicate a serious event. (About 1 percent of the sample was excluded from having a "serious incident" because of this restriction.)

The 13th incident was that of "fights because of drinking." We computed a measure of drinking-related frequency of fights by counting the number of fights reported *when drinking* (q. 116) less the number of fights reported *when not drinking* (q. 117). (These two items were scored on the daily frequency scale shown in Table D.2.) The measure thus counted the number of days that fighting occurred with drinking to the extent that that number exceeded the number of days that fighting occurred without drinking. If the difference was greater than zero, a "serious alcohol incident" was recorded. Under this procedure, a person who reported fighting when drinking "once or twice a week" would be counted as experiencing an alcohol incident if he reported that he also had fights "1-3 times per month" (or less often) when not drinking. However, he would not be counted if he reported fights when drinking "once or twice a week" and also fights when not drinking "once or twice a week." In that case, we would assume that fighting is a normal part of the person's life and the alcohol-relatedness of the fighting was highly doubtful; hence, the imputation of a serious alcohol incident due to fights is not warranted.

The 14th incident was that of "days lost from work because of drinking." This measure was a binary variable that took on a value of 1 if three or more total days were lost because of drinking in the past year, or 0 if less than three days were lost because of drinking. (See Chapter IV for the development of the index of days lost because of drinking, and App. E, Table E.4, for the distribution of the index.)

Each of these 14 incidents was therefore represented as a binary variable, scored 1 if the incident occurred or 0 if it did not occur. An index of total serious incidents was then computed by taking the sum of the 14 binary variables. The distribution of this index is shown in App. E, Table E.5. In the analysis, however, this summative index was not used. Instead, the index was simply dichotomized into two categories: those reporting one or more incidents during the past year, and those reporting none.

Alcohol Warning Incidents. Five questionnaire items were selected as measures of the occurrence of a "warning" concerning incipient alcohol problems, as discussed in Chapter IV. These warning incidents were measured by questions 97, 98, 99, 102, and 94 ("a physician said I should cut down"; "my spouse said I should cut down"; "people at work said I should cut down"; "I was warned about my drinking, but not arrested, by a policeman"; and "my drinking may have hurt my chances for a promotion or a better assignment"). Each incident was coded according to the number of days during the past year when the incident occurred. The index of warning incidents was computed as the sum of these five variables.³

³ Multiple indications of warnings could arise from a single "incident," but it was not possible to correct for such occurrences. For example, one occurrence of drinking on the job could lead to admonitions from coworkers and spouse. Such configurations would be treated as multiple warnings in the index even though they derive from a single event.

Drinking Motivation Index

Five questionnaire items (qs. 79, 80, 81, 82, and 85) were selected as measures of potentially unhealthy motivations for drinking. These items were statements about reasons for drinking ("to forget my worries"; "to relax"; "to cheer me up"; to help "when I am depressed or nervous"; and "to increase my self-confidence"). The response categories were "rarely or never" (scored as 1); "some of the time" (scored as 2); and "most of the time" (scored as 3). Correlational and factor analysis showed that these items were highly intercorrelated and loaded on the same factor (see App. E, Table E.11). Therefore, they were combined into an overall drinking motivation index, computed as the sum of the scores for the five items.

Appendix E

SUPPLEMENTARY TABLES

The tables in this appendix show distributions and analyses of a technical nature. They are included here for the reader who would like to examine the data in more detail.

Table E.1: Quantity-Frequency and Frequency of Heavy Drinking. This table shows the cross-classification of two basic measures of alcohol consumption. The Quantity-Frequency Index (QF) represents ounces of ethanol consumed per *calendar day* in the past month. It is computed from questions for each beverage asking (1) On how many days during the month did you drink this beverage? and (2) How much of this beverage did you drink on a typical drinking day? (See Table 7 and App. D for the distribution of these items and the computation of the index.) Hence the QF index represents the individual's *typical* consumption.

The "Frequency of Heavy Drinking" variable represents *atypical* drinking—days when the individual drank unusually large amounts (eight drinks or more). In combination with the QF index, this measure may be used to isolate individuals who usually drink in moderate amounts but who on some occasions in the past year have consumed large amounts (e.g., binge drinkers). Such a group would be those in the lower left corner of Table E.1 (e.g., those with a daily consumption of 2.0 ounces or less on QF, but 48 or more days of heavy drinking, constituting altogether 4.8 percent of the sample). Examination of this table suggests that there is a large number of people for whom such a combination of typical and atypical drinking is

Table E.1

QUANTITY-FREQUENCY INDEX AND FREQUENCY OF HEAVY DRINKING (Percent of total sample)

Frequency of Heavy Drinking (number of days when 8 or more drinks were consumed) ^a	Quantity-Frequency Index (alcohol consumption, based on typical days) ^b						Total
	0	.1-1.0	1.1-2.0	2.1-3.0	3.1-5.0	Over 5.0	
0	15.5	23.1	1.0	0.1	0.1	0.0	39.8
1-11	0.0	26.5	3.5	0.8	0.1	0.1	31.0
12-23	0.0	3.5	1.1	0.3	0.3	0.1	5.3
24-47	0.0	3.8	3.5	1.2	0.4	0.2	9.1
48-77	0.0	0.3	1.5	0.5	0.1	0.1	2.5
78-181	0.0	0.1	2.9	2.2	1.4	0.6	7.2
182 or more	0.0	0.0	0.0	0.7	1.8	2.6	5.1
Total	15.5	57.3	13.5	5.8	4.2	3.7	100.0

^aSum of responses to questions 66-68.

^bQF index, computed from questions regarding (1) number of days when a beverage was drunk, past month; and (2) quantity of consumption on a typical drinking day, past month (questions 51-53, 56-58, and 61-63). For details of computation, see App. D. Base N = 3075.

characteristic. A complete measure of alcohol consumption must examine both typical and atypical drinking patterns.

Table E.2: Air Force and U.S. Civilian Samples. This table shows the QF index as distributed by sex among the Air Force personnel in the 13-base sample and among a sample of members of U.S. civilian households. The time periods are slightly different (1977 for Air Force, 1972-1974 for civilians), but recent Rand analysis of these and other surveys through 1976 shows that there have been no significant civilian trends in alcohol consumption over this period (Department of Health, Education, and Welfare, 1978). The civilian sample is standardized on the Air Force age distribution; i.e., the civilian percentages are weighted to reflect the distribution that the civilian QF would show if the civilians had the same age distribution as the Air Force. According to these data, one could not conclude that there is any substantial difference between drinking patterns of Air Force personnel and civilians of the same age and sex. The only exception is that members of the Air Force are less likely than civilians to be abstainers and are more likely instead to be moderate drinkers (0.1 to 2.0 ounces per day). Otherwise, the differences between Air Force personnel and civilians are less than 1 percent in all categories.

Table E.3: Distribution of Total Alcohol Consumption. To improve upon the QF index, we computed an index of "total alcohol consumption" by combining the QF index with Frequency of Heavy Drinking (see App. D for computation methods). The Total Consumption Index adjusts the QF index upward where appropriate to count atypical heavy-drinking days at their appropriate level of consumption instead of the "typical" amount reported in the QF index. (This is done when the quantity consumed on typical days is less than consumption on a heavy-drink-

Table E.2
QUANTITY-FREQUENCY INDEX, AIR FORCE
AND U.S. CIVILIAN SAMPLES

Quantity-Frequency Index (ounces of ethanol)	Percent of Sample			
	Air Force, 1977 ^a		U.S. Civilian Samples, 1972-1974 ^b	
	Male	Female	Male	Female
0	18.9	29.8	21.4	42.9
0.1-1.0	59.8	58.5	56.7	52.2
1.1-2.0	11.6	9.2	11.7	3.1
2.1-3.0	4.4	1.7	4.9	1.0
3.1-4.0	1.9	0.0	2.3	0.5
4.1-5.0	1.1	0.4	1.1	0.0
Over 5.0	2.3	0.4	1.9	0.3
(N)	(2813)	(229)	(2528)	(2735)

^aRand 13-Base survey (self-administered questionnaires in group sessions, anonymous).

^bCombination of four U.S. national household samples collected by personal interview by Louis Harris and Associates (Harris, 1975). Percents for civilians are standardized on the age distribution of the Air Force (18-24/25-39/40-60); ages over 60 excluded.

Table E.3

DISTRIBUTION OF THE TOTAL ALCOHOL CONSUMPTION INDEX

Level of Alcohol Consumption ^a (ounces of ethanol per day)	Percent Reporting ^b	Percent Expected Based on Lognormal Distribution ^c
None	15.5	15.5
0.1-0.5	42.8	38.4
0.6-1.0	14.4	18.5
1.1-1.5	8.2	9.4
1.6-2.0	5.4	5.4
2.1-2.5	3.7	3.4
2.6-3.0	2.2	2.3
3.1-3.5	1.3	1.5
3.6-4.0	1.3	1.1
4.1-4.5	0.7	0.8
4.6-5.0	0.9	0.7
5.1-6.0	1.0	0.9
6.1-7.0	0.6	0.6
7.1-8.0	0.4	0.4
8.1-10.0	0.7	0.4
10.1-14.0	0.5	0.4
14.1 or More	0.4	0.3

Summary Statistic	Ounces of Ethanol
Mean, all cases	1.021
Variance, all cases	4.244
Median, all cases	0.351
Median, drinkers only	0.485

^aExpressed in ounces of ethanol (pure alcohol), derived from the ethanol content of beer, wine, and liquor and from the quantity and frequency reported consumed for each beverage. See App. D.

^bBase N = 3075.

^cExcluding zero values (abstainers) from the estimation for drinkers.

ing day.) The Total Consumption Index represents a kind of weighted average counting both the individual's reports of "typical" consumption and his reports of "atypical, heavy" consumption.

Table E.3 shows a detailed distribution of the Total Consumption Index along with summary statistics. It also shows the distribution that would be expected from a lognormal distribution with the same mean and variance as the observed distribution. As has been found in many other studies (Bruun et al., 1975), the match between the lognormal and the observed distribution is very good. The only place where there is a slight discrepancy is in the levels under 1.0 ounce. Because of these two cells, the observed distribution is statistically significantly different from the expected distribution by a Chi-square goodness-of-fit test ($p < .01$). The actual size of the deviations, however, is small.

Table E.4: Days Lost from Work. This table shows a detailed distribution of the four component items and the total scale of "days lost" from work because of alcohol. The items are only slightly sensitive to changes in the (more or less arbitrary) cutting-point of three days lost, which we used as an "adverse effect." At the three-day point, 4.5 percent of the sample show an "effect." If the cutting-point were

Table E.4

DISTRIBUTION OF DAYS LOST FROM ALCOHOL-RELATED WORK EVENTS
(Percent reporting designated number of days lost)

Number of Days Lost	Work Event ^a				Total Days Lost (all four events)
	Missing an Entire Day (each event counted as 1 day lost)	Arriving Late or Leaving Early (each day counted as .25 days lost)	Lower Level of Performance (each event counted as .25 days lost)	Being "High" from Alcohol on Duty (each event counted as .25 days lost) ^b	
0.00	96.9	88.6	80.8	95.3	74.6
0.25	0.0	4.7	5.7	1.6	5.5
0.50	0.0	2.4	3.9	0.8	4.3
0.75	0.0	1.6	3.0	0.5	3.1
1.00	1.9	0.0	0.0	0.1	1.3
1.25	0.0	1.5	2.2	0.5	3.1
1.50	0.0	0.0	0.0	0.0	1.2
1.75	0.0	0.0	0.0	0.1	0.4
2.00	0.4	0.0	0.0	0.0	0.2
2.25	0.0	0.4	1.2	0.2	0.9
2.50	0.0	0.0	0.0	0.0	0.7
2.75	0.0	0.0	0.0	0.0	0.2
3.00	0.3	0.0	0.0	0.0	0.2
3.25	0.0	0.0	0.0	0.0	0.0
3.50	0.0	0.0	0.0	0.1	0.3
3.75	0.0	0.0	0.0	0.0	0.0
4.00	0.0	0.4	1.1	0.2	0.5
4.25 - 5.00	0.4	0.0	0.0	0.0	0.6
5.25 - 6.00	0.0	0.0	0.0	0.0	0.3
6.25 - 8.00	0.0	0.1	0.2	0.1	0.6
8.25 - 10.00	0.0	0.0	0.0	0.0	0.2
10.25 - 12.00	0.0	0.3	0.9	0.5	0.7
12.25 - 16.00	0.0	0.0	0.0	0.0	0.7
Over 16.00	0.1	0.0	0.0	0.0	0.4

^aQuestions 89, 88, 87, and 91. Base N = 3148.

^bCounted only to the extent that "days high on duty" exceeded days of "lower performance" for that person.

increased to four days, 0.5 percent would be dropped. If it were lowered to two days, an additional 2.0 percent would be included. (However, some of these would already be included in the total "adverse effects" category by virtue of one of the other 13 alcohol incidents.)

Table E.5: Distribution of Alcohol Incident Indices. This table shows the number of people who reported a particular number of serious alcohol incidents or warning incidents in the past year. Clearly the occurrence of multiple incidents is fairly common among those who have at least one. Among serious incidents, of the 12.1 percent who reported at least one, 4.8 percent reported multiple incidents.

Table E.6: Correlations Among Serious Incidents; and Table E.7: Correlations Among Warning Incidents. These tables show the product-moment correlations among the items that constitute measures of alcohol incidents. For most

Table E.5

DISTRIBUTION OF ALCOHOL INCIDENT INDICES
(Percent reporting specified number of incidents)

Number of Incidents	Serious Incidents	Warning Incidents
0	87.9	86.7
1	7.3	4.7
2	1.8	2.4
3	1.2	4.1
4	0.4	0.6
5	0.5	0.5
6 or more	0.9	1.0
(N)	(3148)	(3148)

incidents (except those possibly redundant), the correlations are not high by psychometric standards. The adverse effects these incidents represent are quite diverse and not inclined to cluster tightly together (e.g., warnings from spouse). This is as one would expect from events that are determined partly by alcohol-related behavior but also partly by extraneous factors (local law enforcement, level of general health, strictness of supervision, etc.).

Table E.8: Dependence Symptom Scores. This shows the distribution of the dependence symptom score scale, classified by the number of symptoms reported in the past year. The cutting-point we adopted for the definition of dependence was a score of 48 or more. Less than 10 percent of those classified as dependent, constituting 0.4 percent of the sample, were so classified solely by virtue of reporting one symptom. Each of these cases was examined, and in every such case there were substantial indications from other data that the individual did indeed have chronic problems with alcohol.

Table E.9: Joint Distribution of Alcohol Problems. This table shows the percentage of people in the Air Force estimated (after weighting) as falling in each cell of a three-way classification according to our three basic definitional variables (consumption, incidents, and dependence). It is included to permit determination of the resulting prevalence rate if one makes any arbitrary set of changes in the cutting-points between "problem" and "nonproblem" categories.

Table E.10: Problems by Consumption Patterns. This table shows the rates of alcohol problems observed according to the level of total alcohol consumption and the frequency of heavy drinking. (A summary of the most common patterns is presented in Table 38 in the text.) Both the overall level of alcohol consumption and the frequency of heavy drinking substantially influence the occurrence of adverse effects. The largest effects on the rate of alcohol dependence appear to be those associated with steady, high consumption.

Table E.11: Factor Loadings. This table shows the results of a principal-components factor analysis followed by a Varimax rotation of the first three components extracted (Harman, 1967). There are three very distinct factors, each of which is conceptually important and would have been predicted *a priori*. Factor I appears to be an "alcohol incident" or "adverse effect" factor. Most of the serious incidents and warning incidents load more heavily on this factor than on others. However,

Table E.6
CORRELATIONS AMONG SERIOUS ALCOHOL INCIDENTS

Item	Product-Moment Correlation ^a													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Lower performance rating	1000													
2. Official punishment	353	1000												
3. DWI arrest	297	462	1000											
4. Nondriving arrest	324	368	262	1000										
5. Jail	366	463	596	505	1000									
6. Accident with self-injury	306	181	233	177	224	1000								
7. Accident with injury to others	331	210	289	287	258	369	1000							
8. Fights	168	123	151	120	120	079	093	1000						
9. Spouse threatened to leave	188	066	116	138	103	096	069	068	1000					
10. Spouse left	115	050	014	189	069	046	098	-021	200	1000				
11. Illness lasting one week	357	295	248	296	246	228	217	056	170	110	1000			
12. Visits to physician	077	067	-001	055	036	077	135	000	029	073	113	1000		
13. Hospitalization	030	037	017	078	029	116	089	016	014	054	134	390	1000	
14. Loss of 3 working days	145	161	143	105	122	107	129	088	139	099	137	026	033	1000

^aEntries are the correlation multiplied by 1000. Base N = 3148.

Table E.7

CORRELATIONS AMONG ALCOHOL WARNING INCIDENTS

Item	Product-Moment Correlation ^a				
	1	2	3	4	5
1. Physician said cut down	1000				
2. Co-workers said cut down	470	1000			
3. Spouse said cut down	267	266	1000		
4. Police warned about drinking	419	305	199	1000	
5. Drinking may have hurt promotion chances	371	301	161	313	1000

^aEntries are the correlation multiplied by 1000. Base N = 3148.

Table E.8

ALCOHOL DEPENDENCE SYMPTOM SCORES^a

Number of Symptoms Reported	Symptom Score								Total
	0	1-11	12-23	24-47	48-77	78-181	182-364	365 or More	
0	73.1	—	—	—	—	—	—	—	73.1
1	—	12.6	0.0	1.0	0.0	0.3	0.1	0.0	14.0
2	—	3.9	0.4	0.7	0.1	0.4	0.3	0.2	6.0
3	—	1.3	0.6	0.4	0.3	0.4	0.4	0.3	3.7
4	—	0.2	0.2	0.7	0.2	0.3	0.5	1.1	3.2
Total	73.1	18.0	1.2	2.8	0.6	1.4	1.3	1.6	100.0
									(3148)

^aPercent of total sample.

Table E.9

JOINT DISTRIBUTION OF ALCOHOL PROBLEMS
(Percent of total Air Force)^a

Total Alcohol Consumption (ounces per day)	Alcohol Incidents Past Year	Symptom Score, Dependence Scale				
		0	1-23	24-47	48-77	78 or More
0-3.0	None	66.0	10.6	1.0	0.0	0.5
	1 Warning	1.5	1.2	0.1	0.0	0.0
	2 + Warnings	1.6	1.6	0.3	0.0	0.3
	1 Serious	2.6	2.2	0.1	0.2	0.4
	2 + Serious	0.7	0.8	0.3	0.1	0.8
3.1-4.0	None	0.5	0.5	0.1	0.0	0.0
	1 Warning	0.0	0.1	0.0	0.0	0.1
	2 + Warnings	0.0	0.1	0.0	0.0	0.0
	1 Serious	0.2	0.3	0.0	0.0	0.1
	2 + Serious	0.0	0.1	0.1	0.0	0.2
4.1-5.0	None	0.3	0.3	0.1	0.0	0.0
	1 Warning	0.0	0.1	0.0	0.0	0.0
	2 + Warnings	0.0	0.1	0.0	0.0	0.0
	1 Serious	0.1	0.1	0.1	0.0	0.1
	2 + Serious	0.0	0.0	0.0	0.0	0.2
Over 5.0	None	0.4	0.3	0.0	0.0	0.3
	1 Warning	0.0	0.1	0.0	0.0	0.1
	2 + Warnings	0.1	0.1	0.0	0.0	0.1
	1 Serious	0.0	0.2	0.2	0.0	0.2
	2 + Serious	0.0	0.1	0.1	0.2	0.7

^aWeighted to reflect total Air Force distribution on location, pay grade, and marital/accompaniment status. See App. F for weighting procedure.

Table E.10

RATES OF ALCOHOL PROBLEMS BY ALCOHOL CONSUMPTION PATTERNS^a

Frequency of Heavy Drinking (number of days when 8 drinks or more were consumed past year)	Total Alcohol Consumption (per day)				Total
	0.1-1.0 oz. (1-2 Drinks)	1.0-3.0 oz. (3-6 Drinks)	3.0-5.0 oz. (7-10 Drinks)	Over 5.0 oz. (Over 10 Drinks)	
Rate of Alcohol Dependence (percent)					
0	0.3	2.9	—	—	0.4
1-11	1.2	3.0	—	—	1.6
12-47	3.1	6.9	26.3	—	6.1
48 or More	—	12.0	17.3	50.0	21.8
Total	1.2	7.8	18.0	47.7	5.6
Rate of Adverse Effects (percent)					
0	3.1	8.8	—	—	3.3
1-11	6.1	14.2	—	—	7.2
12-47	16.4	25.9	31.6	—	21.4
48 or More	—	25.6	46.2	56.0	37.3
Total	6.5	22.2	42.2	52.3	13.8
Number of Cases					
0	709	34	3	1	747
1-11	815	134	2	3	954
12-47	225	189	19	7	440
48 or More	12	242	104	100	458
Total	1761	599	128	111	2599

^aUnweighted percents, based on total respondents (N = 2599) who drank in the past 30 days and had nonmissing values on both total alcohol consumption and frequency of heavy drinking.

Table E.11

FACTOR LOADINGS OF ALCOHOL PROBLEM MEASURES

Alcohol Problem Measure	Rotated Factor Loadings ^a		
	I	II	III
Alcohol Dependence			
1. Tremors	.289	.748	.055
2. Morning drinking	.157	.690	.084
3. Impaired control	.231	.647	.041
4. Blackouts	.163	.785	.089
Serious Alcohol Incidents			
5. Official punishment	.687	-.042	.105
6. Lower APR/OER	.640	.219	.046
7. Loss of 3 working days	.133	.346	.248
8. Illness lasting one week	.576	.097	-.001
9. Hospitalization	.095	.138	-.129
10. Visits to physician	.118	.087	-.103
11. Accident with self-injury	.403	.284	-.040
12. Accident with injury to others	.490	.219	-.038
13. Spouse left	.177	.045	-.051
14. Spouse threatened to leave	.216	.180	.071
15. DWI arrest	.628	.080	.042
16. Nondriving arrest	.622	.105	-.006
17. Jail	.690	.082	.073
18. Fights	.190	.173	.078
Intoxication Indicators			
19. Being drunk	.071	.686	.243
20. Being sick from drinking	.312	.639	.037
21. Missing meals because of drinking	.096	.709	.213
22. Driving after 5 or more drinks	.127	.693	.118
Warning Incidents			
23. Physician said cut down	.581	.314	.082
24. Co-workers said cut down	.418	.360	.141
25. Spouse said cut down	.186	.223	.247
26. Police warned about drinking	.508	.289	.097
27. Drinking may have hurt promotion	.651	.158	.109
Motivations for Drinking			
28. To forget worries	.033	.164	.691
29. To cheer up when in a bad mood	.007	.063	.636
30. To help when depressed or nervous	.062	.130	.765
31. To relax	.056	.114	.811
32. To increase self-confidence	.058	.214	.510

^aVarimax rotation of the three first principal components. Eigenvalues of the components were 7.62, 3.00, and 1.94.

the incidents hang together less well than the other problem measures in this analysis. Factor II is clearly anchored by "alcohol dependence." In addition, all of the "intoxication" measures load highly on this factor, suggesting that intoxication may well be part of the total process leading to alcohol dependence. Factor III is clearly a "motivations" factor. All five of the motivations for drinking (sometimes called "psychological dependence") load highly on this factor and almost nothing else does. This demonstrates empirically that these motivations are not strongly related to the other indicators of alcohol dependence (or to adverse effects). The implication is that, even if these are interpreted as measures of psychological dependence on alcohol, that concept is not integrally related to the appearance of the basic "dependence" syndrome of withdrawal and loss of control.

Appendix F

WEIGHTING FOR PROJECTION TO THE TOTAL AIR FORCE

This appendix is concerned with the technical methods used to project alcohol problem prevalence rates from the samples we obtained to the total Air Force. In general, all of the samples (both the 13-base survey and the Air Force-wide surveys) were fairly close to the underlying Air Force population on basic demographic variables. However, two significant issues suggested that weighting might be prudent. First, the 13-base survey disproportionately sampled personnel overseas to obtain enough cases for analysis of possible overseas effects. Weighting may be required to compensate for this oversampling if accurate projections to the total Air Force are desired. Second, the total problem rate shown by the 13-base survey was somewhat higher than the total problem rate shown by the Air Force-wide survey Form A (which used an identical questionnaire but administered the survey through Air Force channels). Some of the difference could be due to the differing response rates in these two surveys (89 percent for the 13-base survey, 61 percent for the Air Force-wide survey) or to method effects arising from the differing administration procedures. However, it is also possible that the problem rate differences could be due in part to variations in the geographical areas or types of personnel responding to the two surveys. Therefore, a weighting procedure to compensate for any such differences may be required to compare the two surveys accurately. After weighting, the difference between the two surveys will be examined as an indication of the magnitude of bias arising in official surveys.

WEIGHTING THE 13-BASE SURVEY

As shown in Chapter III, the 13-base survey obtained a very high response rate for the eligible population (89 percent) and the background characteristics of the sample matched the total Air Force quite closely. Except in the case of location there is no reason to suspect any sampling bias. However, the 13-base survey deliberately overrepresented the European and Pacific theaters, and it did not include areas outside of the Continental United States (CONUS), Europe, or the Pacific.

Table F.1 shows the geographical makeup of the 13-base survey sample and the underlying Air Force population. There are about twice as many Pacific respondents in the sample as in the population, and about one-and-one-half times as many European respondents. Because the 13-base sample lacks any respondents to represent the other areas (Alaska, etc.), something should also be done to compensate for this omission (which was necessitated by cost constraints).

Within the overseas areas, certain countries were disproportionately sampled. In Europe, the largest countries (United Kingdom and Germany) were sampled in about the right proportions relative to each other, and the remaining European

Table F.1

GEOGRAPHICAL DISTRIBUTION OF AIR FORCE POPULATION AND 13-BASE SAMPLE

Geographical Location	Percent of Population at this Location	Percent of 13-Base Sample at this Location	Percent of Personnel Unmarried or Unaccompanied (AF population) ^a
Continental U.S.	77.3	69.9	37.6
Europe	10.8	15.0	
United Kingdom	3.2	7.8	44.0
Germany	5.7	7.2	42.2
Other European locations	1.9	0.0	45.8
Pacific	7.1	15.1	
Philippines	1.7	8.2	40.9
Japan	2.3	0.0	45.4
Guam	0.6	0.0	40.6
Hawaii	1.1	0.0	28.4
Korea	1.4	6.9	84.1
Other Pacific locations	0.1	0.0	48.5
Other areas	4.8	0.0	
Alaska	1.8	0.0	47.8
Non-Alaska	3.0	0.0	43.6
Total (number of cases)	100.0 (565,684)	100.0 (3,148)	39.4 (b)

^aData from the Air Force personnel files. "Unaccompanied" refers to all personnel whose spouses are not with them at their duty stations (a special research definition, not the official Air Force definition of an "unaccompanied tour").

^bBased on Air Force population totals.

areas are small. In our judgment, there is not enough significant variation in the living conditions among the European areas to warrant any elaborate weighting scheme to represent the non-UK, non-Germany areas. This judgment is supported by the information shown in the third column of Table F.1, which lists the percent of all personnel in the area who are unmarried or unaccompanied and may be used as a rough index of the "remoteness" of the area. If the area is accessible to the United States (by location, travel cost, or official policy on dependent transportation), a small proportion of personnel would be expected to have spouses absent; if the area is inaccessible, a large proportion would be expected. The table shows that the European areas are not very different from each other on this index.

In the Pacific area, the situation is quite different. We have only two countries represented in the 13-base sample: the Philippines (Clark Air Base) and Korea (Osan Air Base). A fairly large contingent of personnel in Japan and smaller groups in Hawaii and Guam are not represented directly and must be estimated from either the Philippine or Korean sample. Our initial judgment, based on observation during base visits, was that Korea is by far the most remote and alien environment for U.S. forces and probably should stand alone. Hawaii and Guam are U.S. territory, and the Philippines has many historical and cultural ties to the United States. Japan has the attributes of a developed nation and is fairly compatible for U.S.

personnel. It has been viewed as an attractive destination for rest and recreation among personnel stationed elsewhere. These *a priori* considerations suggest that the Korean air base should be used to represent Korea, and the Philippine air base should be used to represent the aggregate of the Philippines, Japan, Guam, Hawaii, and the tiny group of personnel stationed in "other Pacific" areas.

This strategy is supported by the percent of personnel shown in Table F.1 as unmarried or unaccompanied. Korea stands out as the most "remote" on this measure: 84 percent of personnel stationed in Korea have no spouse present, compared with 28 percent in Hawaii and about 40 to 45 percent in the other Pacific areas. For this reason, the estimates for the Pacific theater were computed by taking the weighted mean of rates for the Korean base and the Philippine base. The weights used were the population sizes of all Air Force personnel stationed in Korea and those personnel stationed elsewhere in the Pacific.

The detailed information for the computation of weighted problem rates is given in Table F.2, which shows the total problem rate and the dependence rate for each of the three theaters (CONUS, Europe, Pacific) along with the sample sizes and population sizes that apply to those rates. To ensure that our total Air Force estimates were representative on the most important background factors, we also broke down each area by pay grade and marital/accompaniment status.¹ The weighted totals shown in Table F.2 for the total Air Force and for each area are computed by taking the specific problem rate for each cell in the table and weighting it according to the proportion of the Air Force that actually falls into that cell (according to the personnel files for June 1977). As noted above, no sample was drawn in this survey to represent the other non-CONUS areas (constituting about 4.8 percent of the force). Therefore, the problem rates for these areas had to be estimated. Because the personnel in this group are stationed in places outside the CONUS (Alaska, Canal Zone, etc.), their problem rates were estimated by taking the weighted mean of the rates for the non-CONUS areas (Pacific and Europe).

The results of this weighting can be seen in Table F.3. The top line shows the raw sample problem rates, without any weighting. The next two lines show what happens to these rates when weights are applied (first, a simple set of weights based only on the number of personnel in the theater; second, the more complex weights based on location, pay grade, and marital/accompaniment status as detailed in Table F.2). Altogether, the most complex weighting scheme brings the total problem rate down from 14.8 percent to 13.9 percent. This reflects primarily the oversampling of the Pacific theater, which has a somewhat higher problem rate than other areas.

A final point regarding this weighting scheme concerns the sensitivity of the results to changes in the definition of weighting strata. Table F.3 shows that the picture would not be much different if we had disregarded pay grade and marital status and used only theater location for defining the weighting strata. We also examined the effect of our assumptions regarding the countries represented by particular bases. Changes in these assumptions never resulted in a change of as much as 0.5 percent in the weighted total problem rate. For example, if we had used the Philippine base to represent only the Philippines and Hawaii, and used the

¹ Because of small numbers of cases, the marital/accompaniment status distinction could not be made for grades E7-E9 and officers.

Table F.2
ALCOHOL PROBLEM RATES AND WEIGHTING FACTORS FOR TOTAL AIR FORCE
(13-base survey)

Geographical Location	Statistical Item	Officer and Enlisted Grades E7-E9	Enlisted Grades E1-E6		Total, All Grades (weighted)
			Spouse Present (accompanied)	No Spouse Present (unaccompanied or unmarried)	
Continental United States	Problem rate ^a	5.0	13.0	20.5	13.4
	Dependence rate ^b	2.0	3.6	7.8	4.6
	Sample size ^c	615	873	693	2181
	Population size ^d	.20374	.31288	.25649	.77511
Europe	Problem rate	6.5	9.2	25.5	15.0
	Dependence rate	1.6	4.6	8.2	5.4
	Sample size	62	195	208	465
	Population size	.02351	.04256	.04227	.10833
Pacific	Problem rate	8.7	16.3	22.0	17.1
	Dependence rate	0.5	3.5	5.3	3.6
	Sample size	73	170	227	470
	Population size	.01613	.02549	.02944	.07107
Other Non-CONUS	Sample size ^e	0	0	0	0
	Population size	.01045	.01826	.01878	.04749
Total Air Force (weighted) ^f	Population rate	5.5	12.8	21.4	13.9
	Dependence rate	1.8	3.7	7.6	4.6
	Sample size	750	1238	1128	3116
	Population size	.25383	.39919	.34698	1.00000

^aPersons with dependence or adverse effects, as a percentage of all sample members in the cell.

^bPersons with dependence, as a percentage of all sample members in the cell.

^cNumbers of sample members in the cell.

^dProportion of the total Air Force population that falls in the cell.

^eNo sample of other non-CONUS areas was included in the 13-base survey.

^fWeighted by Air Force population size in each cell. Rates for other non-CONUS areas are estimated as the weighted average of European and Pacific locations.

Table F.3

**RATES OF ALCOHOL PROBLEMS AND
ALCOHOL DEPENDENCE PROJECTED TO
TOTAL AIR FORCE POPULATION**

Method of Projection	Alcohol Problem Rate ^a	Alcohol Dependence Rate
Raw sample rate, unweighted	14.8	4.9
Weighted for theater location only ^b	14.0	4.7
Weighted for geographical location, grade, and marital/ accompaniment status ^c	13.9	4.6

^aPercent with dependence or adverse effects.

^bTheaters are CONUS, Europe, Pacific, and others.

^cGeographical locations are CONUS, Europe, Korea, Pacific non-Korea, and others. If Japan, Guam, and Korea are included in the Korea stratum, and Hawaii and the Philippines are included in the Pacific non-Korea stratum, the rates rise to 14.1 and 4.7 respectively.

Korean base to represent Japan, Korea, and Guam, the total problem rate would be 14.1 percent (see note c, Table F.3).

WEIGHTING THE AIR FORCE-WIDE SURVEY

In contrast to the 13-base survey, the two Air Force-wide surveys (described in Chapter III) had no problem with geographical representation. Several hundred bases worldwide were included in the Air Force-wide samples, and standard Air Force procedures ensured that the proper geographical representation would be obtained. These surveys, however, had a lower response rate. The response rate for the Air Force-wide survey Form A, which was identical to the 13-base questionnaire form, was only about 61 percent even after ineligibles are excluded. The response rate for the Air Force-wide survey Form B was about 66 percent. These rates are somewhat under those reported for the Navy and Army studies of "problem drinking" (76 and 77 percent respectively), but they are consistent with the range of response rates observed in other recent Rand research for the Air Force (65 to 70 percent). With such response rates, there is the possibility of bias in the obtained sample; therefore, we shall investigate the magnitude of such bias.

Table F.4 shows that the magnitude of bias in terms of background characteristics is not very great in either Air Force-wide survey. Because of the large samples involved, many of the differences between the Air Force population and the samples are statistically significant, but their magnitudes are not large enough to cause much concern. The biggest differences appear in the Form A survey, where 8 percent fewer E1-E4 personnel were obtained than should have been.

We can compensate for these demographic biases by a weighting procedure similar to that used in the 13-base survey. Then the Air Force-wide survey results (Form A) can be compared directly with the 13-base survey results, because both

Table F.4
REPRESENTATIVENESS OF AIR FORCE-WIDE SURVEYS

Characteristic	Percent of Group with the Characteristic		
	Total Air Force Population	Air Force-Wide Survey Respondents	
		Form A Instrument ^a	Form B Instrument ^b
Pay Grade			
O4-O6	6.5	9.3	7.5
O1-O3	10.5	11.7	8.5
E7-E9	8.3	10.3	10.3
E5-E6	26.4	28.4	30.5
E1-E4	48.3	40.3	43.3
Sex			
Male	93.1	92.6	94.0
Female	6.9	7.4	6.0
Age			
17-20	13.0	12.9	13.3
21-24	27.8	21.9	24.9
25-30	25.8	26.1	24.4
31-39	23.5	27.2	26.6
40-48	9.1	10.7	9.8
49-60	0.7	1.2	1.0
Education			
Non-high school graduate or GED	3.1	7.7	6.5
High school graduate (diploma)	78.8	69.5	80.3
College degree	18.1	22.8	13.2
Marital Status			
Currently married	66.9	70.2	67.8
Not married	33.1	29.8	32.2
(N)	(565,684)	(6487)	(1407)

^aSame questionnaire as used in the Rand 13-base survey; reproduced in App. A.

^bQuestionnaire compatible with questionnaires used by Cahalan and associates in surveys of other military services; reproduced in App. B.

used the same questionnaire. Any difference in total problem rates that remains can then be attributed to some type of bias affecting the Air Force-wide survey differently than the 13-base survey. (The Air Force-wide survey Form B, which contained questions comparable to those used in surveys of other populations, is discussed in Chapter VI. The analysis presented there controls for demographic characteristics and in effect accomplishes this type of weighting. In any event, we have no direct method of examining bias for that survey and so it will not be discussed further.)

Table F.5 shows the results when the 13-base survey and the Air Force-wide survey (Form A) are both weighted. The two do move closer together, but the Air Force-wide survey still shows a total problem rate 2.9 percentage points below the

Table F.5

**ALCOHOL PROBLEM RATES ESTIMATED BY VARIOUS
SURVEY DATA BASES**

Survey Data Base	Raw Sample Total Problem Rate (Unweighted)	Total Problem Rate, Projected to Total Air Force ^a	Number of Cases
13-base survey	14.8	13.9	3148
Air Force Survey (197 bases Air Force-wide) ^b	10.3	11.0	6487
Air Force Survey (restricted to same 13 bases) ^c	10.2	(d)	714

^aUsing weights shown in Table F.2.

^bForm A (same questionnaire as 13-base survey).

^cRestricted to those respondents to Form A of the Air Force-wide survey who were located at one of the 13 bases in the 13-base sample.

^dWeighting inappropriate.

13-base rate (13.9 percent for the 13-base survey, 11.0 percent for the Air Force-wide survey). This difference cannot be explained in terms of geographical location or biases in the pay grade, marital status, or accompaniment status of the respondents. Nor can it be attributed to any special characteristics of the particular 13 bases. As noted in Chapter III, the 13 bases are representative of the total Air Force on background characteristics. As a further check, we also computed the problem rate using the Air Force-wide survey data but including *only those respondents to the Air Force-wide survey who were stationed at one of the 13 bases*. The third line of Table F.5 shows that the problem rate for these respondents was identical to that for the total Air Force-wide survey group. Therefore, the personnel at the 13 bases cannot be construed as being different in any significant way from the personnel at other bases. The difference between the Air Force survey and the 13-base survey must be due to other factors. In all, this bias appears to lead to an underestimate of the problem rate by 2.9 percent in absolute terms.

ACCOUNTING FOR BIAS

The above analysis suggests that an Air Force-wide survey conducted through official channels may lead to an estimated rate of alcohol problems that is downwardly biased compared with a group-administered data collection procedure in which outsiders visit the bases for survey administration. This finding could be due to a number of potentially important factors, including nonresponse. We shall investigate this question with the objective of estimating the degree to which nonresponse might bias such surveys.

Two prominent factors could lead to the difference observed between the Air Force-wide survey and the 13-base survey. First, the Air Force-wide survey questionnaires were sent out and returned through the local base personnel offices. Although the respondents returned their answer sheets in unidentified form and

anonymity was promised, the use of official Air Force channels for data collection may have caused some respondents to understate their involvement with alcohol. Results from other Rand studies at the 13 bases suggest that this effect could be substantial, resulting in a drop of several percentage points when there has been an extreme degree of official intervention (e.g., identifiability of respondents and involvement of an alcohol-abuse office in the data collection). Second, the response rate for the Air Force-wide survey was lower than for the 13-base survey. It is likely that the rate of alcohol problems among nonrespondents is higher than among respondents, so that the failure to obtain the nonrespondents could depress the problem rate calculated for the obtained sample.

There is no effective way to estimate the magnitude of these two effects precisely, given the available data. However, some reasonable assumptions can be made to give crude estimates of the magnitude of nonresponse bias. This will also help to estimate the possible nonresponse bias in the 13-base survey data (for which 89 percent of the sample responded). The 13-base survey and the Air Force-wide Form A survey give us two data points relating to nonresponse and problem rates. The Air Force-wide survey shows that a response rate of 61 percent produces a problem rate of 11.0 percent. The 13-base survey shows that a response rate of 89 percent produces a problem rate of 13.9 percent. *If there were no intervention effects* (if the difference between the two results were due strictly to nonresponse in the Air Force-wide survey), the problem rates for two respondent groups could be modeled as follows:

Let X = problem rate among the first 61 percent responding (Air Force-wide survey respondents).

Let Y = problem rate among the next 28 percent responding (people who would respond to the 13-base survey but not to the Air Force-wide survey).

Let R = problem rate for all respondents to the 13-base survey (the total of 89 percent).

$$\text{Then } R = \frac{.61X + .28Y}{.89}$$

Because R = 13.9 and X = 11.0, this equation may be solved to yield Y = 20.2.

This result suggests that 20.2 percent of the group who would have responded to the 13-base survey, but not to the Air Force-wide survey, would have serious alcohol problems as we have defined them. This level of 20.2 percent would be the *upper bound* for the problem rate among these nonrespondents; if there are any intervention effects, the true value of X would be higher than the stated value and that would reduce the value of Y. For example, we may assume that there is an intervention effect, and that it reduces the self-reported problem rate in a survey administered by the Air Force (but not in the 13-base survey administered by outsiders). If this effect reduces the Air Force-wide survey problem rate by 1.0 percent (a conservative estimate based on the experience cited earlier), the true

value of X would be 12.0 (11.0 + 1.0) and hence the value of Y obtained would be 18.0. That is, 18.0 percent of the nonrespondent group would have alcohol problems. If the intervention effect were even larger (say, 2.0 percent), the values would be X = 13.0 and Y = 15.9.

These crude estimates of bias among nonrespondents may be used to estimate how much our 13-base survey could be biased by virtue of missing the 11 percent who did not fill out a questionnaire. Table F.6 shows what the "true" (estimated) problem rate would be for the total population under varying assumptions. Three different assumptions about the magnitude of intervention effects are shown: 0, 1, and 2 percent. Also, three methods are shown for estimating the problem rate for the 11 percent who did not respond to the 13-base survey. They are based on the different problem rates obtained for the two surveys. In row one, the 11 percent are assumed to have a problem rate equal to Y; i.e., the 11 percent who do not respond to the 13-base survey have the same problem rate as the 28 percent who would respond to the 13-base survey but not to the Air Force-wide survey. This essentially assumes that the nonresponse bias is constant for response rates from 61 percent to 100 percent (as in the model outlined above). In rows two and three, nonresponse bias is assumed to increase with each percentile of increasing response rates; therefore, the remaining 11 percent would have a higher problem rate than the 28 percent. These estimating methods simply use the points (61,X) and (89,R) to determine a function (either linear or exponential); the rate for the total population is then obtained by evaluating the function at a response rate of 100 percent.

The results in Table F.6 suggest that the magnitude of nonresponse bias is unlikely to be very great, regardless of which assumption is made. Our opinion is that the best estimate is in the lower right-hand portion of the table (i.e., that there

Table F.6.

ESTIMATED RATES UNDER VARYING ASSUMPTIONS OF BIAS
(Percent of total force with alcohol problems)

Assumed Form of Nonresponse Bias ^a	Assumed Degree of Intervention Bias (due to official data collection) ^b		
	0%	1.0%	2.0%
Constant degree of bias ^c	14.6	14.4	14.1
Linear increase in bias ^d	15.0	14.6	14.2
Exponential increase in bias ^e	16.0	15.2	14.4

^aNonresponse bias = difference between the reported problem rate when 100% of the sample respond and when 89% of the sample respond.

^bDifference between problem rate obtained when an outside organization conducts the survey and when an official Air Force agency conducts the survey.

^cAssumes that the proportion of persons with alcohol problems is the same between (1) the interval between 61% and 89% response rate and (2) the interval between 89% and 100% response rate.

^dAssumes that the proportion of persons with alcohol problems increases linearly over the range of response rates from 61% to 100%.

^eAssumes that the proportion of persons with alcohol problems increases exponentially over the range of response rates x from 0% to 100% according to the formula $(a+e^{bx})$, where the values for a and b are determined uniquely by the proportions exhibiting problems at 61% and 89%.

is a small intervention effect for Air Force administration, and the nonresponse bias does increase as the last few percentiles of a population are obtained). This would imply that our reported rate of alcohol problems for the Air Force is downwardly biased by less than 0.5 percentage points. These estimates are very rough, and a fully satisfactory answer to these questions could be obtained only by an experiment specifically designed to address this issue. Without such experimental data, we must use the preliminary estimates. These estimates suggest that nonresponse is not likely to be a major source of bias in this study's results.

Appendix G

BEVERAGE SALES AND SELF-REPORT CONSUMPTION COMPARISON

The purpose of this appendix is to provide detailed information concerning the comparison of base beverage sales and self-report consumption data discussed in Chapter V. The precise formula used to make the comparison will be presented. The formula was applied separately to the data for each base and type of beverage.

The complete comparison formula may be written as:

$$S_i(1 - M_i k_i) = V_i A_i B_i,$$

$$\text{where } M_i = \frac{V_{ia} N_a A_{ia} B_{ia} (1 + c_i)}{V_{ia} N_a A_{ia} B_{ia} (1 + c_i) + V_{iu} N_u A_{iu} B_{iu}}$$

The subscripts may be interpreted as follows:

i = term calculated for beverage i (beer, wine, or hard liquor).

a, u = term calculated for respondents who are accompanied (a) or unaccompanied (u) by spouses.

The meanings of the terms in the formula are discussed below.

S_i = the base beverage sales of beverage i made to active-duty personnel during the 30-day period covered by our survey (in per capita ounces of ethanol per day). Bar sales were determined from cash register receipts or inventory records of the number of ounces sold. The proportion of bar sales made to active-duty personnel was determined in accordance with estimates supplied by the club managers and Non-Appropriated Funds Office representatives. These estimates were typically 90-95 percent. Package store sales were generally determined by special data collection activities covering the 2-4 week period following our site visit to a given base. At our request, club personnel documented the volume (ounces) of beer, wine, and hard liquor sold to active-duty and nonactive-duty (e.g., spouses, retired military personnel) purchasers. This information was verified against cash register receipts where possible. These figures were used in conjunction with the cost of an ounce of beer, wine, and hard liquor to estimate the proportions of sales dollars attributable to purchases of each of the three beverages made by active-duty personnel. These proportions were then applied to the total sales (dollar) figure for the 30-day period preceding our site visit to the given base. Next, the resulting (dollar) figures for the three beverages were reconverted to ounces. Finally, as in the case of bar sales, the ounce figures were transformed to per capita ounces of ethanol per day for each beverage. The proportion of active-duty sales obtained from this package store procedure was also applied to Base Exchange inventory records. At the seven bases included in this analysis, bar sales typically accounted for less than 25 percent of the total alcoholic beverage sales made to active-duty personnel.

M_i = The proportion of sales of beverage i made to active-duty Air Force personnel that is purchased by personnel who are married and accompanied by their spouses at their present duty station. The computation of M_i is described below.

k_i = The proportion of consumption of beverage i in married couples accounted for by wives. These constants were derived by comparing the levels of consumption among married men and married women, for each beverage. The data were provided by the Harris (1974) national surveys. The k_i were .138 for beer, .450 for wine, and .254 for liquor.

V_i = The per capita volume of beverage i consumed at the given base according to the self-reports of our survey respondents (in ounces of ethanol per day).

A_i = The proportion of consumption of beverage i (among active-duty personnel) attributable to purchases made by active-duty personnel. The proportions for beer, wine, and liquor were derived from the responses to survey questions (qs. 54, 59, and 64, App. A) at the given base. The questions required those respondents who had consumed beverage i during the past 30 days to indicate who had purchased beverage i the last time the respondent had consumed it. All personal purchases and four-fifths of the purchases made by someone other than the respondent (but not those made by his spouse) were counted as "active-duty" purchases. The proportion A_i was then computed as the number of "active-duty" purchases divided by the total number of purchases (the number of respondents to the question). Admittedly, the four-fifths figure is somewhat arbitrary. However, there is little question that the true proportion of active-duty consumption attributable to purchases by other Air Force personnel (among nonpersonal, nonspouse purchases) is very high. At the seven bases included in this analysis, "active-duty" purchases accounted for about 85-90 percent of the respondents' consumption.

B_i = The proportion of personal (active-duty) purchases of beverage i made on base. The proportions for beer, wine, and liquor were derived from the responses to survey questions (qs. 55, 60, and 65, respectively) at the given base. The questions required those respondents who had consumed and bought beverage i during the past 30 days to indicate at which of several off- and on-base outlets the most recent purchase of beverage i had been made. The proportion was then calculated by dividing the number of respondents indicating on-base purchases by the number of respondents indicating purchases of beverage i during the past 30 days. The data indicated that on-base purchases accounted for about two-thirds of all beer and liquor purchases and approximately one-half of all wine purchases made during the past 30 days. The proportions varied considerably from base to base.

M_i = The proportion of sales of beverage i made to active-duty Air Force personnel that is purchased by personnel who are married and accompanied by their spouses. The estimation of M_i relied heavily on responses to our survey questions. The terms N_a and N_u refer to the number of accompanied and unaccompanied respondents at the given base, respectively (qs. 9 and 11). The term c_i refers to the level of consumption of beverage i among married women, expressed as a proportion of the consumption level among married men. These constants were derived in a similar manner to the k_i , from the same data base. The other terms listed for the computation of M_i have been previously defined. In the numerator of M_i , the product $V_{ia}N_aA_{ia}B_{ia}$ represents the total quantity of beverage i (in ounces of ethanol per day) that was consumed by accompanied respondents as a result of

active-duty purchases made from on-base beverage outlets. The product is adjusted upward by a factor of c_i to account for the quantity of beverage i (attributable to active-duty purchases made on base) consumed by the spouses of these accompanied respondents. Thus, in essence, the numerator of M_i represents the demand for beverage i at on-base outlets by accompanied active-duty purchasers. The denominator of M_i represents the total on-base, active-duty demand for beverage i (by both accompanied and unaccompanied personnel). On the average, demand for alcoholic beverages by accompanied personnel accounted for approximately one-half of total demand; that is, sales made to personnel who are married and accompanied by their spouses were estimated to account for about one-half of all sales made to Air Force personnel. The value of this proportion did vary considerably, however, from base to base and beverage to beverage.

Appendix H

DEFINITION AND STANDARDIZATION OF THE CAHALAN PROBLEM DRINKING INDEX

The Cahalan problem drinking index used in Chapter VI is based on seven of 13 component scales used to assess various types of alcohol problems. The purpose of this appendix is (1) to provide information concerning the 13 problem drinking scales and the overall problem measure (Cahalan's "Combined Tangible Consequences" index); (2) to show the rates computed for enlisted and officer Air Force personnel on these 14 measures; and (3) to present detailed data pertaining to the standardization of the ("tangible") problem drinking rates obtained in the Navy, Army, and civilian studies, as discussed in Chapter VI.

THE CAHALAN INDICES

Following the procedures used in the Navy study (Cahalan and Cisin, 1975), a high score on each of the 14 Cahalan problem drinking indices was defined as follows.

Heavy Intake. A high score on this scale means that the respondent consumed (1) 12 or more drinks per occasion at least monthly, or (2) eight or more drinks per occasion at least weekly, or (3) four or more drinks per occasion at least three times a week during the past year.

Binge Drinking. A high score on this scale means that the respondent (1) stayed intoxicated for several days at least once or (2) was high for "more than 24 hours in a row," at least three times during the past three years.

Psychological Dependence. This scale measures the importance of various reasons for the respondent's drinking. The reasons include finding drinking helpful when depressed or nervous, to forget everything, to forget worries, to cheer up the respondent when he is in a bad mood, to change the way he feels, and needing a drink when tense and nervous. A high score on the scale means that the respondent found (1) at least one of the above to be a very important reason for his drinking and four (or more) of the other reasons to be fairly important; or (2) at least two of the reasons to be very important and one (or more) of the other reasons to be fairly important; or (3) at least three of the reasons to be very important. The reasons are presumed to refer to drinking during the past three years.

Loss of Control. A high score on this scale means that the respondent indicated at least two of the following behaviors: (1) difficulty in stopping drinking before becoming intoxicated; (2) continuing to drink after promising himself not to; or (3) worrying a lot about his drinking. These behaviors are presumed to apply to drinking during the past three years.

Symptomatic Drinking. A high score on this scale means the respondent indicated that he had at least three of the following experiences: (1) awakening the next day unable to recall at least some of what he had done while drinking; (2) skipping a number of regular meals while drinking; (3) tossing down drinks; (4) sneaking

drinks; (5) having a few "quick" drinks before a party to make sure he had enough; (6) often drinking upon awakening; (7) having his hands shake a lot the morning after drinking; or (8) sometimes becoming high when drinking alone. The experiences refer to the past three years.

Belligerence. A high score on this scale means that the respondent reported at least two of the following experiences in connection with drinking: (1) feeling aggressive or cross; (2) getting into a fight; or (3) getting into a heated argument. The experiences refer to the past three years.

Wife. A high score on this scale means that drinking was harmful to the respondent's marriage or home life or that his wife got angry about his drinking (she may also have left or threatened to do so), during the past three years.

Relative. A high score on this scale means that the respondent's drinking was "very displeasing" to a relative during the past three years.

Friends and Neighbors. A high score on this scale means that the respondent's drinking was harmful to his friendships and social life, or that he lost or drifted apart from a friend, or that both friends and neighbors told him to cut down on his drinking, during the past three years.

Job. A high score on this scale means that the respondent indicated at least one of the following experiences: (1) drinking hurt his chances for a promotion or raise; (2) people at work told him to cut down on his drinking; or (3) drinking had a harmful effect on his job or assignment. The experiences refer to the past three years.

Police. A high score on this scale means that the respondent reported trouble with the law about driving after drinking, about nondriving drinking-related behavior, or both. The trouble occurred in the past three years.

Financial. A high score on this scale means that drinking was harmful to the respondent's financial position or that he spent money on drinking that was needed for essentials, during the past three years.

Health or Injury. A high score on this scale means that the respondent (1) had a drinking-related illness that kept him from regular activities for at least a week; (2) was in a hospital or rest home because of his drinking; or (3) was told by a doctor to cut down, and was injured or felt that his health had been harmed because of his drinking. The experiences refer to the past three years.

Combined Tangible Consequences. The score on this overall index is obtained by summing the respondent's scores on the wife, relative, friends and neighbors, job, police, financial, and health or injury scales. As a rule, these scales have one high, one intermediate, and one low score, plus a zero score for individuals not manifesting the particular problem. In general, a high score on the overall index may be obtained in one of three ways: (1) having the top level (of severity) on at least one of the component scales; (2) having the intermediate level of severity on at least one scale and the low level on at least one other scale; or (3) having the low level of severity on at least three of the component scales. The exceptions to this rule are (1) that the relative scale, having only two levels of the problem, cannot by itself give one a high "Tangible Consequences" score; and (2) that the wife scale has two high levels of severity. The overall score pertains to problems in the past three years.

For complete details on scoring procedures for the Cahalan indices, the reader is referred to *Final Report on a Service-Wide Survey of Attitudes and Behavior of*

Naval Personnel Concerning Alcohol and Problem Drinking, App. B (Cahalan and Cisin, 1975).

CAHALAN PROBLEM DRINKING RATES FOR AIR FORCE PERSONNEL

The rate of high scores for each of the 14 Cahalan indices is presented for officer and enlisted (male) Air Force personnel in Table H.1. With the exception of the Heavy Intake scale (past year), the rates pertain to problems experienced at any time during the past three years. As noted in the text, the "Combined Tangible Consequences" index combines problems of varying severity. Moreover, the seriousness of high scores on the individual scales depends on the particular type of problem being assessed. (For example, compare the meaning of a high score on the relative versus the police scale.) Thus, it is not surprising that the rate of high scores shows considerable variation across the different types of problems.

STANDARDIZATION OF THE AIR FORCE, NAVY, ARMY, AND CIVILIAN PROBLEM DRINKING RATES

Table H.2 presents the problem drinking rates and population sizes used for the standardization procedure discussed in Chapter VI. The rates for the Navy, Army,

Table H.1

CAHALAN PROBLEM DRINKING RATES FOR AIR FORCE PERSONNEL^a

Type of Problem	Problem Drinking Rate (past three years) ^b	
	Officer Personnel	Enlisted Personnel
Heavy intake	6.5	19.5
Binge drinking	0.5	9.9
Psychological dependence	3.2	8.0
Loss of control	2.8	7.3
Symptomatic drinking	5.1	16.7
Belligerence	7.8	21.4
Wife	10.1	12.2
Relative	8.8	16.2
Friends and neighbors	2.8	9.9
Job	3.2	6.5
Police	1.4	5.2
Financial	3.2	10.2
Health or injury	2.8	4.1
Total tangible problem score ^c (percent high)	13.8	25.2

^aPercent of male personnel, all ages.

^bHeavy intake based on past year.

^cIndex based on subset of "tangible" problems (i.e., wife, relative, friends and neighbors, job, police, financial, and health or injury problems).

Table H.2

PROBLEM DRINKING RATES ACCORDING TO EDUCATION, AGE,
AND MARITAL CHARACTERISTICS^a
(In percent)

Sample	High School Education				College Education			
	Age 21-24		Age 25-59		Age 21-24		Age 25-59	
	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present
Air Force (N)	34.4 (93)	29.5 (95)	21.8 (257)	34.5 (55)	18.5 (54)	33.8 (68)	14.0 (422)	23.6 (89)
Navy (N)	33.9 (239)	51.3 (452)	27.7 (1121)	38.3 (368)	20.7 (299)	31.6 (519)	17.6 (2802)	24.7 (785)
Army (N)	38.0 (455)	51.4 (640)	23.6 (1607)	42.9 (574)	19.6 (698)	33.0 (819)	14.9 (3138)	23.6 (734)
Civilian (N)	47.8 (46)	52.4 (21)	19.4 (490)	29.4 (51)	12.5 (32)	22.6 (31)	7.4 (271)	25.7 (35)

^aMales. Education refers to highest level attained (high school diploma or lower level versus college level). Marital status refers to whether or not a spouse is present in the respondent's home.

and civilian samples were standardized on the education, age, and marital characteristics of our (representative) Air Force survey sample. The data for the U.S. subsamples of the three military services are shown in Table H.3.

Although the disaggregation of the civilian sample shown in Table H.2 was used for standardization on education and age characteristics, the cell sizes were deemed too small in some cases to permit a reliable eight-cell standardization for education, age, and marital status. Therefore, a modification in the disaggregation of the civilian sample was made. The data for the disaggregation are shown in Table H.4. The cells in this table differ from those presented earlier in three respects: (1) marital status is not disaggregated for the high school, 21-24 year old subsample; (2) age is not disaggregated in the "college, no spouse" subsample; and (3) the age disaggregation made for the "college, spouse" subsamples is 21-30 versus 31-59 instead of 21-24 versus 25-59 years old. This modification was chosen because it resulted in the desired increases in cell size by combining cells with highly similar problem drinking rates. Indeed, in each case the cells combined had the most similar rates. Thus, the effect of using a somewhat different standardization procedure for the civilian sample than for the Navy and Army samples was minimized. The reader can easily satisfy himself in this regard by comparing the civilian data in Table H.4 with that in Table H.2.

Table H.3

**PROBLEM DRINKING RATES FOR MILITARY PERSONNEL
STATIONED IN THE UNITED STATES^a**
(In percent)

Sample	High School Education				College Education			
	Age 21-24		Age 25-59		Age 21-24		Age 25-59	
	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present	Spouse Present	No Spouse Present
Air Force (N)	36.0 (75)	26.9 (78)	20.9 (206)	32.4 (37)	16.3 (49)	34.5 (55)	13.1 (358)	19.7 (66)
Navy (N)	25.6 (82)	50.6 (79)	29.4 (568)	42.0 (112)	20.6 (136)	27.0 (148)	15.4 (1602)	25.2 (326)
Army (N)	37.9 (391)	51.0 (484)	23.6 (1422)	43.5 (476)	20.7 (579)	34.9 (651)	14.4 (2671)	22.7 (585)

^aMales. Navy data are for the subsample of personnel stationed in the U.S., ashore.

Table H.4

SUPPLEMENTAL DATA FOR CIVILIAN RATE STANDARDIZATION

Civilian Subsample ^a	Standardization Data			
	Civilian Problem Drinking Rate	Number of Cases	Proportion in AF (world-wide sample)	Proportion in AF (U.S. subsample only) ^b
High school, 21-24	49.3	(67)	.166	.166
High school, 25-59, spouse	19.4	(490)	.227	.223
High school, 25-59, no spouse	29.4	(51)	.048	.040
College, 21-30, spouse	10.3	(97)	.163	.170
College, 31-59, spouse	6.8	(206)	.257	.271
College, no spouse	24.2	(66)	.139	.130
Total	18.7	(977)	1.000	1.000

^aMales only. Highest grade completed is high school level or lower versus college level. Spouse/no spouse indicates spouse present in the respondent's home versus no spouse present.

^bRespondents living in one of the 50 states only.

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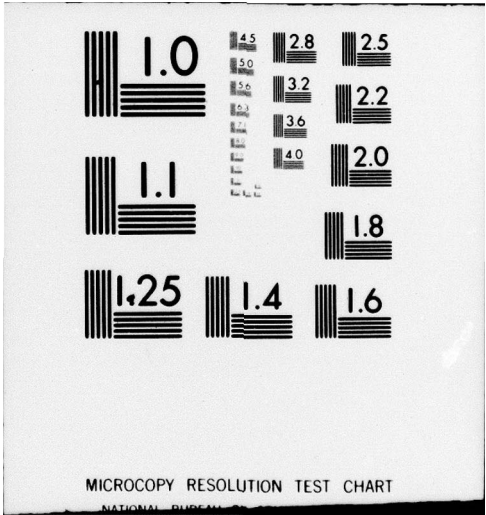
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