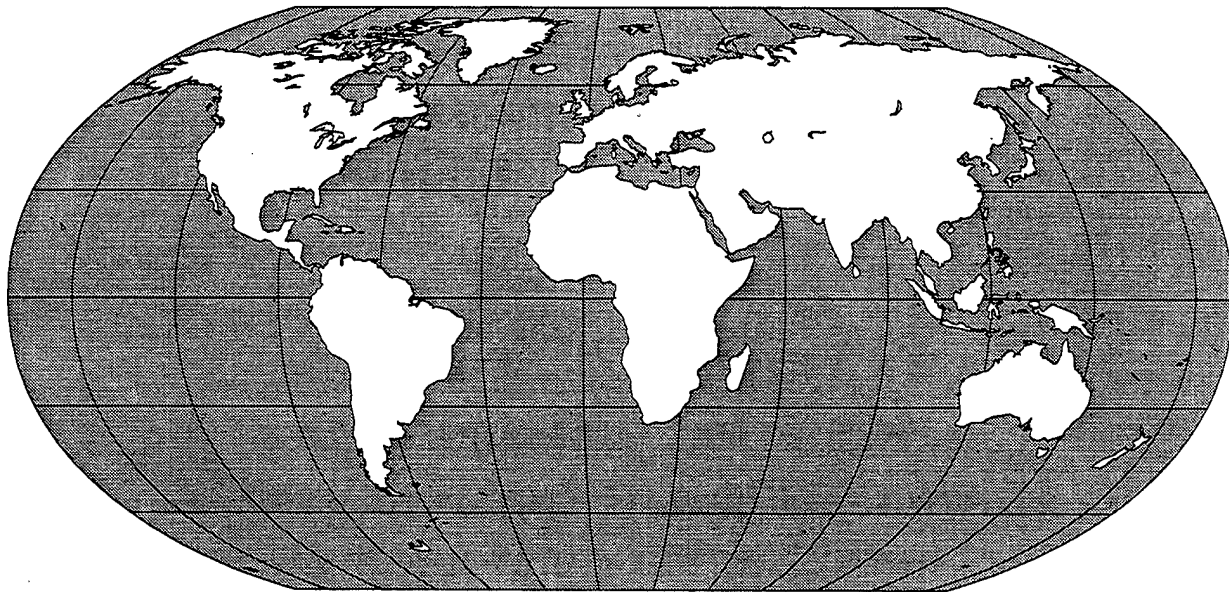


1998 Department of Defense Survey of Health Related Behaviors Among Military Personnel



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This report has been prepared for the Assistant Secretary of Defense (Health Affairs) under Cooperative Agreement No. DAMD17-96-2-6021 by the Research Triangle Institute, P.O. Box 12194, Research Triangle Park, North Carolina 27709 (Phone: 919-541-6000). Robert M. Bray, Ph.D., served as Project Director.

The views, opinions, and findings contained in this report are those of the authors and should not be construed as an official Department of Defense position, policy, or decision, unless so designated by other official documentation.

PREFACE AND ACKNOWLEDGMENTS

The 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel was conducted by the Research Triangle Institute (RTI) under the sponsorship of the Office of the Assistant Secretary of Defense (Health Affairs). The survey is the seventh in a series of DoD surveys conducted since 1980 and has two broad aims: (a) to continue the survey of substance use among active-duty military personnel, and (b) to assess progress toward selected *Healthy People 2000* objectives for active-duty military personnel. As such, it provides comprehensive and detailed estimates of the prevalence of alcohol, illicit drug, and tobacco use and the negative effects of alcohol use. In combination with data from the prior surveys in the series, it provides data for trends. It also provides estimates for health behaviors pertaining to fitness and cardiovascular disease risk reduction, injuries and injury prevention, and sexually transmitted disease risk reduction. In addition, it offers an assessment of the mental health of military personnel, including stress and depression, and examines oral health and dental check-ups, gambling behaviors, and special gender-specific health issues pertaining to women's and men's health.

Many individuals contributed to the success of this study. Among DoD and military Services personnel, special appreciation is due Roger W. Hartman and Patricia Modrow, the Cooperative Agreement Officer's Representatives, who provided valuable guidance and facilitated conduct of the study. Excellent liaison between DoD, RTI, and the Services was provided by Lieutenant Colonel Shirley Newcomb for the Army, Lieutenant Tim Williams for the Navy, Terrance Zline for the Marine Corps, and Lieutenant Colonel James Fraser for the Air Force. We also gratefully acknowledge the efforts of Kenneth Shefflin of the Defense Manpower Data Center for support in obtaining access to military personnel files, and to Robert Hamilton who prepared the raw data for use in constructing the sampling frame and who selected the sample of military personnel. The cooperation of installation commanders, both for the pilot test and the main survey, and the assistance and courtesies provided by the Military Liaison Officers, who coordinated the activities of the data collection teams, were essential for the successful completion of this effort. Finally, we extend our appreciation to the participating Service members whose responses made this effort possible.

Mr. Joe Gfroerer of the Substance Abuse and Mental Health Services Administration, Office of Applied Studies, provided access to the data from the 1997 National Household Survey on Drug Abuse to enable military and civilian comparisons of substance use. Under subcontract to RTI, National Computer Systems printed, shipped and received the questionnaires. They also performed the optical scanning of the survey questionnaires and provided a resulting data file for the analysis.

Many RTI staff members in addition to the report authors contributed significantly to the success of this project by composing the questionnaire, constructing the sampling frames for the Services, coordinating data collection activities, tabulating data, completing various data-processing tasks, and editing and typing the manuscript. In particular, S. Randall Keesling led the data collection task and was assisted by Marjorie Hinsdale-Shouse, who coordinated day-to-day activities with the field sites; Jill Kavee was instrumental in developing the sampling frames and in selecting the sample, and Jun Liu played a key role in developing the sample allocation methodology. Christy J. Crump and Teresa R. Davis performed data imputations, analysis variable construction, and tabulations. Mary Ellen Marsden and Juesta Caddell made valuable comments on the report, and Ashley Murchison assisted in the coordination of the report. Members of the RTI field teams are commended for accomplishing their data collection tasks under rigorous travel and scheduling demands. Finally, thanks are due Richard S. Straw, who copyedited and proofread the report, and to Catherine A. Boykin and Linda B. Fonville, who completed the enormous word-processing requirements.

Robert M. Bray, Ph.D.
Project Director

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EXECUTIVE SUMMARY

This report presents the primary results of the 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel. This study is the seventh in a series of surveys of active-duty military personnel conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 under the direction of the Office of the Assistant Secretary of Defense (Health Affairs). All of the surveys investigated the prevalence of alcohol use, illicit drug use, and tobacco use, as well as negative consequences associated with substance use. The 1985 through 1992 surveys also covered an expanded set of health behaviors and related issues. In 1995 and 1998, health behavior questions were revised and items were added to assess selected *Healthy People 2000* objectives. In addition, questions were added to examine the mental health of the Active Force, specific health concerns of military women and military men, oral health, and gambling behaviors.

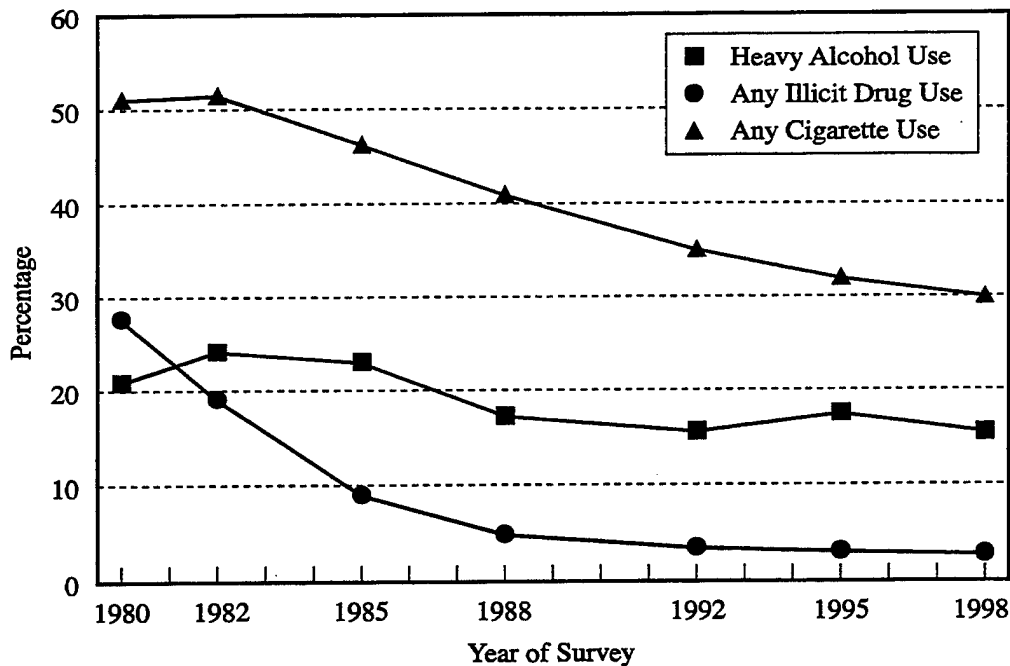
The eligible population for the 1998 survey consisted of all active-duty military personnel except recruits, Service academy students, persons absent without official leave (AWOL), and persons who had a permanent change of station (PCS) at the time of data collection. The final sample consisted of 17,264 military personnel (5,449 Army, 3,930 Navy, 3,622 Marine Corps, and 4,263 Air Force) who completed self-administered questionnaires anonymously. Participants were selected to represent men and women in all pay grades of the Active Force throughout the world. Data primarily were collected from participants in group sessions at military installations or by mail for those not attending the sessions. The overall response rate was 59%. The data were weighted to represent all active-duty personnel. Some of the key findings from the 1998 survey are noted below.

Substance Use and Negative Effects

The 1998 survey obtained data on alcohol, tobacco, and illicit drug use to assess prevalence rates of the use of these substances among military personnel. Data from the 1998 survey and prior surveys in the series were used to examine trends in use and negative effects associated with the use of these substances. In addition, comparisons were made between military and civilian data. The findings showed progress in many areas, but also identified issues in need of further attention.

- As shown in Figure ES-1, comparisons of findings across the seven surveys in the series show a significant downward trend in the use of alcohol, cigarettes, and illicit drugs. For the total DoD during the 30 days prior to the date that a survey was completed, heavy alcohol use declined from 20.8% in 1980 to 15.4% in 1998; cigarette smoking decreased from 51.0% in 1980 to 29.9% in 1998; and use of any illicit drugs declined from 27.6% in 1980 to 2.7% in 1998.

Figure ES.1 Trends in Heavy Alcohol, Cigarette, and Illicit Drug Use, 1980-1998



- Despite overall downward trends in illicit drug use, heavy alcohol use, and cigarette use since 1980, the declines for these substances were not significant between 1995 and 1998. Among the Services, only the Navy showed any significant declines in illicit drug use and heavy alcohol use between 1995 and 1998. There were no significant declines between 1995 and 1998 by any Service in rates of cigarette smoking.
- The average daily amount of alcohol (ethanol) consumed by military personnel declined from 1.48 ounces in 1980 to 0.79 ounces in 1998, a decrease of 47% in 18 years. This shift toward less use of alcohol also was evident in the increase of abstainers or light/infrequent drinkers from 25.6% in 1980 to 43.2% in 1998.
- Although there were declines in overall alcohol use, heavy alcohol use (defined as having five or more drinks per typical occasion at least once a week) remained problematic in 1998. Nearly one in six military personnel engaged in heavy alcohol use. The rate of heavy alcohol use in the Military did not decline significantly from 1988 to 1998, and the decline observed from 1980 to 1998 can be attributed largely to sociodemographic changes in the Military during that period. These results suggest that the prevention of heavy alcohol use is a topic that may need further emphasis in the Military.
- The lack of a significant decline from 1995 to 1998 in rates of cigarette smoking marks the first survey year since 1982 that smoking rates did not show a significant decrease relative to the previous survey. Although the smoking rate in 1998 was significantly lower than it was

in 1980, it remained about 10 percentage points above the *Healthy People 2000* objective of 20%.

- One of the biggest differences between the 1995 and 1998 survey findings was the increase in past year cigar or pipe smoking from 18.7% to 32.6%. Cigar or pipe smoking rates rose at least 11% for each Service. Although the vast majority of this behavior occurred infrequently (less than once a week), this large increase should be of concern to the DoD, and the use of cigars and pipes should be monitored closely in future surveys.
- Overall, 11.7% of military personnel had used smokeless tobacco in the 30 days prior to the survey, and approximately one in five had used it in the past 12 months. The rate of past month use among males aged 18 to 24 years was 19%.
- Significant declines from 1980 to 1998 were found in the percentage of military personnel experiencing alcohol-related serious consequences, productivity loss, and symptoms of alcohol dependence. Serious consequences declined from 17.3% in 1980 to 6.7% in 1998; productivity loss fell from 26.7% in 1980 to 13.6% in 1998; and symptoms of dependence went from 8.0% in 1980 to 4.8% in 1998.
- Standardized comparisons showed substantial differences between substance use patterns of military personnel and civilians (using data from the 1997 National Household Survey on Drug Abuse). After adjusting for demographic differences between Military and civilian populations, military personnel were significantly *more* likely to drink heavily than were their civilian counterparts (14.2% vs. 9.9%), but significantly *less* likely than civilians to use any illicit drugs in the past 30 days (2.6% vs. 10.7%), or to smoke cigarettes (29.1% vs. 32.8%). The lower rate of cigarette smoking among military personnel in 1998 was a first in the DoD series of surveys. The shift in the smoking pattern seems to be explained primarily by an increase in smoking among 18- to 25-year-old male civilians. The fact that a corresponding increase was not observed in the Military is encouraging.

Overall findings indicated that the Military made steady and notable progress during the 18 years from 1980 to 1998 in combating substance use and its associated problems. Despite notable progress, there still is room for considerable improvement in some areas. The DoD has made little progress in reducing heavy alcohol use and preventing cigar or pipe smoking. Cigarette smoking remained common, affecting almost one in every three active-duty military personnel; smokeless tobacco use was particularly high in men aged 24 or younger, affecting about one out of five; nearly one in three personnel had smoked a cigar or pipe in the past year; and heavy alcohol use affected nearly one in six personnel.

Progress Toward Healthy People 2000 Objectives

The 1998 DoD survey provided data for assessing selected *Healthy People 2000* objectives pertaining to rates of (a) cigarette smoking, (b) smokeless tobacco use, (c) overweight, (d) strenuous exercise, (e) blood pressure awareness, (f) blood pressure control (g) cholesterol screening, (h) injuries, (i) seat belt use, (j) helmet use, (k) condom use, (l) Pap tests, and (m) substance use during pregnancy. Table ES-1 presents a summary of progress toward these *Healthy People 2000* goals from 1995 to 1998.

- The rate of cigarette use among military personnel in 1998 (29.9%) was still considerably above the objective of reducing the prevalence of cigarette smoking to no more than 20% by the year 2000. Similarly, the prevalence of current smokeless tobacco use among young men aged 18 to 24 (19.0%) was considerably higher than the objective of 4% for males aged 24 or younger.
- Overall, military personnel in 1998 met or exceeded five of the targets examined (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap smears ever received, and Pap smears received in the past 3 years).
- Other *Healthy People 2000* targets had been met by at least some demographic subgroups in the Military, even if not by the entire force. For example, in the under 20 age group, the goal of no more than 15% overweight was met by women.
- Military personnel were 10 percentage points or less away from reaching the *Healthy People 2000* targets for another seven behaviors (overweight for personnel under age 20, blood pressure screening in the past 2 years, helmet use for motorcyclists and bicyclists, condom use, and no cigarette or alcohol use during pregnancy).

Thus, the Military made good progress by 1998 in a number of areas, but faces considerable challenges in meeting the targets in all areas by the year 2000. The areas where targets were met are those where military regulations help ensure compliance with the desired behaviors (weight control, exercise, seat belt use, and Pap tests). It is likely to be more challenging to reach the targets in other areas where change is more dependent on the initiative of individuals. The largest gaps and greatest challenges will be to meet the objectives for smoking, smokeless tobacco use, controlling high blood pressure, and reducing injuries that require hospitalization. The rate of cigarette smoking remained about 10% higher than the *Healthy People 2000* objective. In addition, among lifetime hypertensives, only 46.5% were taking action (i.e., taking medication, dieting, reducing salt intake, exercising) to control their blood pressure, a figure well below the objective of at least 90%. Similarly, the rate of hospitalization for injuries in the past 12 months

Table ES.1 Progress Toward Selected *Healthy People 2000* Objectives, Total DoD, 1995-1998

Characteristic/Group	Objective	Year	
		1995	1998
Cigarette smoking, past 30 days			
All personnel	≤ 20%	31.9 (0.9)	29.9 (0.8)
Smokeless tobacco use, past 30 days			
Males, aged 18 to 24	≤ 4%	21.9 (1.0)	19.0 (0.8)
Overweight—<i>Healthy People 2000</i> Guidelines			
Under age 20	≤ 15%	19.0 (1.4)	22.9 (2.0)
Aged 20 or older	≤ 20%	16.7 (0.4)	19.5 (0.5) ^a
Strenuous exercise, past 30 days			
All personnel	≥ 20%	65.4 (0.9)	67.7 (0.9) ^a
Blood pressure, checked past 2 years and know result			
All personnel	≥ 90%	76.3 (0.9)	80.4 (0.5) [*]
Taking action to control high blood pressure			
Personnel with history of high blood pressure	≥ 90%	49.3 (1.3)	46.5 (1.4)
Cholesterol checked, past 5 years			
All personnel	≥ 75%	60.1 (1.5)	62.4 (1.1)
Hospitalization for injuries, past 12 months			
All personnel	≤ 754 per 100,000	3,388 (235)	3,271 (237)
Seat belt use			
All personnel	≥ 85% of occupants	90.6 (0.7)	91.4 (0.7) ^a
Helmet use, past 12 months			
Motorcyclists	≥ 80%	71.0 (1.3)	75.9 (0.9) [*]
Bicyclists	≥ 50%	22.8 (1.8)	44.2 (1.7) [*]
Condom use at last encounter			
Sexually active unmarried personnel	≥ 50%	40.4 (1.0)	41.8 (1.0)
Pap smear			
Ever received	≥ 95%	97.1 (0.6)	97.8 (0.2) ^a
Received in past 3 years	≥ 85%	95.2 (0.7)	95.9 (0.4) ^a
Substance use during last pregnancy			
No alcohol use	≥ 88%	85.2 (1.3)	85.8 (1.2)
No cigarette use	≥ 90%	83.9 (1.4)	85.8 (1.3)

Note: Table entries are percentages (with standard errors in parentheses), except for hospitalization for injuries, which is expressed per 100,000 personnel. Definitions and referent items can be found in Tables 3.3 and 3.4.

*Comparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

^a Met or exceeded *Healthy People 2000* objective.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995-1998.

(approximately 3,300 per 100,000 personnel) was more than four times higher than the targeted rate of 754 per 100,000 personnel.

In addition to making progress toward these unmet goals, maintenance of achieved goals is required to ensure that *Healthy People 2000* objectives met in 1998 will continue to be met in subsequent years.

Mental Health, Stress, and Coping

The survey examined a variety of mental health issues among military personnel, including stress, coping mechanisms, symptoms of depression, relationships between alcohol use and mental health problems, and perceptions of the potential career impact of mental health counseling.

- Military personnel were more likely to describe their military duties as stressful than their family or personal lives. The most frequently indicated stressor for both men (19.5%) and women (19.5%) was separation from family. More men (12.9%) than women (7.8%) experienced stress due to deployment, whereas more women (17.9%) than men (13.5%) experienced stress related to changes in the family.
- Personnel who experienced higher levels of stress were more likely than those with lower stress levels to work below normal performance levels (42.6% vs. 25.4%). In addition, injuries due to accidents in the workplace were twice as common among high-stressed personnel (12.9%) than among moderate/low-stressed personnel (6.4%).
- The three most commonly used strategies for coping with stress and feelings of depression were adopting a problem-solving approach, seeking social support, and engaging in physical activity. Nearly a quarter of military personnel, however, used alcohol to cope with stress and depression.
- Rates of depressive symptomology were higher among personnel who were women, Hispanics, less educated, younger, unmarried (or married but not living with their spouse), and (for enlisted personnel only) in lower pay grades. Personnel who met the criterion for needing further depression evaluation reported higher levels of stress at work and in their family lives, and productivity loss was higher among this group than among those who did not need further evaluation. Although productive coping strategies were fairly common among those who showed depressive symptoms, it was disturbing to find that 18.3% of this group had considered suicide or self-injury as a way of coping with stress or depression.
- Heavy users of alcohol had more problems with stress, more mental health problems, and were more likely to exhibit depressive symptoms than those who did not drink. This suggests that there is a strong comorbid relationship between heavy alcohol use and mental health problems, and that this is an area in need of greater attention.

- Approximately 17% of personnel in each Service had perceived a need for mental health care in the 12 months prior to the survey, but only about half of them received this care. This may be due to the fact that personnel are unsure of the impact that mental health counseling would have on their military career.

Overall, these data indicate that most military personnel in 1998 had good mental health and appropriate coping mechanisms for managing stress. A sizable group, however, experienced problems in these areas, which suggests the need for more attention to these issues. It is important to understand these relationships, the risk factors that contribute to them, and the potential clinical, research, and policy actions that should be taken to address them in order to maximize the health and readiness of the Military.

Special Issues

The survey also investigated several other special issues that may affect the readiness of the force: (a) women's health issues, including stress associated with being a woman in the Military; (b) military men's testicular self-examination; (c) oral health; and (d) gambling, including the prevalence of problem gambling and the relationship between problem gambling and alcohol use. Overall findings suggest that several of these topics will require further attention in coming years.

- Almost one in three women reported a "great deal" or "fairly large amount" of stress associated with being a woman in the Military. Rates were higher among women who were younger, less educated, married without a spouse present, and enlisted.
- Several sociodemographic variables were related to the receipt of prenatal care. First trimester care was less likely among women who were enlisted; were unmarried; were 20 years old or younger; and had less than a college degree.
- During the 12 months prior to the survey, about one-third of military men examined their testicles for lumps at least once a month, whereas an additional one-third never had examined themselves. Findings suggested a positive relationship between education and self-care (higher rates of education about self-care were associated with higher rates of self-examination). Only about half (48%) of the men, however, had received information or instruction on testicular self-examination. This is an issue in need of further attention by the Military.
- Approximately 90% of all military personnel had received a dental check-up in the past 12 months. Among those who had *not* had a check-up, the most frequent barriers to dental care were having to wait too long at a military dental clinic before being seen (about 32%) and not liking to go to any dentist (about 31%).

- Some 8.1% of military personnel had experienced at least one of eight gambling-related problems in their lifetime, and 2.2% experienced at least three of these problems, the level constituting probable pathological gambling. The prevalence rates of gambling problems essentially were unchanged from the rate observed in 1992.
- Gambling problems were related to alcohol use. Some 15.2% of heavy drinkers had at least one problem associated with gambling in their lifetime, compared to 4.9% of abstainers. Among personnel who showed symptoms of alcohol dependence, 20.4% also had at least one gambling problem, and 8.8% could be classified as probable pathological gamblers.

Maintaining the health of the Active Force is an important factor contributing to mission readiness. The findings noted above and other related findings are discussed in greater detail in the report. The report also describes the methodologies used to develop these estimates and suggests areas in need of attention to address key health issues facing the Military as it moves to the 21st century.

1. INTRODUCTION AND BACKGROUND

In this report, we present the findings from the 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel, conducted by the Research Triangle Institute of Research Triangle Park, North Carolina. We describe trends in substance use since 1980, health behaviors related to selected *Healthy People 2000* objectives (Public Health Service [PHS], 1991), and progress toward achieving health-related goals set forth by the DoD. For this report, "substance use" includes use of alcohol, other drugs, and tobacco (cigarettes, smokeless tobacco, and pipes and cigars).

This study is the seventh in a series of surveys of military personnel across the world conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 under the guidance of the Office of the Assistant Secretary of Defense for Health Affairs or OASD (HA). All of the surveys have assessed the prevalence of alcohol use, drug use, and tobacco use, as well as adverse consequences associated with substance use. Beginning in 1985, the surveys examined the effect of health behaviors other than substance use on the quality of life of military personnel. In 1988, this emphasis was expanded and oriented around the DoD health promotion objectives and provided information about knowledge of and attitudes toward the acquired immune deficiency syndrome (AIDS). In 1992, in collaboration with the DoD and the Services, we broadened this aspect of the survey even further to give greater emphasis to health risks, knowledge and beliefs about AIDS transmission, and nutrition. The 1992 survey also examined other special issues, including the impact of Operations Desert Shield and Desert Storm on substance use rates and the effects of problem gambling in the Military. In 1995, we revised the health behavior questions and added items to assess selected *Healthy People 2000* objectives, the mental health of the force, and specific health concerns of military women, including stress, pregnancy, substance use during pregnancy, and receipt of health services. In 1998, we revised some of the health behavior questions and added items to assess oral health, men's health, and gambling behavior.

In this chapter, we discuss the relevance of health promotion to the Military, provide background on the DoD survey series, describe objectives for the 1998 survey, and briefly present findings from other studies of the prevalence of substance use and other health behaviors among military personnel.

1.1 Organization of the Report

In this report, we describe the substance use and other health behaviors among active-duty U.S. military personnel throughout the world in 1998. We describe the general methodology for the 1998 survey in Chapter 2, including sampling design, instrument development, data collection procedures, survey performance rates, sample participants

and military population characteristics, key definitions and measures, analysis techniques, variability and suppression of estimates, and strengths and limitations of the data. In Chapter 3, we provide an overview of trends in substance use and other health behaviors for the total DoD population, including measures related to specific *Healthy People 2000* objectives. Trend analyses presented in Chapter 3 compare findings from the 1998 DoD survey with findings from the six previous surveys conducted worldwide for the DoD.

In the next three chapters, we describe the prevalence, trends, correlates, and comparisons with the civilian population of rates of alcohol use (Chapter 4), illicit drug use (Chapter 5), and tobacco use (Chapter 6). Chapter 6 also describes progress in meeting the *Healthy People 2000* objectives on cigarette smoking and smokeless tobacco use.

Chapter 7 examines health behaviors and health promotion, including behaviors related to fitness and cardiovascular disease risk reduction, injuries and injury prevention, and sexually transmitted disease (STD) risk reduction, including an assessment of progress toward *Healthy People 2000* objectives in each of these areas. In connection with findings on STD risk reduction, we also present more detailed information on military personnel's condom use.

Chapters 8 and 9 examine a number of special issues. Chapter 8 examines sources of stress and coping mechanisms, symptoms of depression, and relationships between mental health problems and alcohol use. Chapter 9 discusses military women's health including perceived stress associated with being a woman in the Military, health behaviors related to cervical cancer screenings and pregnancy, and maternal and infant issues. In addition to women's health issues, Chapter 9 explores military men's health, as well as oral health and gambling among military personnel.

We also have included several appendices to assist readers interested in details about our sampling and analysis methodologies, the study questionnaire, and additional data tables. Appendix A describes the sampling design for the 1998 survey, and Appendix B contains a discussion of sample weighting and estimation procedures. We have designed Appendix C to help readers use our estimates of sampling errors and to clarify the suppression rule used with the estimates. Appendix D contains a set of supplemental tables that augment data reported in the main text. Appendix E provides a detailed discussion of the alcohol summary measures used in this report. In Appendix F, we discuss the technical details of our approach to standardization and to multivariate analyses. Appendix G lists the DoD's survey liaison officers who oversaw and coordinated the survey efforts at each of the participating installations. Finally, Appendix H contains a copy of the instrument for the 1998 survey.

1.2 Health Promotion and the Military

1.2.1 Background and Relevance

In the United States, public health measures, such as improved sanitation, better housing conditions, improved nutrition, immunizations, and development of antibiotics, have been largely responsible for reductions in deaths due to infectious diseases that were common in the early part of this century. In 1900, for example, the major causes of death were infectious diseases, such as influenza, pneumonia, diphtheria, and tuberculosis (PHS, 1979). In contrast, the current major causes of death in the United States are now chronic diseases. For example, nearly two-thirds of the deaths in the United States in 1996 were caused by heart disease, cancer, and stroke; unintentional injuries were the fifth leading cause of death in the United States in 1996, after heart disease, cancer, stroke, and chronic obstructive pulmonary diseases (Centers for Disease Control and Prevention [CDC], 1997b). In the early 1990s, among adolescents and young adults aged 15 to 24, however, unintentional injuries were reported as the leading cause of death (CDC, 1992; PHS, 1991).

In 1997, HIV infections fell to 14th among the leading causes of death (Department of Health and Human Services [DHHS], 1998). Although male-to-male sexual contact remains the most common route of infection, the largest increase in AIDS cases occurred through heterosexual contact with an infected partner (CDC, 1997c). Even though the death rate from AIDS is decreasing, the numbers of people infected with the AIDS virus is not, indicating a need to strengthen prevention efforts.

Whereas these diseases and injuries may sometimes be caused by environmental conditions (e.g., occupational exposure to a known carcinogen, such as asbestos), many of these problems are related to "lifestyle" factors, such as cigarette smoking, lack of exercise, fat and cholesterol intake, alcohol use (including driving while impaired), nonuse of seat belts, or risky sexual behaviors (e.g., not using condoms or having multiple sexual partners). In particular, the Surgeon General considers tobacco use to be the single most important preventable cause of death and disease in the United States (Office on Smoking and Health, 1989). More than one in four of the deaths in the United States each year can be attributed to alcohol, illicit drug, or tobacco use (Horgan, Marsden, & Larson, 1993). Cirrhosis of the liver, which is often associated with chronic, heavy alcohol use, was the 10th leading cause of death in 1996 (CDC, 1997b). In 1997, alcohol was also involved in about 40% of motor vehicle fatalities, and over one-third of these fatalities had blood alcohol concentrations of 0.10% or greater, at or above the legal level of intoxication in most States (CDC, 1998c).

In addition, cancer screening procedures, such as Pap smears, can detect potentially malignant cell growths early in their development. Thus, although cervical cancer is a

major cause of cancer-related deaths among women (CDC, 1993a, 1994a), such deaths can be prevented if the cancers are detected sufficiently early (CDC, 1998a; PHS, 1991).

Just as these health-related behaviors are of relevance to society in general, they also are of interest and concern to the DoD and the Services for a number of reasons. First, the health behaviors and habits that military personnel acquire or receive reinforcement to maintain during their stay in the Military can sow the seeds for the kinds of chronic diseases described above, or reduce the risk of these diseases. Even though the military force is comprised primarily of young, healthy individuals, such behaviors as cigarette smoking and heavy alcohol use can lead to serious health problems later in life. Research has shown that Air Force recruits who were smokers reported higher alcohol use, more frequent binge drinking, greater smokeless tobacco use, and less physical activity (Haddock, Klesges, Talcott, Lando, & Stein, 1998). Conversely, military personnel can still maintain behaviors that promote health, such as vigorous physical exercise, long after they are discharged. Effective management of stress, depression, and other mental health problems also can contribute to healthier military personnel.

Second, poor health practices among military personnel, including heavy alcohol use and illicit drug use, interfere with the DoD mission of maintaining a high state of military readiness among the Armed Forces. For example, abuse of alcohol or illicit drugs can impair work performance or pose a danger to others, if personnel are either under the influence of alcohol or other drugs or recovering from the effects of these drugs when carrying out their military jobs. Moreover, alcohol and other drug abuse can create personal or family problems, which in turn can interfere with job performance.

Third, the DoD considers any use of illicit drugs by military personnel to be abuse. The rationale for this policy is that the defiance of laws prohibiting use of illicit drugs can have a potentially deleterious effect on military discipline, even if the effects or consequences of such use are minimal.

For these reasons, the DoD has been placing increased emphasis on health promotion since the 1980s. In the remainder of this section, we briefly describe DoD health promotion policies and discuss health objectives for the Nation and the Military and their relevance to the 1998 DoD survey.

1.2.2 DoD Health Promotion Policies

The DoD has had a long-standing interest in the health and well-being of its members. Indeed, having ready access to a comprehensive health care program at little or no cost to the member has long been viewed as an important benefit of military life (Stanley & Blair, 1993). Health promotion efforts in the Military emerged as an outgrowth

of problems that surfaced due to drug and alcohol abuse in the 1970s. In response to reports of widespread drug abuse among troops during the Vietnam War, and in recognition of the significance of the alcohol abuse problem in the Services, the DoD issued a policy directive in March 1972 (No. 1010.2) that set forth prevention and treatment policies for alcohol abuse and alcoholism among military personnel. Other DoD policy directives (e.g., DoD Directives Nos. 1010.3 and 1010.4 and Instruction Nos. 1010.5 and 1010.6) and programs provide for the following:

- assessment of the nature, extent, and consequences of substance use and abuse in the Military (DoD, 1980a, 1985b, 1997c);
- prevention programs designed to deter substance abuse, which include both education and drug urinalysis testing (DoD, 1980b);
- treatment and rehabilitation programs designed to return substance abusers to full performance capabilities (DoD, 1985a); and
- evaluation of drug urinalysis programs and treatment and rehabilitation programs (DoD, 1985b, 1997c).

In 1986, the DoD established a formal, coordinated, and integrated health promotion policy (DoD Directive No. 1010.10) designed to improve and maintain military readiness and the quality of life of DoD personnel and other beneficiaries (DoD, 1986a). This directive defined health promotion as activities designed to support and influence individuals in managing their own health through lifestyle decisions and self-care. It identified six broad program areas: smoking prevention and cessation, physical fitness, nutrition, stress management, alcohol and other drug abuse prevention, and prevention of hypertension.

Smoking prevention and cessation programs aim to create a social environment that supports abstinence and discourages use of tobacco products, thereby creating a healthy working environment. The programs also seek to provide smokers with encouragement and professional assistance to stop smoking. Information on the health consequences of smoking is to be presented to military personnel when they enter the Military, as part of routine physical and dental examinations, and at the time of a permanent change of station (PCS). At entry, nonsmokers are encouraged to refrain from smoking, and smokers are encouraged to quit. In early 1994, the DoD issued Instruction No. 1010.15 mandating a smoke-free workplace (DoD, 1994). Under this instruction, smoking is banned indoors in all DoD workplaces. Policy related to smoking in clubs, eating facilities, and living facilities, such as bachelor's quarters, is still governed by DoD Directive 1010.10, which permits smoking areas to be designated if adequate space is available for nonsmokers and ventilation is adequate to provide them a healthy environment (DoD, 1986a).

Physical fitness programs aim to encourage and assist military personnel to establish and maintain the physical stamina and cardiorespiratory endurance necessary for good health and a productive lifestyle. Programs that integrate fitness activities into normal work routines and community activities are encouraged.

Nutrition programs aim to encourage and assist military personnel to establish and maintain dietary habits that contribute to good health, prevent disease, and control weight. The weight control aspect of health promotion overlaps with the goals of physical fitness programs discussed above, but nutrition programs also provide information about the nutritional value of foods and the relationship between diet and chronic disease.

Stress management programs aim to reduce environmental stressors and to help target populations cope with stress. Commanders are to develop leadership practices and work policies that promote productivity and health and to offer education to military personnel on stress management techniques.

Alcohol and other drug abuse prevention programs aim to prevent the misuse of alcohol and other drugs, eliminate the illegal use of such substances, provide counseling or rehabilitation to abusers who desire assistance, and provide education to various target audiences about the risks associated with drinking. (This policy supplements earlier alcohol and drug abuse prevention policy.)

Hypertension prevention programs aim to identify hypertension early, provide information about control and lifestyle factors, and provide treatment referral where indicated.

As a response to this health promotion directive, the individual Services established their own health promotion programs consistent with DoD policy to meet the distinctive problems and needs of their members.

In 1991, the DoD set forth a comprehensive military policy on the identification, surveillance, and administration of military personnel infected with HIV (DoD Directive No. 6485.1). The policy provides for testing of military members and candidates for accession and establishes procedures for dealing with those who test positive for HIV. In addition, the Military is providing extensive education about how HIV is transmitted and how to prevent transmission.

In addition, after the publication of *Healthy People 2000* (PHS, 1991), the DoD identified a subset of objectives of most relevance to the Military. These objectives have, in part, focused attention on specific health-related behavior changes that are desirable to

achieve during the present decade. In the next section, we discuss these objectives for the Nation and the Military in greater detail.

1.2.3 *Healthy People 2000* and the Military

Beginning with *Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention* (PHS, 1979) and continuing in 1980 with *Promoting Health/Preventing Disease: Objectives for the Nation* (PHS, 1980), the Federal Government has adopted a national health agenda. Broadly speaking, the agenda is aimed at taking steps to prevent unnecessary disease and disability and to achieve a better quality of life for all Americans. These initial efforts were followed by *Healthy People 2000: National Health Promotion and Disease Prevention Objectives* (PHS, 1991) and are currently being updated to provide objectives for the year 2010 (Office of Disease Prevention and Health Promotion [ODPHP], 1999).

The purpose of *Healthy People 2000*, which sets out health objectives to be achieved by the year 2000, has been to commit the Nation to the attainment of three broad goals during the 1990s:

- increase the span of healthy life for Americans,
- reduce health disparities among Americans, and
- achieve access to preventive services for all Americans.

Responding effectively to the health challenges of the 1990s requires a clear understanding of the health-related threats and opportunities facing Americans. This is to be achieved by setting measurable targets or goals across 22 priority areas grouped into four categories (health promotion, health protection, preventive services, and surveillance and data systems) as follows:

- Health Promotion:
 1. Physical Activity and Fitness
 2. Nutrition
 3. Tobacco
 4. Alcohol and Other Drugs
 5. Family Planning
 6. Mental Health and Mental Disorders
 7. Violent and Abusive Behavior
 8. Educational and Community-Based Programs
- Health Protection:
 9. Unintentional Injuries
 10. Occupational Safety and Health

11. Environmental Health
12. Food and Drug Safety
13. Oral Health

- Preventive Services:

14. Maternal and Infant Health
15. Heart Disease and Stroke
16. Cancer
17. Diabetes and Chronic Disabling Conditions
18. Human Immunodeficiency Virus (HIV) Infection
19. Sexually Transmitted Diseases
20. Immunization and Infectious Diseases
21. Clinical Preventive Services

- Surveillance and Data Systems

22. Surveillance and Data Systems

Health promotion strategies relate to personal choices made in a social context that reflect an individual's lifestyle and therefore influence prospects for future health. Health protection strategies are those related to environmental or regulatory measures that confer protection on large population groups. In contrast to health promotion strategies (which have an individual focus), health protection strategies generally involve a community-wide focus. Preventive services include counseling, screening, and immunization interventions for individuals in clinical settings. Surveillance and data systems are incorporated to ensure useful measurement of progress toward achievement of the objectives. Existing data sources (e.g., ongoing surveys) are identified that can be used to measure progress, and the need for additional data sources are noted. The key to the effort is a set of 383 measurable national health objectives for reducing preventable death, disease, and disability.

Healthy People 2000 calls for individuals, families, communities, health professionals, the media, and government to share the responsibility to improve the Nation's health profile. Simply stated, all segments of society must work together to meet the challenge of the *Healthy People 2000* goals and objectives. *Healthy People 2000* offers hope that through cooperative efforts, all Americans can live longer, healthier lives.

The response from the DoD has been a review of the *Healthy People 2000* objectives to identify those most relevant to the Military. Of the 383 objectives, 181 were identified as being of initial primary concern to the DoD. Of these 181 objectives, 45 were prioritized and designated to be of the highest importance for near-term measurement (OASD [HA],

1992). From these 45 objectives, the DoD identified a subset that focused on health-related behaviors thought to be measurable with surveys.

The DoD has identified the 1998 DoD survey as the key source of measures for many of these objectives. As discussed in Section 1.4, a key objective of the 1995 survey was to use the survey to establish baseline measures of many of these behavioral objectives. Subsequent surveys can then be used to assess change and progress toward meeting the objectives.

The 1992 DoD survey had already provided some information about a limited number of *Healthy People 2000* objectives among military personnel (Bray et al., 1992). Specifically, the 1992 survey provided data on objectives pertaining to

- cigarette use and smokeless tobacco use,
- physical exercise,
- cardiovascular disease risk reduction, and
- HIV and other STD risk reduction.

Specific *Healthy People 2000* objectives addressed through the 1998 DoD survey include the following:

- reduce cigarette smoking to a prevalence of no more than 20% among military personnel;
- reduce smokeless tobacco use by males aged 24 or younger to a prevalence of no more than 4%;
- reduce overweight, as measured by the Body Mass Index (BMI), to a prevalence of no more than 20% among people aged 20 or older and no more than 15% among people under age 20;
- increase to at least 20% the proportion of people aged 18 or older who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion;
- increase to at least 90% the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high;
- increase to at least 90% the proportion of people with high blood pressure who are taking action to help control their blood pressure;
- increase to at least 75% the proportion of adults who had their blood cholesterol checked within the preceding 5 years;

- reduce nonfatal unintentional injuries that require hospitalization to no more than 754 per 100,000 people;
- increase use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats, to at least 85% of motor vehicle occupants;
- increase use of helmets to at least 80% of motorcyclists and at least 50% of bicyclists;
- increase to more than 50% the proportion of sexually active, unmarried people who used a condom at last sexual intercourse;
- increase to at least 95% the proportion of women aged 18 or older with intact uterine cervix who have ever received a Pap test, and to at least 85% those who received a Pap test within the preceding 1 to 3 years; and
- increase abstinence from tobacco use by pregnant women to at least 90% and increase abstinence from alcohol by at least 20%.

The 1998 DoD survey provides measures of progress for each of these *Healthy People 2000* objectives since 1995 when the last DoD survey was conducted.

1.3 DoD Survey Series

A systematic effort to obtain data that can be used to guide and evaluate health and substance abuse programs and policies began in 1980 under the direction of the OASD(HA). The DoD initiated a series of recurrent surveys to (a) improve understanding of the nature, causes, and consequences of substance use and health in the Military; (b) determine the appropriateness of the emphasis placed on program elements; and (c) examine the impact of current and future program policies. The 1980 survey was conducted by Burt Associates, Incorporated, of Bethesda, Maryland (Burt, Biegel, Carnes, & Farley, 1980). The 1982, 1985, 1988, 1992, and 1995 surveys, as well as the current 1998 survey that is the topic of this report, were conducted by Research Triangle Institute of Research Triangle Park, North Carolina (Bray et al., 1983, 1986, 1988, 1992, 1995a). All seven surveys have assessed the extent and consequences of alcohol and other drug use. Beginning in 1985, the survey's focus was broadened to include an assessment of health promotion efforts.

In particular, the 1985 Worldwide Survey of Alcohol and Nonmedical Drug Use Among Military Personnel continued the investigation of nonmedical use of illicit drugs, alcohol use, and associated consequences (Bray et al., 1986). The survey assessed cigarette smoking behavior in more detail and, for the first time, investigated involvement in health behaviors other than alcohol and other drug use. The analyses examined the relationships of substance use and other health behaviors to health status. Thus, the continuing

concerns for monitoring the prevalence of alcohol use and nonmedical drug use and associated consequences were placed within a broader health promotion framework.

The 1988 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel maintained the prior emphases on nonmedical drug use and alcohol use and associated consequences and programmatic responses (Bray et al., 1988). The examination of health attitudes and behaviors, however, had a more central role. Hence, the name of the survey was changed accordingly. Questions on health behaviors other than substance use were augmented, and additional questions on stress were included. Overall, the questions permitted the assessment in the Military of the DoD health promotion areas of alcohol and drug abuse prevention, smoking prevention and cessation, physical fitness, nutrition, stress management, and hypertension prevention behaviors. In addition, the 1988 survey examined attitudes and knowledge related to AIDS, with a view toward determining the need for additional educational efforts.

The 1992 Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel was placed within a broad health promotion framework that continued prior emphases on nonmedical drug and alcohol use and associated consequences and programmatic responses (Bray et al., 1992; Bray, Marsden, Herbold, & Peterson, 1993). The 1992 survey, however, included more extensive comparisons of DoD survey findings with civilian data on alcohol, illicit drug, and cigarette use. In addition, we examined health attitudes and behaviors in greater depth than in prior DoD surveys. We included questions that permitted us to assess progress in the Military in alcohol and other drug abuse prevention, as well as smoking prevention and cessation, and to provide data on health risks, nutrition, stress, and hypertension. The final report for the 1992 survey also discussed findings on the following health behaviors in relation to specific *Healthy People 2000* objectives: cigarette smoking, smokeless tobacco use, condom use, exercise, blood pressure screening and cholesterol screening, and actions taken to control high blood pressure.

In addition, the 1992 survey examined relationships between involvement in Operations Desert Shield and Desert Storm and rates of substance use. The 1992 survey also included questions for the first time to assess the prevalence of anabolic steroid use and included questions to estimate the prevalence of problem gambling in the Military. A special analysis conducted as part of the 1992 survey involved estimating the medical costs of tobacco and alcohol abuse.

The 1995 survey continued the broader health promotion focus begun in 1985 and included a greater emphasis on information for assessing progress toward *Healthy People 2000* objectives (Bray et al., 1995a). Within the contexts of the entire survey series and the

health promotion focus of more recent surveys in the series, the 1995 DoD survey had two broad aims:

- to continue the survey of substance use among military personnel and
- to establish baseline data to assess progress toward selected *Healthy People 2000* objectives.

1.4 Overview and Objectives of the 1998 DoD Survey

In keeping with the broad aims of the 1995 survey, major objectives of the 1998 survey were as follows:

- to continue the analysis of trends in use of alcohol, illicit drugs, and cigarettes, and consequences associated with substance use;
- to describe important correlates of substance use among military personnel in 1998;
- to compare rates of alcohol, illicit drug, and cigarette use among military personnel in 1998 with rates from comparable civilian populations;
- to provide estimates for health behaviors pertaining to fitness and cardiovascular disease risk reduction, injuries and injury prevention, STD risk reduction, cervical cancer screening, and maternal and infant health;
- to identify important correlates of these health behaviors; and
- where appropriate, to compare health behavior data between 1995 and 1998.

Thus, this report for the 1998 survey continues to provide estimates of the use of alcohol, illicit drugs, and cigarettes, but it gives considerable attention to health behaviors other than substance use.

As part of the objective of estimating the prevalence of condom use in 1998, the number of questions about condom use was expanded to allow measurement of use in different sexual relationships.

The 1998 survey also included more detailed questions about mental health services. Specifically, the questionnaire contained questions about receipt of mental health services and the perceived need for mental health services.

Finally, the 1998 survey continues to explore military women's health issues, but it also gives special consideration to such emerging issues as oral health, men's health, and

problem gambling. For example, men's health issues focused on testicular self-examinations and receipt of information about self-examinations because testicular cancer is the most common cancer found among non-Hispanic Caucasian men aged 20 to 34 (National Cancer Institute [NCI], 1999a, 1999b; Ries, Kosary, Hankey, Miller, & Edwards, 1998).

1.5 Prior Studies on Substance Use Among the Military and Civilian Populations

A number of epidemiologic surveys and other studies have documented the nature and extent of substance use (i.e., alcohol, illicit drug, and tobacco use) both for civilians and for military personnel. This section briefly reviews these data. The DoD survey series has been the major source of comprehensive information on substance use among military personnel. The major sources of information documenting substance use for civilians are national alcohol surveys and the National Household Survey on Drug Abuse (NHSDA) series for alcohol use and illicit drug use; the Monitoring the Future survey series for alcohol, tobacco, and other drug use among high school seniors and young adults; and the NHSDA and the National Health Interview Survey (NHIS) for tobacco use. Findings from these surveys provide a context for interpreting findings from the 1998 DoD survey in terms of trends both within the Military and in the broader civilian population, from which the military population is drawn.

1.5.1 Military Population Studies

Findings from prior DoD surveys on the prevalence of substance use among personnel in the total DoD population (Bray et al., 1992, 1995a; Bray, Kroutil, & Marsden, 1995b; Kroutil, Bray, & Marsden, 1994) indicate steady and notable reductions in overall alcohol use, illicit drug use, and cigarette smoking. There was a less noticeable decline, however, in heavy alcohol use, and the declines in heavy alcohol use from 1980 to 1995 could largely be explained by changes in the Military's demographic composition. Specific highlights from prior DoD surveys include the following.

Prevalence of Alcohol, Illicit Drug, and Tobacco Use

- The percentage of the military population who were abstainers from alcohol (i.e., drank once a year or less and not in the month prior to the survey) increased significantly from 1980 (13.5%) to 1995 (20.7%), or approximately one out of five personnel in 1995.
- Overall alcohol consumption, as measured by average daily ethanol consumption, declined significantly from 1.48 ounces in 1980 to 0.87 ounces in 1995.

- The prevalence of heavy alcohol use (i.e., consumption of five or more drinks per occasion on at least a weekly basis in the past 30 days) declined notably from 20.8% in 1980 to 17.4% in 1995. The rate was relatively stable from 1980 to 1985 (between 20% and 25% of all personnel), decreased significantly between 1985 (23.0%) and 1988 (17.2%), decreased slightly between 1988 and 1992 (15.5%), and then increased slightly between 1992 and 1995 (17.4%). See the discussion below, however, for the effects of adjusting for demographic changes.
- The rate of any illicit drug use in the past 30 days declined sharply from 27.6% in 1980 to 3.0% in 1995. The decreases in illicit drug use were statistically significant between each of the surveys from 1980 to 1995.
- The percentage of military personnel who smoked cigarettes in the 30 days prior to the survey showed significant declines over the 15-year period from 51.0% in 1980 to 31.9% in 1995. There were significant declines in the prevalence of smoking between each of the survey years following 1982.
- In 1995, 13.2% of all military personnel used smokeless tobacco in the past 30 days. Nearly one-fifth of military men aged 24 or younger (21.9%), however, used smokeless tobacco in the past 30 days. Furthermore, nearly one-third (30.6%) of Marine Corps men aged 24 or younger used smokeless tobacco in the past 30 days.

Demographic Correlates of Use

- Heavy alcohol use and illicit drug use were consistently related to education, age, marital status, and pay grade across the entire survey series. Specifically, personnel who had less education, were younger, unmarried, and in the lower pay grades were consistently more likely to drink heavily in the past month and to use illicit drugs in the past year.
- Military men showed a higher prevalence of heavy alcohol use than did military women across the entire survey series. For illicit drugs, men and women had similar rates of use from 1980 to 1988. In 1992, however, men were nearly twice as likely as women to have used illicit drugs in the past 12 months. In contrast to the 1992 data, data from the 1995 survey suggested that the difference in use rates of men and women (6.7% vs. 5.3%) may be lessening.
- Cigarette smoking was consistently related to education and pay grade. Military personnel with less education consistently showed a higher prevalence of smoking than did personnel with more education. Smoking also was consistently more prevalent among enlisted personnel (E1 to E9) than among officers (O1 to O10).

Adjustments for Demographic Changes Over Time

- Analyses that controlled for demographic changes in the Military from 1980 to 1995 (i.e., increases in percentages of personnel who were female, older, married, and had more education) indicated that the declines in the rates of illicit drug use and cigarette smoking were not explained by demographic changes.
- Analyses of rates of heavy drinking that adjusted for demographic changes in the Military suggested that declines from 1980 to 1995 were largely a function of changing demographics. When estimates of heavy alcohol use were adjusted to reflect demographic changes in the Military, the adjusted rate of heavy alcohol use in 1995 had not changed significantly from the 1980 rate.

1.5.2 Civilian Population Studies

As for the military population, findings from surveys of the U.S. civilian population indicate declines in the prevalence of cigarette smoking and any illicit drug use, but a relatively stable prevalence of heavy alcohol use. The reductions in cigarette smoking began in the mid-1960s following the publication in 1964 of the first Surgeon General's report on smoking. Declines in illicit drug use have occurred more recently, beginning in the early 1980s. Some recent survey data, however, suggest that drug use is notably higher among some population subgroups (Bray & Marsden, 1999) and may be increasing again among some subgroups in the civilian population (Office of Applied Studies [OAS], 1998c).

Highlights on the prevalence of substance use among the civilian population based on civilian alcohol surveys (Clark & Hilton, 1986; Clark & Midanik, 1982; Polich & Kaelber, 1985), the 1997 National Household Survey on Drug Abuse (NHSDA) (OAS, 1998b), the Monitoring the Future (MTF) study of high school seniors and young adults (University of Michigan, 1998), and the National Health Interview Survey (NHIS) (CDC, 1993b) include the following:

- In 1997, about 5% of the civilian population were heavy drinkers (OAS, 1998c). Approximately 11% of young adults aged 18 to 25 in 1997, however, were heavy alcohol users, based on reported consumption of five or more drinks per occasion on 5 or more days in the past month. In addition, men were more likely than women to drink and to drink heavily. Other studies have found rates of "problem" drinking to be higher for young men, minorities, or those with unstable work or family environments (Clark & Hilton, 1986).
- Trend data on illicit drug use from the NHSDAs (OAS, 1998c) indicate that use of illicit drugs among the civilian population generally peaked during the late 1970s, declined through 1992, and remained relatively stable through 1996. Although trend data

indicate declines since the late 1970s, the 1997 data indicate a slight increase in illicit drug use. About 11% of the 1997 U.S. civilian, noninstitutionalized population aged 12 or older, or roughly 24 million civilian Americans, used at least one illicit drug in the past year.

- According to the 1998 MTF study, the prevalence of drug use may be leveling off among youths and young adults. Although marijuana use in the past 12 months and past month among high school seniors increased between 1992 and 1997, its use had stabilized between 1997 and 1998 (University of Michigan, 1998). Even though the rates of marijuana use may have stabilized, they had been quite high among high school seniors. Recently released findings from the MTF study indicate that almost one-fourth (23.7%) of 12th graders had used marijuana in the past 30 days, up from 15.5% in 1993 (Johnston, O'Malley, & Bachman, 1998a, 1998b). Some 5.8% of high school seniors were daily marijuana users in 1997, up from 2.4% in 1993. Contrary to the findings by the MTF study, preliminary findings from the 1997 NHSDA indicate an increase in the prevalence of marijuana use among youths aged 12 to 17, from 7.1% in 1996 to 9.4% in 1997 (OAS, 1998c).
- A follow-up to the MTF study tracked high schoolers into adulthood and found that those who entered the Military were less likely to use illicit drugs, but more likely to smoke cigarettes or drink heavily than other young adults (Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). Furthermore, their analyses indicated that when controlling for marital status, living arrangements, pregnancy, and parenthood, military service itself seemed to contribute to the increases in smoking and drinking.
- The prevalence of cigarette smoking among civilians has decreased markedly since the first report of the Surgeon General's Advisory Committee in 1964. In 1965, some 42% of adults smoked cigarettes on a regular basis (Giovino et al., 1994); in 1995, the figure was about 25% (CDC, 1997a).
- Smoking rates for men have decreased more rapidly than for women, decreasing the gender differential apparent in the 1960s. In 1965, 52% of men and 34% of women were current smokers (Giovino et al., 1994). From 1965 to 1997, the prevalence of smoking declined such that 26% of men and 23% of women were current smokers in 1997; rates among men and women in 1996 were similar to rates in 1997 (CDC, 1998d).
- Civilian consumption of smokeless tobacco products (snuff and chewing tobacco) increased rapidly beginning in the early 1970s (Connolly et al., 1986), particularly among young males. In 1997, about 17% of the household population aged 12 or older had ever used smokeless tobacco (4.7% in the past year and 3.2% in the past month) (OAS, 1998c). Past month use in 1996 was substantially higher among men than women (6.0% vs. 0.6%) and was highest among young men aged 18 to 25 (12.1%) (OAS, 1998a).
- Findings from the 1991 NHIS (CDC, 1993b) also indicated that the prevalence of current smokeless tobacco use (defined as lifetime use

at least 20 or more times and reported current use) was highest among young males aged 18 to 24. Except for women aged 65 or older, fewer than 1% of women were current smokeless tobacco users. Non-Hispanic Caucasian males were more likely than non-Hispanic African-American and Hispanic males to be current smokeless tobacco users. Among current smokeless tobacco users, over one-fifth (22.9%) were current cigarette smokers, and one-third (33.3%) were former smokers.

1.5.3 Comparisons Between the Military and Civilian Populations

Although findings from both military and civilian surveys indicate declines in illicit drug use, smoking, any alcohol use, and heavy alcohol use, direct comparison of rates between these two populations can be misleading because of demographic differences between the two populations. For example, as shown in this 1998 report and the past two reports in the DoD series, approximately 85% of the Military in the 1990s was male (Bray et al., 1992, 1995a). As noted above, men were more likely than women in both the military and civilian populations to be heavy alcohol users. Thus, higher rates of heavy alcohol use in the Military compared to the heavy alcohol use rate among civilians may be due in part to a much higher proportion of males in the Military, as well as other demographic differences between the military and civilian populations. Similarly, apparent differences in rates of illicit drug and cigarette use between the military and civilian populations may be due to such factors as different age and education compositions of these two populations.

Comparisons of rates of heavy alcohol use, illicit drug use, and cigarette use among the military and civilian populations that controlled for demographic differences (Bray et al., 1992; Bray, Marsden, & Peterson, 1991; Marsden, Bray, Kroutil, & Wheelless, 1993) indicated the following:

- Rates of illicit drug use were consistently *lower* among military personnel than among civilians when demographic differences were taken into account. The lower rates of illicit drug use among military personnel were found among both men and women and across age groups.
- Despite the consistently lower rates of illicit drug use among military personnel, the gap between military and standardized civilian rates of illicit drug use appeared to be narrowing overall and among males.
- Rates of heavy alcohol use and cigarette smoking were consistently *higher* among military personnel than among civilians.
- Although rates of heavy alcohol use were consistently higher for the military population, the gap between the military population rates and standardized civilian rates did not narrow for the total population between 1992 and 1995.

- Young military men aged 18 to 25 were consistently found to have the highest prevalence of heavy alcohol use. Furthermore, rates of heavy alcohol use among young military men were approximately twice the standardized rates for their civilian counterparts.
- The declines in the rates of cigarette use among the overall military population paralleled the declines that would have been observed among the civilian population, if the civilian population's demographic characteristics had more closely resembled the Military's.

1.5.4 Summary

Findings from both military and civilian studies showed declines in illicit drug use and cigarette smoking in both populations during the 1980s and 1990s. Recent surveys, however, indicate that the prevalence of illicit drug use, and particularly marijuana use, may be increasing among some segments of the civilian population. The prevalence of cigarette smoking among the civilian population declined since the mid-1960s. Declines in the prevalence of cigarette smoking among military personnel occurred more recently (i.e., since the early 1980s). Although cigarette smoking among military personnel in 1995 (31.9%) was at its lowest level since the DoD survey series began, this rate was still well above the *Healthy People 2000* target of 20% for military personnel by the year 2000.

In both the military and civilian populations, the prevalence of heavy alcohol use was more stable over time. The prevalence of heavy alcohol use in the past 30 days stayed around 5% of the civilian population. Among military personnel, the actual prevalence of heavy alcohol use declined since the early 1980s, but this decline appears to have been due to changes in the demographic composition of the Military.

Findings from civilian surveys indicate that the prevalence of smokeless tobacco use was highest among young adult males. Findings from the 1995 DoD survey also indicate that the prevalence of smokeless tobacco use in the past 12 months was higher among young males relative to the total military population.

Comparisons of rates of substance use in the military and civilian populations that took into account demographic differences between the two populations indicated consistently higher rates of heavy alcohol use and cigarette use in the Military, but consistently lower rates of illicit drug use in the Military. In particular, rates of heavy alcohol use among military men aged 18 to 25 were approximately twice the standardized rates for civilian men in the same age group.

1.6 Prior Studies on Other Health Behaviors Among the Military and Civilian Populations

Poor health practices have been shown to decrease longevity and adversely affect both physical and mental health. Conversely, classic studies by Belloc and Breslow (1972) and Breslow and Enstrom (1980) demonstrated that good health practices, such as nonuse of cigarettes, moderate use of alcohol, adequate sleep, regular exercise, and proper nutrition, have an additive effect on health.

Since the Surgeon General's report on health promotion and disease prevention (PHS, 1979) and with the release of *Healthy People 2000* (PHS, 1991), these and other health behaviors known to affect morbidity and mortality have been monitored in the U.S. population through the NHIS, sponsored by the National Center for Health Statistics (NCHS). In 1984, the CDC established the Behavioral Risk Factor Surveillance System (BRFSS), and 15 States conducted monthly risk factor surveys throughout the year. By 1991, 47 States and the District of Columbia (DC) were participating in the BRFSS (Siegel, Frazier, Mariolis, Brackbill, & Smith, 1993).

Concern about health behaviors other than substance use in the Military has been more recent, and various behaviors were monitored through the DoD surveys. In particular, the surveys have included items on participation in health screening or education activities, nutritional practices, condom use, presence of specific health risk factors (e.g., high blood pressure), perceptions of health risks associated with different health conditions or health-related behaviors, and behavior changes undertaken to improve health.

1.6.1 Military Population Studies

As noted above, the 1998 DoD survey included questions about a variety of health behaviors in addition to substance use. In addition, some findings were discussed as they related to selected *Healthy People 2000* objectives.

Surveys also have been conducted by the individual Services. Highlights from research on health behaviors other than substance use among the military population are discussed below.

In 1995, nearly two-thirds (65.4%) of personnel in the total DoD, over half of personnel in the Navy and the Air Force, and approximately 80% of personnel in the Army and Marine Corps engaged in regular strenuous physical exercise for 20 minutes or more at least three times a week (Bray et al., 1995a). These rates greatly exceeded the *Healthy People 2000* target of 20% for the adult population in the United States. Given the

emphasis on physical fitness as part of an overall goal of military readiness, this finding is not surprising.

Despite the high rates of strenuous physical exercise, the 1995 survey indicated that the Military had not reached its *Healthy People 2000* objective of reducing the prevalence of overweight personnel to no more than 15% among men only. The Military, however, had met other objectives by reducing the prevalence of overweight among people aged 20 or older to no more than 20% among personnel aged 20 to 25, and for most groups among personnel aged 26 to 34 (Bray et al., 1995a). A Navy study involving use of a Health Promotion Tracking Form (HPTF) estimated that approximately 11% of Navy personnel were above the Navy's acceptable weight standards (Woodruff & Conway, 1992). These findings were comparable with those of an earlier study indicating that approximately 9% of the Navy population in 1988 was either overfat or obese (Conway, Trent, & Conway, 1989; Woodruff & Conway, 1992). These studies, however, do not indicate how personnel would have been classified according to the Body Mass Index (BMI), which is a person's weight in kilograms, divided by the square of the person's height in meters.

In 1995, approximately three-quarters of personnel in the total DoD had had their blood pressure checked in the past 2 years (Bray et al., 1995a). The overall rate for the total DoD was somewhat lower than the *Healthy People 2000* objective of at least 90% of adults having their blood pressure checked and being aware of the result.

Approximately 13% of active-duty military personnel (12.8%) in 1995 indicated a lifetime prevalence of high blood pressure (Bray et al., 1995a). Of that group, approximately 65% were taking one or more of the following actions to improve their health: (a) dieting to lose weight; (b) cutting down on salt or sodium in their diet; (c) exercising; (d) stopping smoking; or (e) cutting down on their consumption of alcohol. Thus, it would appear that the DoD will have to continue its efforts to reach the *Healthy People 2000* objective of at least 90% of adults with high blood pressure taking action to control it.

About half of the military population (47%) in 1995 had had their cholesterol checked in the past 2 years. Approximately 18% of all personnel indicated that they had been told by a health professional that their cholesterol level was high (Bray et al., 1995a). Most personnel, however, may have needed to get their cholesterol checked only within the past 5 years.

With regard to seat belt use, Woodruff and Conway (1992) found that nearly three-fourths of the 747 Navy personnel who completed the HPTF reported using seat belts all or almost all of the time. The authors noted that personnel are required to use seat belts on-

base. They also suggested that legislation requiring seat belt use in many States could be contributing to high rates of seat belt use.

The 1995 DoD survey included questions to measure condom use by military personnel. In 1995, approximately 40% of the unmarried personnel in the total DoD as well as the Air Force (40.5%) who were sexually active used a condom the last time they had sex. In addition, more than 42% of unmarried personnel in the Marine Corps and the Navy used a condom during their last sexual encounter, while only 37.1% of Army personnel did (Bray et al., 1995a).

Thus, the 1995 DoD survey provides some indication of progress toward some *Healthy People 2000* objectives.

1.6.2 Civilian Population Studies

Key sources of data on progress toward *Healthy People 2000* objectives among the adult civilian population in the United States include the NHIS and the BRFSS. Other civilian studies have collected information on such behaviors as helmet use by motorcyclists and condom use by the partners of sexually active women aged 15 to 44. Highlights from research on health behaviors other than substance use among the civilian population are discussed below.

Findings from the NHIS indicate little change over time in rates of regular exercise. Less than half of the adult civilian population in 1985 and 1990 exercised or played sports regularly (42% and 41%, respectively) (Piani & Schoenborn, 1993; Schoenborn, 1988). Findings from the BRFSS indicate that the prevalence of overweight (as measured by the BMI) among the adult civilian population may be increasing. The percentage of adults who were overweight in 1994 (35%) increased 9% since 1980 (CDC, 1998b). These findings suggest that considerable effort may be needed to reduce the prevalence of overweight among civilian adults to no more than 20% by the year 2000.

In 1990, over 80% of people with hypertension reported taking one or more of the following actions to control their high blood pressure: taking high blood pressure medication, decreasing their salt intake, losing weight, or exercising (CDC, 1994b). This rate of people taking action to control their high blood pressure in 1990 was somewhat lower than the 90% target set for the year 2000. Similar to the NHIS results, the National Health and Nutrition Examination Surveys (NHANES) reported that as many as 89% of those with high blood pressure were aware of their condition (Mulrow, 1998). NHANES indicated that for people with high blood pressure, only 29% had their blood pressure controlled to an acceptable range (Mulrow, 1998).

BRFSS data indicate that an increasing percentage of adults in the United States are getting their blood cholesterol checked. In 1987, the median percentage of adults who had ever had their cholesterol checked was 47% (32 States and DC participating in 1987) (CDC, 1988b) and had risen to 55.1% by 1989 (38 States and DC participating). In 1991, the median percentage of adults who had their cholesterol checked in the past 5 years was approximately 64%, based on data from 47 States and DC (Siegel et al., 1993). The BRFSS findings for 1995 indicate that the median percentage of adults who had had their cholesterol checked in the past 5 years rose slightly to 65% (Powell-Griner, Anderson, & Murphy, 1997). These BRFSS findings are consistent with trend data from other earlier studies showing increases in the prevalence of cholesterol screening (Schucker et al., 1987). The median rate in 1995, however, was still below the *Healthy People 2000* target of at least 75% of adults having their cholesterol checked in the past 5 years.

With regard to seat belt use, findings from the NHIS indicate a dramatic increase from 1985 to 1990 in the percentage of adults who reported that they wore seat belts all or most of the time when driving or riding in a car, from 36% in 1985 to 67% in 1990 (Piani & Schoenborn, 1993; Schoenborn, 1988). This increase has been attributed to the growing number of States with laws requiring use of seat belts (Piani & Schoenborn, 1993). Consistent with the notion that increased use of seat belts can be attributed to legislation requiring their use, BRFSS data indicate the five States that had the highest percentages of regular seat belt use in 1995 (Hawaii, Oregon, California, North Carolina, and New Mexico) allow police to ticket motor vehicle occupants for not wearing their seat belts, without the police first having to stop the car for another traffic violation (Powell-Griner et al., 1997). Although previous research showed that comparisons of self-reported seat belt use with data from direct observation of automobile occupants suggest that estimates of seat belt use based on self-reported use can exceed estimates of use based on observational data by about 27% (CDC, 1988a; Siegel et al., 1991), additional research indicates that self-reported use may only be 2% to 5% higher than observed use because seat belt use is considered to be socially desirable behavior (Nelson, 1996). These findings suggest that although survey respondents may overreport their seat belt use, the overreporting may not be as extensive as previously noted.

Data from the National Highway Traffic Safety Administration's (NHTSA's) 19 Cities Survey provided baseline data on the prevalence of helmet use by motorcyclists in 1987. At that time, an estimated 60% of motorcyclists wore helmets when they rode (NCHS, 1993). Data on helmet use by bicyclists, however, has tended to be reported for children rather than for adults (e.g., CDC, 1992) because interventions designed to encourage helmet use among bicyclists have primarily targeted children (e.g., Dannenberg, Gielen, Beilenson, Wilson, & Joffe, 1993; Dannenberg & Vernick, 1993; Ruch-Ross' & O'Connor, 1993).

The National Survey of Family Growth (NSFG), sponsored by the NCHS, has collected information about condom use by sexually active women aged 15 to 44 (Abma, Chandra, Mosher, Peterson, & Piccinino, 1997). Among women who had never married, 29.9% were using condoms as their current method of contraceptive. In addition, 34.0% of sexually active women 15 to 24 years of age who had never married had used a condom at last intercourse.

According to the 1992 NHIS, about 90% of all women aged 18 or older had ever had a Pap smear, and 43% had the test in the past year (Martin, Calle, Wingo, & Heath, 1996). Data from the 1996 BRFSS indicate median percentages of 95% for women aged 18 or older who had ever had a Pap smear and 86% for women who had had a Pap smear in the past 3 years (Powell-Griner et al., 1997). These median percentages indicate that the *Healthy People 2000* objective of 95% for lifetime receipt of Pap smears and the objective of 85% for receipt of a Pap smear in the past 2 years had been achieved (PHS, 1991). By 1995, a number of States had already reached the year 2000 target for lifetime receipt of Pap smears, as well as the target for screening in the past 3 years (Powell-Griner et al., 1997).

1.6.3 Summary

Findings from civilian surveys suggest that progress will still be needed with respect to several of the health objectives discussed above. BRFSS data for 1994-95, however, indicated that some States were already close to or had exceeded objectives related to cervical cancer screening (i.e., Pap smears) among women.

Findings from the 1995 DoD survey suggest that the Military in 1995 was either very close to or had exceeded general population *Healthy People 2000* objectives in the areas of physical exercise, actions taken to control high blood pressure, and Pap smear receipt. These findings, however, cannot predict how the Military in 1998 compares with these objectives because of turnover in military personnel since 1995. Findings from the 1998 survey are important for identifying whether the Military in 1998 continues to meet or exceed these targets. The 1998 survey also provides data to measure progress toward additional health objectives that were not measured in 1992.

Some features of military life may facilitate the Military in achieving some of these objectives before the year 2000. Given the emphasis in the Military on fitness and readiness, one might expect the military population to meet the objectives related to exercise and overweight status. Similarly, access to preventive medical care is likely to be less of a problem in the military population than it is for some segments of the civilian population. The Military also can mandate that personnel receive age-appropriate medical screening at specific intervals. Thus, the Military can mandate that personnel receive

preventive medical services, such as cholesterol screening or Pap tests, in accordance with targets set in *Healthy People 2000*.

1.7 Mental Health, Stress, and Coping

In this section, we provide a brief description of selected studies examining the interrelated areas of mental health, stress, and coping that are of relevance to Military personnel. Although the Military recently released a directive that protects the rights of Service members who seek a mental health evaluation (DoD, 1997a), few studies have examined the relationship of stressors and mental health and functioning of the active-duty Military population. Several national epidemiologic studies have examined risk factors for specific mental disorders, such as stressors, and the comorbidity of mental disorders and substance abuse in civilian and veteran populations (Kessler et al., 1994; Kulka et al., 1990; Regier et al., 1990).

Recent cases of suicide among military personnel have raised concerns about the prevalence of depressive symptoms and the relationship of depression and other mental health problems to stress and to alcohol use. Numerous studies have reported strong relationships between stress, alcohol consumption, and mental disorders, with particularly robust connections reported between stressful life events and depression, especially for women (e.g., Pianta & Egeland, 1994). Kessler, Sonnega, Bromet, Hughes, and Nelson (1995) found in their analysis of data from the National Comorbidity Survey that stress-related psychiatric disorders were highly comorbid with depression and with substance abuse and dependence. Similar relationships among mental health and substance abuse problems have been reported in national surveys of Vietnam-era veterans (Kulka et al., 1990).

Stressors have been studied on the basis of their frequency or ordinariness ("life event" stressors vs. "daily hassles"), their intensity (e.g., mild, moderate, severe, traumatic), as well as their source (e.g., work, family life) (Holt, 1982). Findings from the National Vietnam Veterans Readjustment Study (Kulka et al., 1990), for example, show a strong relationship between exposure to traumatic stress while serving in a military combat zone and subsequent occupational instability. Indeed, Kulka et al.'s (1990) research indicates that male veterans with stress-related psychiatric disorders were more than five times as likely to be unemployed as their counterparts without such stress-related disorders. Findings from a study investigating the effects of combat-relevant stressors on cognitive performance showed that stressors can affect performance, different stressors induce a variety of reactions, the effects of stress vary across individuals, and stressors affect the performance of various tasks differentially (Orasanu & Backer, 1996).

In civilian populations, a number of work-related stressors have been studied, including properties of the working environment (e.g., physical hazards, noise), time factors (e.g., length of the work day, shift work), changes in job (e.g., demotion and transfer), and more subjectively defined stressors, such as role-related stress (e.g., responsibility for people), relationships with co-workers and supervisors, and underutilization of abilities. In a review of the extensive research literature on occupational stress, Holt (1982) reported that higher levels of stress in each of these domains is related to poorer performance outcomes.

Stressors related to the family environment also have been studied, and this research includes the examination of major life events, such as having a child and getting married, as well as studies of day-to-day strains, such as attempting to balance the responsibilities of family with the responsibilities of work (Holt, 1982). By creating family centers, the DoD recognized the strains on personnel who try to balance the Military's mission with family responsibilities (DoD, 1992). The family centers are designed to support DoD personnel and their family members in meeting the demands of the military lifestyle on their personal relationships. Although both men and women experience stressors related to their personal and family relationships, women tend to report higher levels of such stress (Barnett & Baruch, 1985). Research is needed to determine the extent to which men and women in the Military may be affected differentially by responsibilities associated with familial factors, such as major changes in the family environment (e.g., birth of child) or daily strains, such as financial worries. In the 1998 DoD survey, we identified the work-related and family stressors for men and women in the Services and examined the relationship of these stressors to a specific indicator of work performance—loss of productivity.

Research also has shown that a number of variables can mediate the effects of stressors on mental health outcomes, including the use of different types of coping strategies. Coping has been defined in terms of the strategies and processes that individuals use to modify adverse aspects of their environment and to minimize the amount of internal distress elicited by stressor events (Lazarus, 1966; Moos & Billings, 1982). Although research on the stress-moderating effects of different types of coping resources is more recent, this literature is characterized by a level of complexity that precludes succinct summarization. Nevertheless, the extant research literature suggests that coping styles aimed at managing the problem are generally more effective than coping strategies that focus on emotions or attempt to ignore or avoid the problem (Aldwin, 1993).

Social support, for example, is an extensively studied coping factor that has been shown to play a central role in adapting to stress (Etzion, 1984). Considerable research on Vietnam veterans' postwar adjustment suggests that supportive relationships both within and outside the Military can reduce the deleterious effects of exposure to a variety of

stressors associated with combat and military service (Egendorf, Kadushin, Laufer, Rothbart, & Sloan, 1981; King, King, Fairbank, Keane, & Adams, 1995; Norman, 1988). Though informative, this work has focused largely on the effects of social support on military stressors associated with service in a war zone. At the present time, little is known about types of coping that military personnel currently use to manage the diversity of stressors experienced in their military duties and personal lives.

The 1998 DoD survey included a series of questions about the mental health of active-duty personnel. As in the 1988, 1992, and 1995 surveys (Bray et al., 1988, 1992, 1995a), the 1998 survey asked respondents to appraise their levels of stress at work and in their intimate and family relationships. For the first time in the series, respondents also provided information on their perceived need for mental health counseling and their receipt of such counseling. We also asked respondents to specify the strategies that they use to cope with stress. Moreover, we assessed the respondents' perceived need for mental health services and their receipt of services. In addition, we collected information on indicators of depressive symptoms and examined the relationships among stress, depression, and alcohol use. In this report, we present findings on mental health, exposure to stress, coping, and functioning.

2. METHODOLOGY OF THE 1998 DoD SURVEY

In this chapter, we describe the methodology used for the 1998 DoD survey, which is patterned after the methodology used in prior surveys in the series. Our discussion includes an overview of the sampling design, instrumentation and data collection procedures, and survey performance rates. In addition, we describe the 1998 survey respondents and demographic characteristics of the eligible respondent population. We also provide an overview of measurement approaches and analysis techniques. Many of the activities, such as questionnaire development, second-stage sampling, and support for field operations, were collaborative efforts that involved the cooperation of the DoD, the individual Services, and the research team. The comparability of the 1998 study design and measures of substance use and health behaviors to those of earlier DoD surveys enables comparisons of estimates across the survey years. Further, the similarity of key DoD survey measures to those used in civilian surveys enables military and civilian comparisons of substance use and health behaviors.

2.1 Sampling Design Overview

The *target population* for the 1998 DoD survey included all military personnel who were on active duty at the time of data collection (April through August 1998) except for recruits, academy cadets, and persons who were absent without leave (AWOL), incarcerated, or undergoing a permanent change of station (PCS). We excluded personnel who were recruits, were academy students, or were AWOL or in special environments because they either (a) were not on active duty long enough to typify the Services or (b) were not accessible.

Although personnel with PCS status are typical of military personnel, we excluded them because of the practical difficulties of obtaining data from them quickly enough to be of use to the study. We assumed that the substance use and health behaviors for these individuals were similar to those of other personnel represented in the survey. Further, the current survey included information from an array of respondents broad enough (i.e., all pay grades, four Services, worldwide sample) to address substance use policy and program issues.

A primary objective of the sampling design was to facilitate the planned on-site group administration of the survey questionnaire to selected sample members whenever possible. Because of the worldwide geographic distribution of military personnel, we developed a dual-mode sampling design that called for the survey instrument to be group-administered at large installations, including aboard afloat ships (where hundreds of sample members could be assembled), and mailed to persons in smaller locations where it was not practical to conduct on-site group sessions.

The dual-mode approach to data collection allowed us to maximize the cost effectiveness of on-site data collection while retaining complete coverage of the survey population. In addition, we used stratification to control the sample distribution with respect to organizational and demographic characteristics. Similar to the design used for the 1995 DoD Survey (Bray et al., 1995a), this approach allowed the sample to achieve cost efficiency while preserving inferential capability.

During the construction of the sampling frame, we identified 397 military installations where 500 or more active-duty persons were stationed in September 1997. These installations were deemed large enough to support the on-site administration of the survey to between 300 and 400 sample persons. Approximately 88% of all active-duty personnel were found to be stationed at these installations. The remaining 12% of persons were mailed the survey. A complete listing of the installation sampling frame is presented in the study's *Sampling Design and Statistical Analysis Plan* (Iannacchione, Liu, Kavee, & Crump, 1998).

Systematic nonresponse to the survey may introduce bias into the survey estimates. For example, the results of the 1995 DoD survey indicated that most of the nonrespondents to the group administrations did not attend because they were away from their duty station either on routine temporary duty (TDY/TAD) or on leave. If health-related behaviors change when a member is away from home, then the corresponding prevalence estimates of these measures may be biased because of the systematic exclusion of members who were away. To help ensure that all eligible persons had an opportunity to participate in the survey, the sampling design specified that all sample members who did not attend the group administrations be mailed a copy of the questionnaire as part of the nonresponse follow-up.

We selected a total of 36,806 active-duty members for the 1998 DoD survey sample. Of these, 31,403 were asked to attend group administrations at 60 different installations around the world. The remaining 5,403 active-duty members were selected to receive a survey questionnaire through the mail. We determined these sample sizes by using optimization techniques designed to balance the project's analytical requirements with available fiscal resources. Statistical precision requirements were specified for subpopulations considered important for the analysis. These included Service (Army, Navy, Marine Corps, Air Force) gender (male, female), and pay grade groups (E1-E3, E4-E6, E7-E9, W1-W5, O1-O3, O4-O10). Applying the eligibility and response rates realized for the 1995 DoD survey, we expected approximately 20,000 active-duty members to participate in the survey.

The sample of installations was stratified by Service, location within the continental United States (CONUS) or outside the continental United States (OCONUS), and, for the

Navy, afloat designation. Initially, 60 installations were selected with probabilities proportional to the weighted number of persons assigned to each installation. In addition, 20 installations were selected as replacements in the event that an initially selected installation was unable to participate in the survey. During data collection, 3 of the 60 installations were replaced, 1 each from the Navy, Marine Corps, and Air Force. Additional details of the sampling frame construction, sample allocation, and sample selection are described in Appendix A.

After the sample was selected, we computed a sampling weight for each sample member to reflect his/her selection probability. Sampling weights may be viewed as inflation factors that account for the number of persons in the survey population that a sample member represents. The sum of the sampling weights across all active-duty sample members is approximately 1,293,100. This sum estimates the number of persons with a positive probability of being selected into the sample, including those who separated or transferred between sample selection and data collection (i.e., ineligible persons). After data collection, the sampling weights were adjusted for differential eligibility and response among the sample members. The calculation of the adjusted sampling weights is described in Appendix B.

2.2 Instrumentation and Data Collection Procedures

The survey questionnaire was designed to achieve the two broad purposes of the study, which were (a) to measure progress of the Military in meeting selected *Healthy People 2000* objectives, and (b) to continue the survey of substance abuse and health behaviors among military personnel. Military personnel completed the questionnaire either during group sessions conducted by field teams at the installations where selected personnel were stationed, or by mail. We mailed questionnaires to eligible personnel who did not participate in a group session at an installation and to those who were initially classified as being in remote locations. We obtained 76% of the completed survey questionnaires from the group sessions.

2.2.1 Survey Questionnaire

The survey instrument was a self-administered questionnaire designed for optical-mark reader scanning. In collaboration with the DoD, the Headquarters Liaison Officers (HLOs), and other experts from the Services, we modified the 1995 questionnaire for 1998 to provide measures for the survey objectives discussed in Chapter 1. The instrument contained measures of selected aspects of substance use and other health behaviors. More specifically, the questionnaire included a broad array of items about

- sociodemographic characteristics and military experience;

- quantity, frequency, and correlates of alcohol use;
- problems associated with alcohol use, including symptoms associated with alcohol dependence;
- use of cigarettes and other forms of tobacco;
- reasons for starting to smoke cigarettes, intentions to quit smoking, and actual attempts to quit;
- nonmedical use of drugs other than alcohol or tobacco;
- health behaviors related to exercise, eating, and sleeping;
- illnesses and medical care received;
- use of seat belts and helmets;
- stress experienced at work or in family life, specific sources of stress, and coping behaviors;
- perceived physical and mental health status;
- height and weight (to identify personnel who might be considered overweight or underweight);
- other cardiovascular health risks, including having high blood pressure or cholesterol, and actions taken to reduce these risks;
- oral health and dental checkups;
- beliefs about human immunodeficiency virus (HIV) transmission;
- sexual practices and sexually transmitted diseases (STDs); and
- gambling behaviors.

The questionnaire also contained additional items about gender-specific health issues, including testicular self-examination (for military men) and the following issues pertaining to military women: receipt of Pap smears, pregnancy, prenatal care, and use of cigarettes and alcohol during pregnancy. A copy of the questionnaire appears in Appendix H.

During the fall of 1997, we conducted a pilot study at one military installation for each Service to examine the adequacy of questionnaire item wording, formatting, and response alternatives. Based on analyses of item distributions and feedback from informal debriefings of selected participants, we refined some items and modified item formatting or wording to enhance clarity.

2.2.2 Phase 1 Data Collection

Phase 1 questionnaire administrations took place from mid-April through mid-August 1998 at 60 selected installations located worldwide. Data collection was scheduled to be completed by the end of May, but was extended due to delays in obtaining cooperation at selected installations. An HLO was appointed for each Service, and a Military Liaison Officer (MLO) at each participating installation was appointed to coordinate survey activities.

Each HLO performed a variety of tasks that were vital to a successful data collection effort. Specifically, the HLOs did the following:

- informed the Services and selected installations about the survey by sending a series of notifications to appropriate command levels;
- obtained MLO names and addresses for the research team;
- worked with Research Triangle Institute (RTI) staff to coordinate survey scheduling and preparations at the installations.

MLOs were also integral to the data collection effort and before the team arrived were responsible for

- storing the survey instruments,
- receiving lists of the sampled personnel,
- arranging rooms for the survey sessions,
- notifying sampled personnel of their selection, and
- scheduling personnel into one of the survey sessions.

During the field team visits, the MLOs were responsible for monitoring and encouraging attendance of selected personnel at the sessions and documenting the reasons for absence. Nine 2-person RTI field teams collected Phase 1 data in survey sessions at the 60 installations selected for the study. In general, we coordinated arrangements with MLOs for the data collection itinerary to permit us to survey personnel at a nucleus installation during a 2-day visit. As needed, we allowed additional time at locations that had large numbers of personnel selected or who were dispersed over larger geographical areas. We assigned six field teams to the CONUS region and three to the OCONUS region. Before data collection began, we held two 1-day training sessions, one for field team leaders and the other for team leaders and team assistants to ensure that teams were familiar with all procedures to conduct the survey.

The field teams' major responsibilities were to

- establish itineraries consistent with MLO recommendations,
- coordinate preparations with the MLO at the installation,
- conduct scheduled survey sessions,
- ship completed survey forms from installations for optical scanning, and
- report to RTI central staff on the completion of the survey at each site.

At the Phase 1 group sessions, field teams described the purpose of the study, assured the respondents of anonymity, informed participants of the voluntary nature of the survey, and showed personnel the correct procedures for marking the questionnaire. Then team members distributed optical-mark questionnaires to participants who completed them and returned them. On average, the questionnaire required about 50 minutes to complete.

During the visit to an installation, team members attempted to survey all eligible individuals. They used rosters on laptop computers to document attendance at sessions or reasons for absences. At the completion of the site visit, field teams inventoried completed questionnaires, reconciled the inventory with documented counts from the lists of sampled personnel completing the survey, and packaged the questionnaires for shipment. The teams then shipped the questionnaires to National Computer Systems (NCS) in Minnesota for optical-scan processing.

2.2.3 Phase 2 Data Collection

At the conclusion of Phase 1 data collection for each installation, field teams mailed questionnaires to all eligible Phase 1 nonparticipants. The procedure for conducting this phase of data collection (i.e., Phase 2), was to

- document the status of each individual on the list of sampled personnel (e.g., attended, TDY, on leave, PCS),
- identify personnel eligible for Phase 2 data collection (this included those who were on TDY assignments, on leave, deployed, sick or hospitalized, in jail, or who were "no shows" for Phase 1),
- obtain a correct mailing address from the MLO for Phase 2 eligible personnel, and
- prepare and mail a survey packet to Phase 2 personnel.

The Phase 2 packet included a cover letter from RTI that explained the purpose and importance of the study, a copy of a blank questionnaire precoded to identify the first-stage sampling unit (FSU) and the study phase, and a business reply envelope for the respondent to use in mailing the completed questionnaire directly to NCS for scanning. As with Phase 1 data collection, respondents completed the questionnaire anonymously.

2.2.4 Remote Personnel

As noted in Section 2.1 regarding the sampling design, a subset of military personnel who were distant or remote from major installations were sent a questionnaire by mail. Approximately 12% of personnel were classified as being remote. The rationale was that because of the long distances of the people to major installations, they were unlikely to come to the bases for group sessions even if they were linked to the installations (as occurred in prior rounds of the survey). Thus, they would eventually have become eligible for the Phase 2 data collection and received a questionnaire through the mail to complete. To circumvent this process, individuals classified as being located in a remote status were identified as a separate strata and were mailed a questionnaire at the outset.

Packets similar to those used for Phase 2 mailing were prepared and mailed to personnel in remote locations. These packets included a cover letter explaining the study, a copy of the questionnaire, and a business reply envelope for the respondents to use to return their completed questionnaires. Questionnaires were pre-printed with a common FSU number to identify them as part of the remote sample. Questionnaire responses were anonymous. Two mailings were made to personnel in remote sites. Because questionnaires were anonymous, it was not possible to re-mail only to those who had not returned a questionnaire. Consequently, a second packet of materials was sent to all mail respondents with instructions that if they had completed the first questionnaire, they should not answer it a second time.

2.3 Survey Performance Rates

Response rate information is useful for assessing the quality of survey field operations and for assessing nonresponse bias. The term "response rate" can be used for several different performance rates, each important from a survey operational perspective or from a statistical perspective. In the simplest of cases, the response rate can be calculated as the number of individuals in the population of inferential interest (i.e., those to whom you wish to generalize results) for whom information was obtained, divided by the total number of individuals in the population of inferential interest who were slated for data collection.

When the population surveyed and the population of inferential interest are not the same, or when only partial information is obtained for the population units in the sample,

however, the definition becomes more complicated. For the 1998 survey, we computed several different performance rates, which we define and describe below: Phase 1 eligibility rate, Phase 1 availability rate, Phase 1 completion rate, and response rates among eligibles. For the latter, we computed five separate response rates that included one for Phase 1 eligibles, Phase 2 eligibles, remote eligibles, combined Phase 1 and Phase 2 eligibles, and an overall response rate among all eligible personnel. Data for these rates are in Table 2.1 along with the corresponding response data that we used to compute them.

2.3.1 Phase 1 Eligibility Rate

The Phase 1 eligibility rate is the percentage of individuals we selected for the group sessions who were still eligible several weeks later during data collection. Some individuals we selected were ineligible because they left the Military or were AWOL, deceased, PCS, or had an unknown status. The eligibility rate can be an important determinant of statistical efficiency because sampling variances are high when eligibility rates are low. If the eligibility status is not known for every case, some potential for bias due to missing data is introduced. As shown in Table 2.1, the Phase 1 eligibility rate across all Services was 79.5%. The rate was lowest for the Army and highest for the Air Force.

2.3.2 Phase 1 Availability Rate

The Phase 1 availability rate is the percentage of identified eligible persons who were available to participate in Phase 1 group sessions. For various reasons, including TDY assignment, deployment, leave, and illness, some sampled individuals were not available for Phase 1 questionnaire administrations. The availability rate was important operationally, largely determining the facilities needed for the group sessions, data collection schedules, and other factors. The nonresponse of available individuals added another component to the total missing data or nonresponse bias potential. The overall availability rate during Phase 1 data collection was 74.3%. The availability rate suggests that we needed the Phase 2 data to compensate for the potential for nonresponse bias in Phase 1.

2.3.3 Phase 1 Completion Rate

The Phase 1 completion rate is the percentage of identified eligible personnel who attended a Phase 1 session and completed a questionnaire. The completion rate affected data-processing costs and schedules, and the missing data contributed to the potential for biases. The 71.3% completion rate reflects the success of the field teams in obtaining questionnaires from eligible personnel who were available to be surveyed when the field teams were at the installations. For the 1998 survey, this rate indicates that if personnel were available at the installations, the MLOs were highly effective in getting

Table 2.1 Survey Response Data and Performance Rates

Item	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Response Data					
1. Person selected for survey (total sample)	11,214	9,528	9,017	7,047	36,806
2. Phase 1 (group session)	9,774	8,199	6,933	6,497	31,403
3. Remote (mailout)	1,440	1,329	2,084	550	5,403
4. Number of eligible persons identified	8,468	7,626	7,192	5,967	29,253
5. Phase 1 (group session) ^a	7,381	6,562	5,530	5,501	24,974
6. Remote (mailout) ^b	1,087	1,064	1,662	466	4,279
7. Eligibles available during Phase 1	5,582	4,567	3,987	4,426	18,562
8. Total questionnaires from Phase 1	4,438	2,573	2,509	3,712	13,232
9. Usable questionnaires from Phase 1	4,420	2,549	2,494	3,682	13,145
10. Eligible persons for Phase 2 (follow-up to Phase 1) (Item 5 - Item 8)	2,943	3,989	3,021	1,789	11,742
11. Total questionnaires from Phase 2	616	830	494	421	2,361
12. Usable questionnaires from Phase 2	606	810	480	409	2,305
13. Total questionnaires from remotes	423	572	651	174	1,820
14. Usable questionnaires from remotes	423	571	648	172	1,814
15. Total questionnaires from all sources	5,477	3,975	3,654	4,307	17,413
16. Usable questionnaires from all sources	5,449	3,930	3,622	4,263	17,264
Performance Rates (%)					
17. Phase 1 eligibility rate = (Item 5/Item 2)	75.5	80.0	79.8	84.7	79.5
18. Phase 1 availability rate = (Item 7/Item 5)	75.6	69.6	72.1	80.5	74.3
19. Phase 1 completion rate = (Item 8/Item 7)	79.5	56.3	62.9	83.9	71.3
20. Phase 1 response rate among eligibles = (Item 9/Item 5)	59.9	38.8	45.1	66.9	52.6
21. Phase 2 response rate among eligibles = (Item 12/Item 10)	20.6	20.3	15.9	22.9	19.6
22. Remote response rate among eligibles = (Item 14/Item 6)	38.9	53.7	39.0	36.9	42.4
23. Phase 1 & Phase 2 response rate among eligibles (Item 9+ Item 12 / Item 5)	68.1	51.2	53.8	74.4	61.9
24. Overall response rate among eligibles = (Item 16/Item 4)	64.3	51.5	50.4	71.4	59.0

Note: Response data are frequencies; performance rates are percentages.

^aExcludes 6,429 individuals from the sample who had a permanent change of station (PCS) (4,927), or who were separated (1,233), unknown (239), absent without official leave (22), or deceased (8).

^bExcludes 1,124 individuals who were estimated to be PCS, separated, unknown, AWOL, or deceased at the same rate as those for Phase 1 data collection. The anonymity of the study participants did not permit tracking of specific eligibility conditions.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998.

them to attend group sessions in the Air Force (83.9%) and the Army (79.5%), but less successful in the Marine Corps (62.9%) and the Navy (56.3%).

2.3.4 Response Rates Among Eligibles

Response rates among eligibles are the rates at which we obtained usable questionnaires from eligible personnel for the individual and combined components of data collection. For these response rate calculations, we excluded ineligible individuals from the population (i.e., those who were separated, deceased, AWOL, PCS, or unknown). These rates for the individual data collection components (Phase 1, Phase 2, remote) indicate that Phase 1 group sessions provided the highest response rates (52.9%) followed by remote mailout (42.4%) followed by Phase 2 mailout (19.6%). Not only did the group sessions have the highest response rate, they also provided the large majority of completed questionnaires (76%).

The overall response rate among eligibles combines data from all three data collection activities. As shown in Table 2.1 (line 24), it is 59.0%. This rate is notably higher in the Air Force (71.4%) and Army (64.3%) than in the Navy (51.5%) or Marine Corps (50.4%). This overall rate is approximately 11% lower than in the prior 1995 DoD survey (Bray et al., 1995a) and reflects lower response from sampled members primarily in the Navy (67.4% in 1995 vs. 51.5% in 1998) and Marine Corps (70.0% in 1995 vs. 50.4% in 1998). Rates from the Army (64.9% in 1995 vs. 64.3% in 1998) and Air Force (76.5% in 1995 vs. 71.4% in 1998) are approximately the same across the two surveys. As a result, estimates for the Navy and Marine Corps may be subject to greater bias than those for the Army and Air Force.

2.4 Sample Participants and Military Population Characteristics

Table 2.2 displays the distribution of survey respondents for each Service by region and pay grade. Overall, we obtained 17,264 usable questionnaires from sampled personnel. The Army had the largest number of respondents (5,449), followed by the Air Force (4,263), Navy (3,930), and Marine Corps (3,622). The number of respondents is a function of the number of personnel we sampled in each Service and the response rates.

The pay grade distribution for the total DoD shows that the largest number of participants were E4s to E6s (6,251), followed by E7s to E9s (3,882), E1s to E3s (2,875), O4s to O10s (1,818), O1s to O3s (1,779), and W1s to W5s (659). This pattern also was consistent across the CONUS region. The pattern varied slightly, however, across the OCONUS region with O1s to O3s and O4s to O10s switching orders, though the numbers for both groups were very similar.

Table 2.2 Distribution of 1998 Survey Respondents, by Region and Pay Grade

Region/Pay Grade	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
CONUS^a					
E1-E3	469	232	723	416	1,840
E4-E6	909	838	1,218	1,212	4,177
E7-E9	843	602	419	567	2,431
W1-W5	282	44	120	NA	446
O1-O3	315	318	268	343	1,244
O4-O10	363	434	264	255	1,316
Total	3,181	2,468	3,012	2,793	11,454
OCONUS^b					
E1-E3	407	216	223	189	1,035
E4-E6	726	513	218	617	2,074
E7-E9	636	401	58	356	1,451
W1-W5	164	31	18	NA	213
O1-O3	193	145	55	142	535
O4-O10	142	156	38	166	502
Total	2,268	1,462	610	1,470	5,810
Total Worldwide					
E1-E3	876	448	946	605	2,875
E4-E6	1,635	1,351	1,436	1,829	6,251
E7-E9	1,479	1,003	477	923	3,882
W1-W5	446	75	138	NA	659
O1-O3	508	463	323	485	1,779
O4-O10	505	590	302	421	1,818
Total	5,449	3,930	3,622	4,263	17,264

Note: Table entries are numbers of respondents who completed a usable questionnaire.

NA = Not applicable.

^aRefers to personnel stationed within the 48 contiguous States in the continental United States (excluding Alaska and Hawaii).

^bRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (refer to Section 2.5.1 for descriptions of sociodemographic variables).

For the analyses, we weighted the data to reflect the proportional representation of respondents in the population (see Appendix B for additional details on weighting procedures).

Table 2.3 shows the distribution of survey respondents for sociodemographic subgroups. As can be seen, most subgroups had several hundred respondents, and almost half had over 1,000. The smallest group (Navy warrant officers [W1-W5]) had 75 respondents. Many tables in subsequent chapters of the report present data in the form of some variation of the pattern shown in Tables 2.2 and 2.3. Because of the large number of different cell sizes, it was not feasible to present sample sizes in the individual tables for the report. Thus, readers will need to refer to these tables for the approximate sample sizes used. Cell sizes are shown for tables that have cell sizes that vary notably from those shown here.

Table 2.4 presents the sociodemographic characteristics of the 1998 eligible respondent population. These estimates are based on data from the sample respondents that were weighted and poststratified to represent the eligible respondent population (see Appendix B for a discussion of weighting procedures). This eligible respondent population, which included all active-duty personnel except recruits, Service academy students, those who were AWOL, and those who were PCS at the time of data collection, accounted for the large majority (84%) of all active-duty personnel (see Table B.1, Appendix B). Nonetheless, because logistical considerations dictated that the eligible respondent population omit some groups, its characteristics may differ somewhat from those of the total Active Force. For the most part, however, such differences are expected to be relatively small. As shown in Table 2.4, the majority of personnel were males (86.3%), non-Hispanic Caucasians (64.5%), educated beyond high school (68.7%), aged 34 or younger (73.0%), married (60.1%), and in pay grades E1 to E6 (71.4%).

Inspection of Table 2.4 shows some notable differences in demographic composition among the Services. The most striking contrasts occur between the Marine Corps and other Services. Personnel in the Marine Corps were more likely than in other Services to be male (94.5%); to have a high school education or less (52.8%); to be aged 25 or younger (60.0%); to be unmarried (50.1%); and to be of junior pay grade E1 to E3 (34.9%). These differences are of interest because the demographics found in the Marine Corps correspond closely to those of personnel in prior surveys in this DoD series of surveys (e.g., Bray et al., 1988, 1992, 1995a) who were more likely to engage in illicit drug use and heavy alcohol use (i.e., those who were male, younger, less well educated, unmarried, and in junior enlisted pay grades). These demographic differences suggest that the Marine Corps may face a greater challenge than the other Services in addressing substance use issues.

Table 2.3 Distribution of 1998 Respondents, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	4,208	2,824	3,051	3,213	13,296
Female	1,241	1,106	571	1,050	3,968
Race/Ethnicity					
Caucasian, non-Hispanic	2,998	2,730	2,318	3,087	11,133
African American, non-Hispanic	1,495	522	561	552	3,130
Hispanic	620	329	548	332	1,829
Other	336	349	195	292	1,172
Education					
High school or less	1,223	1,076	1,591	630	4,520
Some college	2,700	1,539	1,285	2,320	7,844
College degree or beyond	1,526	1,315	746	1,313	4,900
Age					
20 or younger	544	184	556	269	1,553
21-25	1,165	702	1,212	861	3,940
26-34	1,623	1,193	929	1,412	5,157
35 or older	2,117	1,851	925	1,721	6,614
Family Status^a					
Not married	1,977	1,365	1,619	1,438	6,399
Married	3,472	2,565	2,003	2,825	10,865
Married, spouse not present	668	209	215	222	1,314
Married, spouse present	2,804	2,356	1,788	2,603	9,551
Pay Grade					
E1-E3	876	448	946	605	2,875
E4-E6	1,635	1,351	1,436	1,829	6,251
E7-E9	1,479	1,003	477	923	3,882
W1-W5	446	75	138	NA	659
O1-O3	508	463	323	485	1,779
O4-O10	505	590	302	421	1,818
Total Personnel	5,449	3,930	3,622	4,263	17,264

Note: Table entries are number of respondents who completed a usable questionnaire.

NA = Not applicable.

^aEstimates of family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table 2.4 Sociodemographic Characteristics of Eligible Respondent Population

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	85.6 (1.2)	87.5 (1.7)	94.5 (0.8)	82.5 (1.3)	86.3 (0.7)
Female	14.4 (1.2)	12.5 (1.7)	5.5 (0.8)	17.5 (1.3)	13.7 (0.7)
Race/Ethnicity					
Caucasian, non-Hispanic	56.6 (1.4)	66.4 (1.8)	62.8 (2.0)	73.2 (1.6)	64.5 (0.9)
African American, non-Hispanic	24.8 (1.5)	15.1 (1.8)	15.2 (1.2)	12.2 (1.1)	17.6 (0.8)
Hispanic	12.5 (0.9)	8.9 (0.8)	16.4 (1.9)	8.0 (0.7)	10.8 (0.5)
Other	6.1 (0.4)	9.6 (1.3)	5.6 (0.4)	6.6 (0.6)	7.1 (0.4)
Education					
High school or less	30.7 (1.9)	37.0 (2.6)	52.8 (3.0)	17.3 (1.8)	31.3 (1.2)
Some college	47.0 (1.0)	41.8 (1.5)	34.5 (1.9)	54.9 (2.6)	46.3 (1.0)
College degree or beyond	22.3 (1.4)	21.3 (3.2)	12.7 (2.0)	27.8 (3.7)	22.4 (1.4)
Age					
20 or younger	12.3 (1.0)	5.8 (1.2)	20.0 (2.0)	7.3 (0.9)	10.2 (0.6)
21-25	31.3 (1.6)	24.5 (1.6)	40.0 (2.9)	23.5 (1.3)	28.4 (0.9)
26-34	33.1 (1.2)	38.5 (1.2)	23.7 (2.2)	36.8 (0.8)	34.4 (0.7)
35 or older	23.3 (1.8)	31.2 (1.9)	16.3 (1.9)	32.4 (1.7)	27.0 (1.0)
Family Status^a					
Not married	40.8 (1.1)	38.6 (1.5)	50.1 (2.1)	35.5 (1.1)	39.9 (0.7)
Married	59.2 (1.1)	61.4 (1.5)	49.9 (2.1)	64.5 (1.1)	60.1 (0.7)
Married, spouse not present	9.3 (1.8)	4.6 (0.5)	5.9 (0.5)	4.2 (2.1)	6.2 (0.9)
Married, spouse present	49.9 (2.7)	56.8 (1.7)	44.0 (2.3)	60.2 (2.9)	53.9 (1.4)
Pay Grade					
E1-E3	18.5 (1.2)	14.1 (1.6)	34.9 (3.8)	16.7 (1.7)	18.9 (0.9)
E4-E6	51.1 (1.3)	58.7 (2.8)	45.0 (2.5)	51.7 (2.7)	52.5 (1.2)
E7-E9	11.5 (1.0)	10.4 (0.8)	8.6 (0.9)	11.4 (0.7)	10.8 (0.4)
W1-W5	2.6 (0.4)	0.6 (0.1)	1.3 (0.1)	NA (NA)	1.2 (0.1)
O1-O3	9.2 (0.7)	9.7 (1.5)	6.0 (1.3)	11.2 (2.2)	9.5 (0.8)
O4-O10	7.2 (0.7)	6.6 (1.5)	4.2 (1.1)	9.0 (1.8)	7.2 (0.7)
Total Personnel	34.0 (1.5)	25.8 (1.7)	12.2 (1.1)	28.0 (1.3)	100.0 (NA)

Note: Table entries are column percentages (with standard errors in parentheses).

NA = Not applicable.

^aEstimates of family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (refer to Section 2.5.1 for descriptions of sociodemographic variables).

2.5 Key Definitions and Measures

2.5.1 Demographic Characteristics

The demographic characteristics that we examined in this report include gender, race/ethnicity, education, age, marital status, family status, pay grade, and region. Definitions for these different characteristics are described below.

Gender	Gender was defined as male or female.
Race/ Ethnicity	Following the current U.S. Bureau of the Census classification, we divided personnel into four racial/ethnic groups that are mostly self-explanatory: "Caucasian, non-Hispanic"; "African-American, non-Hispanic"; "Hispanic" (including anyone of Hispanic origin—whether racially black or African-American, white, or other); and "other" (including all other persons not classified elsewhere, such as Native Americans or Asians).
Education	We defined education as the highest level of educational attainment. Categories include high school or less, some college, and college degree or beyond. Personnel with General Equivalency Diplomas (GEDs) were classified as high school graduates.
Age	We defined age of respondents as current age at the time of the survey. For several of the analyses presented in this report, estimates are presented for the age groups 20 or younger, 21 to 25, 26 to 34, and 35 or older. In situations where we present estimates for age groupings other than the four shown above, these alternate age groupings are based on categories specified in <i>Healthy People 2000</i> or age-specific guidelines specified by one or more Services (e.g., for medical screenings).
Family Status	We defined family status in terms of marital status and spouse presence at the member's duty station. Categories include "not married" (including personnel who were living as married, single, widowed, divorced, or separated), "married spouse not present" (including those who were legally married and whose spouse was not living at the member's present duty location), and "married, spouse present" (including those legally married and living in the same household). The current categories represent a change from previous surveys where "married" personnel included those who were living as married. Thus, estimates relating to family status in 1998 are not strictly comparable to those presented in prior survey years.
Pay Grade Groups	Military pay grades for enlisted personnel were grouped as E1 to E3, E4 to E6, and E7 to E9. Pay grades for officers and warrant officers were grouped as O1 to O3, O4 to O10, and W1 to W5.
Region	Region refers to the location of the installation where personnel were stationed at the time of the survey and includes installations in the 48 contiguous States within the continental United States (CONUS), and

installations outside the continental United States (OCONUS). Navy personnel assigned to afloat ships were classified as OCONUS.

2.5.2 Reference Periods

In this report, most estimates are given for the following time periods:

- Past 30 Days** Occurrence of the behavior (e.g., heavy alcohol use, exercise) in the 30 days prior to the survey (also referred to as "past month" or "current" use or behavior).
- Past 12 Months** Occurrence of the behavior (e.g., illicit drug use, helmet use) in the 12 months prior to the survey (also referred to as "past year").
- Lifetime** Occurrence of the behavior or condition (e.g., high blood pressure) at least once in a person's lifetime.

Some estimates, however, related to specific *Healthy People 2000* objectives (PHS, 1991) refer to a time period other than the ones listed above. In these situations, the time period refers to that length of time prior to the survey. For example, the "past 5 years" refers to the 5-year period preceding the survey.

2.5.3 Substance Use Measures

Measures of substance use for the 1998 DoD survey are consistent with those used in prior surveys in this series and with those in major national surveys, such as the National Household Survey on Drug Abuse (NHSDA). We measured alcohol use in this study in terms of the quantity of alcohol consumed and frequency of drinking. We have expressed alcohol use in summary form as the average number of ounces of absolute alcohol (ethanol) consumed per day and as drinking levels.

We computed the ethanol index following the method used in prior DoD surveys (Bray et al., 1983, 1986, 1988, 1992, 1995a) and the Rand study of alcohol use among Air Force personnel (Polich & Orvis, 1979). The ethanol index is a function of (a) the amount of ethanol contained in the ounces of beer, wine, and liquor consumed on a typical drinking day during the past 30 days; (b) the frequency of use of each beverage; and (c) the amount of ethanol consumed on atypical ("heavy") drinking days during the past 12 months. The index represents average daily ounces of ethanol consumed during a 12-month period. Although we have expressed the index in terms of 12-month use, most of the data come from reports of 30-day typical use. Appendix E provides additional details about the procedures for creating this index.

The drinking-level classification scheme used in the 1998 DoD survey was adapted from Mulford and Miller (1960) and followed the method used in prior DoD surveys (Bray et al., 1983, 1986, 1988, 1992, 1995a). We used (a) the "quantity per typical drinking

occasion" and (b) the "frequency of drinking" for the type of beverage (beer, wine, or hard liquor) with the largest amount of absolute alcohol per day to fit individuals into 1 of the 10 categories resulting from all combinations of quantity and frequency of consumption. We then collapsed the resulting quantity/frequency categories into five drinking-level groups: abstainers, infrequent/light drinkers, moderate drinkers, moderate/heavy drinkers, and heavy drinkers. Heavy drinkers, the category of most concern, was defined as drinking five or more drinks per typical drinking occasion at least once a week in the 30 days prior to the survey. The criterion of five or more drinks to define heavy drinkers is consistent with the definition used in other national surveys of civilians, such as the NHSDA (Office of Applied Studies [OAS], 1998a, in press), and Monitoring the Future Study (Johnston, O'Malley, & Bachman, 1998a, 1998b). Additional details about the procedures for creating the drinking-level classification scheme are described in Appendix E.

There was a slight change in the calculation of the ethanol index and the drinking-level measures in the 1998 DoD survey relative to that used in earlier DoD surveys. Specifically, the algorithm for calculating these measures was modified slightly to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995 surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. No changes were made to the algorithm for the 1980 and 1982 surveys because the survey questionnaire did not ask about these larger-size beer containers. Thus, the trend data presented for ethanol and drinking levels show slightly different estimates from those presented in prior reports. Tables D.17 through D.22 provide a comparison of estimates for these measures using the two different calculation procedures of including or not including the larger beer containers.

We also estimated the prevalence of adverse effects associated with alcohol use in the past 12 months. We created three summary measures of alcohol-related negative effects: serious consequences, productivity loss, and symptoms of dependence. The measure of alcohol-related "serious consequences" refers to the occurrence of one or more of the following problems in the past 12 months: (a) being passed over for promotion because of drinking; (b) loss of 1 week or more from duty because of a drinking-related illness; (c) UCMJ (Uniform Code of Military Justice) punishment because of drinking; (d) arrests for DWI (driving while impaired); (e) alcohol-related arrests other than DWI; (f) alcohol-related incarceration; (g) physical fights while drinking; (h) spouse left because of drinking; (i) need for alcohol detoxification; and (j) loss of 3 or more work days because of drinking (for whatever reason).

The measure of alcohol-related "productivity loss" refers to one or more occurrences in the past 12 months of (a) being late for work or leaving early because of drinking, a hangover, or a drinking-related illness; (b) not coming to work at all because of a hangover, a drinking-related illness, or a drinking-related injury; (c) performing below a normal level

of productivity because of drinking, a hangover, or a drinking-related illness; or (d) being drunk at work.

The summary measure of symptoms of alcohol dependence was based on the occurrence in the past 12 months of (a) withdrawal symptoms (e.g., hands shaking because of drinking or having the "shakes"), (b) the inability to recall things that happened while drinking, (c) the inability to stop drinking before becoming drunk, and (d) morning drinking. Respondents reported the number of days that they experienced these symptoms during the past 12 months, and we summed these frequencies over the four symptoms. Individuals with scores of 48 or more were classified as dependent. Our measure of dependence symptoms is based on the Rand Air Force study definition (Polich & Orvis, 1979) that has been used in prior surveys in the DoD survey series. This definition does not reflect the strict definition of dependence used in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (American Psychiatric Association [APA], 1994), but it was used here to permit comparisons with data from prior surveys in this DoD series.

We measured illicit drug use in this study in terms of the prevalence of nonmedical use of any of 12 categories of drugs: marijuana/hashish, phencyclidine (PCP), lysergic acid diethylamide (LSD) or other hallucinogens, cocaine, amphetamines or other stimulants, tranquilizers or other depressants, barbiturates or other sedatives, heroin or other opiates, analgesics or other narcotics, inhalants, designer drugs, and anabolic steroids. We made no attempt to measure quantity (e.g., number of pills) or the size of doses because most respondents cannot furnish this information adequately and because of the considerable variation in "street" drug purity.

To estimate the prevalence of use, we included questions about use of each drug type within the past 30 days and within the past 12 months. In addition, we created indices for estimating the prevalence of use of any illicit drug (omitting steroids) and any drug besides marijuana (omitting steroids). Definitions followed those used in prior DoD surveys to facilitate comparisons. These definitions also have been used in recent waves of the NHSDA (e.g., OAS, 1998a, in press). We constructed indices of any drug use and any drug use except marijuana by creating use/no use dichotomies for each drug category and then setting an individual's score to the maximum score value of the categories that we included (i.e., all, or all but the marijuana category).

Most analyses of tobacco focus on cigarette smoking. We defined "current smokers" as those who smoked at least 100 cigarettes during their lifetime and who last smoked a cigarette during the past 30 days. We defined "heavy smokers" as current smokers who smoked one or more packs of cigarettes per day. In some analyses, we also classified personnel in terms of whether they were lifetime smokers (i.e., smoked at least 100

cigarettes in their lifetime, but did not smoke in the past 30 days) or nonsmokers (smoked fewer than 100 cigarettes lifetime).

The 1998 survey also measured the prevalence of use of other forms of tobacco besides cigarettes (cigars, pipes, smokeless tobacco). "Current" users of smokeless tobacco were defined as personnel who used smokeless tobacco products (i.e., chewing tobacco or snuff) at least 20 times during their lifetime and who last used smokeless tobacco during the past 30 days. Pipe and cigar use was defined as smoking one or more times during the past 30 days.

2.5.4 Other Health Behaviors

A major focus of the 1998 DoD survey was the investigation of health behaviors of military personnel other than use of alcohol, illicit drugs, or tobacco. In particular, we measured the following health behaviors or factors related to specific *Healthy People 2000* objectives:

- overweight and exercise,
- high blood pressure screening and action,
- high cholesterol screening and action,
- hospitalization for injuries,
- seat belt use,
- motorcycle and bicycle helmet use,
- condom use by sexually active unmarried personnel,
- receipt of Pap smears, and
- substance use during pregnancy.

We defined an index of overweight in terms of the Body Mass Index (BMI), where BMI is weight (in kilograms) divided by the square of height (in meters). Using the BMI criteria from *Healthy People 2000*, we defined military men as overweight if they were under age 20 and had a BMI of 25.8 or greater, or if they were aged 20 or older and had a BMI of 27.8 or greater. We defined military women as overweight by *Healthy People 2000* criteria if they were under age 20 and had a BMI of 25.7 or greater, or were aged 20 or older and had a BMI of 27.3 or greater (PHS, 1991).

We also used the BMI to estimate the percentage of military personnel who could be considered underweight, although this was not a *Healthy People 2000* objective. We used the guidelines defined by Brownell and Fairburn (1995) that classified men as underweight if they had a BMI less than 20.7 (regardless of age) and classified women as underweight if they had a BMI less than 19.1 (regardless of age).

During the summer of 1998, the National Heart, Lung, and Blood Institute (NHLBI) developed new BMI guidelines for overweight and underweight. These guidelines defined four levels of overweight, regardless of age or gender: (a) overweight—BMI of 25.0 to 29.9, (b) obesity I—BMI of 30.0 to 34.9, (c) obesity II—BMI of 35.0 to 39.9, and (d) extreme obesity—BMI 40.0 or greater. Underweight was defined as BMI less than 18.5 for both men and women regardless of age (NHLBI, 1998). Even though the DoD has not adopted the NHLBI guidelines, we conducted selected analyses using these BMI criteria to allow the Military to assess the potential implications of adopting such guidelines. For these analyses, we combined the four NHLBI overweight categories into a single category and classified military personnel as overweight for BMI of 25.0 or greater.

The *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we decided to ask just about the overall rate of injuries. This difference between the survey measure of hospitalization for any injuries and the *Healthy People 2000* objective is discussed further in Chapters 3 and 7.

Measures for the other *Healthy People 2000* behaviors were based primarily on responses to specific questions about the behavior and generally did not involve the construction of special indexes. More detailed discussion about specific measures for these other behaviors is given in Chapters 7 and 9.

2.5.5 Mental Health

The 1998 DoD survey included an expanded set of questions on mental health issues, including

- levels of stress at work and in family life;
- sources of stress;
- behaviors for coping with stress;
- perceived quality of mental health;
- symptoms of depression;

- receipt of mental health services in the past 12 months, including the sources of any such services;
- perceived need for mental health services in the past 12 months; and
- perceived damage to one's military career associated with seeking mental health services.

Measures for most of these items were based on responses to specific questions. In addition, an index of Need for Further Depression Evaluation was constructed based on reports of an extended period of depression, primarily in the past 12 months. Personnel were defined as needing further evaluation or assessment if they (a) felt sad, blue, or depressed for 2 weeks or more in the past 12 months, or reported 2 or more years in their lifetime of feeling depressed and felt depressed "much of the time" in the past 12 months; *and* (b) felt depressed on 1 or more days in the past week. This index was based on work by Rost, Burnam, and Smith (1993).

2.5.6 Gambling Behaviors

Respondents in the 1998 survey were asked a series of eight questions about gambling to assess the lifetime prevalence of gambling problems and the lifetime prevalence of pathological gambling in the Military. Items on gambling-related problems were patterned after symptoms of pathological gambling listed in *DSM-IV* (1994). Specifically, respondents were asked whether they had ever had any of the following gambling-related problems:

- being increasingly preoccupied with gambling;
- needing to gamble with increased amounts of money to achieve the desired level of excitement;
- feeling restless or irritable when unable to gamble;
- gambling to escape from problems;
- going back to try to win back earlier gambling losses;
- lying to others about the extent of their gambling;
- having jeopardized or lost important relationships, a job, or career opportunities because of gambling; and
- borrowing money to relieve financial problems caused by gambling.

An affirmative answer to *at least one* of the above items was considered to be indicative of problem gambling at some point in a persons' life, but not necessarily pathological gambling. Answering affirmatively to *three or more* problem items was

considered to indicate probable pathological gambling. The use of three items as the criterion for defining pathological gambling was based on guidance from Dr. H.R. Lesieur during the conduct of an earlier study (H.R. Lesieur, Institute for Problem Gambling, personal communication, June 10, 1991). Dr. Lesieur is a noted expert on issues of pathological gambling (Feigelman, Wallisch, & Lesieur, 1998; Lesieur, 1989; Lesieur & Blume, 1987, 1991; Lesieur, Blume, & Zoppa, 1986).¹

2.6 Analytical Approach

The focus of our analyses of the 1998 DoD survey was to provide knowledge about current levels of substance use and health behaviors, negative effects associated with alcohol use, and trends in these behaviors throughout the survey series. In addition, analyses provide baseline estimates of selected *Healthy People 2000* objectives and other selected behaviors of interest. These analyses provide information to help assess and guide policy and program directions, including the most effective targeting of resources to problem areas.

To accomplish these aims, we conducted five basic types of analyses within this study:

- descriptive univariate and bivariate analyses of the prevalence of substance use, negative consequences, health behaviors, selected *Healthy People 2000* objectives in 1998, and gambling behaviors;
- comparisons of trends in substance use and negative effects from 1980 to 1998 (including standardized comparisons of substance use to control for changes in demographic composition);
- standardized comparisons of the extent of substance use among personnel in the four active Services in 1998;
- standardized comparisons of military and civilian rates of substance use; and
- multivariate logistic regression analyses.

Most of our analyses were descriptive cross-tabulations of the responses from two or more variables. We assessed significant differences for these data using *t* tests.

¹Our measure differed slightly from the *DSM-IV* (1994) criteria that require the occurrence of five or more symptoms for a diagnosis of pathological gambling. We did not include items to measure two symptoms of pathological gambling: (a) repeated, unsuccessful attempts to control, cut down on, or stop gambling (because multiple items would have been needed to establish that a repeated pattern had occurred and that these attempts had been unsuccessful); and (b) commission of illegal acts, such as forgery, fraud, or theft, to finance gambling (because this symptom was likely to be rare). Compared with the criterion of three or more gambling-related problems that we used, requiring affirmative answers to five or more gambling-related problems to identify probable pathological gamblers would likely produce a lower prevalence of pathological gambling among military personnel.

An important part of our analyses included the comparison of trends across the series of DoD surveys. Comparing substance use over time is useful, but researchers and policymakers should recognize the limitations of such analyses in drawing policy conclusions. The data from the DoD survey series are cross-sectional, not longitudinal, and come from different populations due to the high turnover among military personnel. Many individuals serving in the Military in 1980, 1982, 1985, 1988, 1992, and 1995 (years when the surveys were administered) were no longer in the Military in 1998. Thus, analysts must use caution in making inferences about reasons for the observed changes in rates of substance use, health behaviors, or problems. The changes may be due, in part, to effective substance use and health promotion programs and other health-related policies in the Military, but they also may be due, in part, to differences in sociodemographic characteristics, attitudes, and values of the populations being surveyed.

In particular, changes in substance use patterns may have been due in part to changes in the sociodemographic composition of the Military since 1980. The Active Force is now somewhat older, has more officers, has more married personnel, and is better educated than in 1980—factors that in previous DoD surveys have been associated with a lower likelihood of substance use. Therefore, we used the technique of direct standardization (Kalton, 1968) described in Appendix F to create adjusted estimates of heavy alcohol, other drug, and cigarette use for each of the survey years since 1980. These adjustments provide an indication of the expected substance rates if the military population in each of these subsequent survey years had the same age, educational, and marital status distribution as in 1980. In Chapters 3 to 6, we present both adjusted and unadjusted rates (i.e., observed rates) of substance use across the survey years of the average daily number of ounces of ethanol consumed, heavy drinking, illicit drug use, and cigarette smoking. Adjusted estimates are constructed estimates that allow us to determine whether observed changes in substance use rates over the past 18 years can be explained by changes in the demographic composition of the Services. Unadjusted or "raw" estimates are the *observed* substance use rates and identify the challenges facing each Service in its efforts to prevent and reduce heavy drinking, illicit drug use, and smoking.

Although the observed rates mark the realities that the Services must address in combating substance abuse, some of the differences in rates among the Services are likely to be a function of the demographic composition of the Services. For example, as shown in Table 2.4, the Air Force tended to have a greater proportion of women and better educated personnel than the other Services did at the time of the survey. Because these characteristics are associated with lower rates of substance use, all other things being equal, we would expect the prevalences of heavy drinking, drug use, and smoking to be lower in the Air Force than in the other Services. Comparisons of efforts by the Services to combat substance abuse must consider demographic differences in risk factors. To take into account the sociodemographic differences among Services, we computed a second set of

adjusted estimates. As with the approach described above, we used direct standardization (Kalton, 1968) to adjust the 1998 prevalence rates for each Service and to construct the rates that would be expected if each Service were to have the gender, age, education, race/ethnicity, and marital status distribution of the total DoD.

In addition to standardizations that examined trends and Service differences, we also conducted standardized comparisons to assess similarities in substance use rates of military and civilian populations. In these analyses, we standardized the civilian data to match the demographic distribution of the Military and then computed new civilian rates for the standardized population. These standardized comparisons also used the technique of direct standardization (see Appendix F).

Finally, we used logistic regression analyses in Chapter 4 (alcohol use), Chapter 5 (illicit drug use), and Chapter 6 (tobacco use) to model outcome measures of heavy drinking, illicit drug use, and cigarette smoking as a function of demographic variables. In logistic regression, the natural log of the odds (i.e., $\ln p/1-p$) is modeled as a linear function of the independent variables. The parameters of a logistic regression model are transformed to reflect relative changes in the odds due to changes in the independent variables.

2.7 Variability and Suppression of Estimates

Table 2.4 and other tables in the following chapters generally present two numbers in each cell. The first number is an estimate of the percentage of the population with the characteristics that define the cell. The second number, in parentheses, is the standard error of the estimate. Standard errors represent the degree of variation associated with observing a sample rather than observing every member of the population.

Confidence intervals, or ranges that are very likely to include the true population value, can be constructed using standard errors. We can compute the 95% confidence interval by adding to and subtracting from the estimated proportion, the result of multiplying 1.96 times the standard error for that cell. The confidence interval range means that, if we were to repeat the study with 100 identically drawn samples (which might include different individuals), the confidence interval would include the true parameter value 95% of the time. For a given confidence level (such as 95%), then, the precision with which the cell proportions estimate the true population value varies with the size of the standard error.

In this report, we omitted estimates that were considered to be unreliable. More specifically, we suppressed estimates of means and proportions that could not be reported with confidence because they either were based on small sample sizes ($n < 30$) or had large

sampling errors. The rules for classifying estimates as unreliable are explained in Appendix C. Unreliable estimates that were omitted are noted by a "+" in the tables. Very small estimates (i.e., <0.05%) that were not suppressed by the rules, but that rounded to zero, also were omitted from the tables and are shown as two asterisks (**).

2.8 Strengths and Limitations of the Data

Self-reports in which respondents provide data about their behaviors rely on respondents' ability and veracity to provide correct information about observations and events. Surveys have been a major vehicle for obtaining self-report data about a wide variety of behaviors, including substance use and health behaviors. A major strength of the 1998 DoD survey is that it permitted the collection of a rich array of information about the nature and extent of behaviors of interest along with information about correlates of these behaviors. Other strengths of the 1998 DoD survey include the use of sophisticated sampling techniques and widely used questionnaire items that allow for precise estimates of substance use and health behaviors for well-defined populations and permit assessment of trends over time.

Despite these strengths, survey results also are subject to the potential bias of self-reports and to the ambiguities caused by questions with varying interpretations. In addition, there are other potential problems with the validity of survey data, including issues of population coverage and response rates. If the population is not properly represented in the survey or if response rates are low, biases may be introduced that can invalidate the survey results. We believe that the design and field procedures of the 1998 DoD survey adequately addressed these concerns to the extent that they can be addressed using the current survey methodology. A pretest was used to identify and eliminate ambiguities in question wording, the active-duty population was properly represented in the study, and the response rate was within an acceptable range (although somewhat lower than for past DoD surveys). Further, a nonresponse adjustment was made to help compensate for the potential bias of nonsurveyed persons.

Many individuals question the validity of self-reported data on sensitive topics, such as alcohol and drug use, claiming that survey respondents will give socially desirable rather than truthful answers. In some situations, respondents may have strong motivations not to report drug use behavior honestly, and data may yield drug use estimates that are conservative. This issue was of concern for the 1998 survey because of the belief that Service members might not reveal anything about behaviors that could have the potential to jeopardize their careers in the Military.

These issues have been the topic of a number of empirical investigations that have demonstrated that although self-reports may sometimes underestimate the extent of

substance use, they generally provide useful and meaningful data. For example, in an examination of the validity of alcohol-problem measures among Air Force personnel, Polich and Orvis (1979) found little evidence of underreporting when comparing self-reported data on adverse effects with police records and supervisor reports. Air Force beverage sales data, however, suggested that self-reports may underestimate actual prevalence of alcohol use by as much as 20%.

The reliability and the validity of self-report data among respondents from the U.S. civilian general population have been explicitly tested in relation to *alcohol use* (Lemmens, Tan, & Knibbe, 1992; Mayer & Filstead, 1979; Midanik, 1982; Smith, Remington, Williamson, & Anda, 1980) and *drug use* (Haberman, Josephson, Zanes, & Elinson, 1972; Harrison, 1995; Kandel & Logan, 1984; O'Malley, Bachman, & Johnston, 1983; Rouse, Kozel, & Richards, 1985). Overall, the various reviews of the literature are encouraging in suggesting that self-reports on alcohol use and drug use can be reasonably reliable and valid.

Additional information about the validity of self-reports on drug use has been addressed by Harrison (1995) and in a monograph by Rouse et al. (1985). A general conclusion emerging from these reviews is that most people appear to be truthful (within the bounds of capability) under the proper conditions. Such conditions include believing that the research has a legitimate purpose, having suitable privacy for providing answers, having assurances that answers will be kept confidential, and believing that those collecting the data can be trusted (Harrison, 1995; Johnston & O'Malley, 1985). When respondents believe survey questions are reasonable and justified in terms of their purpose, and when they have confidence that their answers will not be used against them, then self-reports can be sufficiently valid for research and policy purposes. When those conditions are not met, there may well be very substantial underreporting.

Support for the validity of data reported in the 1998 and earlier DoD survey derives from this extensive body of research and the methodological rigor used to conduct the studies. Throughout the DoD survey series, we have used a strong research design and have been rigorous in following procedures consistent with those that encourage honest reporting. For example, respondents have been anonymous, questionnaires have been answered privately, and neutral civilian teams collected the data and assured respondents that it would not be shown to military personnel at the participating installations.

Additional corroborating evidence for the survey results comes from urinalysis test data obtained from military personnel. Some of the decline observed in survey results (see discussion in Chapter 1) is mirrored by the decline in positive urinalysis test results. For example, urinalysis tests showed a decline in opiate use from 41 per 10,000 urine tests in 1977 to 40 in 1978, 27 in 1979, 29 in 1980, and 14 in 1981 (Beary, Mazzuchi, & Richie,

1983). Similarly, the most recent urinalysis test data for fiscal year 1998 indicate that only about 1.0% of military personnel test positive for illicit drugs (Captain John Jemionek, Office of Department of Defense Coordinator for Drug Enforcement Policy and Support, personal communication, January 12, 1999).

3. OVERVIEW OF TRENDS IN SUBSTANCE USE AND HEALTHY PEOPLE 2000 OBJECTIVES

In this chapter, we provide a brief overview of the prevalence of alcohol use, illicit drug use, and tobacco use from the 1998 DoD survey and examine the trends in substance use and negative effects due to alcohol use from 1980 to 1998. We examine data for selected *Healthy People 2000* objectives, many of which apply to all personnel, and several that are specific to military women. We also compare changes between 1995 and 1998 for these objectives. Our focus is providing a broad overview of data for the entire DoD. These findings are considered in more detail in later chapters both for the total DoD and the individual Services.

3.1 Trends in Substance Use

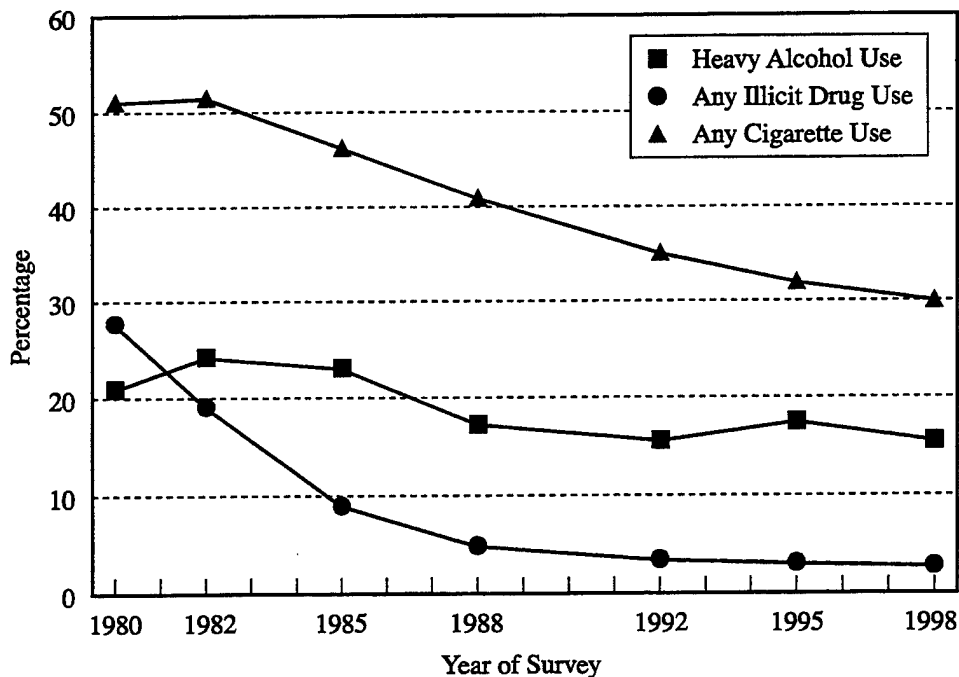
In this section, we present two types of estimates—unadjusted and adjusted prevalence rates. Unadjusted data are the observed rates reported in the surveys of the DoD series from 1980 to 1998 and reflect the circumstances facing the Services in reducing substance use. Adjusted rates, on the other hand, are constructed rates that have been modified to take into account changes in the sociodemographic composition of the Services since the survey series began in 1980. Military personnel in 1998 on average were more likely to be older, to be officers, to be married, and to have more education than in 1980—factors that also are associated with less substance use. Thus, adjusted rates help address the question of whether changes reflected in the trends in substance use are due primarily to shifts in military demographics.

3.1.1 Unadjusted Trends in Substance Use

Figure 3.1 presents the trends over the seven DoD surveys of the percentage of the total Active Force during the past 30 days who engaged in heavy alcohol use, any illicit drug use, and any cigarette use. Table 3.1 presents the observed rates of use of the three substances for the seven survey years and information about the statistical significance of changes in substance use between each pair of survey years. In addition, Table 3.1 shows the distribution of alcohol use among drinking levels across the survey years.

As noted in Section 2.5.3, we made a slight change in 1998 to the calculation of the drinking levels measure relative to earlier surveys. The algorithm was modified to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995 surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. No changes were made to the algorithm for the 1980 and 1982 surveys because the survey questionnaire for these years did not ask about these larger-sized beer containers. Thus,

Figure 3.1 Trends in Substance Use, Past 30 Days, Total DoD, 1980-1998



Note: Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23; Any Illicit Drug Use, Q60 and 67; Any Cigarette Smoking, Q44 and 47).

the trend data presented in Figure 3.1 and Table 3.1 for drinking levels show slightly different estimates from those presented in prior reports. Tables D.17 through D.22 compare estimates using the two different calculation procedures of including or not including the larger beer containers. As shown in these appendix tables, the changes are fairly small and do not alter the pattern of results observed with the prior algorithm. They do result, however, in slightly higher prevalence estimates (0.1 to 0.3 percentage point increase) of heavy alcohol use when the data from the larger containers are included. We have shifted to the new estimates because they provide a more comprehensive view of drinking behavior in the Military.

As shown in Figure 3.1 and Table 3.1, heavy alcohol use, any illicit drug use, and cigarette use all declined significantly between 1980 and 1998, although the rate of decline varied for each of the substances and between each of the seven surveys. The prevalence of

Table 3.1 Substance Use Summary for Total DoD, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Levels							
Abstainer	13.5 (0.5)	11.8 (0.5) ^a	13.3 (0.6) ^a	17.2 (0.4) ^a	20.0 (0.8) ^a	20.7 (0.5)	23.8 (0.6) ^{a,b}
Infrequent/light	12.1 (0.4)	17.6 (0.8) ^a	16.5 (0.7)	17.5 (0.5)	18.5 (0.4)	18.5 (0.6)	19.4 (0.5) ^b
Moderate	21.2 (0.7)	17.0 (0.5) ^a	18.7 (0.6) ^a	19.4 (0.5)	19.6 (0.5)	19.0 (0.5)	18.1 (0.5) ^b
Moderate/heavy	32.4 (0.6)	29.6 (0.6) ^a	28.5 (0.8)	28.8 (0.7)	26.3 (0.6) ^a	24.5 (0.6) ^a	23.2 (0.5) ^b
Heavy	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)	15.4 (0.8) ^b
Any Illicit Drug Use							
Past 30 days	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)	2.7 (0.3) ^b
Past 12 months	36.7 (1.5)	26.6 (1.0) ^a	13.4 (1.0) ^a	8.9 (0.8) ^a	6.2 (0.6) ^a	6.5 (0.5)	6.0 (0.4) ^b
Cigarette Use, Past 30 Days							
Any smoking	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a	29.9 (0.8) ^b
Heavy smoking	34.2 (0.6)	33.5 (0.7)	31.2 (0.8) ^a	22.7 (0.7) ^a	18.0 (0.5) ^a	15.0 (0.6) ^a	13.4 (0.5) ^b
Alcohol Use Negative Effects, Past 12 Months							
Serious consequences	17.3 (1.1)	14.6 (0.6) ^a	10.7 (0.9) ^a	9.0 (0.6)	7.6 (1.1)	7.6 (0.5)	6.7 (0.4) ^b
Productivity loss	26.7 (1.2)	34.4 (0.7) ^a	27.1 (1.1) ^a	22.1 (1.2) ^a	16.4 (1.4) ^a	16.3 (0.8)	13.6 (0.6) ^{a,b}
Dependence	8.0 (0.6)	9.0 (0.5)	7.7 (0.7)	6.4 (0.5)	5.2 (0.4)	5.7 (0.4)	4.8 (0.3) ^b

Note: Table entries are percentages (with standard errors in parentheses). Significance tests were done between consecutive survey years (e.g., 1980 and 1982) and between 1980 and 1998. Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Alcohol Drinking Levels, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

heavy alcohol use declined significantly from 20.8% for all military personnel in 1980 to 15.4% in 1998. When we examine the trend in use over each of the seven surveys, we see that heavy drinking was relatively stable from 1980 to 1985, decreased significantly between 1985 and 1988, and then remained at about the same level between 1988 and 1998. Thus, although heavy alcohol use declined significantly across the entire period from 1980 to 1998, it was relatively stable for the past decade (since 1988) with only minor fluctuations between the survey years.

Examination of drinking levels in Table 3.1 shows that across the survey years, the majority of military personnel had used alcohol at some level. For example, in 1998, more than three-fourths of the total DoD drank alcohol in the past 30 days. These data also show a pattern from 1980 to 1998 of a general increase in the proportion of personnel who abstained from alcohol or who were light/infrequent users and corresponding decreases in the proportions of moderate/heavy and heavy drinkers. The percentage of people who abstained from alcohol or who were infrequent/light drinkers increased from 25.6% in 1980 to 43.2% in 1998.

The prevalence of any reported illicit drug use during the past 30 days declined sharply from 27.6% in 1980 to 2.7% in 1998. The rate of decrease was much greater than for heavy alcohol use, and the decreases were statistically significant between each of the surveys except between 1992 to 1995 and between 1995 and 1998, but even for these years the data showed a declining pattern of use.

The percentage of military personnel who smoked cigarettes in the past 30 days also decreased significantly during the 18-year period, from 51.0% in 1980 to 29.9% in 1998. Smoking rates showed no significant change between 1980 and 1982, decreased significantly between each of the survey years from 1982 to 1995, but did not decline significantly between 1995 and 1998. This marks the first survey year since 1982 when smoking rates did not show a significant decrease from the prior survey even though the prevalence rate showed a 2-percentage point decline from the 1995 smoking rate. Despite clear progress in reducing the prevalence of cigarette smoking, the 1998 rate remained 10 percentage points higher than the *Healthy People 2000* objective of 20% adopted for the Military (PHS, 1991).

Considered together, these trend data on substance use are notable in several regards. All three substances showed statistically significant reductions in use across the total time period between 1980 and 1998. This indicates that the Military made progress in reducing use of all three substances over the 18-year period. In contrast to the long-term decline, however, there were no significant declines between 1995 and 1998 for any of the three substances. This indicates that the observed declines in the prevalence estimates between the last two surveys can be attributed to sampling variation. It also may suggest

that fewer efforts were made to further reduce substance use rates or that such efforts were not effective. Despite these overall DoD findings of no differences, as we see in later chapters and appendices, the Navy did show significant declines in illicit drug use and heavy alcohol use between 1995 and 1998 (see especially Table D.2 in Appendix D).

The lack of a significant decline from 1995 to 1998 in heavy alcohol use suggests that this is an area that may need greater emphasis by the Military. Indeed, the rate of heavy alcohol use had not changed significantly since 1988 and indicates that more than one out of seven military personnel in 1998 was likely to be a heavy drinker. Despite the lack of change in the rate of heavy alcohol use since 1988, Table 3.1 indicates that there was an overall shift from moderate and heavier levels of drinking to infrequent/light drinking or abstainers. Indeed, there was a significant increase in abstainers from 1995 to 1998.

The finding of no significant reduction in illicit drug use between 1995 and 1998 and the relatively low rates of use for both surveys suggests that the Military's effort to curtail illicit drug use may have reached its lower limit. The trend line resembles an asymptotic curve that shows steep declines initially with successively smaller declines until it eventually flattens out. Both the 1995 and the 1998 data suggest that the flattening point may have been reached and that it may not be realistic to expect drug use among military personnel to go much lower.

The lack of decline in the rates of cigarette smoking between 1995 and 1998 is somewhat surprising given the strong emphasis from health planners and practitioners in the Military on smoking reduction and the wave of national attention directed toward the problems of smoking. The rate of cigarette smoking in 1998 remained the highest of the three substances, nearly twice as high as heavy alcohol use and over 10 times as high as illicit drug use.

3.1.2 Trends in Substance Use Adjusted for Changes in Sociodemographic Composition

To examine whether changes in demographic composition explain the pattern of results, we used direct standardization methods to adjust the rates of use for the 1982, 1985, 1988, 1992, 1995, and 1998 surveys to the age/education/marital status distribution for the 1980 survey respondents (see Appendix F for a discussion of standardization methods and the rationale for demographic variables used for the adjustment). Adjusted rates are not actual prevalence estimates, but rather are constructed estimates that show how the rates would have looked if there had been no changes in the demographic characteristics of the Military from 1980 to 1998.

In Table 3.2, we present the trends in unadjusted (i.e., observed) and adjusted (i.e., standardized) rates of heavy alcohol use, any illicit drug use, and cigarette smoking for the total DoD during the seven surveys. In general, adjustments by standardization changed the estimates somewhat, but did not substantially alter the patterns of significant differences between surveys from 1980 to 1998. For heavy alcohol use, adjusted rates increased the estimates of heavy alcohol use by about one to four percentage points for the 1982 to 1998 surveys. That is, if the sociodemographic composition of the Military in later years had been the same as in 1980, rates of heavy alcohol use would have been even higher than the observed rates.

A key finding for heavy alcohol use is that the significant decline from 1980 to 1988 for unadjusted rates was not significant for the adjusted rates. This suggests that the decline in heavy alcohol use observed in the unadjusted rates can be largely explained by the changes in the demographics of the Military over the period from 1980 to 1998. The implication is that military programs and practices had little effect on rates of heavy alcohol use during the 18-year period. This conclusion is subject to other interpretations, however. Both the adjusted and unadjusted data showed a significant increase in heavy alcohol use between 1980 and 1982, and adjusted data were significantly lower in 1998 than in 1982 (significance test not shown). This could be interpreted to mean that the Military made significant progress in reducing heavy alcohol use during the period, from 23.6% in 1982 to 19.3% in 1998 (adjusted rates), that cannot be explained just by demographic changes.

Another view consistent with historical events is that the 1982 increase in heavy alcohol use is an anomaly that may reflect substitution to alcohol when the initial crackdown on illicit drug use began. This notion suggests that rates of heavy drinking merely fluctuated around a base level observed in 1980. In either case, the adjusted data indicate that when demographics of the Military were considered, rates of heavy alcohol use in 1998 were about the same as they were in 1980.

Standardization to adjust the data had much less effect on rates of any illicit drug use and cigarette smoking or on the significance of differences between surveys. For both substances, the adjusted data showed the same strong significant downward trend in use as the unadjusted data between 1980 and 1998. Overall, these analyses indicated that the observed changes in illicit drug use and cigarette smoking were not accounted for by shifts in the sociodemographic composition of the military population between 1980 and 1998. If the demographics of the Military, however, had been the same in 1998 as in 1980, the rate of illicit drug use in 1998 would be expected to be about 1.5 percentage points higher and the rate of cigarette smoking would be nearly 4 percentage points higher.

Table 3.2 Trends in Substance Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Characteristics for Total DoD, 1980-1998

Substance/Type of Estimate	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Heavy Alcohol Use							
Unadjusted	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)	15.4 (0.8) ^c
Adjusted ^b	20.8 (1.1)	23.6 (0.9) ^a	24.8 (0.9)	20.1 (1.1) ^a	19.1 (1.2)	20.5 (0.8)	19.3 (0.9)
Any Illicit Drug Use							
Unadjusted	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)	2.7 (0.3) ^c
Adjusted ^b	27.6 (1.5)	18.2 (0.7) ^a	9.7 (0.6) ^a	5.6 (0.4) ^a	4.3 (0.6)	3.6 (0.4)	4.1 (0.4) ^c
Cigarette Use							
Unadjusted	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a	29.9 (0.8) ^c
Adjusted ^b	51.0 (0.8)	52.0 (0.6)	47.5 (0.9) ^a	42.9 (0.7) ^a	37.2 (0.8) ^a	34.3 (0.6) ^a	33.8 (0.7) ^c

Note: Table entries are percentages (with standard errors in parentheses). Significance tests were done between consecutive survey years (e.g., unadjusted estimates between 1980 and 1982; adjusted estimates between 1980 and 1982) and between 1980 and 1998. Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bAdjusted estimates have been standardized to the 1980 distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23; Any Illicit Drug use, Q60 and 67; Cigarette Use, Q44 and 47).

3.1.3 Trends in Alcohol-Related Negative Effects

The substantial negative consequences of alcohol use on the work performance, health, and social relationships of military personnel have been a continuing concern assessed in the DoD surveys. In Figure 3.2 and Table 3.1 (shown earlier), we present trends in alcohol-related negative effects for the total DoD between 1980 and 1998. In view of the decline in heavy drinking between 1980 and 1998 (unadjusted rates) observed in Figure 3.1, we anticipated a decline in negative effects due to drinking. Results confirmed our expectation. In 1980, 17.3% of military personnel experienced one or more serious consequences associated with alcohol use during the year. This figure declined to 6.7% in 1998. In Figure 3.2, results for serious consequences show a steady downward decline from 1980 to 1985, with more gradual declines and a leveling off to 1998. The 1980 to 1998 decrease was statistically significant, as were the decreases between 1980 and 1982 and between 1982 and 1985. Declines since 1985 were more moderate and were not significantly different from those of the preceding survey year.

Alcohol use productivity loss, also shown in Figure 3.2, decreased significantly between 1980 and 1998, from 26.7% to 13.6%. The decrease also was significant between 1995 and 1998. The pattern of change for this measure differs from the other measures in this figure in that it shows a significant increase between 1980 and 1982 (consistent with the increase in heavy drinking between 1980 and 1982 noted above) and a significant decrease for each survey from 1982 to 1992, but no significant change from 1992 to 1995. The 1998 rate was less than half the rate observed at its peak in 1982.

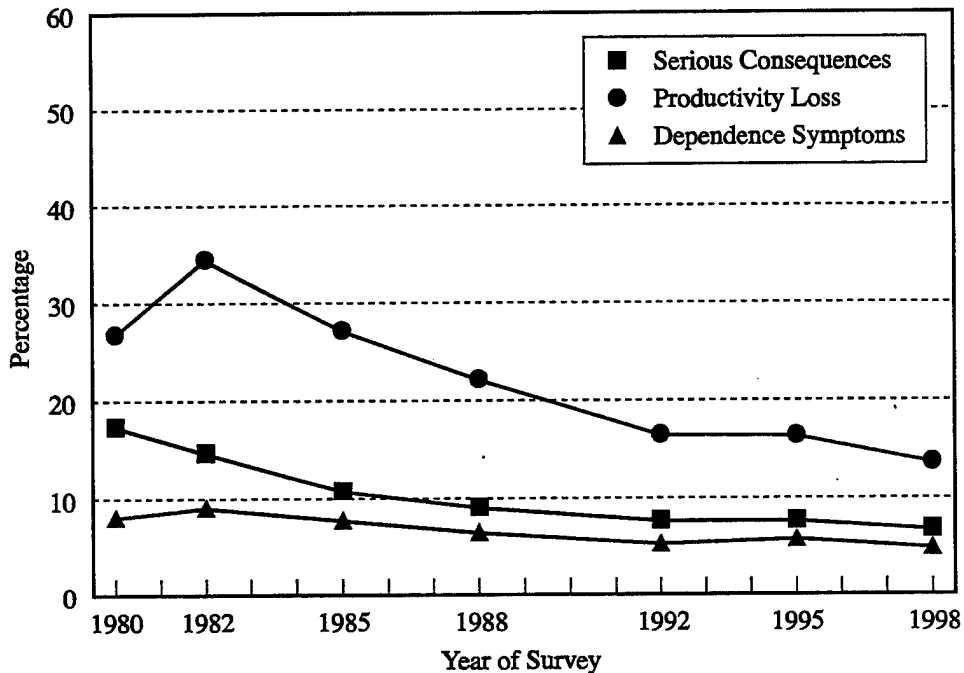
We found fewer substantial decreases in the percentage of military personnel reporting symptoms of alcohol dependence between each of the surveys, although there was a significant decline over the 18-year period. In 1980, as shown in Table 3.1, 8.0% of total DoD personnel indicated that they had experienced symptoms of dependence during the past year compared to 4.8% in 1998. Despite the significant decrease, the curve looks relatively flat over the years, with about 5% reporting alcohol dependence symptoms during the decade after 1988.

3.2 Progress Toward *Healthy People 2000* Objectives

A major aim of the 1998 DoD survey was to measure progress toward selected *Healthy People 2000* objectives for a variety of health behaviors. In addition to the objective already discussed above for reducing cigarette smoking to a prevalence of 20% or less, the objectives that were measured included the following:

1. reduce smokeless tobacco use by males aged 24 or younger to a prevalence of no more than 4%;

Figure 3.2 Trends in Alcohol Use Negative Effects, Past 12 Months, Total DoD, 1980-1998



Note: Definitions and measures of substance use are given in Section 2.5.3.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (Serious Consequences, Q34 and 36; Productivity Loss, Q32A-F; Dependence Symptoms, Q33A-C and E-F).

2. reduce overweight, as measured by the Body Mass Index (BMI), to a prevalence of no more than 15% among people under age 20, and to no more than 20% among people aged 20 or older;
3. increase to at least 20% the proportion of people aged 18 or older who engage in vigorous physical activity 3 or more days per week for 20 or more minutes per occasion;
4. increase to at least 90% the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high;
5. increase to at least 90% the proportion of people with high blood pressure who are taking action to help control their blood pressure;
6. increase to at least 75% the proportion of adults who had their blood cholesterol checked within the preceding 5 years;
7. reduce nonfatal unintentional injuries that require hospitalization to no more than 754 per 100,000 people;

8. increase the use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats, to at least 85% of motor vehicle occupants;
9. increase the use of helmets to at least 80% of motorcyclists and at least 50% of bicyclists;
10. increase to more than 50% the proportion of sexually active, unmarried people who used a condom at last sexual intercourse;
11. increase to at least 95% the proportion of women aged 18 or older with an intact uterine cervix who have ever received a Pap test, and to at least 85% those who received a Pap test within the preceding 3 years; and
12. increase abstinence from tobacco use by pregnant women to at least 90% and increase abstinence from alcohol by at least 20%.

In this section, we describe overall findings from the total DoD for these objectives. Chapter 6 gives additional details about objective 1 on smokeless tobacco use. Chapter 7 discusses objectives 2 to 6 on cardiovascular disease risk reduction, objectives 7 to 9 on injuries and injury prevention, and objective 10 on sexually transmitted disease (STD) risk reduction. Chapter 9 examines objectives 11 and 12, which are specific to Military women, regarding Pap smears and reduction of substance use during pregnancy. In addition, we also provide findings for the new National Heart, Lung, and Blood Institute (NHLBI) guidelines on overweight (see Chapter 2 for a discussion of definitions). Like the guidelines on overweight for *Healthy People 2000*, these new guidelines also are based on the BMI, but use different cutoff values.

3.2.1 Smokeless Tobacco Use (Objective 1)

Table 3.3 presents the first 10 *Healthy People 2000* objectives plus the NHLBI guidelines for overweight and corresponding DoD data for 1995 and 1998. Information about objectives 11 and 12 is presented in Table 3.4. As shown, for objective 1 on smokeless tobacco use in the past 30 days, military men aged 18 to 24 showed a prevalence of 19.0% for 1998, which was a nonsignificant change from 21.9% in 1995. This 1998 rate was almost five times higher than the objective of 4%. Given the rather large disparity between the smokeless tobacco rate among young adult males and the *Healthy People 2000* goal, the Military faces a considerable challenge to reduce smokeless tobacco use among young males to the targeted level by the year 2000.

3.2.2 Overweight (Objective 2)

Estimates of the prevalence of overweight in Table 3.3 were based on the BMI, which is defined as the ratio of a person's weight in kilograms to the square of that

Table 3.3 Progress Toward Selected *Healthy People 2000* Objectives, Total DoD, 1995-1998

Characteristic/Group	Objective	Year	
		1995	1998
Smokeless tobacco use, past 30 days			
Males, aged 18 to 24	≤ 4%	21.9 (1.0)	19.0 (0.8)
Overweight—<i>Healthy People 2000</i> Guidelines^a			
Under age 20	≤ 15%	19.0 (1.4)	22.9 (2.0)
Aged 20 or older	≤ 20%	16.7 (0.4)	19.5 (0.5) ^{ab}
Overweight—1998 NHLBI Guidelines^c			
Under age 20	≤ 15%	27.6 (1.7)	30.5 (2.1)
Aged 20 or older	≤ 20%	50.2 (0.6)	53.9 (0.5) [*]
Strenuous exercise, past 30 days^d			
All personnel	≥ 20%	65.4 (0.9)	67.7 (0.9) ^b
Blood pressure, checked past 2 years and know result			
All personnel	≥ 90%	76.3 (0.9)	80.4 (0.5) [*]
Taking action to control high blood pressure^e			
Personnel with history of high blood pressure	≥ 90%	49.3 (1.3)	46.5 (1.4)
Cholesterol checked, past 5 years			
All personnel	≥ 75%	60.1 (1.5)	62.4 (1.1)
Hospitalization for injuries, past 12 months			
All personnel	≤ 754 per 100,000	3,388 (235)	3,271 (237)
Seat belt use^f			
All personnel	≥ 85% of occupants	90.6 (0.7)	91.4 (0.7) ^b
Helmet use, past 12 months^f			
Motorcyclists	≥ 80%	71.0 (1.3)	75.9 (0.9) [*]
Bicyclists	≥ 50%	22.8 (1.8)	44.2 (1.7) [*]
Condom use at last encounter			
Sexually active unmarried personnel ^g	≥ 50%	40.4 (1.0)	41.8 (1.0)

Note: Table entries are percentages (with standard errors in parentheses), except for hospitalization for injuries, which is expressed per 100,000 personnel.

*Comparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

^aDefinition of BMI is given in Section 2.5.4. Personnel under age 20 were defined as overweight if BMI ≥ 25.8 for men or BMI ≥ 25.7 for women. Personnel aged 20 and older were defined as overweight if BMI ≥ 27.8 for men or BMI ≥ 27.3 for women (Q95 and 96) (PHS, 1991).

^bMet or exceeded *Healthy People 2000* objective.

^cDefinition of BMI is given in Section 2.5.4. NHLBI (1998) guidelines define four levels of overweight, regardless of age or gender: (1) overweight (BMI of 25.0 to 29.9); (2) obesity I (BMI of 30.0 to 34.9); (3) obesity II (BMI of 35.0 to 39.9); and (4) extreme obesity (BMI of 40.0 or greater). For these analyses, these four levels were aggregated such that personnel were considered overweight if their BMI was ≥ 25.0 (Q95 and 96).

^dOne or both of the following three or more times a week for 20 minutes or more: running/cycling/walking, or other strenuous exercise (Q68A and C).

^eEstimate subsetted to personnel who had ever been told they had high blood pressure (other than pregnancy-related). These personnel were defined as taking action to control their high blood pressure if (a) they had been advised by a health professional to take blood pressure medication, diet to reduce their weight, reduce their salt intake, or exercise; and (b) they were currently taking one or more of these advised actions (Q99-100, 101A-C, 102A-C and 102E).

^fReported wearing seat belts or helmets "always" or "nearly always." Objectives on helmet use were subsetted to personnel who rode a motorcycle or bicycle in the past 12 months (Seat Belt Use, Q72; Bicycle Helmet Use, Q76 and 77; Motorcycle Helmet Use, Q74 and 75).

^gDefined as unmarried personnel who had one or more sexual partners in the past 12 months. For consistency with 1995 estimates, the 1998 estimates do not include personnel who are living as married (Q113 and 114).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995-1998 (Smokeless Tobacco Use, Past 30 Days, Q55 and 51; Blood Pressure, Checked Past 2 Years and Know Result, Q97-98; Cholesterol Checked, Past 5 Years, Q103; Hospitalization for Injuries, Past 12 Months, Q71).

person's height in meters. As shown, 22.9% of all military personnel in 1998 under the age of 20 were classified as overweight, and 19.5% of personnel aged 20 or older were defined as overweight based on *Healthy People 2000* guidelines. These data did not differ significantly from results in 1995 for those under 20, but showed a significant increase in overweight among personnel aged 20 or older. Despite this increase, the 1998 prevalence of overweight still fell below the objective for personnel aged 20 or older. Thus, for both years of data, personnel in the total DoD under the age of 20 were somewhat above the objective of no more than a 15% prevalence of overweight, whereas personnel aged 20 or older had met the goal of no more than a 20% prevalence of overweight. The significant increase in overweight, however, suggests that this is an area that may need attention.

It is somewhat surprising that military personnel under age 20 exceeded the *Healthy People 2000* objective whereas those over age 20 did not, given the strong emphasis on fitness in the Military. It is possible that the BMI may overestimate somewhat the percentages of military personnel who are overweight. Specifically, some BMI measurements among military personnel who are over the threshold for classifying someone as overweight may be due to increased muscle mass, rather than to excess body fat. Thus, some of these personnel classified as overweight may still have had percentage body fat measurements within acceptable ranges for their Services. Alternatively, some junior personnel as they entered the Military may have been somewhat, though not excessively, above the weight standard, and it may simply take a period of time in the Military for them to "get into shape." Also, these measures are based on self-reports of height and weight and may not be totally accurate.

Data on overweight based on the NHLBI guidelines present a considerably different picture. Because the NHLBI cutoff values for defining overweight are more conservative in that they are lower than the *Healthy People 2000* guidelines, the percentages of military personnel classified as overweight were substantially higher than those observed for the *Healthy People 2000* guidelines. For 1998, 30.5% of personnel under age 20 were defined as overweight, and 53.9% of those aged 20 or older were classified as overweight. For 1995, the corresponding percentages were 27.6% and 50.2% respectively. The data under the NHLBI guidelines essentially show the same relative relationships between 1995 and 1998 as are shown for the *Healthy People 2000* guidelines, but the threshold of the two guidelines is notably different.

Presently, the DoD has not adopted the NHLBI guidelines for defining overweight. These analyses make clear that if at some future time they do so, the impact will be to shift a sizable group of personnel from a category of meeting weight standards to a category of being overweight. This would result from lowering the cutoff value in the scale, but it would not be due to any change in behavior or appearance of the Military. Such a change would have negative implications for perceptions of readiness of the force.

3.2.3 Exercise (Objective 3)

Objective 3 examines personnel who engaged in strenuous exercise (running/cycling/walking or other strenuous exercise, such as swimming laps) at least 3 days per week for at least 20 minutes per occasion in the past 30 days. As shown in Table 3.3, 68% of personnel in the total DoD reported meeting this requirement in 1998 and 65% in 1995. Data for both years far exceed the *Healthy People 2000* objective of 20% or greater for the general adult population. Given the emphasis that the Military places on physical fitness as part of an overall goal of military readiness, this finding is not surprising.

3.2.4 Blood Pressure (Objectives 4 and 5)

Table 3.3 presents findings on percentages of personnel who had their blood pressure checked in the 2 years prior to the survey and who also were aware of the result. We classified personnel as *not* meeting these criteria if they (a) last had their blood pressure checked more than 2 years before the survey, (b) could not recall when they last had their blood pressure checked, or (c) were not aware of the result of their last blood pressure check (e.g., high, low, normal), even if it occurred in the past 2 years. Because some personnel may have had their blood pressure checked in the past 2 years but could not recall when they last had it checked, our estimates may be somewhat conservative. Overall, in 1998, 80.4% of total DoD personnel had their blood pressure checked in the past 2 years and could state the result. Although this rate was somewhat lower than the *Healthy People 2000* target of 90%, it nonetheless represents a significant increase in blood pressure awareness from 76.3% in 1995.

We also gathered data about the group of people who had high blood pressure who were taking positive steps to control it, either through physical activity, diet, lifestyle changes, or medication. We developed our measure based on the structuring of blood pressure control questions in the National Health Interview Survey (NHIS). As shown, for 1998, 46.5% of all military personnel who had a lifetime history of high blood pressure were taking one or more recommended actions to control it at the time of the 1998 DoD survey. Although this number indicates that about half of military personnel were consciously taking steps to control their high blood pressure, it falls well below the 90% level, which is the *Healthy People 2000* objective. Although not significant, the data show a slight drop in the percentages from 1995 on this measure. It is possible that some of these personnel may not have been taking any action to control their blood pressure if their blood pressure had returned to normal. Nevertheless, those personnel who had a history of high blood pressure but were not taking any of these actions to control their high blood pressure are a group at increased risk for a recurrence of the problem.

3.2.5 Cholesterol (Objective 6)

As shown in Table 3.3 for 1998, some 62.4% of all personnel in the total DoD in 1998 and some 60.1% in 1995 had their cholesterol checked within the preceding 5 years. These rates were somewhat lower than the *Healthy People 2000* target of 75% for adults. Although the Military was below the goal, part of the reason may be related to military regulations that specify age-dependent screening criteria. Woodruff and Conway (1991), for example, noted that Navy regulations do not require personnel under the age of 25 to be screened for blood cholesterol level, whereas they do require that personnel between the ages of 25 and 49 have their cholesterol checked once every 5 years and that personnel between the ages of 50 and 59 have theirs checked once every 2 years. Chapter 7 presents additional analyses that examine age-specific screening rates. In view of age-specific regulations, it may be advisable for the DoD to set its own targets for the Military, at least for cholesterol, rather than relying on the targets for civilians.

3.2.6 Injuries and Injury Prevention (Objective 7)

Table 3.3 also presents estimates of the prevalence of hospitalization for treatment of injuries in the 12 months prior to the survey. Unlike the other estimates in this table, which are expressed as percentages, the estimates for hospitalization are presented as the number of personnel hospitalized for treatment of injuries per 100,000 active-duty personnel. Analyses of the 1998 survey showed that for every 100,000 active-duty personnel, approximately 3,300 were hospitalized for treatment of an injury in the past 12 months. The 1998 rate was still about four times higher than the *Healthy People 2000* target of 754 per 100,000 people. These high rates of injury are consistent with findings by Jones and Hansen (1996), who identified injuries in the Military as a hidden epidemic. The finding suggests the need for additional research to identify risk factors for injury and to assess prevention strategies.

It should be noted that the *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we decided to ask just about the overall rate of injuries. Because the number of hospitalizations due to intentional injuries is likely to be small, the high rate of hospitalizations for injuries for both 1995 and 1998 cannot be explained by *intentional* injuries.

3.2.7 Seat Belt Use (Objective 8)

Table 3.3 shows that in 1998, 91.4% of DoD personnel wore seat belts "always" or "nearly always" when they drove or rode in an automobile. This commendably high rate was comparable to the rate of 90.6% observed in 1995 and exceeds the *Healthy People 2000* target of use of occupant protection systems by at least 85% of motor vehicle occupants. These high rates of seat belt use among military personnel, in part, may be a result of regulations requiring personnel to use seat belts when they are driving or riding in motor vehicles on military installations. As was noted in Chapter 1, however, comparison of civilian survey data on seat belt use with actual observation of people in motor vehicles suggests that there may be a tendency for survey respondents to overreport their seat belt use. To the extent that military personnel do overreport their seat belt use, estimates of regular seat belt use may overestimate somewhat the percentages of personnel who actually use their seat belts regularly.

3.2.8 Helmet Use (Objective 9)

Table 3.3 also shows the percentages of motorcyclists and bicyclists who wore helmets "always" or "nearly always" when they rode a motorcycle or bicycle in the past 12 months. We based the estimates of helmet use by motorcyclists on those personnel who rode a motorcycle at least once in the past 12 months ($N = 4,429$). Similarly, we based the estimates of helmet use by bicyclists on those personnel who rode a bicycle at least once in the past 12 months ($N = 10,075$). Personnel who reported that they never rode a motorcycle in the past 12 months or who never rode a bicycle were excluded from these estimates.

Among personnel in 1998 who rode a *motorcycle* at least once in the past 12 months, 75.9% wore helmets always or nearly always. This represents a significant increase from 71.0% who reported this behavior in 1995. Although the 1998 overall rate indicates progress since 1995, it remains somewhat below the *Healthy People 2000* objective of increasing helmet use to at least 80% of motorcyclists. Among personnel in 1998 who rode *bicycles* in the past 12 months, 44.2% or more than two in five used helmets always or nearly always. This rate is nearly double the rate of 22.8% in 1995 and represents the behavior with the greatest improvement among the *Healthy People 2000* objectives studied here. Despite the marked improvement in helmet use for bicyclists, the 1998 rate was somewhat below the *Healthy People 2000* objective of helmet use by at least 50% of bicyclists. Taken together, these findings suggest that additional efforts will be needed to encourage regular helmet use by motorcyclists and bicyclists to reach the objectives of helmet use by the year 2000 among military personnel.

3.2.9 Condom Use (Objective 10)

The proper use of condoms can reduce the risk of contracting STDs (including AIDS) among individuals who are sexually active but not in a monogamous relationship. The bottom row in Table 3.3 presents findings on condom use among sexually active unmarried personnel in the Military the last time they had intercourse. We defined "sexually active" personnel as those who had vaginal or anal intercourse in the 12 months prior to the survey. As shown, in 1998, some 41.8% of unmarried personnel in the total DoD who were sexually active in the past 12 months used a condom. This rate was nearly identical to the rate of 40.4% observed in 1995 and was lower than the *Healthy People 2000* objective of 50% condom use among sexually active unmarried persons at the last episode of sexual intercourse. This finding suggests that the Military will need to focus additional attention on this area.

3.2.10 Pap Tests (Objective 11)

The major way that women can lessen the risk of cervical cancer is through regular Pap smear tests. As shown in Table 3.4, based on the 1998 survey, 97.8% of military women had ever received such tests and 95.9% had received the tests within the past 3 years. These high rates are virtually identical to those observed in 1995. Military women, overall, exceeded the *Healthy People 2000* objectives of 95% having ever had a Pap smear and 85% having had one in the past 3 years. The near universality of receipt of Pap smears is notable. These exceptionally high rates of obtaining Pap smears probably reflect both ready access to care and mandatory care at specified intervals for military women.

3.2.11 Substance Use Reduction During Pregnancy (Objective 12)

Avoidance of substance use during pregnancy is important in ensuring maternal and infant health. The *Healthy People 2000* objective states that the percentage of women abstaining from alcohol during pregnancy should be increased by at least 20%. This objective is stated differently from others in that it specifies measuring a change from baseline rather than a specific percentage target. Because there was no prior baseline data, the rate of abstinence from alcohol during pregnancy from the 1995 survey (i.e., 85.2%) serves as the baseline from which to measure change. A 20% increase, however, in *abstinence* from alcohol during pregnancy relative to this 1995 baseline of approximately 85% would effectively require 100% of military women to abstain from alcohol during pregnancy. Although this would be an ideal goal in principle, it could be difficult if not impossible in practice to achieve this outcome. Stated another way, large changes in the prevalence of a behavior (e.g., abstinence from alcohol during pregnancy) are easier to achieve when the prevalence of that behavior is low but become more difficult to achieve as the prevalence gets closer to being universal because a shrinking "pool" of people remain who have not yet adopted the behavior change.

Table 3.4 Progress Toward Selected *Healthy People 2000* Objectives for Military Women, Total DoD, 1995-1998

Characteristic	Objective	Year	
		1995	1998
Pap Smear^a			
Ever received	≥ 95%	97.1 (0.6)	97.8 (0.2)
Received in past 3 years	≥ 85%	95.2 (0.7)	95.9 (0.4)
Substance Use During Last Pregnancy^c			
No alcohol use	≥ 88% ^b	85.2 (1.3)	85.8 (1.2)
No cigarette use	≥ 90%	83.9 (1.4)	85.8 (1.3)

Note: Table entries are percentages (with standard errors in parentheses).

^aEstimate made for women with an intact uterine cervix ($N=3,760$ in 1998, and $N=2,807$ in 1995).

^bAlthough the *Healthy People 2000* objective refers to a 20% increase in abstinence from alcohol during pregnancy, this objective would be virtually impossible to achieve because of the very high rate in 1995. Therefore, progress toward this objective was measured in terms of a 20% reduction in the prevalence of alcohol use during pregnancy as opposed to a 20% increase in abstinence. A 20% reduction in the prevalence of alcohol use during pregnancy relative to 1995 would result in an alcohol use prevalence of about 12% and a corresponding prevalence of 88% who abstained.

^cEstimate based on 1,299 in 1998 and 1,077 in 1995 women who were pregnant in the past 5 years. For women who were pregnant at the time of the survey, "last pregnancy" refers to the *current* pregnancy.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995 and 1998 (1998 Questions: Pap Smear, Q134 and 135; Substance Use During Last Pregnancy: No Alcohol Use, Q137 and 141-142, No Cigarette Use, Q137 and 139-140).

For this particular objective, it may therefore be more useful to think in terms of *reducing* the prevalence of military women's alcohol use during pregnancy by 20%, as opposed to increasing the prevalence of abstinence from alcohol by 20%. If approximately 15% of military women in 1995 who were pregnant in the 5 years prior to that survey used alcohol during their most recent pregnancies, then a corresponding 1998 prevalence of about 12% would represent a 20% reduction in the prevalence of alcohol use during pregnancy relative to 1995. For consistency in the way the data are presented in Table 3.4, however, we state attainment of this objective in terms of 88% of women abstaining from alcohol (i.e., 100% minus 12%).

As shown in Table 3.4 for 1998, 85.8% of military women who had been pregnant in the past 5 years reported that they did not consume any alcohol during their last pregnancy. These data are encouraging in that the large majority of women who were pregnant in the 5 years prior to the survey did not use alcohol during their last pregnancy. There was no change, however, from the 1995 rate of 85.2%; consequently, the 1998 rate remains below the target of 88%. Again, the lack of a significant change from 1995 to 1998

probably reflects the very high prevalence of abstinence from alcohol during pregnancy that was observed in 1995.

Table 3.4 also shows that 85.8% of military women in 1998 who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy. This rate is about the same as observed in 1995 and falls slightly below the *Healthy People 2000* objective of increasing abstinence from tobacco use during pregnancy to 90% or higher. Thus, greater preventive efforts need to be directed at those military women who used alcohol or smoked cigarettes during their last pregnancy.

3.2.12 Status in Meeting *Healthy People 2000* Objectives

The 12 objectives described in this section identified 16 targets to improve the health of military personnel. In addition to these 16 targets, there also is a target to reduce cigarette smoking among military personnel to 20%, bringing the total number of targets to 17. As noted earlier in this chapter (see Table 3.1), the percentage of current cigarette smokers in the Military is 29.9%, which substantially exceeds the objective of 20%. The 1998 DoD survey provides important data for assessing progress toward these goals since 1995.

Overall, the present results show that the Military has already met or exceeded 5 of the 17 *Healthy People 2000* targets (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap smears ever received, and Pap smears received in the past 3 years). Further, as discussed later in the report, other targets have been met by at least some demographic subgroups in the Military, even if not by the entire force. In addition, military personnel are 10% percentage points or less away from reaching the *Healthy People 2000* targets for another 7 of the 17 behaviors (overweight for personnel under age 20, blood pressure checked past 2 years and knowing the result, helmet use for motorcyclists, helmet use for bicyclists, condom use, no alcohol use during pregnancy, no cigarette use during pregnancy).

Thus, the Military has made good progress in a number of areas, but faces considerable challenges in meeting the targets in all areas by the year 2000. It is noteworthy that the areas where targets have been met are those where military regulations help ensure compliance with the desired behaviors (weight control, exercise, seat belt use, Pap tests). It is not clear whether the targets for these behaviors would be achieved without such requirements. It seems clear that it will be more challenging to reach the targets in other areas where individuals have to take more initiative to achieve the targets of the objectives.

3.3 Summary

In this chapter, we briefly review the prevalence of alcohol use, illicit drug use, and tobacco use from the 1998 DoD survey and examine trends in substance use and negative effects due to alcohol use from 1980 to 1998. For substance use trends, we provide raw estimates and estimates that have been adjusted for changes in demographic characteristics over the time the surveys were conducted. We also provide data for selected *Healthy People 2000* objectives for military personnel, many of which apply to all personnel and several that are specific to military women. Our focus is on data for the entire DoD.

3.3.1 Unadjusted Trends in Substance Use

Comparisons of findings from seven DoD surveys of military personnel conducted in 1980, 1982, 1985, 1988, 1992, 1995, and 1998 show a downward trend in the use of alcohol, illicit drugs, and cigarettes (Table 3.1 and Figure 3.1). Specifically, focusing on past 30-day substance use trends for the total DoD indicates that

- heavy drinking declined significantly from 20.8% in 1980 to 15.4% in 1998;
- use of any illicit drugs declined sharply from 27.6% in 1980 to 2.7% in 1998; and
- cigarette smoking decreased significantly from 51.0% in 1980 to 29.9% in 1998.

In addition, the data showed a general shift toward less use of alcohol. The percentage of people who abstained from alcohol or who were infrequent/light drinkers increased significantly from 25.6% in 1980 to 43.2% in 1998.

Comparisons of findings between the 1995 and 1998 surveys show no significant changes in the rates of heavy alcohol use, illicit drug use, or cigarette smoking. The finding of no significant decline from 1995 to 1998 in heavy alcohol use suggests that this is an area that may need greater emphasis by the Military. Indeed, the 1998 rate of heavy alcohol use had not changed significantly over the past decade from the 1988 rate. Despite the findings for the DoD as a whole, as is discussed later, the Navy did show significant declines in illicit drug use and heavy alcohol use between 1995 and 1998. Increased efforts on the part of the Navy to combat alcohol and illicit drug use may have had an impact on declines in use.

The finding of no significant reduction in illicit drug use between 1995 and 1998 and the relatively low rates of use for both surveys suggests that illicit drug use may have reached its lower limit. It may be unrealistic to expect drug use rates to go much lower. The finding that smoking did not decline significantly between 1995 and 1998 marks the

first survey year since 1982 when smoking rates did not show a significant decrease from the prior survey. Despite clear progress in reducing the prevalence of cigarette smoking, the 1998 rate remained 10 percentage points higher than the *Healthy People 2000* objective of 20%.

3.3.2 Trends in Substance Use Adjusted for Changes in Sociodemographic Composition

Members of the Armed Forces in 1998 were more likely to be older, to be officers, to be married, and to have more education than in 1980—factors that also are associated with less substance use. To examine whether changes in demographic composition explained declines in substance use across survey years, we standardized or adjusted rates of use for all surveys since 1982 to the age/education/marital status distribution for the 1980 survey. Adjusted (standardized) rates are not actual prevalence estimates, but rather are constructed estimates that show how the rates would have looked if there had been no changes in the demographic characteristics of the Military from 1980 to 1998 (Table 3.2).

- A key finding for heavy drinking is that the significant decline from 1980 to 1998 for unadjusted rates was not significant for the adjusted rates. This suggests that the decline in heavy drinking observed in the unadjusted rates can be largely explained by the changes in the demographics of the Military over the period from 1980 to 1998. The implication is that Military programs and practices had little effect on rates of heavy drinking during the 18-year period.
- For illicit drug use and cigarette smoking, adjusted data showed the same strong significant downward trend in use as the unadjusted data between 1980 and 1998. This indicates that the declines in use between surveys were not explained by shifts in the sociodemographic composition of the military population.

3.3.3 Alcohol-Related Negative Effects

Significant declines were found in the percentage of military personnel experiencing alcohol-related serious consequences, productivity loss, and symptoms of dependence across the survey years (Figure 3.2 and Table 3.1):

- serious consequences declined significantly from 17.3% in 1980 to 6.7% in 1998;
- productivity loss declined significantly from 26.7% in 1980 to 13.6% in 1998; and
- symptoms of dependence decreased significantly from 8.0% in 1980 to 4.8% in 1998.

3.3.4 Status in Meeting *Healthy People 2000* Objectives

The 1998 DoD survey provided data for 13 *Healthy People 2000* objectives that identified 17 targets to improve the health of military personnel. The 1998 survey provides data to assess progress toward these goals since 1995:

- Overall, the Military already met or exceeded 5 of the 17 targets (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap smears ever received and Pap smears received in the past 3 years).
- Other targets have been met by at least some demographic subgroups in the Military, even if not by the entire force.
- Military personnel are 10 percentage points or less away from reaching the *Healthy People 2000* targets for another 7 of the 17 behaviors (overweight for personnel under age 20, blood pressure checked past 2 years and knowing the result, helmet use for motorcyclists, helmet use for bicyclists, condom use, no alcohol use during pregnancy, no cigarette use during pregnancy).

Thus, the Military made good progress in a number of areas by 1998, but faces considerable challenges in meeting the targets in all areas by the year 2000. It is noteworthy that the areas where targets have been met are those where military regulations help ensure compliance with the desired behaviors (weight control, exercise, seat belt use, Pap tests). It is not clear whether the targets for these behaviors would have been achieved without such requirements. It seems clear that it will be more challenging to reach the targets in other areas where change is more dependent on the initiative of individuals.

3.3.5 Areas of Challenge

Overall, these findings indicate that the Military has made steady and notable progress during the past 18 years in combating illicit drug use and smoking and in reducing alcohol-related problems. The DoD has made less progress in reducing heavy alcohol use. These findings are consistent with the Military's strong emphasis on the reduction of drug abuse that began in the early 1980s (DoD, 1980a, 1980b, 1985a, 1985b, 1997c) and cessation of smoking that began during the mid-1980s (DoD, 1986b, 1994).

Despite notable progress, there is still room for considerable improvement in some areas. Cigarette smoking remains common, affecting nearly one in every three military personnel, and the rate of heavy alcohol use—the consumption level most likely to result in alcohol-related problems—affects more than one in seven active-duty personnel. Further, when we adjusted the estimates of heavy alcohol use to reflect changes in the sociodemographic composition of the Military, we found that the 1998 rate had not changed significantly from the 1980 rate. This finding suggests that the observed declines in heavy

alcohol use from 1980 to 1998 (unadjusted rates) were largely a function of changes in the demographic composition of the Military and that stronger initiatives and efforts will be needed to reduce heavy alcohol use.

The Military also has made progress in a number of areas toward meeting selected *Healthy People 2000* objectives, but primarily in areas that are mandated by military regulations. Considerable effort will be needed to meet the objectives in all areas by the year 2000. Findings suggest that the largest gaps and greatest challenges will be to meet the objectives for smoking, smokeless tobacco use among males aged 18 to 24, controlling high blood pressure, and reducing hospitalization rates for injuries.

4. ALCOHOL USE

In this chapter, we report the results of detailed analyses of alcohol use among military personnel. We examine trends in alcohol use, comparisons of alcohol use in each Service and the DoD, correlates of heavy alcohol use, negative effects of alcohol use, participation in counseling and treatment programs, and levels of use among military personnel compared with use among civilians. As described in Chapter 2, we have defined alcohol use in terms of both average ounces of alcohol (i.e., ethanol) consumed and levels of alcohol use, with special emphasis on the heaviest level of alcohol use. Negative effects of alcohol use include serious consequences, productivity loss, and dependence symptoms. We have included in Appendix D additional information on sociodemographic characteristics associated with alcohol use (Tables D.1 to D.4).

Beginning with the 1985 survey, the question about the size of the container from which respondents usually drank beer included a response category for liter or quart (32-ounce) bottles or mugs. In addition, another response option was added in 1998 for 40-ounce bottles as the typical size of beer container one usually drank. Estimates of average daily alcohol consumption and heavy alcohol use in the tables in this chapter (and elsewhere in this report) incorporate responses about these two sizes of beer containers for the years when such options were available. Typical use of these large-sized containers could be important for some subgroups in the Military, such as personnel stationed in Europe (where beer is commonly served in liter mugs) or in certain sections of the continental United States (where 40-ounce containers have become increasingly popular). Therefore, calculations of the measures of average ounces of ethanol consumed daily and levels of alcohol use for years since 1985 now incorporate the new 32-ounce container size and for 1998 include both 32-ounce and 40-ounce sized containers.

Tables D.17 through D.21 compare estimates of drinking levels and Table D.22 compares average ounces of ethanol consumed daily from 1985 through 1998 based on the two slightly different procedures for calculating these measures that differ in whether they account for typical consumption of beer in 32- and 40-ounce containers. In general, including the 32-ounce response category changed the estimates only slightly (if at all) relative to estimates that excluded this response category. More important, the general conclusions about trends in drinking levels and average daily ethanol consumption did not change. If the 32-ounce response category for beer had any effect, the net result for estimates of drinking levels was to (a) decrease slightly the estimates for abstainers, infrequent/light drinkers, and moderate drinkers, and (b) increase slightly the estimates for moderate/heavy and heavy drinkers. Similarly, inclusion of the 32-ounce category for beer tended to raise some estimates of average daily ethanol consumption very slightly. But no estimates based on the calculation procedure that includes the two large-sized

beverage containers differ significantly from estimates based on the procedure that does not include 32-ounce or 40-ounce containers, for either measure of alcohol use.

4.1 Trends in Alcohol Use

In this section, we provide two sets of estimates of alcohol use for the survey years from 1980 to 1998: the average daily ounces of alcohol (ethanol) and heavy alcohol use in the past 30 days. For each measure, we provide both observed (unadjusted) estimates and adjusted estimates; the latter take into account differences in sociodemographic characteristics over the course of the surveys.

4.1.1 Average Daily Ounces of Alcohol

As shown in the unadjusted portions of Table 4.1, the average amount of ethanol consumed per day decreased substantially from 1980 to 1988. For the total DoD, the amount decreased from 1.48 ounces per day in 1980 to 0.79 ounce in 1998. This represents a 47% decrease over the 18-year period. The decreases from 1985 to 1988 and from 1988 to 1992 were statistically significant. But the most recent decrease from 1995 to 1998 was not statistically significant for the DoD or any Service, except the Navy. The Navy was the only Service to have a significant decline in the average amount of ethanol consumed between 1995 and 1998. The average amount of ethanol consumed per day in the Navy declined from 0.93 ounce per day in 1995 to 0.70 ounce in 1998, a substantial decrease both statistically and substantively.

Over the 18-year period, alcohol consumption among members of each of the individual Services also decreased substantially (as shown in the rows for unadjusted estimates in Table 4.1). We observed significant decreases between 1980 and 1998 of 42% for Army personnel, 57% for Navy personnel, 38% for Marine Corps personnel, and 50% for Air Force personnel. Consumption among Air Force personnel was by far the lowest of all the Services in each of the survey years.

The observed decreases in alcohol consumption may partially reflect changes in the sociodemographic composition of the military population over time. Between 1980 and 1998, the military population became slightly older and more likely to be married, factors both related to lower levels of alcohol use (Bray et al., 1995b). To examine whether the observed decreases in alcohol use were associated with changes in sociodemographic composition of the Services, we adjusted estimates from the 1982 through the 1998 surveys to take into account demographic changes since 1980. We standardized the demographic distributions of the military population from the 1982 to 1998 surveys to the 1980 age, education, and marital status distribution for each Service and the total DoD. These results are presented as adjusted estimates in Table 4.1. (See Appendix F for a technical

Table 4.1 Trends in Average Daily Ounces of Ethanol Consumed, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998

Service/Type of Estimate	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Unadjusted	1.61 (0.10)	1.58 (0.08)	1.42 (0.13)	1.12 (0.06) ^a	0.90 (0.06) ^a	0.98 (0.07)	0.94 (0.07) ^c
Adjusted ^b	1.61 (0.10)	1.51 (0.06)	1.49 (0.12)	1.26 (0.05)	1.09 (0.06) ^a	1.12 (0.06)	1.14 (0.08) ^c
Navy							
Unadjusted	1.64 (0.12)	1.64 (0.12)	1.34 (0.10)	0.88 (0.08) ^a	0.85 (0.11)	0.93 (0.08)	0.70 (0.07) ^{a,c}
Adjusted ^b	1.64 (0.12)	1.58 (0.09)	1.48 (0.09)	0.97 (0.04) ^a	0.94 (0.10)	1.11 (0.08)	0.93 (0.09) ^c
Marine Corps							
Unadjusted	1.75 (0.09)	1.45 (0.09) ^a	1.49 (0.23)	1.20 (0.11)	1.04 (0.06)	1.19 (0.07)	1.08 (0.11) ^c
Adjusted ^b	1.75 (0.09)	1.47 (0.02) ^a	1.60 (0.21)	1.46 (0.20)	1.07 (0.06)	1.37 (0.07) ^a	1.27 (0.10) ^c
Air Force							
Unadjusted	1.08 (0.11)	0.96 (0.05)	0.87 (0.07)	0.66 (0.03) ^a	0.52 (0.03) ^a	0.54 (0.04)	0.54 (0.04) ^c
Adjusted ^b	1.08 (0.11)	0.97 (0.04)	0.91 (0.06)	0.71 (0.03) ^a	0.61 (0.04) ^a	0.58 (0.05)	0.65 (0.04) ^c
Total DoD							
Unadjusted	1.48 (0.07)	1.41 (0.05)	1.24 (0.06) ^a	0.92 (0.03) ^a	0.79 (0.04) ^a	0.87 (0.04)	0.79 (0.04) ^c
Adjusted ^b	1.48 (0.07)	1.38 (0.03)	1.34 (0.06)	1.05 (0.03) ^a	0.91 (0.04) ^a	0.99 (0.03)	0.96 (0.04) ^c

Note: Table entries are mean ounces of ethanol (with standard errors in parentheses). Adjusted estimates take into account sociodemographic changes within Services across survey years; estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing average daily ounces of ethanol consumed was altered for this report as follows: Estimates for average daily ounces of ethanol consumed for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for average daily ounces of ethanol consumed for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, estimates for 1985 to 1995 average daily ounces of ethanol consumed differ slightly from those reported in previous DoD survey reports. Table D.22 compares estimates of average daily ounces of ethanol consumed for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bEstimates have been standardized to the 1980 DoD or Service-specific distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Average Daily Ounces of Ethanol, Past 30 Days, Q15-23 and 28-30).

discussion of standardization procedures.) These adjusted estimates are *constructed* estimates and are not the actual, observed prevalence estimates for these survey years.

For the total DoD, adjustment of estimates of average daily alcohol (ethanol) consumption across the DoD survey series increased the estimate in 1998 from 0.79 to 0.96 ounce. Differences between survey years, however, that were statistically significant when comparing unadjusted estimates (i.e., between 1985 and 1988, 1988 and 1992, and 1980 and 1998) remained significant following adjustment. Further, adjustment of DoD estimates to reflect sociodemographic changes did not reveal any statistically significant differences between survey years that were not apparent when we compared unadjusted estimates.

Similarly, adjustment of estimates of average ethanol consumption to reflect sociodemographic changes in each of the Services did not appreciably affect consumption trends between 1980 and 1998, except that adjusted estimates were higher. But even after the adjustment, they still showed a significant decline over time. These findings suggest that the overall decreases in average alcohol consumption for the Services since the survey series began in 1980 were not due primarily to sociodemographic changes.

4.1.2 Heavy Alcohol Use

As shown in the unadjusted portions of Table 4.2, heavy alcohol use was lower in 1998 than it had been in 1980 and most intervening years for the total DoD and for each of the Services (also see Table 3.1 in Chapter 3 for DoD drinking levels and Tables D.1 to D.2 for Service drinking levels). The percentage of heavy drinkers among total DoD personnel decreased significantly about five percentage points between 1980 and 1998, a 26% decrease from 20.8% in 1980 to 15.4% in 1998. We also found statistically significant decreases over the 18-year period for the Navy (a 47% decrease), but not for any of the other Services.

For the total DoD and each of the Services, heavy alcohol use was relatively stable between the 1980 and 1985 surveys, and most of the decreases occurred from 1988 to 1998. In 1998, the percentage of heavy drinkers from lowest to highest was 11.7% among Air Force personnel, 13.5% among Navy personnel, 17.2% among Army personnel, and 23.0% among Marine Corps personnel. The percentage of heavy drinkers was lowest among Air Force personnel in each of the survey years, reaching its lowest level in 1995. Between 1992 and 1995, the percentage of heavy drinkers increased for all the Services except the Air Force, then decreased in 1998 back to approximately the proportions exhibited in 1992. The percentage of heavy drinkers in the Navy increased from 14.2% in 1992 to 19.1% in 1995, a statistically significant increase, but declined in 1998 back to 13.5%, a statistically significant decrease from the 1995 percentage and virtually equal to the percentage in

Table 4.2 Trends in Heavy Alcohol Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-1998

Service/Type of Estimate	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Unadjusted	20.3 (1.6)	24.7 (1.4) ^a	25.5 (2.2)	19.7 (1.2) ^a	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)
Adjusted ^b	20.3 (1.6)	23.5 (1.3)	26.7 (1.8)	23.2 (0.8)	23.0 (1.8)	21.2 (1.8)	21.7 (1.5)
Navy							
Unadjusted	25.6 (2.3)	27.7 (2.9)	25.0 (1.4)	14.7 (2.0) ^a	14.2 (1.7)	19.1 (1.5) ^a	13.5 (1.8) ^{a,c}
Adjusted ^b	25.6 (2.3)	26.7 (2.4)	27.3 (1.9)	16.3 (3.6) ^a	16.6 (3.4)	23.9 (1.5)	18.2 (2.1) ^{a,c}
Marine Corps							
Unadjusted	28.6 (2.5)	30.6 (0.9)	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)
Adjusted ^b	28.6 (2.5)	31.6 (2.4)	32.5 (3.2)	30.7 (4.2)	30.4 (1.3)	33.5 (1.9)	26.9 (1.8) ^a
Air Force							
Unadjusted	14.3 (1.4)	17.7 (1.2)	16.5 (1.4)	14.5 (1.0)	10.6 (0.8) ^a	10.4 (1.1)	11.7 (1.0)
Adjusted ^b	14.3 (1.4)	18.1 (0.8) ^a	17.5 (1.2)	16.1 (0.9)	12.9 (0.8) ^a	12.0 (0.9)	14.7 (1.0) ^a
Total DoD							
Unadjusted	20.8 (1.1)	24.1 (1.0) ^a	23.0 (1.1)	17.2 (0.9) ^a	15.5 (0.8)	17.4 (0.9)	15.4 (0.8) ^c
Adjusted ^b	20.8 (1.1)	23.6 (0.9) ^a	24.8 (0.9)	20.1 (1.1) ^a	19.1 (1.2)	20.5 (0.8)	19.3 (0.9)

Note: Table entries are percentages (with standard errors in parentheses). Adjusted estimates take into account sociodemographic changes *within* Services across survey years; estimates have not been adjusted for sociodemographic differences *among* Services. Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels (including heavy alcohol use) was altered for this report as follows: Estimates for heavy alcohol use for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for heavy alcohol use for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 heavy alcohol use estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bEstimates have been standardized to the 1980 DoD or Service-specific distribution by age, education, and marital status.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Heavy Alcohol Use, Q15-18 and 20-23).

1992. The 1998 estimates of heavy drinkers for the other Services were not statistically significant from those in 1995.

In general, adjustments for sociodemographic differences for the total DoD and each of the Services increased the estimates of heavy alcohol use by about three to five percentage points. The adjustments by standardization did alter the unadjusted patterns of significant differences between the surveys from 1980 to 1998. For adjusted rates, there was no significant decline in the rate of heavy alcohol use between 1980 and 1998 for the total DoD or for the Army, Marine Corps, or the Air Force. The 1998 adjusted rates were nearly identical to those in 1980 for the total DoD, the Army, and the Air Force. Both the Navy and the Marine Corps showed substantially lower rates of heavy alcohol use in 1998 compared to 1995; for the Navy, this decrease from both the 1995 and 1980 rates was statistically significant, while the adjusted rate of heavy alcohol use in the Marine Corps was about the same as it had been in 1980 but was significantly lower than the rate in 1995.

To summarize, the average amount of alcohol consumed per day decreased significantly between 1980 and 1998 for the total DoD and for personnel from all of the individual Services. Most of the largest decreases in the percentages of heavy drinkers occurred mainly between 1985 and 1988, with some reduction since 1988. Taken together, these findings suggest that the Military has shown since 1980 reductions in the average amount of alcohol actually being used and the actual prevalence of heavy alcohol use among its personnel. Adjusted estimates, however, suggest that reductions in heavy alcohol use between 1980 and 1998 both for the total DoD for and each of the Services except perhaps the Navy appear to have been largely a reflection of changes in the sociodemographic composition of the Military rather than a result of efforts intended to reduce heavy alcohol use. The decreases since 1980 in heavy alcohol use may not have happened or been as large without such efforts, and possibly more receptive personnel. But the leveling of heavy alcohol use rates over the past three or four DoD surveys may mean that demographic forces and convincing easily persuaded heavy drinkers can no longer be relied upon; rather, more program effort and resources will be needed to reduce heavy alcohol use in the Military any further.

4.2 Service Comparisons of Alcohol Use

In this section, we provide two sets of estimates for each of the Services, one set for average daily ethanol use and one set for the prevalence of heavy alcohol use in 1998. We begin by presenting unadjusted estimates for each of the Services. These unadjusted estimates are descriptive only and yield no explanatory information about differences among the Services. They do, however, reflect the actual average amount of alcohol

consumed per day by the drinkers in each Service and the actual prevalence of heavy alcohol use in 1998 for each of the Services.

As discussed in Section 2.6, one possible explanation for differences across the Services stems from differences in their sociodemographic composition. To address this possibility, we also provide adjusted estimates of ethanol use and heavy alcohol use, using direct standardization procedures to control for sociodemographic differences (see Appendix F). These constructed estimates resulting from standardization permit comparisons among the Services, as if each Service had the sociodemographic composition of the total DoD in 1998. Unadjusted and adjusted estimates for both average ounces of ethanol and heavy alcohol use are shown in Table 4.3.

4.2.1 Unadjusted Estimates

Over the survey series, comparisons of unadjusted estimates of average daily alcohol (ethanol) consumption (Table 4.1) and heavy alcohol use (Table 4.2) show that alcohol use has generally been lower among Air Force personnel than for personnel from the other Services. Service comparisons of unadjusted estimates for 1998 of average daily ethanol consumption shown in Table 4.3 indicate that Air Force personnel on average consumed significantly less alcohol per day than did personnel in the Army or Marine Corps. But the average amount consumed daily by Navy personnel in 1998 did not differ significantly from the Air Force estimate. The unadjusted estimates of average daily ethanol consumption for the Army and Marine Corps also differed from the Navy by statistically significant amounts.

Unadjusted rates of heavy alcohol use (i.e., five or more drinks per typical drinking occasion at least once a week, on average) in 1998 were significantly lower among Air Force and Navy personnel than among personnel in the Army or Marine Corps. In addition, the prevalence of heavy alcohol use for the Marine Corps was significantly higher than for Army personnel.

These unadjusted estimates of the prevalence of heavy alcohol use show the relative challenges that the Services face in discouraging heavy alcohol use among their personnel. The Marine Corps faces the greatest challenge, with an estimate of more than one in four Marines (26.9%) being heavy drinkers. The Air Force in 1998 had the smallest proportion of personnel being heavy drinkers, 11.7%, but its difficulty of discouraging heavy alcohol use may be as great or greater than that faced by any other Service because these few personnel may be among the most resistant to change. Rates for the Army (17.2%) and Navy (13.5%) fall between these two extremes. These prevalence estimates, however, do not provide any underlying explanations for Service differences with regard to alcohol use. Adjusting for differences in the sociodemographic composition of the Services may account for some of the differences between Services.

Table 4.3 Estimates of Alcohol Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Measure/ Type of Estimate	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Average Daily Ounces of Ethanol					
Unadjusted	0.94 (0.07) ^{a,b}	0.70 (0.07) ^c	1.08 (0.11) ^{a,b}	0.54 (0.04)	0.79 (0.04)
Adjusted ^d	0.92 (0.05) ^{a,b}	0.73 (0.06)	0.79 (0.05) ^a	0.64 (0.04)	0.79 (0.04)
Heavy Alcohol Use					
Unadjusted	17.2 (1.6) ^{a,c}	13.5 (1.8) ^c	23.0 (2.1) ^a	11.7 (1.0)	15.4 (0.8)
Adjusted ^d	17.1 (1.1)	13.7 (1.5)	16.4 (0.8)	13.9 (0.9)	15.4 (0.8)

Note: Table entries for average daily ounces of ethanol are mean values, and entries for heavy drinkers are percentages. Standard errors are in parentheses. Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Differences that were statistically significant are indicated. Definitions and measures of substance use are given in Section 2.5.3.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bEstimate is significantly different from the Navy at the 95% confidence level.

^cEstimate is significantly different from the Marine Corps at the 95% confidence level.

^dAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD distribution.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Average Daily Ounces of Ethanol, Q15-23 and 28-30; Heavy Alcohol Use, Q15-18 and 20-23).

4.2.2 Adjusted Estimates

Observed differences in average daily alcohol (ethanol) use and heavy alcohol use among the four Services may be partially accounted for by differences in the sociodemographic composition of the Services. In particular, the higher rates of alcohol consumption on average and of heavy alcohol use in the Marine Corps may have been due in part, as shown in Table 2.4, to the sociodemographic composition of the Marine Corps in comparison with the other Services. The Marine Corps has traditionally had higher percentages of personnel who were male, younger, less educated, unmarried, and enlisted—groups who have been shown in previous DoD surveys to be more likely to be heavy drinkers (Bray et al., 1995b). Conversely, the lower levels of alcohol consumption and heavy alcohol use in the Air Force may have been due in part to its sociodemographic composition, with its personnel being more likely to be older, better educated, and married compared to the other Services. Thus, the Marine Corps could have had a lower level of average alcohol consumption and a lower prevalence of heavy alcohol use, and the Air Force could have had a higher level of alcohol consumption and a higher rate of heavy alcohol use, if the Services had the same sociodemographic composition.

To examine the potential impact of sociodemographic composition of the Services on alcohol use rates, we developed adjusted estimates of average daily alcohol use and heavy alcohol use in 1998. To do so, we standardized the sociodemographic composition of the Services to the gender, age, education, race/ethnicity, and marital status distributions for the total DoD (see Appendix F). These adjusted estimates following standardization are presented in Table 4.3 for both average daily alcohol use and heavy alcohol use.

For average daily alcohol (ethanol) consumption, adjusting the estimates for sociodemographic differences had virtually no effect on the Army estimate (a consequence of the Army's comprising such a large proportion of the total DoD). Standardization raised the Air Force estimate from an average of 0.54 ounce of ethanol per day to an average of 0.64 ounce. Standardization raised the Navy estimate slightly from 0.70 ounce per day (unadjusted) to 0.73 ounce (adjusted). Standardization had an effect on the Marine Corps estimate unlike the effects on the other Services' estimates, resulting in a large decrease from 1.08 ounces per day on average (unadjusted) to 0.79 ounces (adjusted). This finding suggests that the higher absolute alcohol consumption (i.e., unadjusted) among Marine Corps personnel was mostly accounted for by the fact that the Marine Corps is very different from the total DoD in sociodemographic composition; when the Marine Corps is made to match the sociodemographic composition of the total DoD, its average daily alcohol consumption also matches that of the Army and Navy.

Following standardization, however, the Air Force continued to have a significantly lower level of average alcohol consumption compared to the Army, the Marine Corps, and the total DoD. These results suggest that the lower level of average daily alcohol consumption in the Air Force was not due only to differences in sociodemographic composition.

With regard to heavy alcohol use, standardization to the total DoD demographic composition raised the prevalence estimates slightly for the Air Force (from 11.7% to 13.9%). Adjusting the estimates for sociodemographic differences had no effect on the Army estimates (17.2% unadjusted vs. 17.1% adjusted) or on the Navy estimates (13.5% unadjusted vs. 13.7% adjusted). Standardization reduced the estimated prevalence of heavy alcohol use for the Marine Corps, lowering it by nearly four percentage points, from 23.0% (unadjusted) to 16.4% (adjusted). Following standardization, adjusted rates of heavy alcohol use for any of the Services did not differ by any statistically significant amounts from the adjusted rate for the Air Force.

These results indicate that almost all of the differences in the unadjusted rates of heavy alcohol use in 1998 between the Services can be accounted for by differences in the sociodemographic composition of the Services. This finding is particularly evident and important for the Marine Corps, which has consistently shown the highest unadjusted

rates of heavy alcohol use across the DoD survey series and continued to do so in 1998. The distinctive sociodemographic makeup of the Marine Corps, however, which has a higher representation of personnel at greater risk for heavy alcohol use, is an important factor in the rate of heavy alcohol use. As long as the Marine Corps has higher percentages of demographic groups at increased risk for heavy alcohol use than do the other Services, then the Marine Corps will continue to face the greatest challenge in coping with heavy alcohol use among its personnel.

4.3 Correlates of Heavy Alcohol Use

Past research on military and civilian populations has firmly established that alcohol use patterns differ among certain sociodemographic groups and social conditions (Bray et al., 1992; Clark & Hilton, 1991; Midanik & Clark, 1994). For example, drinking tends to be more common and heavier among younger persons, males, and the less well educated. Knowledge about these correlates of alcohol use is useful for specifying high-risk populations to be targeted for educational and treatment efforts. This section examines the correlates of heavy alcohol use. Two types of analyses were conducted: descriptive prevalence analyses and multivariate logistic regression analyses. Results of both are presented in Table 4.4, with the first column of numbers presenting prevalence data for the demographic groups and middle column of numbers showing the odds ratios from the logistic regression.

The prevalence rates in Table 4.4 indicate substantial differences for Service, gender, race/ethnicity, education, age, family status, and pay grade. As discussed previously, heavy alcohol use is more prevalent among Army, Navy, and Marine Corps personnel than among Air Force personnel. Heavy alcohol use also is more prevalent among males, non-Hispanic Caucasians and Hispanics, those with less education, those 25 or younger, those not married or those who were married but unaccompanied by their spouse, and those in pay grades E1 to E6.

For the logistic regression model, we used the probability of being a heavy drinker as the dependent measure. The dichotomous outcome measure was heavy alcohol use versus other drinking levels (excluding abstainers). The independent variables included eight sociodemographic variables: Service, gender, race/ethnicity, education, age, family status, pay grade, and region. As shown in Table 4.4, all of the demographic variables, with the exception of region, were significant predictors of heavy alcohol use. Results show that the odds of being heavy drinkers were significantly higher, after we adjusted for all other variables in the analysis, for the following subgroups:

- Army and Marine Corps compared with Navy and Air Force personnel;

Table 4.4 Demographic Correlates of Heavy Alcohol Use, Past 30 Days, Total DoD

Sociodemographic Characteristic	Prevalence	Adjusted Odds Ratio ^a	95% CI of Odds Ratio ^b
Service			
Army	17.2 (1.6)	1.30 ^c	(1.04, 1.62)
Navy	13.5 (1.8)	0.98	(0.70, 1.37)
Marine Corps	23.0 (2.1)	1.27 ^c	(1.03, 1.57)
Air Force	11.7 (1.0)	1.00	NA
Gender			
Male	17.2 (0.9)	5.24 ^c	(4.26, 6.44)
Female	4.1 (0.4)	1.00	NA
Race/Ethnicity			
Caucasian, non-Hispanic	16.5 (0.9)	1.00	NA
African American, non-Hispanic	11.5 (1.2)	0.59 ^c	(0.47, 0.74)
Hispanic	18.3 (1.3)	0.91	(0.77, 1.08)
Other	11.1 (1.2)	0.60 ^c	(0.48, 0.74)
Education			
High school or less	24.3 (1.2)	2.28 ^c	(1.65, 3.15)
Some college	14.2 (0.8)	1.61 ^c	(1.16, 2.23)
College graduate or higher	5.6 (0.5)	1.00	NA
Age			
20 or younger	24.2 (1.9)	1.39	(0.98, 1.97)
21-25	25.6 (1.3)	2.14 ^c	(1.65, 2.80)
26-34	11.3 (0.9)	1.24	(1.00, 1.53)
35 or older	6.7 (0.6)	1.00	NA
Family Status^d			
Not married	23.9 (1.2)	2.43 ^c	(2.10, 2.79)
Married, spouse not present	18.5 (1.6)	1.96 ^c	(1.58, 2.42)
Married, spouse present	8.8 (0.7)	1.00	NA
Pay Grade			
E1-E3	25.9 (1.3)	2.96 ^c	(1.61, 5.44)
E4-E6	16.6 (1.0)	2.76 ^c	(1.62, 4.71)
E7-E9	8.1 (0.5)	2.32 ^c	(1.45, 3.73)
W1-W5	6.5 (1.3)	1.59	(0.87, 2.91)
O1-O3	7.3 (0.9)	2.07 ^c	(1.34, 3.19)
O4-O10	2.2 (0.4)	1.00	NA
Region			
CONUS ^e	14.3 (0.9)	0.78	(0.64, 0.97)
OCONUS ^f	18.6 (1.9)	1.00	NA
Total	15.4 (0.8)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cOdds ratio is significantly different from the reference group.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Heavy Alcohol Use, Past 30 Days, Q15-18 and 20-23; refer to Section 2.2 for descriptions of sociodemographic variables).

- males compared with females;
- non-Hispanic Caucasians and Hispanics compared with non-Hispanic African Americans and those in the “other” racial/ethnic category;
- those with a high school education or less and those with some college compared with those with more education;
- those younger than age 35 compared with those aged 35 or older;
- those who were single or married with spouse absent compared with those who were married with spouse present; and
- those in pay grades E1 to E3 through O1 to O3 compared with those in pay grades O4 to O10.

Pay grade and gender showed the strongest effects in the model. Junior personnel in pay grades E1 to E3 had odds of being heavy drinkers three times greater than senior officers in pay grades O4 to O10, and personnel in pay grades E4 to E9 had odds from over two to nearly three times greater. The odds of junior officers in pay grades O1 to O3 being heavy drinkers were two times that of senior officers. Male personnel had odds more than five times those of female personnel to be heavy drinkers. The logistic model also showed that the odds of being heavy drinkers for single personnel and personnel with a high school education or less were more than two times greater than for married personnel with spouse present and college graduates, respectively. These logistic regression analyses suggest that prevention efforts for heavy alcohol use focused on lower grade enlisted male personnel in the Army, Navy, and Marine Corps, as well as on single personnel and personnel with a high school education or less, are likely to be most productive.

4.4 Negative Effects of Alcohol Use

In this section, we examine the negative effects of alcohol consumption on military personnel. First, we examine trends in negative effects and contrast findings from the 1980 to the 1998 DoD surveys. Next, we examine the negative effects as a function of pay grade and the relationship between drinking levels and serious consequences.

4.4.1 Trends in Negative Effects

The Military showed dramatic reductions in alcohol-related negative effects during the 18-year period from 1980 to 1998. Alcohol-related negative effects declined significantly since the survey series began. In 1998, 6.7% of military personnel reported having experienced a serious consequence associated with alcohol use during the past year, 13.6% reported some productivity loss, and 4.8% reported one or more symptoms of dependence (see Table 3.1 in Chapter 3). The decrease between 1995 and 1998 in the prevalence of productivity loss (from 16.3% in 1995 to 13.6% in 1998) was statistically significant. The percentages for the other two kinds of negative effects were essentially the

same as those in the 1995 survey (i.e., in 1995, 7.6% experienced serious consequences and 5.7% experienced a dependence symptom). Our definition of dependence, as described in Section 2.5.3, does not reflect the strict definition used in the *DSM-IV* (1994). Rather, it only includes one or more symptoms commonly associated with dependence. Between 1980 and 1998, the decreases in all three types of negative effects of alcohol use were statistically significant.

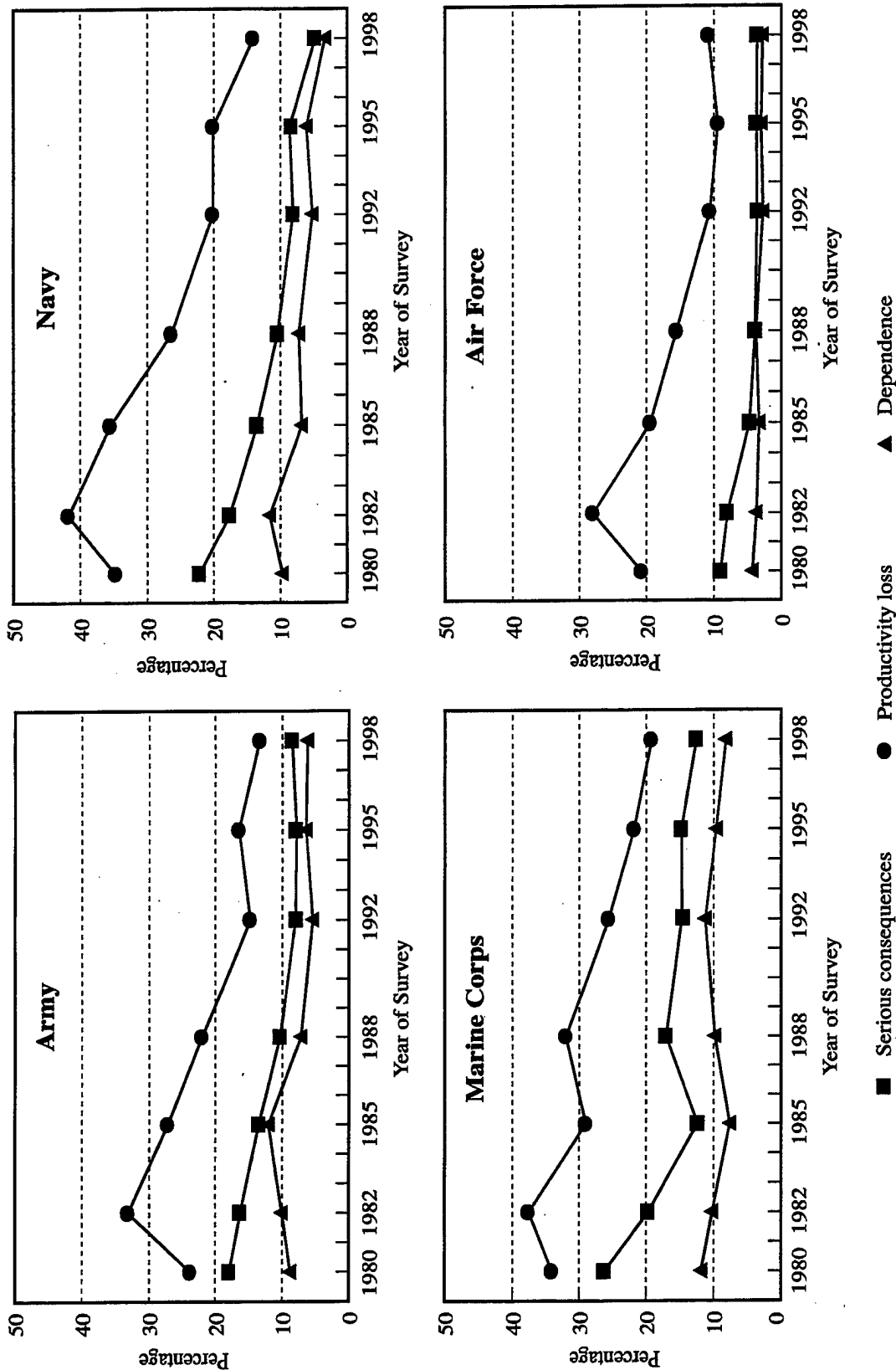
The same reductions in negative effects that we observed for total DoD also occurred for personnel in each of the Services. Figure 4.1 and Tables D.1 to D.4 show Service trends from 1980 to 1998 for each of the three types of negative effects due to alcohol use. We found a fairly steady decline in serious consequences among Army personnel from 17.9% in 1980 to 8.5% in 1998. Following an increase in productivity loss from 1980 to 1985, productivity loss for Army personnel returned to 1980 levels in 1988 and declined further to 13.4% in 1998. Trends in symptoms of alcohol dependence showed a somewhat different pattern than serious consequences or productivity loss. For the Army, alcohol dependence symptoms increased from 8.8% in 1980 to 12.1% in 1985, declined significantly to 7.2% in 1988, dropped further to 5.4% in 1992, increased slightly to 6.4% in 1995, and remained at that level in 1998 (6.2%).

For Navy personnel, we found a steady decline in serious consequences from 22.1% in 1980 to 4.8% in 1998. Following an increase in productivity loss from 1980 to 1982, productivity loss for the Navy returned to 1980 levels in 1985 and declined steadily to 14.1% in 1998. Trends in symptoms of alcohol dependence showed a somewhat different pattern than serious consequences or productivity loss. For the Navy, the prevalence of alcohol dependence symptoms increased from 9.7% in 1980 to 11.6% in 1982, dropped significantly in 1985, and remained fairly constant through 1995, when it was 6.1%; in 1998, however, only 3.3% of Navy personnel reported any dependence symptoms.

Serious consequences among Marine Corps personnel declined from 26.2% in 1980 to 12.5% in 1998. Following an increase in productivity loss from 1980 and 1982, productivity loss for the Marine Corps decreased to 29.0% in 1985, increased in 1988 to 32.0%, and declined steadily to 19.2% by 1998. Trends in reports of symptoms of alcohol dependence showed a decrease in dependence symptoms between 1980 and 1985, then the prevalence of dependence symptoms returned in 1992 to the 1980 levels and then decreased to 8.2% by 1998.

We found a steady decline in serious consequences among Air Force personnel from 9.0% in 1980 to 3.9% in 1988; the trend in reports of this kind of negative effect remained level from 1992 (3.5%) to 1998 (3.6%). Following an increase in productivity loss from 1980 to 1982, productivity loss for the Air Force returned to 1980 levels in 1985, declined to 10.6% in 1992, and subsequently remained at that level with a prevalence of 10.8% in

Figure 4.1 Trends in Alcohol-Related Negative Effects, by Service, 1980-1998



Note: Definitions and measures of substance use are given in Section 2.5.3.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Serious Consequences, Q34 and 36; Productivity Loss, Q32A-F; Dependence Symptoms, Q33A-C and E-F).

1998. The Air Force showed the lowest prevalence of dependence symptoms throughout the 18-year period, from 4.3% in 1980 down to 2.8% in 1998.

4.4.2 Pay Grade Differences

Because those in the lower pay grades are more likely to drink heavily, a similar distribution might be expected for negative effects of alcohol use. As Table 4.5 indicates, there were considerable variations in the problems reported by individuals in different pay grades. The highest levels of serious consequences, productivity loss, and dependence symptoms consistently occurred in the lowest pay grades (i.e., E1 to E3). Productivity loss also was high in pay grades E4 to E6. Rates of alcohol-related negative effects for serious consequences, productivity loss, and dependence symptoms were lowest in pay grades O4 to O10. For the total DoD, 15.2% of junior enlisted personnel (E1s to E3s) but only 0.2% of senior officers (O4s to O10s) reported the occurrence of serious consequences due to alcohol consumption. For productivity loss, 20.7% of E1s to E3s reported a problem compared with 5.2% of O4s to O10s. The prevalence of dependence symptoms was 10.2% for E1s to E3s and 0.4% for O4s to O10s. This pattern in the total DoD also occurred for all of the Services.

In view of the high rates of problems among E1s to E3s, Table 4.5 includes Service comparisons. Serious consequences among E1s to E3s were highest in the Marine Corps (21.5%), followed by the Army (17.5%), the Navy (10.7%), and the Air Force (9.8%). Serious consequences among E4s to E6s also were found to be higher in the Marine Corps (10.4%) and Army (9.5%) than in other Services. Productivity loss among E1s to E3s was most prevalent in the Marine Corps (25.3%), about equally prevalent in the Navy (19.8%) and Army (20.4%), and least prevalent in the Air Force (17.8%). Productivity loss among E4s to E6s was most prevalent in the Marine Corps (19.3%), and about equal for the Navy (15.3%) and Army (15.1%). We also found productivity loss to be more prevalent among O1s to O3s in the Marine Corps (13.4%) and Navy (11.1%). Finally, about 14% of E1s to E3s in the Marine Corps and about 12% of E1s to E3s in the Army experienced dependence symptoms, along with 8.0% for the Navy and 6.1% for the Air Force.

These high prevalences of alcohol problems among junior enlisted personnel indicate that these pay grades are at substantially greater risk of experiencing negative effects when they drink, relative to other pay grades. In addition, because most negative effects of alcohol use occur among these junior enlisted personnel, the absolute numbers of personnel having these drinking problems are quite large, requiring substantial resources to reduce even slightly the impact of so many personnel experiencing these negative effects.

Table 4.5 Negative Effects of Alcohol Use, Past 12 Months, by Pay Grade

Measure/Pay Grade	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Serious Consequences					
E1-E3	17.5 (1.9)	10.7 (1.6)	21.5 (1.3)	9.8 (1.1)	15.2 (0.9)
E4-E6	9.5 (1.0)	4.9 (0.5)	10.4 (1.2)	3.1 (0.3)	6.5 (0.4)
E7-E9	2.3 (0.6)	2.4 (0.7)	2.8 (0.7)	2.2 (0.5)	2.3 (0.3)
W1-W5	1.2 (0.5)	** (**)	1.7 (1.4)	NA (NA)	1.1 (0.4)
O1-O3	2.1 (0.7)	1.3 (0.5)	1.9 (0.7)	0.9 (0.5)	1.5 (0.3)
O4-O10	0.1 (0.1)	0.3 (0.3)	0.8 (0.5)	** (**)	0.2 (0.1)
Productivity Loss					
E1-E3	20.4 (2.1)	19.8 (2.7)	25.3 (1.4)	17.8 (1.8)	20.7 (1.1)
E4-E6	15.1 (1.1)	15.3 (1.6)	19.3 (1.6)	11.3 (1.4)	14.6 (0.7)
E7-E9	5.6 (0.7)	8.0 (1.0)	7.5 (1.2)	7.1 (1.1)	6.8 (0.5)
W1-W5	5.8 (1.3)	5.1 (2.7)	4.2 (1.3)	NA (NA)	5.5 (1.0)
O1-O3	8.0 (1.2)	11.1 (2.4)	13.4 (2.3)	7.1 (1.1)	8.9 (0.9)
O4-O10	5.3 (1.0)	5.6 (1.1)	5.1 (1.0)	5.0 (0.9)	5.2 (0.5)
Dependence Symptoms					
E1-E3	11.6 (1.3)	8.0 (1.3)	14.4 (1.3)	6.1 (1.8)	10.2 (0.8)
E4-E6	7.1 (0.8)	3.3 (0.5)	6.7 (1.0)	2.7 (0.5)	4.7 (0.4)
E7-E9	2.0 (0.5)	1.8 (0.4)	1.2 (0.4)	1.7 (0.7)	1.8 (0.3)
W1-W5	0.8 (0.4)	** (**)	0.5 (0.5)	NA (NA)	0.7 (0.3)
O1-O3	1.5 (0.8)	1.0 (0.5)	1.4 (0.7)	1.3 (0.4)	1.3 (0.3)
O4-O10	0.5 (0.3)	** (**)	** (**)	0.6 (0.4)	0.4 (0.2)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Serious Consequences, Q34 and 36; Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F).

4.4.3 Drinking Levels and Negative Effects

To better understand the influence of drinking levels on negative effects of alcohol use, we examined the relationship between drinking levels (omitting abstainers) and the percentage of personnel with one or more alcohol-related serious consequences, any reported loss of productivity, or occurrence of one or more dependence symptoms (see Table 4.6). Approximately a quarter of heavy drinkers had one or more serious consequences (23.8%), a rate that was more than three times as great as for any other group of drinkers. We observed the next highest prevalence among those who were moderate/heavy drinkers, with 6.7% experiencing at least one serious consequence. Having experienced a serious consequence of alcohol use was reported by about equal percentages of moderate drinkers (3.6%) and infrequent/light drinkers (3.4%).

Table 4.6 Negative Effects of Alcohol Use, by Drinking Level

Drinking Level	Serious Consequences	Productivity Loss	Dependence Symptoms
Infrequent/Light	3.4 (0.5)	5.4 (0.5)	1.6 (0.3)
Moderate	3.6 (0.6)	8.6 (0.7) ^a	0.9 (0.2)
Moderate/Heavy	6.7 (0.6) ^{a,c}	21.1 (1.1) ^{a,c}	4.1 (0.4) ^{a,c}
Heavy	23.8 (1.2) ^{a,b,c}	38.7 (1.4) ^{a,b,c}	21.6 (1.1) ^{a,b,c}

Note: Table entries are percentages (with standard errors in parentheses) of personnel in each drinking level who had one or more of the alcohol-related problems mentioned. Definitions and measures of substance use are given in Section 2.5.3.

^aSignificantly higher than for moderate drinkers.

^bSignificantly higher than for moderate/heavy drinkers.

^cSignificantly higher than for infrequent/light drinkers.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F; Drinking Level, Q15-18 and 20-23).

Productivity loss was most prevalent among the heaviest drinkers, with almost 40% of them reporting such a negative effect. Such loss of productivity was only half as prevalent among moderate/heavy drinkers, although still high at 21.2%. In comparison, the prevalence of productivity loss was lower among moderate drinkers (8.6%) and infrequent/light drinkers (5.4%), although still high enough to warrant concern.

Finally, dependence symptoms were reported by 21.6% of the heavy drinkers, but by only 4.1% of the moderate drinkers. The prevalence of experiencing one or more dependence symptom was lowest among moderate drinkers (0.9%) and secondarily among infrequent/light drinkers (1.6%). This finding differs from the pattern of prevalences of the other kinds of negative effects and is counterintuitive, in that one would expect the proportion of all drinkers experiencing any dependence symptom to be smallest among the lightest drinkers. It may be that light drinkers were more likely or willing to attribute a problem to their drinking. Another possibility is that the infrequent/light drinking group contained a subgroup of sporadic or "binge" drinkers who, although they did not drink frequently, encountered problems when they did.

4.5 Participation in Counseling and Treatment Programs

In Table 4.7, we can see that a number of military personnel reported receiving treatment for an alcohol problem since joining the Military. Rates varied from about 5% of current abstainers to almost 14% of heavy drinkers for the total DoD. For all Services,

Table 4.7 Participation in Alcohol Treatment Since Joining the Military, by Drinking Level and Service

Service/Alcohol Treatment	Drinking Level			
	Abstainer	Infrequent Light	Moderate	Moderate Heavy Heavy
Army				
No treatment	96.2 (0.7)	94.4 (1.0)	94.5 (1.3)	92.6 (1.3)
Any military alcohol treatment	3.7 (0.7)	5.0 (0.9)	4.6 (1.1)	6.6 (1.3)
Any civilian alcohol treatment	0.6 (0.3)	1.0 (0.4)	1.1 (0.6)	1.9 (0.5)
Military or civilian alcohol treatment	3.8 (0.7)	5.6 (1.0)	5.5 (1.3)	7.4 (1.3)
Navy				
No treatment	91.2 (1.2)	94.3 (0.6)	93.1 (1.7)	88.2 (1.5)
Any military alcohol treatment	8.2 (1.2)	5.1 (0.6)	6.7 (1.7)	10.9 (1.6)
Any civilian alcohol treatment	0.7 (0.4)	0.7 (0.4)	0.6 (0.4)	1.7 (0.5)
Military or civilian alcohol treatment	8.8 (1.2)	5.7 (0.6)	6.9 (1.7)	11.8 (1.5)
Marine Corps				
No treatment	95.6 (1.0)	93.7 (0.8)	95.2 (0.9)	92.4 (1.2)
Any military alcohol treatment	4.2 (1.0)	6.2 (0.8)	4.3 (0.9)	7.1 (1.1)
Any civilian alcohol treatment	1.2 (0.4)	0.8 (0.5)	0.9 (0.5)	1.2 (0.3)
Military or civilian alcohol treatment	4.4 (1.0)	6.3 (0.8)	4.8 (0.9)	7.6 (1.2)
Air Force				
No treatment	96.2 (0.7)	97.1 (0.5)	93.6 (0.8)	91.8 (1.1)
Any military alcohol treatment	3.5 (0.7)	2.7 (0.5)	5.9 (0.8)	7.8 (1.0)
Any civilian alcohol treatment	0.6 (0.2)	0.7 (0.3)	0.9 (0.4)	0.8 (0.3)
Military or civilian alcohol treatment	3.8 (0.7)	2.9 (0.5)	6.4 (0.8)	8.2 (1.1)
Total DoD				
No treatment	94.9 (0.5)	95.1 (0.4)	94.0 (0.7)	91.2 (0.7)
Any military alcohol treatment	4.9 (0.5)	4.5 (0.4)	5.5 (0.6)	8.1 (0.7)
Any civilian alcohol treatment	0.7 (0.2)	0.8 (0.2)	0.9 (0.2)	1.5 (0.2)
Military or civilian alcohol treatment	5.1 (0.5)	4.9 (0.4)	6.0 (0.7)	8.8 (0.7)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Alcohol Treatment Since Joining the Service, Q41; Drinking Level, Q15-18 and 20-23).

almost all of the personnel treated for an alcohol-related problem received their treatment through a military treatment program or facility than through any kind of civilian medical facilities or treatment programs.

As shown in Table 4.7, there was much less difference than might be expected in participation in alcohol counseling and treatment programs across all drinking levels for the total DoD sample and for the individual Services. This most likely reflects the fact that approximately 80% of all active-duty personnel consumed alcohol, even if not in the immediately past 30 days. Rates of alcohol counseling and treatment program participation were higher among heavy alcohol users (13.8%) when compared to DoD personnel who drank at moderate (6.0%) or lower levels, or not at all (i.e., 5.1% of abstainers in Table 4.7 reported that they had treatment) in the past 30 days, but the rates for these personnel classified in the lower or nondrinking levels were not trivial.

This finding, however, that a substantial proportion of *current* heavy alcohol users (i.e., heavy alcohol users in the 30 days prior to the survey) had a history of alcohol treatment since entering the Military could be cause for concern. Stated another way, about 14% of personnel who were heavy alcohol users in the 30 days prior to the survey had received treatment at some time for an alcohol-related problem, yet not only were they drinking at present, but they were drinking heavily. To have been in alcohol treatment in the past, this group had likely experienced moderately or very severe alcohol-related problems, indicating that they were probably at higher risk than other heavy drinkers for future alcohol-related problems. These personnel who had been in treatment but were currently heavy alcohol users could represent a group of relapsers who might, at a minimum, need future courses of treatment.

Among moderate to heavy users of alcohol in the Air Force, rates of having been treated for an alcohol problem were very similar to those for persons drinking at the same levels in the other Services. Such a finding focuses attention on the fact that treatment rates are closely tied to alcohol use levels; that is, although the prevalence of heavy alcohol use was relatively low in the Air Force, compared to the other Services, persons using alcohol at this high level participated in treatment at about the same rate regardless of Service. Thus, the treatment rate for heavy drinkers in the Air Force of 14.7% differed only slightly from the treatment rates for heavy drinkers in the other Services (13.7% for the Army, 14.5% for the Navy, and 12.0% for the Marine Corps). It is notable, however, that the Marine Corps, with the highest prevalence of heavy alcohol use, had the lowest rate of participation in treatment.

4.6 Military and Civilian Comparisons

Results of standardized comparisons of heavy alcohol use among military personnel and civilians are presented in Table 4.8. Data for civilians are *standardized* estimates based on data from the 1997 National Household Survey on Drug Abuse (NHSDA). Thus, the standardized civilian estimates presented here may differ from any published NHSDA estimates for 1997 (e.g., OAS, 1998b). Data for military personnel are U.S.-based population estimates (including personnel stationed in Alaska and Hawaii) from the 1998 DoD survey. Because the military estimates for Table 4.8 have been subsetted to U.S.-based personnel, they may not match the estimates in earlier tables, which are based on the entire military population.

Findings for military/civilian comparisons of heavy alcohol use are presented in Table 4.8 for males and females separately and by age group (18 to 25, 26 to 55, and all ages). These findings show that the percentage of heavy drinkers generally was significantly higher among military personnel than among civilians for the U.S.-based total DoD (14.2% vs. 9.9%, respectively), even after the civilian estimates had been adjusted to standardize demographic differences between the military and civilian populations. As might be expected because males are about 86% of the military population, military males showed the same pattern of results as the total DoD: a significantly higher rate of drinking in the Military (16.0%) than among civilian males (11.0%). In contrast, Military females for the total DoD showed rates very similar to those among civilian females; none of the differences between Military and civilian females was statistically significant.

Most but not all of the patterns of military/civilian differences between the total DoD and civilian populations held for the individual Services. The prevalence of heavy alcohol use among males aged 18 to 25 and all personnel in the Air Force was significantly higher than among civilians in the same gender and age subgroups. Otherwise, rates of heavy alcohol use among Air Force personnel were highly similar to the rates for civilians when we controlled for differences in sociodemographic composition. After standardizing, heavy alcohol use among Navy males of all ages was not significantly different from this level of alcohol use among their civilian counterparts. This pattern also was exhibited among all Navy personnel, males and females. But the prevalences of heavy alcohol use among Navy females aged 18 to 25 and of all ages were significantly higher than among civilian females in the same age groups.

Differences in military and civilian heavy alcohol use rates were largest for men aged 18 to 25. Among young men, the military rate was nearly twice as high as the standardized civilian rate (26.9% vs. 14.9%, respectively). For the individual Services, the largest discrepancies between military and standardized civilian estimates were for the

Table 4.8 Standardized Comparisons of the Prevalence of Heavy Alcohol Use, Past 30 Days, Among Military Personnel and Civilians for Persons Aged 18 to 55

Gender/Age Group	Comparison Population					
	Civilian ^a	Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=5,956	N=9,338	N=2,647	N=1,916	N=2,436	N=2,339
18-25	14.9 (1.1)	26.9 (1.6) ^b	27.7 (2.7) ^b	24.5 (5.0)	31.0 (2.8) ^b	23.2 (2.7) ^b
26-55	8.7 (0.9)	9.8 (0.8)	11.2 (1.5)	9.6 (2.1)	10.7 (1.2)	8.3 (0.7)
All ages	11.0 (0.7)	16.0 (1.0) ^b	18.3 (1.7) ^b	13.1 (2.4)	22.4 (2.6) ^b	12.5 (1.1)
Females	N=8,179	N=3,214	N=947	N=922	N=505	N=840
18-25	3.9 (0.7)	5.7 (0.7)	4.8 (1.2)	7.3 (1.1) ^b	7.3 (1.4)	5.4 (1.2)
26-55	1.4 (0.3)	1.9 (0.4)	1.5 (0.7)	2.6 (0.8)	3.8 (1.4)	1.7 (0.6)
All ages	2.5 (0.4)	3.6 (0.4)	3.0 (0.7)	4.4 (0.6) ^b	5.9 (1.2)	3.2 (0.6)
Total	N=14,135	N=12,552	N=3,594	N=2,838	N=2,941	N=3,179
18-25	13.2 (0.9)	23.4 (1.5) ^b	24.3 (2.3) ^b	21.0 (4.3)	29.4 (2.9) ^b	18.9 (2.3) ^b
26-55	7.8 (0.8)	8.8 (0.7)	9.8 (1.3)	8.8 (2.0)	10.3 (1.2)	7.3 (0.6)
All ages	9.9 (0.6)	14.2 (0.9) ^b	16.1 (1.5) ^b	12.0 (2.2)	21.4 (2.6) ^b	10.8 (1.0)

Note: Table entries are percentages (with standard errors in parentheses). Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among Services.

^aDefined as consumption of five or more drinks on the same occasion on 4 or more days in the past 30 days.

^bSignificantly different from civilian estimate at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Heavy Alcohol Use, Past 30 Days, Q15-18 and 20-23).

younger men aged 18 to 25 in the Marine Corps (31.0%), the Army (27.7%), the Navy (24.5%), and the Air Force (23.2%) as compared to civilian men aged 18 to 25 (14.9%).

The higher rates of heavy alcohol use among military personnel remained after we controlled for differences in the sociodemographic composition of military and civilian populations. Although military personnel were more likely to be young and male, rates of heavy alcohol use were significantly higher than among civilians even when we took such differences into account.

4.7 Summary

4.7.1 Trends in Alcohol Use

In 1998, the average amount of alcohol consumed daily and the proportion of military personnel who were heavy drinkers were the lowest since the survey series began. With only a few exceptions, findings from the 1998 DoD survey generally indicate reductions in average alcohol consumption and the prevalence of heavy alcohol use relative to 1995, although most of these decreases were not statistically significant (Tables 4.1 and 4.2):

- The unadjusted average daily amount of alcohol (ethanol) consumed by total DoD personnel decreased significantly from 1.48 ounces in 1980 to 0.79 ounce in 1998, a decrease of 47% in 18 years. All Services also showed similar decreases, all of which were statistically significant.
- Unadjusted rates of heavy alcohol use showed significant declines between 1980 and 1998 among total DoD personnel and for personnel in the Navy but not for members of the other three Services.
- Comparisons of unadjusted rates of ethanol consumed and heavy alcohol use in 1995 with those in 1998 showed that changes from 1995 to 1998 were not significant for the total DoD, the Army, the Marine Corps, and the Air Force. In contrast, the Navy showed a significant decrease in the ounces of ethanol consumed in 1995 (0.93%) and 1998 (0.70%) and in the rate of heavy alcohol use from 1995 (19.1%) to 1998 (13.5%). These decreases in the Navy suggest that *The Right Spirit* campaign to prevent and deglamorize alcohol abuse may be having a positive effect.
- Adjusted estimates showed no significant decline in the rates of heavy alcohol use between 1980 and 1998 among total DoD personnel or for any Service, except the Navy. This indicates that sociodemographic changes in the Military between 1980 and 1998 accounted for most of the reductions observed in the unadjusted estimates and may indicate that the Military's programmatic efforts may not have had much effect in reducing heavy alcohol use among its members.

4.7.2 Service Comparisons of Alcohol Use

Observed differences in ethanol use and heavy alcohol use among the four Services may be partially accounted for by differences in the sociodemographic composition of the Services (Table 4.3):

- Comparisons of unadjusted estimates showed that average daily ethanol consumption in 1998 was significantly lower among Air Force personnel than among members of the Army and the Marine Corps, but not among members of the Navy.
- Unadjusted rates of heavy alcohol use were significantly lower among Air Force personnel than among personnel from the Army and the Marine Corps, but not the Navy. More than one in four Marines (23.0%) drank heavily in the 30 days before the 1998 survey; such a high prevalence of heavy alcohol use may be cause for concern about military readiness.
- After standardizing for sociodemographic differences among the Services, the adjusted rates of average ethanol use for all the Services except the Marine Corps showed the same pattern as was seen in comparisons of unadjusted rates. But the adjusted Marine Corps estimate of average ethanol consumption was substantially lower than the original unadjusted estimate. This suggests that the difference between the Marine Corps' level of consumption and that of the other Services is accounted for by differences in sociodemographic composition.
- The pattern of differences between unadjusted rates of heavy alcohol use among the Services persisted when the rates were adjusted, except for the Marine Corps, whose adjusted rate was much lower than its unadjusted rate.

4.7.3 Correlates of Heavy Alcohol Use

Surveys of military and civilian populations have established certain enduring patterns in alcohol use among sociodemographic groups that are useful in targeting prevention and treatment efforts. Logistic regression analyses showed that Service, gender, race/ethnicity, education, age, family status, and pay grade were significantly related to heavy alcohol use. Specifically, the odds of heavy alcohol use were greater among the following (Table 4.4):

- Army, Navy, and Marine Corps personnel compared with Air Force personnel;
- males compared with females;

- non-Hispanic Caucasians and Hispanics compared with non-Hispanic African Americans and those in the “other” racial/ethnic category;
- those with a high school education or less and those with some college compared with those with more education;
- those younger than age 35 compared with those aged 35 or older;
- those who were single or married with spouse absent compared with those who were married with spouse present; and
- those in pay grades E1 to E3 through O1 to O3 compared with those in pay grades O4 to O10.

4.7.4 Alcohol Use Negative Effects

We measured alcohol use negative effects in terms of any serious consequences, productivity loss, and dependence symptoms (Table 3.1, Tables 4.5 and 4.6, Figure 4.1, and Tables D.1 to D.4):

- Alcohol-related negative effects declined significantly from 1980 to 1998. In 1998, 6.7% of all military personnel experienced at least one alcohol-related serious consequence, 13.6% had some alcohol-related productivity loss, and 4.8% showed signs of alcohol dependence (see Table 3.1).
- Alcohol-related serious consequences, productivity loss, and dependence symptoms were substantially higher among the E1 to E3 pay grades than among other pay grades (Table 4.5).
- Negative effects of alcohol use were experienced by heavy drinkers at rates 4 times (productivity loss) to 11 times (dependence symptom) higher than by military personnel who drank at only moderate or lighter levels (Table 4.6).

4.7.5 Participation in Counseling

- Only 4.9% of all military personnel who used alcohol at the infrequent/light level reported that they had received treatment for an alcohol problem since joining the Military (Table 4.7); however, 13.8% of current heavy alcohol users had a history of alcohol treatment. These heavy alcohol users who reported that they had received treatment may constitute a group at highest risk of needing future treatment.
- Most of those treated had received counseling or treatment through a military treatment program or facility rather than through any civilian programs and facilities.

4.7.6 Military and Civilian Comparisons

We standardized civilian data from the 1997 NHSDA to the distribution of the U.S.-based Military on gender, age, education, race/ethnicity, and marital status. We then compared military and civilian rates of heavy alcohol use (Table 4.8):

- Military personnel overall and military men in particular were significantly more likely to drink heavily than were their civilian counterparts (14.2% of all military personnel vs. 9.9% of civilians; 16.0% of military men vs. 11.0% of civilian men). The prevalence of heavy alcohol use among females in the total DoD and in every Service except the Navy was not significantly different from heavy alcohol use by civilian women.
- Differences in military and civilian heavy alcohol use rates were greatest for young men aged 18 to 25. Among young men, the rate of heavy alcohol use for the Military was about 1.8 times higher than the rate for civilians (26.9% vs. 14.9%).
- The Army and Marine Corps showed the same pattern as the total DoD with rates of heavy alcohol use among military personnel higher than among civilians. Except for young men, Air Force gender/age subgroup rates of heavy alcohol use did not differ from civilian rates.

5. ILLICIT DRUG USE

In this chapter, we examine illicit drug use among military personnel, including trends in use, Service comparisons of illicit drug use, prevalence of the use of specific drugs and classes of drugs, correlates of illicit drug use, the relationship of illicit drug use to productivity loss, and the relationship of drug use to drug-testing history and predictability of last drug test. We also compare these findings to prior surveys of military and civilian populations. We have included supplemental tables on drug use, including trends and sociodemographic characteristics associated with illicit drug use, for each Service in Appendix D.

5.1 Trends in Illicit Drug Use

Drug use reported by military personnel declined steadily from 1980, when the DoD survey series began, to 1998. Table 5.1 presents trends in any illicit drug use for the total DoD and each of the Services during the 30 days and 12 months prior to each survey's administration. Because the patterns for use in the past 30 days and past 12 months are similar, except that 12-month data were correspondingly higher, we focus our discussion here on past 30-day drug use. As shown in Table 5.1, illicit drug use for the total DoD during the past 30 days declined steeply from a high of 27.6% in 1980 to a low of 2.7% in 1998. This represents a striking decrease of 90.2% over the 18-year period. Figure 3.1 in Chapter 3 displays this trend as a steep initial decline during the first four surveys (i.e., from 1980 to 1988), then successively smaller declines until the curve flattens out. Significant decreases in drug use were found in each survey year from 1980 to 1992, and drug use continued to decline in 1995 and 1998. The continuing decline in drug use reflects the effectiveness of military efforts to reduce drug use among personnel.

As shown in the trends for the total DoD, each Service also had a large and significant decline in 30-day drug use between 1980 and 1998. Steady declines in use are apparent for each Service since 1980, although many decreases were not statistically significant from the previous survey year after 1992. The Army and Air Force continued to have significant declines in illicit drug use through 1992 and then leveled off around 4.0% and 1.0%, respectively. The Marine Corps saw the largest decline in 1985, although since then its rate declined gradually and leveled off to a rate similar to the Army's. As the rate approaches zero, large, statistically significant declines in use will become increasingly difficult to achieve because programs and other factors related to decreased drug use may eliminate all but the most difficult and perhaps unidentified problems.

Notably, the Navy was the only Service that had a significant decline in past 30-day drug use between 1995 and 1998 (3.6% to 1.8%). The Navy rate for 1998 is similar to that of the Air Force (1.2%), whose personnel have consistently shown the lowest rates of drug

Table 5.1 Trends in Any Illicit Drug Use, Past 30 Days and Past 12 Months, by Service, 1980-1998

Service/Period of Use	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	
Army								
Past 30 days	30.7 (2.8)	26.2 (1.8)	11.5 (1.3) ^a	6.9 (0.7) ^a	3.9 (0.8) ^a	4.0 (0.9)	4.5 (0.8) ^b	
Past 12 months	39.4 (2.9)	32.4 (1.8) ^a	16.6 (1.3) ^a	11.8 (1.1) ^a	7.7 (0.8) ^a	9.2 (1.1)	9.8 (0.9) ^b	
Navy								
Past 30 days	33.7 (2.1)	16.2 (2.2) ^a	10.3 (1.7) ^a	5.4 (0.7) ^a	4.0 (0.9)	3.6 (0.6)	1.8 (0.3) ^{a,b}	
Past 12 months	43.2 (2.1)	28.1 (1.7) ^a	15.9 (2.3) ^a	11.3 (2.1)	6.6 (1.9)	7.3 (0.8)	4.2 (0.5) ^{a,b}	
Marine Corps								
Past 30 days	37.7 (3.0)	20.6 (2.0) ^a	9.9 (3.2) ^a	4.0 (0.7)	5.6 (1.0)	3.6 (0.8)	3.3 (0.4) ^b	
Past 12 months	48.0 (3.1)	29.9 (3.2) ^a	14.7 (3.8) ^a	7.8 (1.0)	10.7 (1.3)	7.3 (1.2)	7.2 (0.8) ^b	
Air Force								
Past 30 days	14.5 (1.1)	11.9 (1.5)	4.5 (0.8) ^a	2.1 (0.4) ^a	1.2 (0.2) ^a	1.0 (0.2)	1.2 (0.1) ^b	
Past 12 months	23.4 (1.7)	16.4 (1.8) ^a	7.2 (0.9) ^a	3.8 (0.6) ^a	2.3 (0.3) ^a	2.5 (0.4)	2.4 (0.2) ^b	
Total DoD								
Past 30 days	27.6 (1.5)	19.0 (1.0) ^a	8.9 (0.8) ^a	4.8 (0.3) ^a	3.4 (0.4) ^a	3.0 (0.3)	2.7 (0.3) ^b	
Past 12 months	36.7 (1.5)	26.6 (1.0) ^a	13.4 (1.0) ^a	8.9 (0.8) ^a	6.2 (0.6) ^a	6.5 (0.5)	6.0 (0.4) ^b	

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67).

use among the Services. The Army and Marine Corps had similar rates, both higher than those of the Air Force or the Navy. In 1998, all of the Services were either at the lowest level for the survey series or were at comparable levels to those observed in 1995.

In Chapter 2 (see Table 2.4), we noted that the demographics of Marine Corps personnel may place them at higher risk of illicit drug abuse (i.e., they have a higher proportion than the other Services of young personnel, single males, E1 to E3 pay grades, and those with a high school education or less). Interestingly, despite these demographics, Marine Corps drug use rates were not consistently higher than those for the other Services. They were highest only in 1980, the baseline year for the survey series, and in 1992. Even for these two surveys, however, statistical tests show that Marine Corps rates were not statistically different from the other Services except the Air Force. Thus, despite their potential for higher use, the Marine Corps has been able to contain drug use to comparable levels with the Army and Navy generally and the Army in 1998.

5.2 Service Comparisons of Illicit Drug Use

In this section, we provide two sets of estimates of the extent of drug use for each of the Services. We begin by presenting actual or unadjusted estimates for each of the Services. These estimates, which indicate observed past year prevalence rates in 1998, provide a perspective on the comparative magnitude of the challenge facing the Services in their efforts to eradicate drug use. These unadjusted estimates are, however, only descriptive and yield no explanatory information on the differences among the Services. As discussed in Section 2.6, one possible explanation for observed differences in drug use across the Services is differences in the sociodemographic composition of the Services. Thus, we also provide adjusted estimates using direct standardization procedures to control for these differences. These adjusted or constructed estimates permit comparisons among the Services, after controlling for differences in the sociodemographic composition of the Services.

Both unadjusted and adjusted estimates of past 12-month drug use prevalence for the total DoD and individual Services are shown in Table 5.2. Because marijuana has been the most commonly used drug, data are presented separately for any illicit drug use, marijuana use, and any illicit drug use except marijuana.

5.2.1 Unadjusted Estimates

As shown in Table 5.2, the Army had the highest unadjusted past 12-month rate of any illicit drug use (9.8%) and marijuana use (7.7%); these rates were significantly higher than those of the Marine Corps (7.2% and 5.2%, respectively), who had the next highest rates. The Army and Marine Corps had similar rates of any illicit drug use except

Table 5.2 Estimates of Illicit Drug Use, Past 12 Months, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Drug/Type of Estimate	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Marijuana					
Unadjusted	7.7 (0.9) ^{a,b,d}	2.5 (0.4) ^{a,d}	5.2 (0.7) ^a	1.1 (0.1)	4.2 (0.4)
Adjusted ^c	7.0 (0.6) ^{a,b,d}	3.2 (0.3) ^a	3.2 (0.3) ^a	1.3 (0.3)	4.2 (0.4)
Any Illicit Drug Except Marijuana^e					
Unadjusted	4.9 (0.5) ^{a,b}	2.8 (0.4) ^{a,d}	4.5 (0.5) ^a	1.8 (0.2)	3.4 (0.2)
Adjusted ^c	4.6 (0.4) ^{a,b,d}	3.2 (0.4) ^a	3.0 (0.2) ^a	2.1 (0.3)	3.4 (0.2)
Any Illicit Drug^f					
Unadjusted	9.8 (0.9) ^{a,b,d}	4.2 (0.5) ^{a,d}	7.2 (0.8) ^a	2.4 (0.2)	6.0 (0.4)
Adjusted ^c	9.1 (0.6) ^{a,b,d}	4.9 (0.4) ^a	4.6 (0.3) ^a	3.0 (0.3)	6.0 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Definitions and measures of substance use are given in Section 2.5.3.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bEstimate is significantly different from the Navy at the 95% confidence level.

^cAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD distribution.

^dEstimate is significantly different from the Marine Corps at the 95% confidence level.

^eAny nonmedical use of PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, "designer" drugs, or inhalants.

^fSame definition as "e" except marijuana is included in the set of drugs.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Marijuana, Q60A, 61A, and 67A; Any Illicit Drug Use Except Marijuana, Q60B-K, 61B-K, and 67B-K; Any Illicit Drug Use, Q60A-K, 61A-K, and 67A-K).

marijuana (4.9% and 4.5%, respectively), indicating that marijuana use accounts for most of the difference seen between the Army's and Marine Corps' rates of any illicit drug use.

The Air Force had significantly lower unadjusted past 12-month rates compared to those for the Army, Navy, and Marine Corps on each measure of drug use. The Navy, while its rates were higher than those for the Air Force, had considerably lower rates of any illicit drug use than both the Army's and the Marine Corps' (4.2% vs. 9.8% and 7.2%, respectively), marijuana use (2.5% vs. 7.7% and 5.2%, respectively), and any illicit drug use except marijuana (2.8% vs. 4.9% and 4.5%, respectively). These findings show the relative challenges that the Services face in combating illicit drug use. The Army and Marine

Corps face the greatest challenges, whereas the Navy and Air Force face the smallest challenge.

5.2.2 Adjusted Estimates

The unadjusted results present prevalence estimates, but do not examine any underlying explanations for Service differences in rates of illicit drug use. Adjusting for differences in sociodemographic compositions of the Services may explain some of the discrepancies. As shown in Table 5.2, adjusting for sociodemographic differences among the Services reduced the rates of marijuana use, any illicit drug use except marijuana, and any illicit drug use for the Army and Marine Corps, and they slightly increased the rates for the Navy and Air Force. The adjustments had the largest impact on the Marines, with the estimates for use of any illicit drug dropping from 7.2% to 4.6%. Adjusted estimates show that the Marine Corps' rates were significantly lower than the adjusted rates for the Army on all three measures and were nearly identical to the Navy's rates. Thus, the higher unadjusted rates of illicit drug use in the Marine Corps can be explained in part by the demographic composition of that Service. Although standardization increased the Air Force's drug use rates slightly, the Air Force still had significantly lower adjusted rates of use compared to the rates for the other three Services and for all classes of drugs shown in Table 5.2, even when we controlled for sociodemographic characteristics.

Although standardization reduced the estimates of illicit drug use for the Marine Corps, that Service faces a greater challenge than the other Services because it has a higher proportion of personnel at high risk for using drugs. The data also suggest that the low rates in the Air Force are a function of both demographic factors and other factors because the Air Force's rates of illicit drug use were significantly lower than rates for the other Services both before and after standardization.

Overall, these findings suggest that differences among the Services in sociodemographic composition remain viable as a partial explanation for some differences we observed in drug use, particularly between the Marine Corps and the other Services. Clearly, this explanation does not account for all observed differences in drug use among the Services. The standardizations conducted here controlled for Service differences in gender, age, education, race/ethnicity, and marital status, but they may not have controlled for all important differentiating factors. Alternative explanations accounting for observed differences are that the Services may vary in policies and practices associated with controlling drug use or that personnel across the Services have different attitudes and values regarding drug use.

5.3 Prevalence of Specific Drug Use in 1998

As overall drug use has declined across survey years, use of most of the individual drugs or types of drugs considered in this survey also declined. Table 5.3 presents the percentage of users of 12 specific drugs or drug classes during the 30 days and 12 months before the survey for each Service and the total DoD. Two summary measures also are included, one for use of any illicit drug, and the other for use of any illicit drug except marijuana. The rates presented in this section have not been adjusted for sociodemographic differences.

As shown in Table 5.3, use of all specific drugs was quite low. Marijuana remained the most commonly used drug, with 1.4% of military personnel reporting use during the past month and 4.2% reporting use within the past year. Past 30-day use of each of the other individual drugs was generally well under 1.0%, with the exception of amphetamine/stimulant use among Marine Corps personnel (1.1%), and analgesic use among Army personnel (1.1%). Similarly, 12-month use of all individual drugs except marijuana was generally considerably less than 2% among all Services; however, LSD/hallucinogen use among Army and Marine Corps was 2.0%. Use of anabolic steroids was rare for the total DoD and for each of the Services (less than 1.0%).

In examining the prevalence of specific drugs for the individual Services, we found that use was similar for the Army and Marine Corps on all drugs except marijuana, which was higher in the Army. Prevalence of use was lower among Navy personnel than both Army and Marine Corps for each individual drug. As noted previously, Air Force rates of use of individual drugs were lower than those of the other Services.

A similar pattern can be seen when examining the summary measures of any illicit drug use and any illicit drug use except marijuana. The Army had the highest 30-day and 12-month use of any illicit drug (4.5% and 9.8%) and any illicit drug except marijuana (2.7% and 4.9%), followed by the Marine Corps, Navy, and Air Force. Thirty-day use of any illicit drug was well below 5.0%, and 12-month use remained under 10.0% across Services and the total DoD. Thirty-day use of any illicit drug except marijuana was well below 3.0%, and 12-month use remained under 5.0% across Services and the total DoD.

5.4 Correlates of Illicit Drug Use

In addition to examining overall prevalence rates, we also assessed the sociodemographic correlates of illicit drug use. Two types of analysis were conducted to examine any illicit drug use during the past 12 months: descriptive prevalence analysis and multivariate logistic regression analysis (described in Chapter 2 and Appendix F). Results of both are presented in Table 5.4. Column 2 of Table 5.4 presents prevalence data

Table 5.3 Any Illicit Drug Use, Past 30 Days and Past 12 Months

Drug/Period of Use	Service					Total DoD
	Army	Navy	Marine Corps	Air Force		
Marijuana						
Past 30 days	2.7 (0.8)	0.7 (0.2)	1.4 (0.3)	0.4 (0.1)	1.4 (0.3)	
Past 12 months	7.7 (0.9)	2.5 (0.4)	5.2 (0.7)	1.1 (0.1)	4.2 (0.4)	
Cocaine						
Past 30 days	0.5 (0.2)	0.3 (0.2)	0.7 (0.2)	0.1 (0.1)	0.4 (0.1)	
Past 12 months	1.4 (0.3)	0.7 (0.2)	1.6 (0.3)	0.3 (0.1)	0.9 (0.1)	
PCP						
Past 30 days	0.3 (0.1)	0.1 (0.1)	0.4 (0.1)	0.1 (0.1)	0.2 (0.1)	
Past 12 months	0.5 (0.1)	0.3 (0.1)	0.5 (0.1)	0.2 (0.1)	0.4 (0.1)	
LSD/Hallucinogens						
Past 30 days	0.7 (0.2)	0.4 (0.1)	0.8 (0.2)	0.2 (0.1)	0.5 (0.1)	
Past 12 months	2.0 (0.3)	1.0 (0.2)	2.0 (0.3)	0.4 (0.2)	1.3 (0.1)	
Amphetamines/Stimulants						
Past 30 days	0.8 (0.2)	0.3 (0.1)	1.1 (0.3)	0.2 (0.1)	0.6 (0.1)	
Past 12 months	1.4 (0.2)	0.5 (0.2)	1.6 (0.3)	0.3 (0.1)	0.9 (0.1)	
Tranquilizers						
Past 30 days	0.7 (0.2)	0.2 (0.1)	0.7 (0.2)	0.2 (0.1)	0.5 (0.1)	
Past 12 months	1.1 (0.2)	0.4 (0.1)	0.9 (0.1)	0.4 (0.1)	0.7 (0.1)	
Barbiturates/Sedatives						
Past 30 days	0.5 (0.2)	0.2 (0.1)	0.4 (0.1)	0.1 (0.1)	0.3 (0.1)	
Past 12 months	0.7 (0.2)	0.3 (0.1)	0.6 (0.1)	0.3 (0.1)	0.5 (0.1)	
Heroin/Other Opiates						
Past 30 days	0.3 (0.1)	0.1 (0.1)	0.4 (0.1)	0.1 (0.1)	0.2 (**)	
Past 12 months	0.5 (0.1)	0.2 (0.1)	0.6 (0.1)	0.1 (0.1)	0.3 (0.1)	
Analgesics						
Past 30 days	1.1 (0.2)	0.8 (0.2)	0.7 (0.1)	0.4 (0.1)	0.8 (0.1)	
Past 12 months	1.7 (0.3)	1.0 (0.2)	1.1 (0.1)	0.8 (0.2)	1.2 (0.1)	
Inhalants						
Past 30 days	0.8 (0.1)	0.4 (0.1)	0.7 (0.2)	0.1 (0.1)	0.5 (0.1)	
Past 12 months	1.2 (0.2)	0.5 (0.1)	1.2 (0.2)	0.4 (0.1)	0.8 (0.1)	
"Designer" Drugs						
Past 30 days	0.7 (0.2)	0.3 (0.1)	0.7 (0.1)	0.1 (0.1)	0.4 (0.1)	
Past 12 months	1.2 (0.2)	0.5 (0.2)	1.3 (0.3)	0.3 (0.1)	0.8 (0.1)	
Any Illicit Drug^a						
Past 30 days	4.5 (0.8)	1.8 (0.3)	3.3 (0.4)	1.2 (0.1)	2.7 (0.3)	
Past 12 months	9.8 (0.9)	4.2 (0.5)	7.2 (0.8)	2.4 (0.2)	6.0 (0.4)	
Any Illicit Drug Except Marijuana^b						
Past 30 days	2.7 (0.4)	1.6 (0.3)	2.6 (0.3)	0.9 (0.1)	1.9 (0.2)	
Past 12 months	4.9 (0.5)	2.8 (0.4)	4.5 (0.5)	1.8 (0.2)	3.4 (0.2)	
Anabolic Steroids						
Past 30 days	0.5 (0.1)	0.3 (0.2)	0.7 (0.2)	0.2 (0.1)	0.4 (0.1)	
Past 12 months	0.8 (0.2)	0.6 (0.2)	0.9 (0.2)	0.3 (0.1)	0.6 (0.1)	

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

**Estimate rounds to zero.

^aNonmedical use one or more times of any of the above classes of drugs (steroids excluded).

^bNonmedical use one or more times of any of the above classes of drugs, excluding marijuana (steroids also excluded).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Illicit Drug Use, Past 30 Days, Q60 and 67; Past 12 Months, Q60-61 and 67).

Table 5.4 Demographic Correlates of Any Illicit Drug Use, Past 12 Months, Total DoD

Sociodemographic Characteristic	Prevalence	Adjusted Odds Ratio^a	95% CI of Odds Ratio^b
Service			
Army	9.8 (0.9)	3.65 ^c	(2.84, 4.69)
Navy	4.2 (0.5)	1.69 ^c	(1.24, 2.30)
Marine Corps	7.2 (0.8)	1.71 ^c	(1.32, 2.22)
Air Force	2.4 (0.2)	1.00	NA
Gender			
Male	6.2 (0.4)	1.54 ^c	(1.25, 1.88)
Female	4.6 (0.3)	1.00	NA
Race/Ethnicity			
Caucasian, non-Hispanic	5.6 (0.4)	1.00	NA
African American, non-Hispanic	6.8 (0.7)	1.02	(0.82, 1.27)
Hispanic	7.6 (0.8)	0.98	(0.77, 1.26)
Other	4.8 (0.8)	0.81	(0.60, 1.09)
Education			
High school or less	10.2 (0.8)	2.25 ^c	(1.25, 4.06)
Some college	5.3 (0.4)	1.91 ^c	(1.09, 3.34)
College graduate or higher	1.6 (0.2)	1.00	NA
Age			
20 or younger	15.9 (1.3)	4.11 ^c	(2.50, 6.75)
21-25	10.1 (0.8)	3.56 ^c	(2.36, 5.36)
26-34	3.3 (0.3)	1.76 ^c	(1.25, 2.48)
35 or older	1.3 (0.2)	1.00	NA
Family Status^e			
Not married	9.7 (0.6)	1.63 ^c	(1.26, 2.12)
Married, spouse not present	6.1 (1.4)	1.21	(0.77, 1.88)
Married, spouse present	3.2 (0.4)	1.00	NA
Pay Grade			
E1-E3	14.0 (1.0)	1.98	(0.81, 4.85)
E4-E6	5.6 (0.4)	1.28	(0.55, 2.97)
E7-E9	1.5 (0.2)	0.83	(0.40, 1.76)
W1-W5	0.8 (0.4)	0.28 ^c	(0.08, 0.98)
O1-O3	2.1 (0.4)	1.12	(0.54, 2.30)
O4-O10	0.9 (0.3)	1.00	NA
Region			
CONUS ^e	5.8 (0.5)	0.94	(0.76, 1.15)
OCONUS ^f	6.6 (0.7)	1.00	NA
Total	6.0 (0.4)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA= Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cOdds ratio is significantly different from the reference group.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Past 12 Months, Q60-61 and 67; refer to Section 2.5.1 for descriptions of sociodemographic variables).

for the demographic groups, and column 3 shows the odds ratios from the logistic regression.

The prevalence data indicate significant differences for Service, gender, education, age, family status, and pay grade. As discussed previously, Army, Navy, and Marine Corps personnel were more likely to use drugs than were Air Force personnel. Others more likely to use drugs were males, those with less education, those who were younger, those who were not married, and those at a lower pay grade.

For the logistic regression model, we used the probability of any drug use in the past 12 months as the dependent variable. The past year period was used rather than past month period because of the relatively low rates of illicit drug use. Independent variables in the model were sociodemographic and Service variables of Service, gender, race/ethnicity, education, age, family status, pay grade, and region. As shown in Table 5.4, results of the analysis showed that Service, gender, education, age, family status, and pay grade were significantly related to the probability of any drug use in the past 12 months. Results show that the odds of being a 12-month drug user were significantly higher, after adjusting for all the other variables in the analysis, among the following:

- Army, Navy, and Marine Corps personnel compared with Air Force personnel;
- males compared with females;
- high school graduates or nongraduates, and those with some college, compared with college graduates;
- younger compared with older personnel; and
- those who were not married compared with those who were married with a spouse present.

In addition, pay grade showed that drug use among warrant officers was especially low after adjusting for other variables in the model. Age and Service showed the strongest effects in the model. Younger personnel under the age of 20 had the highest odds of using drugs; odds in this age group were more than four times those of personnel older than 35 years. Those aged 21 to 25 had the next highest odds of using drugs, more than 3.5 times those of personnel older than 35. The odds for drug use were similarly higher for Army personnel (3.6) compared to Air Force personnel. Being in the Navy or Marine Corps compared to the Air Force, and being between the age of 26 to 34 compared to older than 35, all increased the odds by approximately 1.7. This logistic regression analysis suggests that drug use prevention efforts should focus on younger personnel in the Army, Navy, and Marine Corps.

The logistic regression findings differed slightly from the descriptive results in that the multivariate analysis showed minimal effects for pay grade, whereas the descriptive analysis showed a more pronounced effect. Pay grade may thus be correlated with other variables in the model (e.g., age, family status, education), such that when all of the demographic and Service variables were examined simultaneously in a single analysis, few additional effects were attributable to pay grade.

Although age was a significant predictor of drug use in the model but pay grade was not, readers should not conclude that illicit drug use is not a problem among personnel in lower pay grade groups. As shown in column 2 of Table 5.4, 14.0% of personnel in the E1 to E3 pay grades used illicit drugs in the past 12 months. Because age and pay grade were most likely to be overlapping variables, we conducted a separate analysis that omitted age as a predictor variable in the logistic regression analysis. The results showed a strong effect for pay grade similar to the pattern in the prevalence data. Thus, the association between age and pay grade (i.e., younger personnel tending to be in the lower pay grades) explains why pay grade did not emerge as a strong predictor of illicit drug use in the logistic regression analysis when other demographic variables were taken into account, including age.

5.5 Illicit Drug Use and Productivity Loss

We also examined the relationship between illicit drug use and productivity loss. Indicators of productivity loss that were examined were being late for work, leaving work early, being hurt in an on-the-job accident, working below one's normal level of performance, and not coming to work because of illness or injury. For the 1998 DoD survey, we asked about these items without any attributions to illicit drugs.

Table 5.5 presents productivity loss indicators for all DoD personnel, for those reporting any illicit drug use during the past 12 months, and for those reporting any illicit drug use except marijuana during the past 12 months. Estimates are presented as the number of work days lost in the past 12 months due to a particular productivity loss indicator. Examination of the table shows that personnel who reported use of any illicit drugs or any drug except marijuana were more likely than all DoD personnel to report productivity loss on 1 or more work days in the past year. For example, 26.6% of all DoD personnel reported being late for work compared to nearly 40% of those who reported using any illicit drug or any illicit drug except marijuana. Similar differences are apparent for leaving work early, being hurt in an on-the-job accident, and working below one's normal performance level. There were fewer differences for reports of missing work due to illness or injury, although those who used drugs had a higher percentage than the total DoD.

Table 5.5 Any Illicit Drug Use and Productivity Loss, Past 12 Months, Total DoD

Group/Problem	N	Number of Work Days Affected, Past 12 Months					Any Number of Days
		No Days	1 Day	2 or 3 Days	4 or More Days		
All Personnel	17,264						
Late for work by 30 minutes or more		73.4 (0.7)	11.1 (0.3)	9.8 (0.3)	5.7 (0.3)	26.6 (0.7)	
Left work early		64.2 (0.7)	7.5 (0.3)	12.6 (0.4)	15.8 (0.5)	35.8 (0.7)	
Hurt in an on-the-job accident		90.4 (0.6)	5.8 (0.3)	2.6 (0.2)	1.2 (0.1)	9.6 (0.6)	
Worked below normal performance level		66.4 (0.6)	5.7 (0.2)	10.2 (0.3)	17.7 (0.5)	33.6 (0.6)	
Did not come into work because of illness or injury		77.4 (0.7)	7.8 (0.3)	8.6 (0.4)	6.3 (0.3)	22.6 (0.7)	
Any Illicit Drug Use Past 12 Months	814 ^a						
Late for work by 30 minutes or more		60.2 (2.4)	15.4 (1.9)	11.5 (1.3)	13.0 (1.4)	39.8 (2.4)	
Left work early		53.4 (1.5)	7.6 (1.2)	13.1 (1.6)	25.9 (1.6)	46.6 (1.5)	
Hurt in an on-the-job accident		79.8 (1.6)	10.6 (1.1)	5.9 (1.3)	3.7 (0.6)	20.2 (1.6)	
Worked below normal performance level		52.1 (2.0)	7.1 (1.0)	11.9 (1.8)	28.9 (1.7)	47.9 (2.0)	
Did not come into work because of illness or injury		73.2 (2.0)	6.5 (0.9)	10.4 (1.4)	9.9 (1.1)	26.8 (2.0)	
Any Illicit Drug Use Except Marijuana, Past 12 Months	507 ^b						
Late for work by 30 minutes or more		61.1 (2.5)	16.6 (2.4)	12.6 (1.8)	9.7 (1.7)	38.9 (2.5)	
Left work early		51.3 (2.5)	8.1 (1.7)	13.8 (1.9)	26.8 (3.0)	48.7 (2.5)	
Hurt in an on-the-job accident		77.8 (2.3)	10.8 (1.7)	6.4 (1.6)	5.0 (1.1)	22.2 (2.3)	
Worked below normal performance level		50.3 (2.9)	6.6 (1.4)	12.5 (2.2)	30.6 (2.6)	49.7 (2.9)	
Did not come into work because of illness or injury		70.6 (2.5)	7.7 (1.5)	8.3 (1.4)	13.4 (1.8)	29.4 (2.5)	

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aUnweighted number of respondents in the total DoD sample who reported any nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics "designer" drugs, or inhalants.

^bUnweighted number of respondents in the total DoD sample who reported any nonmedical use of PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, "designer" drugs, or inhalants.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Productivity Loss, Q69A-E; Any Illicit Drug Use, Q60A-K, 61A-K, and 67A-K; Any Illicit Drug Use Except Marijuana, Q60B-K, 61B-K, and 67B-K).

The percentage of those who reported 4 or more work days affected by the productivity loss indicators was higher among both drug use categories than for the total DoD. Most notable of the productivity loss indicators, approximately 16% of the total DoD reported leaving work early on 4 or more days in the past year compared to over 25% of those in both drug use categories. Approximately 30% of those in both drug use categories reported working below normal performance level on 4 or more days compared to less than 20% of the total DoD. For those who reported any illicit drug use, 13% reported being late for work compared to less than 6% of the total DoD. Conversely, the total DoD showed a higher percentage of those who reported productivity loss on no days in the past year compared with those who reported illicit drug use and illicit drug use except marijuana.

These data provide some evidence that illicit drug use affects productivity and performance and thus results in lost time from work and military duties. It also suggests that these indicators may be a red flag to indicate possible substance abuse problems by military personnel. That is, if personnel have an excessive number of occurrences of being late for work, leaving early, or working below their normal levels, drug use is one possible explanation. Caution, of course, must be used before jumping to this conclusion because a number of other reasons could explain these behaviors.

5.6 Illicit Drug Use and Drug Testing

This section examines the association of past 12-month drug use and drug-testing experience among military personnel. Table 5.6 presents the distribution of testing periods overall and by illicit drug use status. The time frames include being tested for drugs in the past 30 days, more than 30 days ago but within the past 12 months, more than 12 months ago, and never.

As shown, virtually all Military personnel (98.8%) had been tested for drugs at some point since joining the Service. Past 12-month drug use was not associated with the recency of the test for any of the Services or the total DoD. Overall, 87.4% of personnel reported being tested within the past 12 months. Marine Corps personnel (93.9%) and Army personnel (93.5%) reported the highest rates of testing in the past 12 months, followed by the Navy (89.7%) and the Air Force (74.8%). There were few differences among testing rates for drug users and nonusers.

We also examined perceptions of the relative difficulty of predicting the last drug test by 12-month illicit drug use status. Personnel were asked think about their last drug test and then rate how easy it was to predict that they were going to be tested. Predictability of testing was assessed on a four-point scale from "very easy" to "very hard."

Table 5.6 Any Illicit Drug Use in Past 12 Months, by Last Time Tested for Illicit Drug Use

Service/Testing	Illicit Drug Use, Past 12 Months		Total
	Yes	No	
Army			
Tested in past 30 days	34.2 (3.2)	31.8 (2.1)	32.0 (2.1)
Tested more than 30 days ago, but within past 12 months	57.8 (3.3)	62.0 (1.8)	61.5 (1.7)
More than 12 months ago	5.9 (1.4)	5.7 (0.7)	5.7 (0.6)
Never	2.0 (0.8)	0.6 (0.2)	0.7 (0.2)
Navy			
Tested in past 30 days	19.9 (4.0)	25.5 (1.7)	25.2 (1.7)
Tested more than 30 days ago, but within past 12 months	69.9 (4.9)	64.3 (1.1)	64.5 (1.2)
More than 12 months ago	10.2 (3.1)	9.5 (1.1)	9.5 (1.0)
Never	** (**)	0.7 (0.2)	0.7 (0.2)
Marine Corps			
Tested in past 30 days	41.8 (4.7)	32.9 (2.7)	33.5 (2.8)
Tested more than 30 days ago, but within past 12 months	51.8 (4.1)	61.0 (2.0)	60.4 (2.1)
More than 12 months ago	5.3 (2.3)	5.8 (1.2)	5.7 (1.2)
Never	1.1 (0.8)	0.3 (0.1)	0.4 (0.1)
Air Force			
Tested in past 30 days	19.3 (1.8)	12.9 (0.8)	13.0 (0.8)
Tested more than 30 days ago, but within past 12 months	61.4 (4.0)	61.9 (1.2)	61.8 (1.1)
More than 12 months ago	13.1 (3.8)	22.9 (1.5)	22.6 (1.4)
Never	6.2 (3.5)	2.4 (0.3)	2.5 (0.3)
Total DoD			
Tested in past 30 days	31.1 (2.0)	24.8 (0.9)	25.1 (0.9)
Tested more than 30 days ago, but within past 12 months	59.5 (2.2)	62.4 (0.8)	62.3 (0.8)
More than 12 months ago	7.4 (1.2)	11.7 (0.6)	11.4 (0.6)
Never	2.0 (0.6)	1.1 (0.1)	1.2 (0.1)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

** Estimate round to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Q60-61 and 67; Last Time Tested, Q63).

As shown in Table 5.7, a majority of military personnel (63.0%) reported that it was very hard to predict the time of their last drug test. Overall, the Navy (74.7%) and the Air Force (76.1%) had the highest percentage of personnel reporting that it was very hard to predict when they were last going to be tested for drug use. Fewer personnel in the Army (49.1%) and the Marine Corps (47.0%) reported that it was very hard to predict when they were last tested. Results for the Navy are consistent with the recent implementation of new software for selecting testing days and personnel. It is designed to ensure greater randomization of the testing process. To the extent it is working effectively, we would expect personnel to report that it was difficult to predict drug testing.

Personnel who did not use drugs were more likely to rate that it was very hard to predict testing (64.1%) compared to past 12-month drug users (45.7%). There are many possible explanations for this difference; it would be reasonable to assume, for example, that drug users would be "on guard" and thus would be suspicious of any indication that a test was forthcoming. Further, these individuals may be more likely to perceive that they "knew" they were going to be tested while nonusers would not. Another explanation may be that drug users are minimizing their perception of their risk of being caught using drugs in order to rationalize their use.

5.7 Military and Civilian Comparisons

Compared to the general U.S. household population, the Military contains a disproportionately large percentage of young males, a group that typically has the highest rate of drug use. For any comparisons between drug use in military and civilian populations to be valid, consideration must be given to differences in sociodemographic characteristics between military personnel and civilians. Table 5.8 contains standardized comparisons of drug use among military personnel and civilians during the past 30 days, with the civilian data drawn from the 1997 National Household Survey on Drug Abuse (NHSDA). Prevalence estimates for the DoD and the individual Services are actual estimates but were subset to U.S.-based personnel to be consistent with the NHSDA data. We have standardized the estimates for civilians to the distribution of U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates, including Alaska and Hawaii.

As shown in Table 5.8, the prevalence of any illicit drug use among the total DoD in 1998 was less than one-third that of civilian personnel in 1997. We found that 2.6% of all military personnel aged 18 to 55 used illicit drugs in the previous month, which was significantly lower than the standardized estimate of 10.7% among civilians. Similarly, drug use for all personnel aged 18 to 55 for each of the Services also was significantly lower than use in the civilian population with similar sociodemographic characteristics.

Table 5.7 Any Illicit Drug Use in Past 12 Months, by Predictability of Drug Testing

Service/Predictability	Illicit Drug Use, Past 12 Months		Total
	Yes	No	
Army			
Very easy	19.1 (2.2)	13.4 (0.8)	13.9 (0.8)
Somewhat easy	18.9 (1.9)	13.4 (1.0)	13.9 (0.9)
Somewhat hard	22.2 (2.1)	22.5 (0.7)	22.4 (0.7)
Very hard	39.9 (4.2)	50.1 (1.7)	49.1 (1.7)
Never tested	** (**)	0.7 (0.3)	0.6 (0.2)
Navy			
Very easy	15.4 (2.5)	7.8 (0.6)	8.1 (0.6)
Somewhat easy	9.6 (2.5)	5.3 (0.5)	5.5 (0.4)
Somewhat hard	9.9 (2.3)	11.1 (0.7)	11.0 (0.7)
Very hard	65.1 (2.9)	75.1 (0.9)	74.7 (1.0)
Never tested	** (**)	0.7 (0.2)	0.7 (0.2)
Marine Corps			
Very easy	23.8 (4.2)	16.9 (0.8)	17.4 (0.8)
Somewhat easy	22.4 (2.9)	14.2 (1.2)	14.8 (1.2)
Somewhat hard	15.9 (2.4)	20.7 (0.7)	20.3 (0.6)
Very hard	36.2 (3.9)	47.8 (1.6)	47.0 (1.8)
Never tested	1.6 (1.2)	0.5 (0.2)	0.5 (0.2)
Air Force			
Very easy	15.1 (3.2)	6.7 (0.6)	6.9 (0.6)
Somewhat easy	11.4 (4.9)	5.3 (0.3)	5.5 (0.4)
Somewhat hard	10.9 (4.1)	8.8 (0.6)	8.8 (0.6)
Very hard	56.3 (5.0)	76.6 (1.0)	76.1 (0.9)
Never tested	6.3 (3.5)	2.6 (0.3)	2.7 (0.3)
Total DoD			
Very easy	18.7 (1.5)	10.4 (0.4)	10.9 (0.4)
Somewhat easy	16.9 (1.4)	9.0 (0.4)	9.5 (0.4)
Somewhat hard	17.8 (1.4)	15.3 (0.4)	15.4 (0.4)
Very hard	45.7 (2.7)	64.1 (0.8)	63.0 (0.8)
Never tested	1.0 (0.5)	1.2 (0.1)	1.2 (0.1)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

**Estimates round to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Q60-61 and 67; Predictability of Drug Testing, Q64).

Table 5.8 Standardized Comparisons of the Prevalence of Any Illicit Drug Use, Past 30 Days, Among Military Personnel and Civilians, for Persons Aged 18 to 55

Gender/ Age Group	Comparison Population					
	Civilian	Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=6,177	N=9,338	N=2,647	N=1,916	N=2,436	N=2,339
18-25	17.1 (1.3)	5.7 (0.9) ^a	8.6 (1.9) ^a	2.1 (0.7) ^a	4.9 (0.7) ^a	3.5 (0.8) ^a
26-55	7.9 (0.8)	1.1 (0.2) ^a	2.3 (0.4) ^a	0.8 (0.3) ^a	0.5 (0.2) ^a	0.5 (0.2) ^a
All ages	11.4 (0.8)	2.8 (0.4) ^a	5.0 (1.0) ^a	1.1 (0.2) ^a	3.1 (0.5) ^a	1.3 (0.2) ^a
Females	N=8,496	N=3,214	N=947	N=922	N=505	N=840
18-25	9.4 (0.9)	2.5 (0.4) ^a	3.8 (0.7) ^a	4.1 (1.2) ^a	3.2 (1.2) ^a	** (**)
26-55	3.7 (0.5)	1.4 (0.4) ^a	1.9 (0.7) ^a	2.3 (1.0)	0.4 (0.4) ^a	0.6 (0.3) ^a
All ages	6.2 (0.5)	1.9 (0.2) ^a	2.8 (0.3) ^a	3.0 (0.5) ^a	2.1 (0.8) ^a	0.4 (0.2) ^a
Total	N=14,673	N=12,552	N=3,594	N=2,838	N=2,941	N=3,179
18-25	15.9 (1.1)	5.2 (0.8) ^a	7.9 (1.7) ^a	2.5 (0.6) ^a	4.8 (0.7) ^a	2.7 (0.6) ^a
26-55	7.4 (0.7)	1.2 (0.2) ^a	2.2 (0.4) ^a	1.0 (0.3) ^a	0.5 (0.2) ^a	0.5 (0.2) ^a
All ages	10.7 (0.7)	2.6 (0.3) ^a	4.7 (0.9) ^a	1.4 (0.2) ^a	3.0 (0.5) ^a	1.2 (0.2) ^a

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3. Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among Services.

**Estimates round to zero.

^aSignificantly different from civilian estimate at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Illicit Drug Use, Past 30 Days, Q60 and 61).

Differences between the military and civilian populations were more pronounced for males than for females, particularly with younger males. We estimated that 2.8% of U.S.-based males in the Military aged 18 to 55 used drugs in the past 30 days compared to 11.4% of civilian males. For females, 1.9% of those aged 18 to 55 in the Military used drugs in the past month compared to 6.2% of civilians.

Each Service had significantly lower rates of drug use compared to civilian estimates in each age category. These differences held across gender with one exception: Rates for Navy women aged 26 to 55 were not significantly lower than those of civilian women. Overall, these findings suggest that the military environment discourages illicit drug use quite successfully.

5.8 Summary

Drug use declined steadily during the 1980s and continued to decline in the 1990s for military personnel. Drug use among military personnel in 1998 was the lowest since the survey series began. The decline in drug use among military personnel suggests that there may be a broader societal trend of reduction in drug use, as well as evidence of the effectiveness of military policies and programs directed toward reducing or eliminating drug use.

5.8.1 Trends in Illicit Drug Use

Illicit drug use among military personnel declined dramatically between 1980 and 1998, showing a significant decrease in the prevalence of drug use of over 90% in 18 years (Table 5.1):

- Use of any illicit drugs decreased from 27.6% in the past 30 days in 1980 to 2.7% in 1998.
- All Services showed the same pattern of decreases from 1980 to 1998 observed for total DoD for illicit drug use in the past 30 days.
- The Navy decreased its 30-day drug use significantly from 3.6% in 1995 to 1.8% in 1998; the other Services did not show a significant decrease since 1995.

5.8.2 Service Comparisons of Illicit Drug Use

Unadjusted and adjusted estimates of drug use for each of the Services were computed to assess the effects of demographic composition on drug use rates (Table 5.2):

- Comparisons of unadjusted 12-month estimates showed that the rate of any illicit drug use during past year was lowest among Air Force

(2.4%) and Navy (4.2%) personnel and that the rate was similar among personnel in the Army (9.8%) and Marine Corps (7.2%).

- The difference in the unadjusted 12-month estimates in each drug use category between the Air Force and each of the other Services was statistically significant. The Navy's estimates were significantly lower than those for the Army and the Marine Corps.
- After adjusting for demographic differences among the Services, the Marine Corps' drug use estimates were significantly lower than the Army's, but higher than the Air Force's. The Marine Corps' rates became nearly equal to the Navy's after the adjustment, where the unadjusted rates were significantly higher. In view of the demographic profile of the Marine Corps, which makes its personnel at higher risk for drug use, these findings suggest that the Marine Corps' efforts to combat drug use have been more effective than those of the Army.

5.8.3 Prevalence of Specific Drug Use

Marijuana remained the drug most commonly used by military personnel, and use of other drugs was much lower (Table 5.3):

- In 1998, 1.4% of military personnel reported use of marijuana within the past month and 4.2% during the past year.
- Thirty-day use of all other individual drugs was less than 1%, and 12-month use was less than 2%.

5.8.4 Correlates of Illicit Drug Use

Illicit drug use was related to a number of sociodemographic factors (see Table 5.4). Logistic regression analysis showed that Service, gender, education, age, family status, and pay grade were significantly related to the probability of any drug use in the past 12 months. Specifically, the probability of any illicit drug use was significantly higher among the following:

- Army, Marine Corps, and Navy personnel compared with Air Force personnel;
- males compared with females;
- high school graduates or nongraduates, and those with some college, compared with college graduates;
- younger compared with older personnel; and
- those who were not married compared with those who were married with their spouse present.

In addition, drug use among warrant officers was especially low after adjusting for other variables in the model. Age and Service showed the strongest effects in the model. Younger personnel under the age of 20 had the highest odds of using drugs; odds in this age group were more than four times that of those older than 35 years. Those aged 21 to 25 had the next highest odds of using drugs, nearly 3.5 times of personnel aged 35 or older. The odds for drug use were similarly higher for Army personnel (3.6) compared to Air Force personnel. Being in the Navy or Marine Corps compared to the Air Force, and being between the age of 26 to 34 compared to older than 35, all increased odds approximately 1.7. This logistic regression analysis suggests that drug use prevention efforts should focus on younger personnel primarily in the Army, Navy, and Marine Corps.

5.8.5 Illicit Drug Use and Productivity Loss

Illicit drug use was related to productivity loss as measured by being late for work, leaving work early, being hurt in an on-the-job accident, working below one's normal level of performance, and not coming to work because of illness or injury (Table 5.5):

- Military personnel who used any illicit drugs or any drug except marijuana were more likely than all DoD personnel to report productivity loss from work.
- Compared with the total DoD, a higher percentage of those who used any illicit drug or any illicit drug except marijuana reported one of the productivity loss indicators 4 or more days in the past year.

5.8.6 Illicit Drug Use and Drug Testing

Drug testing is used to deter and detect drug use among military personnel. Analyses examined the association of past 12-month drug use and drug-testing experience among military personnel (Tables 5.6 and 5.7):

- Virtually all Military personnel (98.8%) had been tested for drugs at some point since joining the Service. Past 12-month drug use was not associated with the recency of the test for any of the Services or the total DoD. Overall, 87.4% of personnel reported being tested within the past 12 months. Marine Corps personnel (93.9%) and Army personnel (93.5%) reported the highest rates of testing in the past 12 months, followed by personnel in the Navy (89.7%) and the Air Force (74.8%). There were few differences among testing rates for drug users and nonusers.
- A majority of military personnel (63.0%) reported that it was very hard to predict the time of their last drug test. This estimate varied, however, by Service. The Navy (74.7%) and the Air Force (76.1%) had the highest percentage of personnel reporting that it was very hard to predict when they were last going to be tested for drug use, followed by the Army (49.1%) and the Marine Corp (47.0%). Results for the Navy are consistent with the recent implementation of new software

for selecting testing days and personnel that is designed to ensure greater randomization of the testing process.

- Personnel who did not report drug use in the past 12 months were more likely to rate that it was very hard to predict testing (64.1%) than those who did report drug use (45.7%).

5.8.7 Military and Civilian Comparisons

We standardized civilian data from the 1997 NHSDA to the distribution of the Military on gender, age, education, race/ethnicity, and marital status. We then compared military and civilian rates of use (Table 5.8):

- Military personnel were notably and significantly less likely than civilians to use any illicit drug in the past 30 days (2.6% vs. 10.7%). This pattern held across all age groups and for males and females for the total DoD.
- Each of the Services showed the same patterns as for the total DoD across the age and gender groups with one exception; there were no significant differences for Navy women aged 26 to 55 compared to civilian women in that age group.

6. TOBACCO USE

Historically, the Military has had a reputation as an environment in which tobacco use is accepted and common. Two decades ago, just over half of military personnel on active duty were smokers. In recent years, the DoD has increased efforts to lower tobacco use by members of the Armed Forces, and the rate has declined sharply. Still, tobacco use in 1998 remained fairly high among military personnel (see Table 3.1). This high rate of smoking is of concern to the DoD for several reasons. First, smoking-related illnesses take a toll on the physical readiness of the Armed Forces. Literally thousands of studies have demonstrated an association between the use of tobacco and negative health outcomes, such as cardiovascular diseases, various cancers, and pulmonary disease (Haddock et al., 1998). The use of tobacco also has been associated with negative performance outcomes, such as higher absenteeism, diminished motor and perceptual skills, and poorer endurance (Chisick, Poindexter, & York, 1998). A second concern is financial. Each year, the DoD spends an estimated \$875 million on smoking-related health care and productivity loss (Conway, 1998). Yet another concern is that most of the 1.4 million individuals currently serving in the U.S. Armed Forces eventually will return to civilian life, and the DoD has an obligation to return veterans to the civilian sector as healthy as possible (Chisick et al., 1998).

In this chapter, we examine more extensively tobacco use among military personnel, including use of cigarettes, smokeless tobacco, and cigars and pipes. We present information regarding prevalence and trends in cigarette use among the Services; correlates of smoking; cigarette use and productivity loss; attempts to stop smoking; and comparisons of the prevalence of smoking between the military and civilian populations. Where relevant, we compare our findings with *Healthy People 2000* objectives pertaining to cigarette and smokeless tobacco use. We have included additional information in Appendix D (Tables D.7, D.8, and D.10) about sociodemographic characteristics associated with tobacco use.

6.1 Cigarette Use

6.1.1 Trends in Cigarette Use, by Service

Table 6.1 shows trends for the DoD in any cigarette use and in heavy cigarette use (one or more packs of cigarettes per day) during the past 30 days across the seven DoD surveys. The trends for both indicators between 1980 and 1998 are similar. During the 18-year period, any cigarette use declined significantly for the total DoD from 51.0% to 29.9%. Any cigarette use remained relatively constant from 1980 to 1982, then showed significant declines across subsequent survey years. Heavy smoking also declined significantly, from 34.2% in 1980 to 13.4% in 1998. Like the rates for any cigarette use,

Table 6.1 Trends in Cigarette Use, Past 30 Days, by Service, 1980-1998

Service/ Smoking Level	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Army							
Any smoking	54.3 (0.7)	54.7 (1.8)	52.0 (1.8)	43.1 (1.1) ^a	37.0 (2.0) ^a	34.1 (1.6)	31.1 (1.2) ^b
Heavy smoking	35.2 (0.7)	34.6 (1.4)	33.6 (1.4)	22.8 (0.7) ^a	18.0 (1.1) ^a	17.0 (0.6)	14.1 (0.8) ^{a,b}
Navy							
Any smoking	53.8 (1.2)	55.4 (1.0)	47.9 (1.2) ^a	43.8 (1.8)	37.1 (1.7) ^a	34.9 (1.6)	30.6 (1.5) ^b
Heavy smoking	37.3 (1.3)	35.7 (1.4)	34.8 (1.6)	24.6 (2.0) ^a	20.4 (0.5) ^a	16.3 (1.4) ^a	14.8 (1.1) ^b
Marine Corps							
Any smoking	53.4 (0.6)	48.7 (0.4) ^a	42.6 (3.1)	41.3 (1.8)	39.2 (2.3)	35.0 (1.8)	34.9 (2.1) ^b
Heavy smoking	34.5 (0.9)	31.6 (0.7) ^a	26.1 (0.8) ^a	18.7 (2.2) ^a	20.7 (1.8)	15.0 (1.2) ^a	13.5 (1.1) ^b
Air Force							
Any smoking	43.2 (1.8)	44.1 (1.6)	39.0 (2.3)	35.8 (1.2)	29.2 (1.4) ^a	25.1 (1.3) ^a	25.7 (1.5) ^b
Heavy smoking	29.7 (1.3)	30.6 (1.2)	26.8 (1.7)	22.0 (0.8) ^a	14.6 (1.0) ^a	11.2 (0.8) ^a	11.2 (1.0) ^b
Total DoD							
Any smoking	51.0 (0.8)	51.4 (0.8)	46.2 (1.0) ^a	40.9 (0.8) ^a	35.0 (1.0) ^a	31.9 (0.9) ^a	29.9 (0.8) ^b
Heavy smoking	34.2 (0.6)	33.5 (0.7)	31.2 (0.8) ^a	22.7 (0.7) ^a	18.0 (0.5) ^a	15.0 (0.6) ^a	13.4 (0.5) ^b

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

^aComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^bComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 1998 (1998 Questions: Any Smoking, Q44 and 47, Heavy Smoking, Q45).

heavy smoking did not change significantly between 1980 and 1982 but declined significantly thereafter, although the decline from 1995 to 1998 was not statistically significant. It is likely that these trends reflect, in part, societal trends in smoking and an increased emphasis on smoking prevention or cessation.

Trends for each Service also are presented in Table 6.1 (see also Tables D.1 to D.4 and D.6 to D.10 for further detail). The percentage of smokers for any smoking in each of the Services was significantly lower in 1998 than in 1980. As shown in Table 6.1, there was a general decline in rates of cigarette smoking from 1980 to 1998 for each Service. The decrease for each Service, however, from 1995 to 1998 generally followed that same pattern but was not statistically significant.

For heavy smoking, each of the four Services followed the DoD pattern of a significant decline from 1980 to 1998 (Table 6.1). The Army, Navy, and Air Force showed very similar patterns across the entire survey series, with declines in heavy smokers between 1980 and 1998 of about 18 to 22 percentage points, and generally significant declines each survey year since 1985 or 1988. The Marine Corps showed significant declines each survey year, with the exception of 1992 when there was a slight but not significant increase in heavy smoking. The Army was the only Service to show a significant decline in heavy smoking from 1995 (17.0%) to 1998 (14.1%).

These findings indicate the progress that the DoD and the Services are making with respect to selected *Healthy People 2000* objectives pertaining to smoking. In particular, one of the *Healthy People 2000* objectives is to reduce the prevalence of current cigarette smoking to no more than 20% of military personnel (PHS, 1991). Although smoking declined significantly from 1980 to 1998, the rates of any smoking for the DoD and each of the Services were still above the 20% target rate in 1998.

6.1.2 Service Comparisons of Cigarette Use

In this section, we provide two sets of estimates of the observed extent of cigarette use for each Service. We begin by presenting unadjusted estimates for each of the Services. These estimates, which indicate the observed prevalence rates of smoking in 1998, provide a perspective on the comparative magnitude of the challenge facing each Service in its efforts to eliminate smoking. These unadjusted estimates are descriptive only, however, and yield no explanatory information about differences among the Services.

As discussed in Section 2.6, sociodemographic differences between the Services may contribute to the observed differences in cigarette smoking. That is, if a given behavior is more common among unmarried personnel, then Services that have a higher proportion of unmarried personnel likely would show higher rates of that behavior. Thus, observed

difference in rates of tobacco use may not reflect systematic program-level differences among the Services. To address this possibility, we also provide adjusted estimates of the prevalence of smoking, using direct standardization procedures to control for sociodemographic differences (see Appendix F). These constructed estimates resulting from standardization permit comparisons among the Services, as if each Service had the sociodemographic composition of the total DoD in 1998.

Unadjusted and adjusted estimates for both any smoking and heavy smoking in the past 30 days are shown in Table 6.2. The unadjusted rate for any smoking was significantly lower for the Air Force (25.7%) than for the other three Services. Unadjusted prevalence estimates of any smoking for the other three Services were approximately 31% to 35%. Members of the Air Force also had a lower unadjusted rate of heavy smoking (11.2%) than did the Army (14.1%) and the Navy (14.8%), but members of the Marine Corps (13.5%) did not engage in heavy smoking more so than those in the Air Force.

These unadjusted estimates show the relative challenges that the Services face in discouraging smoking, particularly to meet the *Healthy People 2000* goal of reducing the prevalence of any smoking among military personnel to no more than 20%. These

Table 6.2 Estimates of Cigarette Use, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Smoking Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Any Smoking					
Unadjusted	31.1 (1.2) ^a	30.6 (1.5) ^a	34.9 (2.1) ^a	25.7 (1.5)	29.9 (0.8)
Adjusted ^b	31.8 (0.8) ^a	29.8 (1.5)	28.9 (1.4)	27.4 (1.4)	29.9 (0.8)
Heavy Smoking					
Unadjusted	14.1 (0.8) ^a	14.8 (1.1) ^a	13.5 (1.1)	11.2 (1.0)	13.4 (0.5)
Adjusted ^b	15.4 (0.6) ^{a,c}	14.0 (1.0)	11.9 (0.9)	11.9 (0.8)	13.4 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Pairwise significance tests were done between all possible Service combinations (e.g., Army vs. Navy, Navy vs. Marine Corps). Definitions and measures of substance use are given in Section 2.5.3.

^aEstimate is significantly different from the Air Force at the 95% confidence level.

^bAdjusted estimates have been standardized by gender, age, education, race/ethnicity, and marital status to the total DoD.

^cEstimate is significantly different from the Marine Corps at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Smoking, Q44 and 47; Heavy Smoking, Q45).

prevalence estimates, however, do not provide any underlying explanations for the lower rates of any smoking and heavy smoking in the Air Force. One possible explanation is that the sociodemographic composition of the Air Force differs somewhat from the other three Services (see Table 2.4). Specifically, the Air Force in 1998 contained a somewhat higher proportion of females than did the other Services, and their personnel were more educated (over 80% had at least some college). In addition, Air Force personnel were somewhat more likely to be married and living with their spouse and to be in higher pay grades compared to the other Services. For most of these sociodemographic variables, the Air Force differed most markedly from the Marine Corps, and the Army and Navy were intermediate. Adjusting for these differences may explain some of the variance between the Air Force and the other Services.

To examine the potential impact of sociodemographic differences among the Services, we developed adjusted prevalence estimates by standardizing the sociodemographic compositions of the Services to the gender, age, education, race/ethnicity, and marital status distributions for the total DoD. These adjusted estimates are presented in Table 6.2. As shown, adjusting for sociodemographic differences resulted in slightly lower estimates of any smoking and heavy smoking for the Navy and Marine Corps, and slightly higher estimates for the Army and the Air Force. When sociodemographic factors were taken into account, only the Army (31.8%) showed significantly higher rates of any smoking than did the Air Force (27.4%). For heavy smoking, the adjusted prevalence estimate was higher for the Army (15.4%) than for the Marine Corps (11.9%) or the Air Force (11.9%), but the rate for the Navy (14.0%) did not differ significantly from any other Service.

These findings suggest that the rates of any smoking and heavy smoking for the individual Services would be somewhat different if they had the same sociodemographic composition, and that sociodemographic differences do play a role in explaining differences in prevalence estimates among the Services. Once these differences are controlled by adjusting the estimates, Army personnel stand out as the most likely to engage in any smoking and heavy smoking.

The fact that differences between the Air Force and the Navy and Marine Corps were no longer significant when sociodemographic differences were controlled for indicates that differences between these Services in gender, age, education, race/ethnicity, and marital status explain much of the variance in rates of heavy smoking and any smoking. The significantly higher rates, however, of any smoking and heavy smoking for the Army, even after we adjusted for sociodemographic differences, suggest that other factors are affecting smoking behavior in the Army. These differences in smoking rates might be explained in part by environmental or programmatic differences between the Army and the other Services. Alternatively, there may be other differences in the characteristics of

personnel who join the Army compared to those who join the other Services. For example, individuals who join the Army may be more predisposed to become smokers or less predisposed to quit, or they may have fewer negative attitudes and values about smoking.

6.1.3 Correlates of Cigarette Use

Knowing the characteristics of tobacco users is essential if the Military is to develop sound policies and programs that meet the needs of the military organization and personnel. In this section, we examine the sociodemographic correlates of cigarette smoking. Prevalence estimates presented in Table 6.3 are the percentages of personnel with each sociodemographic characteristic who were current smokers at the time of the survey. Significant correlates are identified by statistically significant odds ratios in a multivariate regression model predicting current smoking.

Table 6.3 presents the prevalence estimates of current cigarette use by selected sociodemographic characteristics. As previously shown in Table 6.1, Marine Corps personnel were the most likely to smoke (34.9%), whereas those in the Air Force were the least likely (25.7%). Males were more likely than females to smoke (30.6% vs. 25.5%). Among personnel in different racial/ethnic groups, non-Hispanic African-American personnel were the least likely to smoke (19.5%). In general, as education, age, and pay grade increased, smoking rates declined. Married personnel living with a spouse were less likely to smoke (25.5%) than were married personnel not living with a spouse (30.1%), or unmarried personnel (35.9%). Finally, there was virtually no difference in smoking prevalence associated with whether personnel were stationed within or outside the continental United States (the latter includes those stationed aboard afloat ships).

The picture, however, may not be as simple as it appears. Taken individually, the relationship we observed between each of the individual demographic characteristics and current smoking status fails to account for the effects of the characteristics that are related. For example, personnel who are younger are likely to be in a lower pay grade, have less education, and be unmarried. We needed a multivariate framework to assess the independent effects of these factors. Therefore, we conducted logistic regression analyses to examine the independent contribution of each of the demographic characteristics when we considered them simultaneously. Results are presented as adjusted odds ratios in Table 6.3.

For these multivariate analyses, we created a dichotomous (0,1) smoking variable. Current smokers were coded as 1, and nonsmokers were coded as 0. The logistic regression analyses estimated the odds of being a smoker, based on demographic variables, which were independent or predictor variables in the model. Reference groups (i.e., those to

Table 6.3 Demographic Correlates of Any Cigarette Smoking, Past 30 Days, Total DoD

Sociodemographic Characteristic	Prevalence	Adjusted Odds Ratio ^a	95% CI of Odds Ratio ^b
Service			
Army	31.1 (1.2)	1.40 ^c	(1.24, 1.58)
Navy	30.6 (1.5)	1.18 ^c	(1.01, 1.39)
Marine Corps	34.9 (2.1)	1.20 ^c	(1.03, 1.40)
Air Force	25.7 (1.5)	1.00	NA
Gender			
Male	30.6 (0.8)	1.17 ^c	(1.04, 1.30)
Female	25.5 (1.0)	1.00	NA
Race/Ethnicity			
Caucasian, non-Hispanic	33.0 (1.0)	1.00	NA
African American, non-Hispanic	19.5 (1.1)	0.37 ^c	(0.31, 0.43)
Hispanic	27.9 (1.4)	0.59 ^c	(0.50, 0.70)
Other	30.6 (1.5)	0.80 ^c	(0.70, 0.91)
Education			
High school or less	40.7 (0.8)	2.35 ^c	(1.91, 2.91)
Some college	31.7 (0.8)	1.77 ^c	(1.43, 2.19)
College graduate or higher	11.2 (0.7)	1.00	NA
Age			
20 or younger	39.8 (1.7)	0.71 ^c	(0.55, 0.90)
21-25	37.6 (1.1)	0.91	(0.76, 1.09)
26-34	26.3 (1.0)	0.84 ^c	(0.72, 0.99)
35 or older	22.8 (0.8)	1.00	NA
Family Status^d			
Not married	35.9 (0.9)	1.30 ^c	(1.17, 1.44)
Married, spouse not present	30.1 (1.6)	1.15	(0.98, 1.35)
Married, spouse present	25.5 (0.9)	1.00	NA
Pay Grade			
E1-E3	42.7 (1.0)	6.39 ^c	(4.60, 8.88)
E4-E6	33.1 (0.9)	4.64 ^c	(3.33, 6.45)
E7-E9	26.9 (1.0)	3.68 ^c	(2.73, 4.94)
W1-W5	21.0 (2.0)	2.54 ^c	(1.71, 3.77)
O1-O3	9.0 (0.8)	1.49 ^c	(1.11, 1.99)
O4-O10	6.6 (0.7)	1.00	NA
Region			
CONUS ^e	29.5 (0.9)	0.95	(0.85, 1.06)
OCONUS ^f	31.2 (1.3)	1.00	NA
Total	29.9 (0.8)	NA	NA

Note: Prevalence estimates are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

^aOdds ratios were adjusted for Service, gender, race/ethnicity, education, age, family status, pay grade, and region.

^b95% CI = 95% confidence interval of the odds ratio.

^cEstimate is significantly different from the reference group at the 95% confidence level.

^dEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^eRefers to personnel stationed within the 48 contiguous States in the continental United States.

^fRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Cigarette Smoking, Past 30 Days, Q44 and 47; refer to Section 2.5.1 for descriptions of sociodemographic variables).

whom all other categories of each demographic variable were compared) are designated by a 1.00 in the adjusted odds ratio column in Table 6.3. Odds ratios greater than 1.00 indicate a greater odds of smoking in the comparison group relative to the reference group, and those less than 1.00 indicate a lesser odds. Confidence intervals of 95% indicate whether the odds ratio is significant at the .05 level or less. Any interval that includes 1.00 within its boundaries indicates that the odds ratio is not significant at the .05 level (i.e., there is no significant difference between the reference group and the comparison group).

Nearly all of the adjusted odds ratios presented in Table 6.3 were statistically significant. Only three comparisons failed to reach significance when the effects of the other variables were taken into account. The prevalence of smoking did not differ for personnel aged 21 to 25 compared to those aged 35 or older; for married personnel not living with their spouses compared to those living with their spouses; or for personnel stationed within versus outside the continental United States. Results of the logistic regression analysis show that the following groups were significantly more likely to be current smokers when the effects of all other demographic variables in the model were held constant:

- personnel in the Army, Navy, and Marine Corps compared to those in the Air Force;
- males compared to females;
- non-Hispanic Caucasians compared to all other racial/ethnic groups;
- those who did not graduate from college compared to those with at least a college degree;
- personnel aged 35 or older compared to younger personnel;
- unmarried personnel compared to those who were married and living with their spouses; and
- those in pay grades lower than the O4 to O10 range compared to those in pay grades O4 and above.

Adjusted odds ratios associated with two of the demographic variables are worthy of further discussion. First, for the age variable, the prevalence estimates indicate that as age increased, the smoking rate decreased. Examination of the odds ratios, however, shows that when other variables related to age are taken into account, this is not the case. In fact, personnel 20 or younger, as well as those 26 to 34 years old, had *lower* odds of smoking than personnel aged 35 or older. The odds for being a current smoker were about the same for 21 to 25 year olds as for those 35 or older. The reason for this seemingly contradictory finding is likely due to the relations between age, education, family status, and pay grade in this population. Younger personnel were more likely than older

personnel to have less education, be unmarried, and be in lower pay grades. As previously noted, education, pay grade, and being married were negatively associated with smoking. When the effects of education, pay grade, and family status are controlled as they were in the regression model, the independent effects of age can be determined. In this case, age tended to be (but was not always) positively associated with current smoking when all other age-related factors were controlled.

Second, the sizes of the odds ratios associated with pay grade were quite large for the lowest grades and declined as pay grade levels increased. Comparing the lowest to the highest grades, those in E1 to E3 had the highest odds of smoking; odds in this group were about six times that of personnel in pay grades O4 to O10. The odds for smoking among those in pay grades O1 to O3, however, were only 1.49 times that of personnel in pay grades O4 to O10. The sizes and pattern of these odds ratios suggest a strong negative relation between pay grade and current smoking, even when controlling for other relevant demographic variables.

6.1.4 Cigarette Use and Productivity Loss

Data presented earlier in this chapter showed that, although the prevalence of smoking among military personnel declined between 1980 and 1998, almost a third of all personnel continued to smoke in 1998. An important related issue regards the possible effect of this behavior on productivity within the Military. Data addressing this question are presented in Table 6.4.

Table 6.4 presents information on productivity loss in the Armed Forces, by all personnel, current smokers, lifetime smokers, and nonsmokers. For the purposes of comparison, the data for all personnel (regardless of cigarette use) are presented first. Leaving work early was the most common type of productivity loss among all personnel (35.8%), followed closely by working below normal performance level (33.6%), then being late for work (26.6%), and not coming to work because of illness or injury (22.6%). Being hurt in an on-the-job accident was a relatively rare event among military personnel (9.6%).

Next, we examined the data for personnel who were current smokers at the time they completed the survey. Compared to nonsmokers and to the total DoD, a slightly higher percentage of current smokers reported each type of productivity loss. For current smokers, working below normal performance level was the most commonly reported productivity loss (37.9%), followed by leaving work early (36.8%), being late for work (32.1%), not coming to work because of illness or injury (22.8%), and being hurt in an on-the-job accident (12.6%). Individuals classified as "lifetime smokers" showed productivity losses generally similar to nonsmokers.

Table 6.4 Cigarette Use and Productivity Loss, Past 12 Months, Total DoD

Group/Problem	N	Number of Work Days Affected, Past 12 Months				
		No Days	1 Day	2 or 3 Days	4 or More Days	Any Number of Days
All Personnel	17,264					
Late for work by 30 minutes or more		73.4 (0.7)	11.1 (0.3)	9.8 (0.3)	5.7 (0.3)	26.6 (0.7)
Left work early		64.2 (0.7)	7.5 (0.3)	12.6 (0.4)	15.8 (0.5)	35.8 (0.7)
Hurt in an on-the-job accident		90.4 (0.6)	5.8 (0.3)	2.6 (0.2)	1.2 (0.1)	9.6 (0.6)
Worked below normal performance level		66.4 (0.6)	5.7 (0.2)	10.2 (0.3)	17.7 (0.5)	33.6 (0.6)
Did not come into work because of illness or injury		77.4 (0.7)	7.8 (0.3)	8.6 (0.4)	6.3 (0.3)	22.6 (0.7)
Current Smokers^a	4,712					
Late for work by 30 minutes or more		67.9 (0.9)	12.7 (0.6)	12.3 (0.6)	7.1 (0.5)	32.1 (0.9)
Left work early		63.2 (1.1)	7.5 (0.5)	13.0 (0.7)	16.3 (0.8)	36.8 (1.1)
Hurt in an on-the-job accident		87.4 (0.8)	7.5 (0.5)	3.4 (0.4)	1.7 (0.3)	12.6 (0.8)
Worked below normal performance level		62.1 (0.9)	6.7 (0.5)	11.3 (0.6)	19.8 (0.8)	37.9 (0.9)
Did not come into work because of illness or injury		77.2 (0.9)	8.4 (0.4)	8.0 (0.5)	6.5 (0.5)	22.8 (0.9)
Lifetime Smokers^b	2,675					
Late for work by 30 minutes or more		75.3 (1.1)	10.6 (0.8)	8.7 (0.7)	5.3 (0.6)	24.7 (1.1)
Left work early		62.9 (1.3)	5.9 (0.6)	12.5 (0.7)	18.7 (1.1)	37.1 (1.3)
Hurt in an on-the-job accident		91.9 (0.9)	5.0 (0.6)	2.2 (0.4)	0.9 (0.3)	8.1 (0.9)
Worked below normal performance level		66.4 (1.3)	3.9 (0.5)	9.7 (0.8)	20.0 (1.2)	33.6 (1.3)
Did not come into work because of illness or injury		76.0 (1.4)	7.5 (0.6)	9.1 (0.8)	7.3 (0.6)	24.0 (1.4)
Nonsmokers^c	9,845					
Late for work by 30 minutes or more		76.0 (0.7)	10.3 (0.4)	8.8 (0.4)	4.9 (0.4)	24.0 (0.7)
Left work early		65.0 (0.7)	7.9 (0.3)	12.4 (0.5)	14.7 (0.5)	35.0 (0.7)
Hurt in an on-the-job accident		91.7 (0.6)	5.0 (0.4)	2.3 (0.2)	1.0 (0.2)	8.3 (0.6)
Worked below normal performance level		68.7 (0.6)	5.7 (0.3)	9.7 (0.3)	16.0 (0.6)	31.3 (0.6)
Did not come into work because of illness or injury		77.8 (0.8)	7.5 (0.3)	8.8 (0.5)	5.9 (0.4)	22.2 (0.8)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aUnweighted number of respondents in the total DoD sample who smoked at least 100 cigarettes lifetime and smoked in the past 30 days.

^bUnweighted number of respondents in the total DoD sample who smoked at least 100 cigarettes lifetime but did not smoke in the past 30 days.

^cUnweighted number of respondents in the total DoD sample who smoked fewer than 100 cigarettes lifetime.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Productivity Loss, Q69A-E; Current Smoker, Lifetime Smoker, and Nonsmoker, Q44 and 47).

Although the findings from this survey reveal a tendency for current smokers to report greater productivity loss, it should be noted that the largest percentage difference between current smokers and others was only about 8% (for being late), and that the patterns of productivity loss were similar across all categories of smokers. Hence, any evidence to suggest that cigarette smoking might be related to productivity loss in the Military is weak.

6.1.5 Attempts to Stop Smoking Cigarettes

Information regarding attempts to stop smoking provides valuable insights into the response of smokers in the Military to policies and programs designed to reduce smoking. For this reason, these data are particularly relevant to development of additional military smoking policies and programs.

Table 6.5 presents our findings on respondents' attempts to stop smoking cigarettes during the past year. As shown in the top panel, a large percentage (56.2%) of military personnel never smoked. In the total DoD, a considerable number of personnel (14.1%) stopped smoking successfully, 10.3% over a year ago and 3.8% within the past year. An additional 15.6% made a serious but unsuccessful attempt to quit smoking within the past year, whereas 14.1% of current smokers did not try to quit in the past 12 months. When both smokers and nonsmokers were considered together, there were only slight differences across the four Services in regard to attempts to stop smoking.

Perhaps of most interest to the DoD are patterns of attempts and intentions to quit smoking. The middle panel of Table 6.5 shows smokers' attempts to stop smoking cigarettes during the past year. For the total DoD, 11.3% of smokers quit within the past year, 46.6% tried to quit but continued smoking, and 42.2% did not try to quit. Overall, then, over half (57.9%) of the military personnel who were smokers in the past year made an attempt to quit during the past year. Only about 20%, however, of these attempts to quit were successful.

The pattern of quit attempts among past year smokers in each Service generally is similar to that for the entire DoD. The one exception to this pattern is that among Navy personnel, it was slightly more common for smokers *not* to attempt cessation (44.7%) than to attempt it (42.4%); however, this finding should not be interpreted as less interest in quitting among Navy personnel because the Navy also had one of the highest rates of successful smoking cessation in the past year among all four Services.

A final consideration for those planning smoking cessation programs is the intent of current smokers to quit smoking. The bottom panel of Table 6.5 presents this information.

Table 6.5 Smoking Status and Smoking Cessation, Past 12 Months, by Service

Group/Status	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Among All Personnel					
Never smoked ^a	56.8 (0.8)	52.6 (1.4)	54.2 (1.5)	59.6 (2.0)	56.2 (0.7)
Former smoker, quit over a year ago	8.9 (0.6)	12.7 (0.8)	7.2 (0.8)	11.3 (0.6)	10.3 (0.4)
Former smoker, quit within past year	3.3 (0.4)	4.5 (0.5)	4.1 (0.3)	3.6 (0.3)	3.8 (0.2)
Current smoker, tried to quit	16.2 (0.7)	14.7 (1.0)	19.2 (1.3)	14.0 (1.0)	15.6 (0.5)
Current smoker, didn't try to quit	14.8 (0.7)	15.5 (1.0)	15.3 (1.2)	11.4 (0.7)	14.1 (0.4)
Among Smokers, Past Year					
Former smoker, quit within past year	9.5 (1.3)	12.9 (1.3)	10.5 (0.9)	12.5 (0.7)	11.3 (0.6)
Current smoker, tried to quit	47.2 (1.1)	42.4 (2.0)	49.8 (1.9)	48.2 (1.3)	46.6 (0.8)
Current smoker, didn't try to quit	43.2 (1.4)	44.7 (1.8)	39.7 (2.0)	39.2 (1.2)	42.2 (0.8)
Among Current Smokers					
Planning to quit in next 30 days	31.8 (1.5)	34.8 (1.5)	35.8 (1.4)	33.4 (1.5)	33.5 (0.8)
Intending to quit in next 6 months	24.3 (1.4)	24.6 (1.3)	22.7 (1.4)	22.7 (1.3)	23.8 (0.7)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3. Current smokers are defined as those who smoked at least 100 cigarettes and smoked in the past 30 days.

^aSmoked fewer than 100 cigarettes in the lifetime (Q44 and 47).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Former Smoker, Quit Over a Year Ago or Within Past Year, Q44 and 47; Current Smoker, Tried to Quit or Didn't Try to Quit, Q44, 47-48; Current Smoker, Planning to Quit in Next 30 Days, Q44, 47 and 50; Current Smoker, Planning to Quit in Next 6 Months, Q44, 47, and 49).

Current smokers indicated whether they planned to quit smoking in the next 30 days, or intended to quit in the next 6 months, but *not* within the next 30 days. The time frame distinction was made because personnel who were planning to quit within 30 days may have been more committed to cessation than were those who planned to quit at a later date; a more proximal cessation goal may reflect that an individual is further along in the “stages of change” process (DiClemente et al., 1991). Table 6.5 shows that only about a third of current smokers were planning to quit soon, with an additional 23.8% reporting an intention to quit in the next 6 months. These patterns of intention to quit held true in each of the four Services.

Considered together, these data suggest considerable interest in cessation of smoking, coupled with a low success rate. Thus, there is in the Armed Forces a large, motivated audience for programs designed to help military personnel stop smoking. On the other hand, roughly 4 out of 10 current smokers did not try to quit in the past year, and the same proportion reported no plans to quit within the next 6 months. These smokers may represent a more formidable target for military policies and programs designed to reduce or eliminate smoking.

6.1.6 Military and Civilian Comparisons

As indicated in Section 6.1.1, cigarette smoking has declined over time in both the military and civilian populations. In a previous comparison of smoking rates in military and civilian population data, however, we found that the prevalence rates of any smoking in 1995 still were significantly higher among military personnel aged 18 to 25 years than they were among civilians in the same age group, after the civilian data had been standardized to take into account demographic differences between the military and civilian populations (Bray et al., 1995a). In this section, we describe comparisons of the prevalence of current smoking made between civilian data taken from the 1997 National Household Survey on Drug Abuse (NHSDA) (Office of Applied Studies [OAS], in press) and data from the 1998 DoD survey.

Results of the comparison of the prevalence of current smoking for the civilian and U.S.-based (including Alaska and Hawaii) military populations are shown in Table 6.6. It should be noted that the smoking measure used in this table includes those who had smoked in the past 30 days, but to be comparable to the NHSDA measure, the other criterion of current smoking used in this report (smoking at least 100 cigarettes over one's lifetime) was not included in the measure reported in Table 6.6. To further increase comparability of the two datasets, we standardized the civilian data to the demographic distribution of the U.S.-based military population by gender, age, education, race/ethnicity, and marital status. Details about the standardization procedures are in Appendix F.

Table 6.6 Standardized Comparisons of the Prevalence of Any Cigarette Smoking Among Military Personnel and Civilians, Past 30 Days, for Persons Aged 18 to 55

Gender/ Age Group	Comparison Population					
	Civilian	Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=6,114	N=9,338	N=2,647	N=1,916	N=2,436	N=2,339
18-25	45.0 (1.7)	39.1 (1.2) ^a	40.2 (1.8)	32.3 (3.2) ^a	44.3 (1.7)	37.1 (2.4) ^a
26-55	27.0 (1.3)	24.3 (0.9)	25.0 (1.2)	28.3 (2.0)	21.6 (1.8)	20.7 (1.7) ^a
All ages	33.8 (1.0)	29.7 (0.9) ^a	31.6 (1.3)	29.3 (1.8) ^a	34.6 (2.4)	25.2 (1.9) ^a
Females	N=8,396	N=3,214	N=947	N=922	N=505	N=840
18-25	28.4 (1.5)	27.8 (1.3)	21.9 (1.7) ^a	31.1 (3.2)	32.9 (3.7) ^a	30.9 (2.6)
26-55	25.1 (1.2)	23.5 (1.5)	19.3 (2.1) ^a	26.0 (3.0)	26.1 (3.5) ^a	25.4 (2.9)
All ages	26.6 (1.0)	25.4 (1.2)	20.5 (1.1) ^a	28.0 (2.7)	30.3 (3.2) ^a	27.7 (2.4)
Total	N=14,510	N=12,552	N=3,594	N=2,838	N=2,941	N=3,179
18-25	42.4 (1.5)	37.3 (1.1) ^a	37.5 (1.6) ^a	32.1 (2.6) ^a	43.5 (1.7)	35.6 (2.4) ^a
26-55	26.7 (1.1)	24.2 (0.9)	24.2 (1.2)	28.1 (2.0)	21.8 (1.8) ^a	21.4 (1.7) ^a
All ages	32.8 (1.0)	29.1 (0.9) ^a	30.0 (1.3)	29.1 (1.8)	34.4 (2.3)	25.7 (1.9) ^a

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

Civilian data have been standardized to the U.S.-based military data by gender, age, education, race/ethnicity, and marital status. Data for the total DoD and the individual Services are U.S.-based population estimates (including personnel in Alaska and Hawaii). N's show the number of cases on which the weighted estimates are based. Estimates have not been adjusted for sociodemographic differences among services.

^aSignificantly different from civilian at the .05 significance level.

Civilian data source: National Household Survey on Drug Abuse, 1997.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Any Cigarette Smoking, Past 30 Days, Q44 and 47).

Table 6.6 thus presents data on the prevalence of current smoking within different age groups and among males, females, and the total population, for the civilian and the U.S.-based military populations. Based on the definition of current smoking used in the analyses, the overall civilian rate was 32.8%, which was significantly higher than the rate of 29.1% for the total DoD. When the rates of cigarette smoking in the total DoD are examined by age and gender, it becomes clear that the driving force behind the military and civilian difference lies in the population of individuals aged 18 to 25 years, especially males. Civilian males between the ages of 18 and 25 smoked more (45.0%) than the comparison group of males in the Military (39.1%).

Several differences between the four Services emerged when their cigarette smoking rates were compared to the civilian population. Among males, personnel in the Army, Marine Corps, and 26 to 55 year olds in the Navy did not differ from their male counterparts in the civilian population. Males in the Air Force and young males (aged 18 to 25) in the Navy were less likely to smoke than those in the civilian population. Among females, members of the Navy and Air Force did not differ in their smoking rates from civilian females. Females in the Army smoked less than civilian females. The only notable deviation from the pattern of military personnel smoking less than or equal to civilians was among females in the Marine Corps, who smoked at higher rates than civilian females.

The finding that rates of cigarette smoking among some subpopulations in the civilian sector were higher than those among military personnel of the same age and gender is unique in the DoD series of surveys. In past years, civilians had been found to smoke at rates less than or equal to military personnel. An examination of cigarette smoking rates from 1995 reveals that the observed change was due to two simultaneous phenomena. First, when the total DoD is considered, each age by gender subpopulation experienced a small decline in cigarette smoking since 1995. Second, during the same period, cigarette smoking among certain sectors of the civilian population (most notably males between the ages of 18 and 25) increased (see Bray et al., 1995a).

The finding that members of the Armed Forces did not smoke at rates higher than civilians in 1998 should not be interpreted as a successfully reached goal. Although the civilian population serves as a useful baseline of smoking behavior, the *Healthy People 2000* objective of no more than 20% current smokers in the Military has not been met. Nevertheless, the fact that the gap between the military and civilian populations seems to have closed suggests that there may be few or no system-level factors in the Military that are related to higher levels of smoking compared to the civilian population, and the continuing decreases in rates of cigarette smoking in the Military despite increases in the civilian population are very encouraging.

6.2 Cigar, Pipe, and Smokeless Tobacco Use

The 1998 DoD survey confirmed that cigarettes constituted by far the most pervasive form of tobacco use in the Military, but that military personnel also used other forms of tobacco. Knowing the extent of tobacco use other than cigarettes is necessary to develop comprehensive policies and programs for prevention and cessation of tobacco use. In this section, we examine data related to cigar and pipe smoking, as well as the use of smokeless tobacco.

6.2.1 Prevalence of Smokeless Tobacco Use, Past 30 Days

Table 6.7 presents the trends for the prevalence of past month smokeless tobacco use for each of the Services and for the total DoD. Because smokeless tobacco is used predominantly by males, prevalence estimates are presented for males only. These estimates are shown by age group within each Service. In addition, we present the data from the 1995 DoD Survey of Health Related Behaviors Among Military Personnel for comparison. It should be noted that these prevalence estimates have not been adjusted for sociodemographic differences.

As shown in the bottom panel of Table 6.7, 11.7% of all military personnel in 1998 reported using smokeless tobacco in the past 30 days. Among males across all Services, the rate of smokeless tobacco use was 13.4%, and prevalence of use declined sharply as the age of personnel increased. The prevalence rate among the youngest age group of men (18 to 24 years) was 19.0%, but only 5.3% of those aged 35 or older reported use.

Comparisons across the four Services show large differences in smokeless tobacco use between the different Services. Personnel in the Marine Corps had the highest prevalence of use (19.1%), and those in the Air Force had the lowest (7.3%). For the Army (14.4%) and the Navy (9.2%), the estimates were intermediate. Within each Service, however, the pattern of greater use among younger personnel applied.

The *Healthy People 2000* objective for smokeless tobacco is to reduce prevalence of use by males aged 24 or younger to no more than 4%, with current users being defined as persons who have used smokeless tobacco on 20 or more occasions in their lifetime and who have used smokeless tobacco in the past month (PHS, 1991). As shown in Table 6.7, 19.0% of males aged 18 to 24 in the DoD used smokeless tobacco in the past month. This and the prevalence estimates for young men in all four Services were still well above the 4% prevalence objective. Although this *Healthy People 2000* objective for the general population includes males who are under age 18, these high rates of smokeless tobacco use among young males in the Military, and particularly in the Marine Corps, clearly are a cause for concern.

Table 6.7 Comparison of Smokeless Tobacco Use in 1995 and 1998, Past 30 Days, for All Personnel and for Males

Service/Age Group	Year	
	1995	1998
Army		
All personnel	15.3 (1.1)	14.4 (1.3)
Males		
All ages	17.4 (1.1)	16.7 (1.3)
Ages 18-24	21.5 (1.4)	20.1 (1.2)
Ages 25-34	18.6 (1.5)	18.6 (1.8)
Ages 35+	7.3 (1.0)	8.3 (1.0)
Navy		
All personnel	12.0 (1.7)	9.2 (0.8)
Males		
All ages	13.4 (1.7)	10.4 (0.7)
Ages 18-24	21.2 (2.7)	18.1 (1.7)
Ages 25-34	12.2 (1.5)	11.7 (0.8)
Ages 35+	4.6 (0.9)	3.2 (0.6)
Marine Corps		
All personnel	24.0 (1.4)	19.1 (1.6) ^a
Males		
All ages	25.1 (1.3)	20.3 (1.5) ^a
Ages 18-24	30.6 (1.0)	22.4 (2.0) ^a
Ages 25-34	21.2 (2.2)	21.9 (1.3)
Ages 35+	11.6 (1.4)	10.2 (1.2)
Air Force		
All personnel	7.9 (1.0)	7.3 (0.7)
Males		
All ages	9.3 (1.1)	8.9 (0.8)
Ages 18-24	15.9 (1.6)	13.7 (1.0)
Ages 25-34	9.0 (1.1)	10.5 (0.9)
Ages 35+	3.3 (0.9)	3.4 (1.0)
Total DoD		
All personnel	13.2 (0.7)	11.7 (0.7)
Males		
All ages	15.0 (0.7)	13.4 (0.6)
Ages 18-24	21.9 (1.0)	19.0 (0.8) ^a
Ages 25-34	13.9 (0.7)	14.6 (0.7)
Ages 35+	5.5 (0.5)	5.3 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who used smokeless tobacco at least 20 times in the lifetime and who used it in the past 30 days. Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

^aComparisons between 1995 and 1998 are statistically significant at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1995 and 1998 (1998 Questions: Smokeless Tobacco Use, Q51 and 55; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Even though rates of smokeless tobacco use among males in the Military remained high in 1998, there were improvements since the survey was administered in 1995. Statistically significant declines between 1995 and 1998 are marked in Table 6.7 by a superscripted "a." In the total DoD, males aged 18 to 24 declined in their use of smokeless tobacco. For individual Services, this difference was significant only for the Marine Corps, which experienced a drop of almost 8% in just 3 years. This decline among 18- to 24-year-old Marines was enough to cause significant declines for all male Marines, as well as for Marines overall. Although the rates for the Marines remained the highest of the Services, the substantial drop over a short period of time is promising.

6.2.2 Prevalence of Cigar and Pipe Smoking and Smokeless Tobacco Use, Past 12 Months

In addition to past 30 day use of smokeless tobacco, we examined the frequency of past year use of both smokeless tobacco and cigars or pipes. The bottom panel of Table 6.8 presents the unadjusted prevalence of past year use smokeless tobacco for the total DoD and for each of the Services. When we extended the time frame from 30 days to 12 months, estimates of any smokeless tobacco use rose. Estimates of past year use were highest in the Marine Corps (31.0%), followed by the Army (22.1%), the Navy (13.3%), and the Air Force (12.4%). An examination of the frequency information reveals that, regardless of Service, most personnel who used smokeless tobacco did so either frequently

Table 6.8 Frequency of Cigar, Pipe, and Smokeless Tobacco Use, Past 12 Months, by Service

Tobacco/Frequency	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Cigars/Pipe					
Didn't smoke	66.9 (1.6)	68.7 (1.6)	58.0 (1.2)	71.1 (1.3)	67.4 (0.8)
Less than once/week	29.7 (1.5)	28.5 (1.5)	38.2 (0.9)	26.6 (1.2)	29.6 (0.7)
1-4 days/week	2.0 (0.3)	1.8 (0.4)	2.4 (0.4)	1.6 (0.2)	1.9 (0.2)
5 or more days/week	1.5 (0.2)	1.0 (0.2)	1.4 (0.2)	0.8 (0.2)	1.1 (0.1)
Smokeless Tobacco					
Didn't use	77.9 (1.7)	86.7 (1.0)	69.0 (1.7)	87.6 (1.0)	81.8 (0.8)
Less than once/week	9.1 (0.7)	5.0 (0.6)	13.9 (1.0)	5.6 (0.5)	7.6 (0.4)
1-4 days/week	3.3 (0.6)	2.2 (0.3)	4.4 (0.4)	1.7 (0.3)	2.7 (0.2)
5 or more days/week	9.7 (0.9)	6.1 (0.4)	12.7 (0.8)	5.1 (0.7)	7.8 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Cigar/Pipe Use, Q57; Smokeless Tobacco Use, Q51 and 54).

(5+ days a week) or rarely (less than once a week). Moderate use (1 to 4 days a week) was considerably less common.

The top panel of Table 6.8 shows the frequency of cigar or pipe smoking. An estimated 32.6% of all military personnel smoked cigars or pipes in the 12 months prior to the 1998 survey. This finding represents the most significant change from the 1995 survey (Bray et al., 1995a) among measures of tobacco use (see Table 6.9). Just 3 years before, cigar or pipe smoking was reported by 18.7% of military personnel. This 75% increase from 1995 to 1998 was preceded by a slight increase from 1992 to 1995 (Bray et al., 1992). Each Service showed this sharp increase over the 3 years between 1995 and 1998. Cigar or pipe smoking was most prevalent among Marines (42.0%), followed by the Army (33.1%), the Navy (31.3%), and the Air Force (28.9%).

Table 6.9 Service Comparisons in the Prevalence of Any Cigar or Pipe Use, Past 12 Months, 1995 and 1998

Service	Year	
	1995	1998
Army	22.1 (1.5)	33.1 (1.6) ^a
Navy	17.1 (1.5)	31.3 (1.6) ^a
Marine Corps	28.4 (1.3)	42.0 (1.2) ^a
Air Force	12.8 (0.7)	28.9 (1.3) ^a
Total DoD	18.7 (0.7)	32.6 (0.8) ^a

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. Definitions and measures of substance use are given in Section 2.5.3.

^a1998 estimate is significantly different from 1995 estimate at .05 significance level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Cigar/Pipe Use, Q57).

By far the largest increase was observed among those smoking cigars or pipes less than once a week. Across the Services, prevalence rates for this low frequency ranged from 26.6% in the Air Force to 38.2% for the Marine Corps. Rates of frequent pipe or cigar smoking (i.e., 1 or more days a week) remained low in 1998, for each Service and across the entire DoD. For this frequency, none of the Services showed a cigar or pipe smoking prevalence rate over 2.5%.

Although rates of cigar and pipe smoking were not measured separately, it is likely that most of this increase was due to a sharp rise in cigar smoking in recent years. This finding parallels an alarming trend in cigar use among the general population. Cigar smoking had been on the decline for most of the past century, especially since 1964, but in 1993 this trend began to reverse. Between 1993 and 1997, cigar smoking in the United States increased by almost 50% (Gerlach et al., 1998) and most of this increase was among occasional users. Disturbing trends noted in the general population are a strong increase in cigar smoking among adolescents and groups who have traditionally had relatively low rates of smoking (e.g., affluent, well-educated) (Burns, 1998).

The sharp increase in cigar or pipe smoking should be seriously considered by the DoD. Given the dramatically quick rise in use over a 3-year period, both intense short-term steps and longer term monitoring should be addressed.

6.3 Summary

This chapter has described tobacco use (cigarettes, smokeless tobacco, and cigars and pipes) among military personnel. For cigarette use, trends among personnel over the past 18 years were described, sociodemographic correlates were identified, information about attempts at smoking cessation was gathered, and comparisons between military and civilian populations were examined. The prevalence of smokeless tobacco use was estimated. Prevalence estimates for cigar and pipe smoking were presented, as were comparisons in cigar and pipe use between 1995 and 1998.

6.3.1 Trends in Cigarette Use

Prior studies among civilians and military personnel show a decline in the prevalence of cigarette smoking. This trend is supported by findings of the 1998 DoD survey, which show smoking levels at their lowest since the survey series began in 1980 (see Tables 6.1 and 6.2). The rate of decline slowed recently, however, and the differences in smoking rates from 1995 to 1998 were not significant:

- The prevalence of any cigarette smoking for the total DoD declined from 51.0% in 1980 to 29.9% in 1998. For all four Services, the prevalence of any cigarette smoking in 1998 also was significantly lower relative to the start of the survey series in 1980.
- The prevalence of heavy cigarette smoking (one or more packs per day) for the total DoD also showed a significant decline from 34.2% in 1980 to 13.4% in 1998. We observed similar overall trends in the decline in heavy smoking relative to 1980 for all four of the Services.
- Despite the continued decline in smoking, the rates of any smoking in the total DoD and in all four Services were all still well above the 20% target set for military personnel by *Healthy People 2000*.

- Overall, the comparisons of unadjusted and adjusted rates for any smoking and heavy smoking suggest that variations in the sociodemographic composition of the Services play a moderate role in explaining Service differences in smoking.

6.3.2 Correlates of Cigarette Use

Development of sound policies and programs regarding smoking requires knowledge of characteristics of tobacco users. We compared the prevalence estimates of current smoking across various demographic groups and tested for the simultaneous effects of these demographic characteristics in a multivariate logistic regression model (Table 6.3):

- In the Military, males were significantly more likely than females to be current smokers (30.6% vs. 25.5%).
- Non-Hispanic Caucasians (33.0%) were significantly more likely than personnel in all other racial/ethnic groups to smoke (non-Hispanic African Americans, 19.5%; Hispanics, 27.9%; others, 30.6%).
- Cigarette smoking was significantly and negatively related to education, with 40.7% of personnel with a high school education being smokers compared to only 11.2% of personnel with a college degree or higher.
- Pay grade was negatively and strongly related to current smoking. The odds of personnel in pay grades E1 to E3 smoking were over 6 times those of personnel in pay grades O4 to O10 (42.7% vs. 6.6%).
- Prevalence estimates indicated that age was negatively associated with smoking. Interestingly, odds ratios in the logistic regression model showed a different pattern. Apparently, once factors related to age, such as education, family status, and pay grade, were controlled for statistically, older personnel were generally more likely to smoke than younger personnel. This effect likely is due to the strong relationship between age and pay grade.
- Unmarried personnel were significantly more likely than married personnel living with their spouses to be current smokers (35.9% vs. 25.5%).

6.3.3 Attempts to Stop Smoking

Information about attempts to quit smoking provides useful insights about needs for additional program emphasis and groups likely to be receptive to "quit smoking" messages:

- In the total DoD, 14.1% of all personnel successfully stopped smoking, with 3.8% having quit in the past year (Table 6.5). An additional 15.6% made a serious, but unsuccessful, attempt

to quit smoking in the past year. Overall, more than 56% of military personnel never smoked.

- Among those who smoked during the past year, 46.6% made an attempt to quit smoking. Only 11.3%, however, of the personnel who were smokers in the past year successfully quit.

6.3.4 Military and Civilian Comparisons

Using the 1998 DoD survey data and 1997 NHSDA data, we compared rates of *current* smoking among the military and civilian populations after we adjusted the civilian data to reflect the demographic characteristics of the military population (see Table 6.6). The most interesting finding was that rates of cigarette smoking in the Military were equal to or lower than rates of smoking in the corresponding civilian population. This finding represents the first time in the DoD series of surveys that certain age and gender groups of military personnel smoked less than their civilian counterparts. Although it appears that this change may be due more to rising smoking rates among young people in the civilian population as opposed to falling rates among military personnel, it is encouraging that members of the Armed Forces are not following the societal trend toward higher smoking rates.

- Overall, military personnel showed a significantly lower rate of any smoking (29.1%) than the civilian population (32.8%). Although this difference was statistically significant, it was not large. It appears that the driving force behind this difference was that in the total DoD, younger male military personnel (aged 18 to 25) showed lower rates of current smoking (39.1%) than did civilians in the same age and gender group (45.0%). Comparisons of rates for older age groups, however, were not significantly different.
- When Services were examined individually (with gender and age breakdowns), each exhibited a different pattern of significant difference from the civilian population. When all members of a Service were considered together, only the Air Force had a lower rate of smoking than civilians.

6.3.5 Other Tobacco Use

Planners and policymakers must be aware of the prevalence of other tobacco use (smokeless tobacco, cigars, and pipes) in addition to cigarette use in order to develop comprehensive policies and programs for smoking prevention and cessation (see Tables 6.7 and 6.8). Our findings reveal that considerable effort is needed to achieve the *Healthy People 2000* objective of 4% current smokeless tobacco use among males aged 24 or younger and that there has been a strong resurgence in cigar or pipe smoking:

- Overall, 11.7% of military personnel had used smokeless tobacco in the 30 days prior to the survey, and approximately one-fifth had used it in the past year. Past month use was highest among men aged 18

to 24 (19.0%). The only Service to show a significant drop from 1995 to 1998 in the use of smokeless tobacco was the Marine Corps. This decline was driven by a reduction among 18- to 24-year-old males from 30.6% in 1995 to 22.4% in 1998.

- An estimated 32.6% of military personnel smoked cigars or a pipe in the 12 months prior to the survey. This figure is 13.9% higher than the 1995 rate. Cigar or pipe smoking rates rose by at least 11 percentage points for each Service. Although the vast majority of cigar or pipe smoking occurred infrequently (less than once a week), this drastic increase should be of concern to the DoD, and the use of cigars and pipes should be closely monitored in future surveys.

Taken together, findings from the 1998 DoD survey indicate that the Military has made considerable progress since 1980 in reducing the prevalence of cigarette smoking among its personnel. Overall, military rates were not significantly different from civilian rates, although this finding should be regarded with cautious optimism in that it seems largely to have been caused by an increase in smoking among civilians rather than significant decreases among military personnel. The rates of any cigarette smoking in the total DoD (29.1%) and in all four Services (25.7% to 34.9%) were all still well above the *Healthy People 2000* target of 20% for the Military.

Smokeless tobacco use in the Military, and particularly among young males, is also cause for concern. The use of smokeless tobacco in the past 30 days for each Service ranged from about 9% to about 19%. It was especially prevalent among men aged 24 or younger (19%). Given that one of the *Healthy People 2000* objectives is to reduce the current prevalence of smokeless tobacco use to no more than 4% of males aged 24 or younger, these findings indicate that the DoD and the Services will have to engage in considerable effort to reduce smokeless tobacco use among young males if this objective is to be met within the Military.

7. HEALTH BEHAVIOR AND HEALTH PROMOTION

This chapter reports indicators of health behavior and health promotion among military personnel. Fitness and cardiovascular disease risk reduction are discussed, including the prevalence of personnel who are overweight and underweight, frequency of exercise, knowledge and awareness of blood pressure and cholesterol checks, and actions taken to control high blood pressure and high cholesterol. Injuries and injury prevention are explored, including such factors as the prevalence of injuries, seat belt use, and helmet use among motorcyclists and bicyclists. Sexually transmitted diseases (STDs) and STD risk reduction also are examined, including the prevalence of STDs, condom use, and knowledge and beliefs about AIDS. Where appropriate, knowledge and behavior among military personnel are compared with relevant *Healthy People 2000* objectives (PHS, 1991). In contrast to the DoD-level information presented in Chapter 3, this chapter examines estimates for the Services and includes more detailed information about attainment of *Healthy People 2000* objectives.

7.1 Fitness and Cardiovascular Disease Risk Reduction

Cardiovascular disease, including coronary heart disease and stroke, remains a prevalent public health problem. Heart disease and stroke are the first and third leading causes of death, respectively, in the United States, for all age groups (Ventura, Anderson, Martin, & Smith, 1998). In addition, research has shown high blood pressure to be a risk factor for coronary heart disease and stroke (Kannel, 1993). Studies have shown that high blood cholesterol also is related to coronary heart disease and that reducing cholesterol reduces the risk of that condition (Grundy, 1997; Kannel, 1993; National Cholesterol Education Program, 1994; Rossouw, 1994). Moreover, a sedentary lifestyle, characterized by a lack of physical exercise, increases a person's risk for coronary heart disease (Department of Health and Human Services [DHHS], 1996; Francis, 1998). Similarly, research has linked being overweight with a variety of chronic medical problems, including hypertension, heart disease, and diabetes (Pi-Sunyer, 1993).

Fortunately, behavioral measures can positively impact these types of conditions. For example, the health benefits of regular physical exercise and proper weight control have been well documented. Regular physical activity can reduce the risks of coronary heart disease, can prevent or help control high blood pressure, and is important for weight control (DHHS, 1996; Paffenbarger, Hyde, Wing, & Hsieh, 1986; Piani & Schoenborn, 1993; Siscovick, LaPorte, & Newman, 1985). In addition, physical exercise can have positive mental health benefits, such as reducing depression or anxiety (DHHS, 1996; Taylor, Sallis, & Needle, 1985).

In addition to problems that stem from cardiovascular disease, overall physical well-being also can be compromised by being underweight. Research in this area, however, is limited. Low body weight has been demonstrated to be associated with increased mortality, especially among older adults (Sichieri, Everhart, & Hubbard, 1992; Tayback, Kumanyika, & Chee, 1990). Among young men (17 or younger), being underweight has been linked with bronchial and lung conditions, intestinal conditions, and emotional disorders (Lusky et al., 1996). Lusky et al.'s study of young men at induction into the Israeli Army underscored the impact that disorders related to low body weight can have upon military readiness and overall health. In the Military, early detection of cardiovascular disease risks and low body weight is likely to be facilitated by access to medical care and regulations mandating that personnel receive regular preventive medical services.

In this section, we present findings from the 1998 DoD survey related to overweight, underweight, exercise, high blood pressure screening and control, and cholesterol screening among military personnel. Guidelines for the evaluation of overweight and underweight have changed over time. Recently, new guidelines for determining overweight and underweight were released by the National Heart, Lung, and Blood Institute (NHLBI, 1998). Thus, prevalence rates of overweight and underweight are presented using previous guidelines and those recently suggested by the NHLBI. Although these new NHLBI guidelines have not been adopted by the Military, we have included them in our analyses in order to present the data using the most current recommendations for overweight and underweight and to provide information for the Military to assess the impact of the new guidelines.

We use 1998 survey findings to examine progress toward the following *Healthy People 2000* objectives:

- reduce overweight, as measured by the Body Mass Index (BMI) to a prevalence of no more than 20% among people aged 20 or older and no more than 15% among people younger than age 20;
- increase to at least 20% the proportion of people aged 18 or older who engage in vigorous physical activity that promotes the development and maintenance of cardiorespiratory fitness 3 or more days per week for 20 or more minutes per occasion;
- increase to at least 90% the proportion of adults who have had their blood pressure measured within the preceding 2 years and can state whether their blood pressure was normal or high;

- increase to at least 90% the proportion of people with high blood pressure who are taking action to help control their blood pressure; and
- increase to at least 75% the proportion of adults who had their cholesterol checked within the preceding 5 years.

7.1.1 Overweight, Underweight, and Exercise

7.1.1.1 Overweight. Table 7.1 presents findings on the prevalence of overweight among active-duty military personnel, by age and gender, calculated from self-reports of weight and height. Consistent with the definition of overweight from *Healthy People 2000*, estimates in Table 7.1 were based on the BMI, or the ratio of a person's reported weight in kilograms to the square of that person's reported height in meters. Military men were defined as overweight if they were under the age of 20 and had a BMI of 25.8 or greater, or if they were aged 20 or older and had a BMI of 27.8 or greater. Military women were defined as overweight if they were under the age of 20 and had a BMI of 25.7 or greater, or if they were aged 20 or older and had a BMI of 27.3 or greater (PHS, 1991).

For individuals under age 20, approximately 23% of all personnel (26% of males and 9% of females) would be classified as overweight according to the BMI. Thus, women in the total DoD under the age of 20 had met the *Healthy People 2000* objective of having a prevalence of overweight of no more than 15%. More specifically, the prevalence of overweight among women in the Army and Air Force was 8.2% and 6.0%, respectively, and thus women in these Services also met the *Healthy People 2000* objective. In contrast, the estimates for all personnel under age 20 (and especially men under 20) were considerably above this target of 15%. This pattern was true also for Service-level estimates for this age group, both for the total DoD and for men separately.

As is shown in Table 3.3, the *Healthy People 2000* objective for overweight among people aged 20 or older (prevalence of no more than 20%) had been met for personnel in this age group in the total DoD (19.5%). Examining this goal separately for those aged 20 to 25, 26 to 34, and 35 or older, however, reveals a slightly different picture. Many personnel aged 20 to 25 and 26 to 34 were at or below the *Healthy People 2000* objective of 20% for overweight. Nonetheless, the prevalence of overweight for several groups and subgroups was much higher than 20%. Among all personnel aged 26 to 34, 21% were considered overweight, and among all Navy personnel in both age groups the prevalence of overweight exceeded the *Healthy People 2000* goal (21.2% for ages 20 to 25 and 27.6% for ages 26 to 34). Further, prevalence of being overweight among all men aged 26 to 34 was 22.4%. At the Service level, Army and Navy men aged 26 to 34 and Navy men aged 20 to 25 exceeded the *Healthy People 2000* objective (21.3%, 28.5%, and 23.0%, respectively).

Table 7.1 Prevalence of Overweight Active-Duty Personnel, by Age and Gender

Gender/Age Group	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Males^a					
Under 20	26.9 (5.1)	28.8 (4.8)	24.8 (2.0)	23.3 (5.7)	25.9 (2.4)
20-25	15.2 (1.5)	23.0 (2.0)	10.3 (1.1)	13.3 (1.3)	15.4 (0.8)
26-34	21.3 (1.2)	28.5 (1.8)	13.0 (1.4)	20.4 (1.3)	22.4 (0.8)
35 or older	23.7 (1.3)	30.2 (1.6)	12.9 (1.1)	26.6 (1.3)	25.8 (0.8)
Females^b					
Under 20	8.2 (3.1)	+ (+)	+ (+)	6.0 (2.8)	9.2 (2.0)
20-25	6.3 (1.1)	12.3 (2.4)	0.4 (0.4)	3.3 (1.0)	6.2 (0.8)
26-34	9.7 (1.4)	19.9 (2.5)	0.8 (0.6)	8.1 (1.9)	11.3 (1.1)
35 or older	18.1 (2.6)	15.0 (2.2)	4.4 (1.7)	9.3 (1.8)	13.6 (1.3)
Total DoD					
Under 20	22.8 (3.9)	28.4 (4.2)	23.3 (2.1)	18.6 (4.5)	22.9 (2.0)
20-25	13.9 (1.2)	21.2 (1.8)	9.7 (1.1)	11.0 (0.9)	14.0 (0.7)
26-34	19.7 (1.0)	27.6 (1.6)	12.3 (1.3)	18.4 (1.1)	21.0 (0.7)
35 or older	23.0 (1.1)	28.8 (1.5)	12.5 (1.0)	24.5 (1.2)	24.5 (0.7)

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting criteria for being overweight. Estimates have not been adjusted for sociodemographic differences among Services. Overweight was defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.5.4. New guidelines for what is considered overweight were released in 1998 by the National Heart, Lung, and Blood Institute (NHLBI); however, estimates for this table were generated according to *Healthy People 2000* guidelines in order to evaluate progress toward those objectives. Table 7.3 presents data using the new NHLBI guidelines.

+Low precision.

^aDefined as being overweight by *Healthy People 2000* if BMI \geq 25.8 for men under age 20 or BMI \geq 27.8 for men aged 20 or older.

^bDefined as being overweight by *Healthy People 2000* if BMI \geq 25.7 for women under age 20 or BMI \geq 27.3 for women aged 20 or older.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Prevalence of Overweight, Q95-96).

Notably, in 1995 only a few groups in these two age ranges exceeded the goal of no more than 20% prevalence of overweight; thus, the prevalence of overweight among subgroups of the Military increased (Bray et al., 1995a). In contrast, with the exception of Navy women aged 26 to 34 (prevalence of 19.9%), estimates of overweight among military women aged 20 to 25 and 26 to 34 in the total DoD and each Service were all considerably lower than the objective of 20% set for the year 2000.

Attainment of the *Healthy People 2000* goal among personnel aged 35 or older was mixed. For all Marine Corps personnel (and for men and women separately) and for female personnel in the remaining Services (and hence the total DoD), the objective for overweight had been met. The prevalence of overweight among Marine Corps women aged 35 or older was very low (4.4%). All other groups and subgroups of personnel aged 35 or older had rates of overweight that exceeded 20%. For example, 24.5% of personnel aged 35 or older in the total DoD were overweight. The prevalence of overweight among Navy men aged 35 or older was particularly high (30.2%).

Comparing the 1998 findings to those of 1995 reveals an increase in the prevalence of overweight for the *Healthy People 2000* guidelines. As Table 3.3 indicates, for personnel under age 20, the percentage considered overweight increased by approximately 4% from 1995 to 1998. For those aged 20 or older, the percentage considered overweight increased by about 3% during that period. This change was statistically significant for those 20 or older. This increase is evident for most of the groups and subgroups in the Military when comparing data in Table 7.1 to those of 1995. The percentage increase in the prevalence of overweight varied from less than 1% to more than 7%. For example, in 1995 20.8% of Navy men under age 20 were considered overweight compared with 28.8% in 1998. And among Army women aged 35 or older, the percentage of those overweight increased from 14.8% in 1995 to 18.1% in 1998. Only for all women under age 20, Air Force and Marine Corps women aged 20 to 25, Marine Corps and Army women aged 26 to 34, Air Force women and Marine Corps men aged 35 or older, and all Air Force personnel aged 35 or older did the prevalence of overweight decrease between 1995 and 1998 (Bray et al., 1995a). Given this increase since 1995, it is not surprising that more subgroups of personnel aged 20 to 25 and 26 to 34 did not meet the *Healthy People 2000* objective, as mentioned earlier. Moreover, these findings highlight an important area that deserves attention, given the health problems discussed earlier that can result from being overweight.

Readers should use caution, however, in interpreting these estimates, and particularly those for younger personnel, because the BMI may overestimate somewhat the percentages of military personnel who are overweight. The BMI system does not distinguish between weight due to muscle and weight due to fat (Harrison, Brennan, & Shilanskis, 1998). Thus, some of these personnel who are classified as overweight may still have percentage body fat measurements that are within acceptable ranges for their

Services. Alternatively, some junior personnel may indeed be somewhat overweight upon entry to the Military but may still be within their Services' acceptable limits for percentage body fat. Once these personnel have been in the Military for a longer period of time and have been exercising regularly, their weights may eventually decrease. This interpretation may help explain why some estimates of overweight in older age groups were lower than the estimates among personnel under the age of 20. Nonetheless, the potential misclassifications that can result from using the BMI to evaluate who is considered overweight are important to remember. Indeed, current Military policy dictates that the decisive factor for who is considered overweight is percentage body fat (maximum 26% for males and maximum 36% for females) (DoD, 1995).

7.1.1.2 Underweight. Table 7.2 presents data on the percentages of military personnel considered underweight, by age and gender, calculated from self-reports of weight and height, using cutoff points suggested by Brownell and Fairburn (1995). Estimates of the prevalence of underweight in Table 7.2 were based on the BMI, or the ratio of a person's reported weight in kilograms to the square of that person's reported height in meters. As was indicated for overweight, estimates for prevalence of underweight were based only on those personnel whose reported heights were within the Services' acceptable height standards. Military men were defined as underweight if they had a BMI of less than 20.7, regardless of age. Military women were defined as underweight if they had a BMI of less than 19.1, regardless of age.

The findings in Table 7.2 indicate that being underweight was most common among younger individuals. For all personnel (and both males and females separately), the prevalence of underweight was highest among personnel under age 20. For example, about 12% of all military personnel under 20 were considered underweight compared with 6.8% of those aged 20 to 25, 2.7% of those aged 26 to 34, and only 2.3% of those aged 35 or older. Further, with the exception of Navy women, this pattern was visible within each Service. Notably, young male personnel showed higher rates of being underweight than young female personnel. Approximately 13% of men under age 20 in the total DoD met the criteria for being underweight, based on their self-reported weight and height. In contrast, only 9.1% of women aged 20 or younger in the total DoD were considered underweight. In addition, rates by Service varied according to gender in this age group. Among men under age 20, higher percentages of men in the Army and Air Force were underweight (16.0% and 17.4%, respectively) compared with the Navy and Marine Corps (11.5% and 7.9%, respectively). This pattern held for the under 20 age group in the total DoD. Among women under age 20, those in the Marine Corps and Air Force had higher rates of underweight (11.8% and 10.7%, respectively), while rates in the Army were lower (8.2%).

In addition to rates of underweight being highest among those under age 20, the data in Table 7.2 demonstrate a distinct pattern in the rates of underweight. In the total

Table 7.2 Prevalence of Underweight Active-Duty Personnel, by Age and Gender

Gender/Age Group	Service					Total DoD
	Army	Navy	Marine Corps	Air Force		
Males^a						
Under 20	16.0 (3.9)	11.5 (3.1)	7.9 (2.2)	17.4 (3.4)	13.1 (1.7)	
20-25	6.3 (0.6)	7.8 (1.9)	6.0 (0.8)	8.4 (2.3)	7.0 (0.7)	
26-34	2.2 (0.5)	2.5 (0.6)	2.5 (0.7)	2.6 (0.4)	2.4 (0.3)	
35 or older	1.3 (0.3)	3.6 (0.7)	1.6 (0.5)	1.9 (0.4)	2.2 (0.3)	
Females^b						
Under 20	8.2 (3.4)	+ (+)	11.8 (5.7)	10.7 (4.9)	9.1 (2.3)	
20-25	4.2 (1.4)	3.9 (1.3)	8.5 (2.2)	8.6 (1.2)	5.9 (0.7)	
26-34	2.7 (0.9)	5.8 (1.4)	5.4 (2.2)	4.9 (1.1)	4.4 (0.6)	
35 or older	2.1 (0.7)	5.1 (1.5)	4.0 (2.2)	2.8 (0.9)	3.2 (0.6)	
Total DoD						
Under 20	14.3 (3.0)	10.8 (2.8)	8.2 (2.4)	15.6 (2.9)	12.4 (1.5)	
20-25	5.9 (0.5)	7.1 (1.6)	6.2 (0.8)	8.5 (1.7)	6.8 (0.6)	
26-34	2.3 (0.5)	2.8 (0.5)	2.6 (0.7)	3.0 (0.4)	2.7 (0.3)	
35 or older	1.4 (0.3)	3.7 (0.6)	1.7 (0.5)	2.0 (0.4)	2.3 (0.2)	

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting criteria for being underweight. Estimates have not been adjusted for sociodemographic differences among Services. Underweight was defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.5.4. New guidelines for what is considered underweight were released in 1998 by the National Heart, Lung, and Blood Institute (NHLBI); however, estimates for this table were generated according to guidelines in Brownell and Fairburn (1995). Table 7.3 presents data using the new NHLBI guidelines.

+Low precision.

^aDefined as underweight by Brownell and Fairburn (1995) if BMI < 20.7 for men (regardless of age).

^bDefined as underweight by Brownell and Fairburn (1995) if BMI < 19.1 for women (regardless of age).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Prevalence of Underweight, Q95-96).

DoD (and for both men and women separately), the prevalence of underweight decreased as age increased. This same pattern held for the Army, Marine Corps, and Air Force, for the total DoD and for each gender separately. The Navy was the only Service where this pattern did not occur. Rather, among all personnel in the Navy, the percentage of underweight among those 35 or older (3.7%) was higher than among those 26 to 34 (2.8%). For females in the Navy, the percentage of underweight among those aged 26 to 34 was higher than among those aged 20 to 25 (5.8% vs. 3.9%, respectively). The pattern of decreasing prevalence of underweight as age increases is very likely due to natural body changes resulting from aging. Nonetheless, the high rates of underweight male personnel under age 20 suggest an area deserving further attention by the Military, particularly in view of research that has identified various health disorders associated with young men who were underweight (Lusky et al., 1996).

Additional key findings from Table 7.2 include the following:

- The prevalence of underweight among males aged 20 to 25 was higher than that of females (7.0% vs. 5.9%); this trend was reversed for those aged 26 to 34 and 35 or older. For all females aged 26 to 34, 4.4% were underweight compared with 2.4% of males. Among personnel aged 35 or older, 3.2% of women and 2.2% of men were underweight.
- There was little Service-level variation in the prevalence of underweight for males aged 20 to 25 and especially males aged 26 to 34. Rates for females in these two age groups, however, were more disparate. Rates of underweight for Marine Corps and Air Force women aged 20 to 25 (8.5% and 8.6%, respectively) were similar and higher than those of Army and Navy women in this age group (4.2% and 3.9%, respectively). For women aged 26 to 34, however, those in the Army had the lowest prevalence of being underweight (2.7%) compared with higher rates for the other three Services.
- Estimates of underweight for all Navy personnel aged 35 or older were much higher than estimates for the other three Services and the total DoD. For example, about 4% of Navy personnel aged 35 or older were underweight compared with 2.0% of Air Force personnel, 1.7% of Marine Corps personnel, 1.4% of Army personnel, and 2.3% of the total DoD.

Taken together, these data on underweight prevalence in the Military provide important baseline information that can be used to evaluate the trends among military personnel considered to be underweight.

Rates of overweight and underweight presented thus far have been based upon *Healthy People 2000* guidelines for overweight and Brownell and Fairburn (1995) for

underweight. As mentioned earlier, the NHLBI issued new weight guidelines in 1998 based on the BMI. These guidelines specify four levels of overweight for both men and women, regardless of age: overweight (BMI of 25.0 to 29.9); obesity (BMI of 30.0 to 34.9); obesity II (BMI of 35.0 to 39.9); and obesity III (BMI of 40.0 or greater). Further, the guidelines indicate that men and women, regardless of age, are considered underweight if their BMI is less than 18.5 (NHLBI, 1998). A report issued by the Military Family Institute (MFI) analyzed data collected from military personnel using these new criteria and found that a considerable percentage of the military population were considered overweight by the new guidelines (Harrison et al., 1998). Given this finding and these new guidelines, we felt it was important to present overweight and underweight data using both sets of criteria, for both 1995 and 1998. It is important to recognize, however, that the new NHLBI guidelines have not been adopted as new DoD standards. Rather, these data are presented for the purpose of comparing the 1995 and 1998 Worldwide data with the most recent recommendations. For these analyses, all four levels of overweight were aggregated such that an individual was considered overweight if his or her BMI was 25.0 or greater.

Table 7.3 presents the prevalence of overweight and underweight for the total DoD by gender for both 1995 and 1998 using the previous guidelines and the new NHLBI guidelines. As shown, the prevalence of underweight in the total DoD, as measured by previous guidelines, in both 1995 and 1998 was similar (5.0% in 1995 and 4.3% in 1998). For both years, rates for men and women were similar to the total DoD, though slightly more women were underweight than men. Measuring underweight using the new NHLBI guidelines revealed similar patterns. In both 1995 and 1998, the prevalence of underweight in the total DoD was comparable (0.9% in 1995 and 0.8% in 1998). In addition, rates for being underweight were higher for women, though under these new guidelines a much higher percentage of women, as compared to men, were considered underweight. For example, using previous guidelines, 4.9% of women and 4.2% of men were underweight in 1998. Using NHLBI guidelines, 2.8% of women and 0.4% of men were underweight. The more striking difference, however, in the rates of underweight for the two different criteria is the large decrease in the prevalence of underweight when using NHLBI criteria. As stated above, for the military population as a whole, about 5% of personnel in 1995 and about 4% of personnel in 1998 would be considered underweight using the previous guidelines. Based on the NHLBI guidelines, this rate dropped to about 1% of the total DoD for both 1995 and 1998. This same pattern held for both males and females in both years, though the rates for males exhibited a greater percentage decrease. The estimates for all personnel are roughly identical to those found by Harrison et al. (1998).

Table 7.3 Comparison of the Prevalence of Overweight and Underweight Active-Duty Personnel, 1995 and 1998, by Gender, Using Previous Guidelines and 1998 NHLBI Guidelines

	1995		1998	
	Previous Guidelines	NHLBI Guidelines	Previous Guidelines	NHLBI Guidelines
Underweight^a				
Male	5.0 (0.3)	0.7 (0.1)	4.2 (0.3)	0.4 (0.1)
Female	5.2 (0.4)	2.7 (0.3)	4.9 (0.4)	2.8 (0.3)
Total DoD	5.0 (0.2)	0.9 (0.1)	4.3 (0.2)	0.8 (0.1)
Overweight^b				
Male	17.6 (0.4)	53.0 (0.6)	20.7 (0.5)	57.2 (0.5)
Female	8.1 (0.7)	21.0 (0.9)	9.4 (0.6)	25.4 (1.0)
Total DoD	16.4 (0.4)	49.0 (0.6)	19.1 (0.5)	52.9 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel meeting the criteria for the weight categories indicated. Weight categories were defined in terms of the Body Mass Index (BMI). Definitions of BMI are given in Section 2.5.4.

^aDefined as being underweight by Brownell and Fairburn (1995) if BMI < 20.7 for men (regardless of age) and < 19.1 for women (regardless of age). National Heart, Lung, and Blood Institute (NHLBI) 1998 guidelines define underweight as BMI < 18.5 for men and women (regardless of age).

^bDefined as being overweight by *Healthy People 2000* guidelines if BMI ≥ 25.8 for men under age 20 or BMI ≥ 27.8 for men aged 20 or older. For women, defined as being overweight by *Healthy People 2000* guidelines if BMI ≥ 25.7 for women under age 20 or BMI ≥ 27.3 for women aged 20 or older. NHLBI 1998 guidelines define four levels of overweight, regardless of age or gender: (1) overweight (BMI of 25.0 to 29.9); (2) obesity I (BMI of 30.0 to 34.9); (3) obesity II (BMI of 35.0 to 39.9); and (4) extreme obesity (BMI of 40.0 or greater). For these analyses, these four levels were aggregated such that personnel were considered overweight if their BMI was ≥ 25.0.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (1998 Questions: Prevalence of Overweight and Underweight, Q95-96).

The data for overweight presented in Table 7.3 indicate that for all military personnel, using the *Healthy People 2000* guidelines, the prevalence of overweight increased slightly from 1995 to 1998. This finding is consistent with data presented in Table 3.3 by age group and information. About 16% of personnel in 1995 would be considered overweight compared with about 19% of personnel in 1998. For both years, a much higher percentage of men than women were overweight (17.6% vs. 8.1% in 1995, and 20.7% vs. 9.4% in 1998). Basing overweight prevalence on the new NHLBI standards revealed a marked increase in the percentage of personnel considered overweight. For the total DoD, about 49% in 1995 and about 53% in 1998 had a BMI of 25.0 or greater and would be considered overweight. These rates were over 2.5 times higher than the prevalence rates as measured by the *Healthy People 2000* criteria. Notably, the prevalence rates for the total DoD for both years are similar to, but slightly below, those measured by Harrison et al. (1998). The authors reported that over half (55%) of all military personnel had a BMI of 25.0 or greater using the new NHLBI guidelines. The fact that the DoD

estimates and the estimates by Harrison et al. (1998) converge substantiates the finding that the new guidelines inflate the percentage of military personnel considered to be overweight and thereby decrease the percentage considered to be underweight. Taken together, these findings provide baseline data that will be useful to the Military in considering the utility of the new guidelines for military purposes.

7.1.1.3 Exercise. Table 7.4 presents data on the percentages of military personnel who engaged in strenuous exercise at least 3 days per week for at least 20 minutes per occasion in the past 30 days. Focusing on those who reported that they engaged in one or both types of strenuous exercise (running, cycling, or walking or other strenuous exercise, such as swimming), slightly more than two-thirds of personnel in the total DoD engaged in regular strenuous physical exercise for 20 minutes or more at least 3 times a week. These rates, however, varied by Service. Approximately 79% of personnel in the Marine Corps and 85% in the Army engaged in regular strenuous exercise compared with approximately 50% and 59% of personnel in the Air Force and Navy, respectively. Considering the two types of exercise separately, a higher percentage of personnel, regardless of Service, engaged in running, walking, or bicycling. Nevertheless, for all self-reported types of exercise, the total DoD and the four Services were all considerably above the *Healthy People 2000* objective of 20% or greater for the general adult population. Given the emphasis on physical fitness as part of an overall goal of military readiness, this finding is not surprising.

Table 7.4 Involvement in Strenuous Exercise, Past 30 Days

Activity	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Run, cycle, or walk 20 minutes or more	81.7 (1.5)	52.3 (1.2)	72.8 (2.1)	42.1 (1.4)	61.9 (1.0)
Other strenuous exercise 20 minutes or more (e.g., swim- ming laps)	51.2 (0.9)	35.9 (1.2)	49.9 (1.6)	29.4 (0.8)	41.0 (0.6)
One or both types of strenuous exercise 20 minutes or more	84.8 (1.3)	58.9 (1.3)	78.6 (1.9)	50.0 (1.3)	67.7 (0.9)

Note: Table entries are percentages (with standard errors in parentheses) of personnel involved in strenuous exercise who engaged in the activity 3 to 4 days per week or more often in the past 30 days.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Run, Cycle or Walk, Q68A; Other Strenuous Exercise, Q68C).

7.1.2 Blood Pressure

7.1.2.1 Blood Pressure Screening and Awareness. Table 7.5 presents findings on blood pressure checks and awareness among military personnel. This table reports percentages of personnel who had their blood pressure checked in the 2 years preceding the survey and also knew the result. Personnel did *not* meet these criteria if they (a) most recently had their blood pressure checked more than 2 years before the survey, (b) could not recall when they last had their blood pressure checked, or (c) had their blood pressure checked within the past 2 years, but could not recall the result (e.g., high, low, normal). Because some personnel may have had their blood pressure checked in the past 2 years but reported that they could not recall when they last had it checked, the estimates in Table 7.5 may be somewhat conservative.

Healthy People 2000 includes an objective stating that 90% or more adults should have had their blood pressure checked in the past 2 years and be able to state whether their blood pressure was normal or high. Overall, about 80% of personnel in the total DoD met these two criteria, which is approximately 10 percentage points below meeting the *Healthy People 2000* objective. The Air Force had the highest percentage of personnel having had a recent blood pressure check and remembering the result (82.6%), followed by the Navy (81.4%), the Army (80.0%), and the Marine Corps (74.3%). Although the *Healthy People 2000* goal for blood pressure screening and awareness was not attained, the 1998 results represent an approximately 4 percentage point improvement from 1995. This change was statistically significant.

Some sociodemographic characteristics were associated with an increased likelihood of having had one's blood pressure checked within the past 2 years and being able to recall the result (Table 7.5). Females were slightly more likely than males to meet these criteria in both the total DoD (82.3% vs. 80.1%) and within each Service. This disparity was largest in the Marine Corps, in which 5.0% more women met the criteria than did men (79.0% vs. 74.0%). In the total DoD, non-Hispanic Caucasians (81.8%) were the most likely racial/ethnic group to meet these criteria, and Hispanics (75.6%) were the least likely racial/ethnic group to meet them. Higher education was associated with a greater likelihood of having had one's blood pressure checked in the past 2 years and remembering the result. In the total DoD, about 89% of college graduates met these criteria compared to about 81% of those with some college education and approximately 73% of those with an education level of high school or less. This pattern of higher educational attainment being associated with an increased likelihood of having had one's blood pressure checked and remembering the result also held within each Service. Higher age also was associated with a greater likelihood of meeting these two criteria in the total DoD and within each Service. In the total DoD, 88.2% of those 35 or older had their blood pressure checked in the past 2 years and remembered the result compared to 82.6% of those aged 26 to 34, 74.2% of those

Table 7.5 Blood Pressure Screening and Awareness, by Selected Sociodemographic Characteristics

Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	79.7 (1.1)	81.2 (1.0)	74.0 (1.3)	82.5 (1.1)	80.1 (0.6)
Female	81.9 (1.4)	82.3 (2.3)	79.0 (1.6)	83.2 (1.2)	82.3 (0.9)
Race/Ethnicity					
Caucasian, non-Hispanic	82.0 (1.2)	83.1 (1.0)	75.8 (1.6)	82.9 (1.2)	81.8 (0.6)
African American, non-Hispanic	78.6 (1.5)	78.2 (2.4)	74.9 (1.8)	83.5 (2.0)	79.1 (1.0)
Hispanic	76.8 (2.4)	75.1 (3.0)	69.8 (2.4)	78.7 (2.1)	75.6 (1.3)
Other	73.8 (3.2)	80.3 (2.9)	69.5 (4.3)	83.0 (3.1)	78.0 (1.7)
Education					
High school or less	73.4 (1.5)	75.1 (1.5)	69.9 (1.3)	73.6 (1.8)	73.2 (0.8)
Some college	80.0 (1.2)	83.4 (1.8)	76.0 (1.7)	82.1 (1.3)	81.1 (0.7)
College graduate or higher	89.1 (1.3)	88.4 (1.0)	87.6 (2.0)	89.4 (1.3)	88.9 (0.7)
Age					
20 or younger	69.6 (2.9)	72.7 (3.4)	66.5 (1.5)	70.2 (2.8)	69.5 (1.5)
21-25	73.9 (1.4)	74.5 (1.8)	69.6 (1.6)	77.8 (2.6)	74.2 (0.9)
26-34	83.0 (1.3)	81.3 (1.1)	80.5 (1.6)	84.1 (0.9)	82.6 (0.6)
35 or older	89.5 (0.9)	88.5 (1.0)	86.3 (1.6)	87.2 (1.3)	88.2 (0.6)
Total	80.0 (1.0)	81.4 (0.8)	74.3 (1.3)	82.6 (1.1)	80.4 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who had their blood pressure checked in the 2 years prior to the survey and who knew the result. Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Blood Pressure Screening and Awareness, Q97-98; refer to Section 2.5.1 for descriptions of sociodemographic variables).

aged 21 to 25, and only 69.5% of those aged 20 or younger. No demographic subgroup of the DoD met the *Healthy People 2000* objective for blood pressure checks, but those older and those with higher educational attainment came closest among subgroups of the DoD.

These findings do not necessarily mean that younger or less educated military personnel are less likely to have had their blood pressure checked. They may indicate that these personnel are less likely to be aware of when they last had their blood pressure checked or to be aware of the result of their most recent check. Thus, efforts geared toward increasing the percentages of personnel who had their blood pressure checked in the past 2 years and can state the result could focus on (a) increasing the number of personnel who have had their blood pressure checked in the past 2 years or (b) implementing strategies to communicate blood pressure results more effectively.

7.1.2.2 High Blood Pressure Advice or Interventions. Table 7.6 reports percentages of personnel who had ever been told by a health care provider that they had high blood pressure (hypertension). These estimates do not include women who had high blood pressure during pregnancy only. In total, an estimated 14.2%, or approximately one in seven, of all active-duty military personnel in 1998 had ever been diagnosed as having hypertension. The overall lifetime rates of high blood pressure in the Navy (15.3%) and Army (14.9%) were higher than the rate for the total DoD, while the overall rates in the Air Force (13.0%) and Marine Corps (12.4%) were lower.

Table 7.6 also presents information on the different types of medical advice or intervention related to lowering blood pressure received by military personnel who had ever been told that they had hypertension (lifetime hypertensives). Types of advice or intervention we asked about in the questionnaire include the following:

- prescribing blood pressure medication,
- advising dietary changes to reduce a person's weight,
- advising reductions in sodium intake, and
- recommending exercise.

About two-thirds of military personnel (65.6%) who had a history of high blood pressure had been advised to take one or more of the actions we asked about in the questionnaire. Air Force personnel (72.0%) were most likely among Services to have been advised to take one or more of these actions, while Marine Corps personnel were least likely (54.0%) to have been so advised.

Recommendations to reduce salt intake and to exercise were the most common forms of medical advice given to lifetime hypertensives in the total DoD (51.3% and 50.3%, respectively). About 28% of personnel with a history of high blood pressure in the total

Table 7.6 Actions Taken to Control High Blood Pressure

Characteristic	N	Service				Total DoD
		Army	Navy	Marine Corps	Air Force	
Lifetime History of High Blood Pressure	17,166 ^a	14.9 (0.8)	15.3 (0.8)	12.4 (1.3)	13.0 (0.7)	14.2 (0.4)
Advice Given to Lifetime Hypertensives^b	2,446 ^c					
Medication prescribed		19.0 (2.0)	26.7 (2.5)	13.6 (1.6)	21.6 (2.0)	21.3 (1.1)
Diet to reduce weight		23.7 (2.5)	34.7 (2.7)	14.4 (1.7)	32.3 (2.2)	28.2 (1.3)
Decrease salt intake		51.8 (2.0)	52.5 (3.4)	41.6 (3.4)	53.1 (1.9)	51.3 (1.3)
Exercise		37.7 (2.1)	59.7 (2.4)	30.1 (2.2)	64.0 (2.0)	50.3 (1.4)
Any of the above		61.0 (2.4)	69.8 (2.5)	54.0 (1.8)	72.0 (1.5)	65.6 (1.3)
Action Being Taken by Lifetime Hypertensives^d	2,446 ^c					
Take prescribed medication		10.3 (1.7)	17.4 (2.1)	6.9 (1.1)	15.4 (1.5)	13.2 (0.9)
Diet to reduce weight		12.5 (1.7)	19.5 (1.8)	7.6 (1.2)	18.1 (1.4)	15.4 (0.9)
Decrease salt intake		27.9 (1.8)	34.4 (3.0)	22.8 (2.3)	35.7 (2.3)	31.1 (1.3)
Exercise		26.1 (2.1)	41.2 (2.1)	20.4 (2.2)	41.4 (2.2)	33.7 (1.2)
Any of the above		40.9 (3.1)	52.5 (2.3)	33.4 (2.9)	53.2 (1.4)	46.5 (1.4)
Action Being Taken by Probable Current Hypertensives^e	996 ^f					
Take prescribed medication		15.9 (2.5)	22.4 (3.5)	11.8 (2.3)	23.7 (3.2)	19.0 (1.6)
Diet to reduce weight		15.2 (2.8)	27.4 (3.6)	9.3 (1.9)	26.0 (2.8)	20.3 (1.6)
Decrease salt intake		30.8 (3.0)	33.0 (3.8)	30.0 (4.0)	48.8 (2.4)	35.6 (1.8)
Exercise		29.1 (3.0)	45.1 (4.5)	26.1 (2.7)	55.3 (3.9)	39.3 (2.0)
Any of the above		47.0 (4.7)	56.6 (4.2)	44.0 (2.9)	67.1 (2.7)	54.0 (2.3)

Note: Table entries are percentages (with standard errors in parentheses).

^aUnweighted number of respondents in the total DoD sample who answered the question about blood pressure.

^bAdvice given by a health care provider, such as a doctor or other health professional.

^cUnweighted number of respondents in the total DoD sample who had ever been told they had high blood pressure.

^dEstimates based on personnel with a lifetime history of high blood pressure. Personnel "taking action" are those who were advised by a health care provider to take a particular action to control high blood pressure and were following this advice at the time of the survey.

^eDefined as personnel who (a) had ever been told they had high blood pressure; (b) had their blood pressure checked in the past 2 years; and (c) last blood pressure reading was high.

^fUnweighted number of respondents in the total DoD sample who (a) had ever been told they had high blood pressure, (b) had their blood pressure checked in the past 2 years, and (c) whose last blood pressure reading was high.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Lifetime History of High Blood Pressure, Q99; Advice, Q101A-C; Medication Prescribed, Q100; Action Taken, Q102A-C and F).

DoD were advised to diet to reduce their weight, and only about 21% of such personnel were prescribed blood pressure medication.

The lower rates of personnel receiving prescriptions for blood pressure medication may mean that military health care providers were attempting to control personnel's high blood pressure first by recommending behavioral changes before prescribing medication. Another possibility is that some of these personnel may have had borderline hypertension that is potentially controllable without medication. The low rate of medication being prescribed for military personnel with a history of high blood pressure may reflect the younger age composition of the Military, health and fitness standards for enlistment that can screen out less healthy applicants, the Military's emphasis on fitness and readiness, and the almost universal access to preventive medical services in the Military. This access to medical services in the Military means that hypertension may be detected relatively early and at less seriously elevated levels.

These estimates of medical advice given to military personnel may be somewhat conservative because they are based on survey respondents' ability to recall whether they had been given a particular form of advice to control their high blood pressure. Thus, some respondents with a history of high blood pressure may have been advised to take one or more of these actions but did not report this on the survey. In addition, some personnel may have been advised to take actions to control their high blood pressure that we did not ask about in the survey.

7.1.2.3 Actions to Control High Blood Pressure. Table 7.6 also indicates percentages of military personnel with a lifetime history of high blood pressure who (a) had been advised by a health care provider to take a particular action to control their high blood pressure, and (b) were currently following this advice.

Overall, less than half of personnel who had a lifetime history of high blood pressure (46.5%) were currently taking one or more of these four recommended actions to control their high blood pressure. The rate for the Marine Corps was lower than the corresponding rates for the total DoD and the other Services. Specifically, among personnel with a history of high blood pressure, about 53% of those in the Navy and Air Force were currently following one or more of these four recommendations compared to about 41% of those in the Army and approximately 33% of those in the Marine Corps. Of those advised to reduce salt intake, about 31% of DoD personnel were taking action to follow this advice. Among those in the total DoD advised to exercise, about 34% were acting on that advice.

Lower percentages of DoD personnel with a lifetime history of high blood pressure were currently dieting or taking blood pressure medication (15.4% and 13.2%,

respectively). The lower rates of personnel currently taking blood pressure medication, however, may reflect changes in the form of intervention to reduce or control their blood pressure. Specifically, if some personnel's blood pressure had been lowered sufficiently through medication, they may have been taken off the medication completely, in the hope that their blood pressure could be controlled through behavioral changes.

A *Healthy People 2000* objective for people with high blood pressure is that 90% or more should be taking action to control their condition. Considering personnel who have had a lifetime history of high blood pressure in the total DoD, our findings indicate that only about half were currently taking action (46.5%). Some of these personnel, however, may not have been taking current action because their blood pressure had returned to normal. In addition, they may have been taking other actions that we did not ask about on the questionnaire. Nevertheless, those personnel who had a history of high blood pressure but were not taking any of these actions to control their high blood pressure are a group at increased risk for a recurrence of hypertension. This percentage increased from 50.7% to 53.5% between 1995 and 1998.

Table 7.6 also reports actions to control blood pressure among probable current hypertensives: the subset of personnel with a lifetime history of high blood pressure who (a) had ever been told they had high blood pressure, (b) had their blood pressure checked within the past 2 years, and (c) reported that their last blood pressure reading was high. Among these probable current hypertensives, 54.0% were taking one or more of the actions shown in Table 7.6. This rate was still far below the *Healthy People 2000* objective of at least 90% of people with high blood pressure taking action to control their hypertension and also was below the 1995 rate of 60.6%. Probable current hypertensives in the Air Force (67.1%) were the most likely to report taking one or more actions to control high blood pressure, followed by personnel in the Navy (56.6%), Army (47.0%), and Marine Corps (44.0%).

Considering these probable current hypertensives, the most common actions taken to control blood pressure were exercise (39.3%) and dietary changes to decrease salt intake (35.6%). About one in five of these personnel were dieting to lose weight, and 19.0% were taking prescribed blood pressure medication. For each of the four actions we studied, personnel in the Marine Corps were least likely among Services to report taking the action. For example, although about 16% to 27% of probable current hypertensives in the Army, Navy, and Air Force reported that they were dieting to reduce weight in order to control their high blood pressure, only about 9% of probable current hypertensives in the Marine Corps reported doing so.

7.1.3 Cholesterol

Table 7.7 presents findings on recency of cholesterol screening. Findings are displayed for specific age groups and for the overall total DoD and Service populations because requirements for cholesterol screening tend to be age-dependent. As indicated by Woodruff and Conway (1991), for example, Navy regulations do not require personnel under the age of 25 to be screened for cholesterol, whereas they do require that personnel between the ages of 25 and 49 have their cholesterol checked once every 5 years and that personnel between the ages of 50 and 59 have theirs checked once every 2 years.

Approximately 62% of personnel in the total DoD and more than 65% of Army and Air Force personnel had their cholesterol checked within the preceding 5 years. In comparison, slightly more than 64% of all Navy personnel and slightly more than 41% of all Marine Corps personnel had their cholesterol checked within the past 5 years. These overall rates for the total DoD, Army, Navy, and Air Force were somewhat lower than the *Healthy People 2000* target of 75% of adults having their cholesterol checked within the preceding 5 years. The overall rate for the Marine Corps was considerably lower than this target of 75%. The lower rate of cholesterol screening among Marine Corps personnel, however, may in part reflect the younger age composition of this Service; these younger personnel may not be required to have their cholesterol checked. Similarly, the fact that the overall rates for the Military were below the target of 75% may be due in part to the younger age composition of the Military relative to the age composition of the civilian population.

In addition, 16.5% were unable to recall when they last had their cholesterol checked. The inability to recall the recency of cholesterol screening was considerably higher among younger personnel (26.8% of personnel under the age of 25 vs. 11.5% of personnel aged 25 to 49). At least some of these personnel, however, might have had it checked in the past 5 years, and forgotten about it, or perhaps might have been unaware of it, if the test were performed as one of many in a standard battery of blood tests. Hence, the estimates of cholesterol screening in the past 5 years in Table 7.7 may be somewhat conservative.

Although the overall percentages of personnel in the total DoD and the Services who had their cholesterol checked within the past 5 years were all below the *Healthy People 2000* target of 75%, this objective was reached in 1998 among

- personnel aged 25 to 49 in the Army and Air Force (if the Air Force estimate is rounded), and
- personnel aged 50 or older in the total DoD, Army, Navy, and Marine Corps.

Table 7.7 Receiving Cholesterol Screening, by Age

Age Group/ Recency	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Under 25					
Within past 2 years	37.9 (2.7)	38.3 (2.2)	23.0 (1.3)	36.3 (3.9)	34.6 (1.4)
Within past 5 years	45.9 (3.0)	44.4 (1.9)	25.5 (1.3)	41.3 (4.0)	40.5 (1.5)
More than 5 years ago	0.7 (0.3)	1.3 (0.4)	1.6 (0.3)	1.3 (0.4)	1.1 (0.2)
Never	27.3 (2.6)	29.3 (1.4)	41.6 (1.8)	32.0 (2.7)	31.6 (1.3)
Don't know	26.1 (0.9)	25.0 (2.1)	31.3 (1.5)	25.4 (1.8)	26.8 (0.7)
Ages 25 to 49					
Within past 2 years	60.8 (1.9)	52.7 (1.4)	48.2 (1.9)	56.3 (2.1)	56.0 (1.0)
Within past 5 years	76.8 (1.5)	70.7 (1.3)	61.1 (1.9)	74.7 (2.0)	73.1 (0.9)
More than 5 years ago	4.0 (0.5)	3.9 (0.4)	3.7 (0.6)	8.0 (0.9)	5.2 (0.3)
Never	8.7 (0.7)	12.0 (0.9)	19.0 (0.9)	7.8 (0.8)	10.2 (0.4)
Don't know	10.5 (1.0)	13.3 (0.8)	16.2 (1.2)	9.6 (0.7)	11.5 (0.5)
Ages 50 or Older					
Within past 2 years	79.9 (3.9)	90.4 (3.4)	+ (+)	86.2 (5.7)	84.1 (2.5)
Within past 5 years	92.5 (2.7)	100.0 (**)	100.0 (**)	+ (+)	95.3 (1.8)
More than 5 years ago	7.5 (2.7)	** (**)	** (**)	+ (+)	4.1 (1.4)
Never	** (**)	** (**)	** (**)	** (**)	** (**)
Don't know	** (**)	** (**)	** (**)	2.0 (1.5)	0.6 (0.5)
Total					
Within past 2 years	52.3 (2.3)	49.4 (1.4)	34.2 (1.9)	51.2 (2.4)	49.1 (1.1)
Within past 5 years	65.3 (2.2)	64.4 (1.5)	41.4 (2.3)	65.9 (2.4)	62.4 (1.1)
More than 5 years ago	2.8 (0.3)	3.2 (0.3)	2.5 (0.3)	6.2 (0.6)	3.8 (0.2)
Never	15.6 (1.4)	16.2 (0.9)	31.5 (1.8)	14.1 (1.2)	17.3 (0.7)
Don't know	16.3 (1.0)	16.1 (1.0)	24.5 (1.2)	13.7 (0.8)	16.5 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Estimates do not sum to 100% because categories "within past 2 years" and "within past 5 years" are not mutually exclusive. Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Cholesterol Screening, Q103).

Indeed, among those aged 50 or older, 100% in the Navy and the Marine Corps had received cholesterol screening within the past 5 years. In addition, the percentage of personnel aged 25 to 49 in the total DoD who had their cholesterol checked within the past 5 years (73.1%) was close to the *Healthy People 2000* objective.

Although the estimate for screening in the past 5 years among Air Force personnel aged 50 or older was of low precision, the estimate for personnel aged 50 or older in that Service who had their cholesterol checked within the past 2 years was of acceptable precision and was above the *Healthy People 2000* target for screening in the past 5 years. This result suggests that this objective may have been reached among Air Force personnel aged 50 or older. In addition, more than 90% of Navy personnel aged 50 or older and more than 84% of personnel aged 50 or older in the total DoD had their cholesterol checked within the past 2 years. As noted above, these high rates of cholesterol screening in the past 2 years for personnel aged 50 or older are probably related to requirements for more frequent screening among this age group.

Table 7.8 shows estimates of the lifetime prevalence of elevated cholesterol among military personnel, related advice given by a health care provider, and behavioral changes undertaken to lower cholesterol. We based the lifetime history estimates according to whether survey respondents reported having ever been told by a doctor or other health professional that their cholesterol level was high.

In the total DoD population, 18.0% of all personnel had been told by a health care provider that they had elevated cholesterol at some point in their lives. Only 9.5% of Marine Corps personnel reported that they had a lifetime history of high cholesterol, again probably due in part to the younger age of members of that Service. The lower prevalence of elevated cholesterol among Marine Corps personnel also may reflect lower rates of cholesterol screening among those in younger age groups.

In the DoD as a whole, 1.7% of all personnel reported that they had been prescribed medication to help lower cholesterol, while 15.4% of all personnel had been told by a doctor or other health professional to reduce their dietary fat intake. In terms of actions taken to lower cholesterol, 1.0% of the total DoD population was following a health care provider's advice at the time of the survey. Almost 12% of all DoD personnel were cutting down on their dietary fat intake, on the advice of a health professional, to help lower their cholesterol. In each of the four Services, as well as the DoD overall, there were gaps between the percentages of personnel who received advice from a health care provider and those who reported that they were acting on the advice of a health care provider. The gaps indicate a certain level of noncompliance when it comes to making difficult behavioral changes in an effort to lower cholesterol levels.

Table 7.8 Actions Taken to Control High Cholesterol

Characteristic	N	Service				Total DoD
		Army	Navy	Marine Corps	Air Force	
Lifetime History of High Cholesterol		17.6 (1.3)	20.7 (1.2)	9.5 (0.9)	19.6 (0.8)	18.0 (0.6)
Advice^a	3,493 ^b					
Medication prescribed		1.4 (0.2)	2.0 (0.3)	0.9 (0.1)	2.2 (0.2)	1.7 (0.1)
Cut down on fat		14.8 (1.1)	18.0 (1.1)	7.9 (0.9)	16.9 (0.7)	15.4 (0.5)
Action Taken to Lower Cholesterol^c	3,493 ^b					
Taking medication		0.7 (0.2)	1.2 (0.2)	0.4 (0.1)	1.3 (0.2)	1.0 (0.1)
Cut down on fat		11.1 (1.0)	14.0 (0.8)	6.1 (0.6)	13.6 (0.7)	11.9 (0.5)

Note: Table entries for advice and action being taken are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

^aAdvice given by a health care provider, such as a doctor or health professional.

^bUnweighted number of respondents in the total DoD sample who have ever been told they have high cholesterol.

^cEstimated based on personnel with a lifetime history of high cholesterol. Personnel "taking action" are those who were advised by a health care provider to take a particular action to lower their cholesterol and are currently following that advice.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Lifetime History of High Cholesterol, Q104; Advice: Medication Prescribed, Q106, Cut Down on Fat, Q105; Action Taken: Taking Medication, Q107B, Cut Down on Fat, Q107A).

7.2 Injuries and Injury Prevention

A major effort in injury prevention is to reduce injuries sustained in motor vehicle crashes and motor vehicle fatalities. In 1997, an estimated 42,000 people were killed and 3.4 million people were injured in motor vehicle crashes (National Highway Traffic Safety Administration [NHTSA], 1997a). Research demonstrates, however, that seat belts are very effective in preventing injury and reducing the likelihood of death in motor vehicle crashes (NHTSA, 1996). Most States now have laws requiring motor vehicle occupants to use seat belts. As of September 1998, 49 States and the District of Columbia (DC) had mandatory seat belt use laws (Insurance Institute for Highway Safety [IIHS], 1998a).

Injuries to motorcyclists and bicyclists also are of concern. For example, in 1997, motorcycle and bicycle fatalities accounted for 5% and 2%, respectively, of all traffic fatalities (NHTSA, 1997a). Motorcycle and bicycle helmets, however, can decrease the risk of head injuries in a crash or fall (Sacks, Holmgreen, Smith, & Sosin, 1991; Sosin, Sacks, & Holmgreen, 1990; Thompson, Rivara, & Thompson, 1989). A recent study showed

motorcycle helmets to be 67% effective in preventing brain injuries (NHTSA, 1996). As of September 1998, 47 States and DC had laws requiring some motorcyclists (usually riders younger than age 20) or all motorcyclists to use helmets (IIHS, 1998b). Fewer States (only 15) had laws regarding bicycle helmet use, and these applied only to young riders (aged 16 or younger) (IIHS, 1998b).

In this section, we present findings from the 1998 DoD survey related to the prevalence of injuries requiring hospitalization and behaviors that are designed to reduce the risk of injury, such as seat belt use and helmet use. As part of this discussion, we compare 1998 survey findings with the following *Healthy People 2000* objectives:

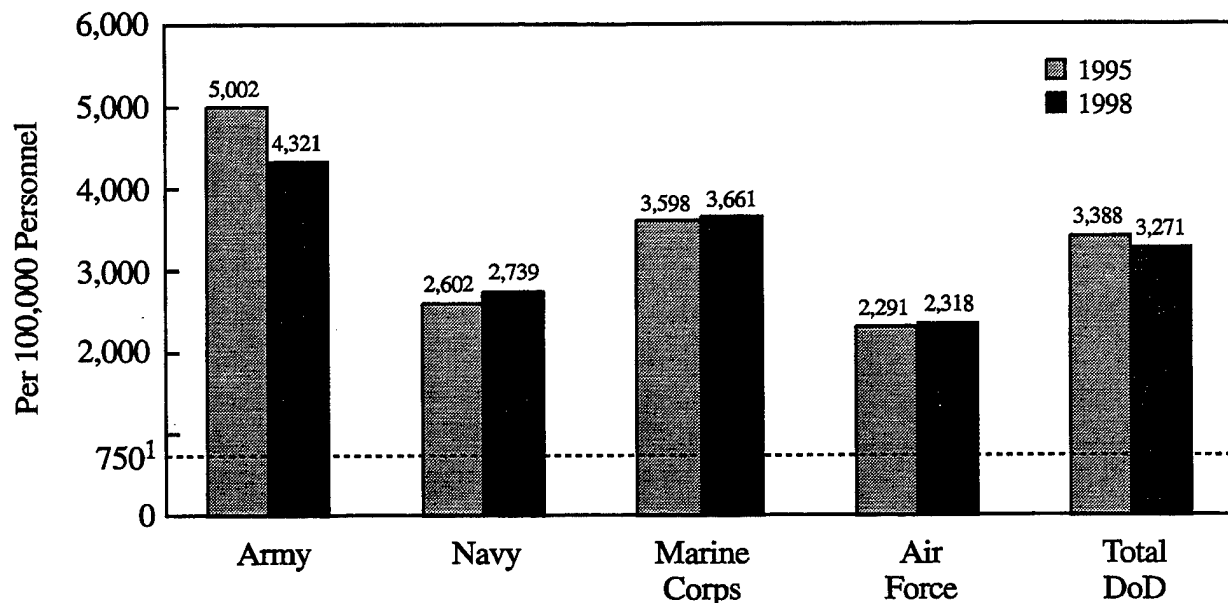
- reduce nonfatal unintentional injuries that require hospitalization to no more than 754 per 100,000 people;
- increase use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats, to at least 85% of motor vehicle occupants; and
- increase use of helmets to at least 80% of motorcyclists and at least 50% of bicyclists.

7.2.1 Prevalence of Injuries

Figure 7.1 compares prevalence estimates from the 1995 and 1998 DoD surveys of hospitalization for treatment of injuries in the 12 months prior to each survey. To obtain these estimates, we asked respondents whether they had any overnight hospital stays in the past 12 months for treatment of an injury. Unlike most other estimates in this report, which are expressed as percentages, the estimates shown in Figure 7.1 are presented as the number of personnel hospitalized for treatment of injuries per 100,000 active-duty personnel.

In the total DoD in 1998, 3,271 per 100,000 personnel were hospitalized for injuries. Among the Services, personnel in the Army were most likely to have been hospitalized (4,321 per 100,000); rates for the Air Force and the Navy were roughly comparable (2,318 per 100,000 and 2,739 per 100,000, respectively). Comparing 1998 rates to those of 1995, Figure 7.1 indicates that rates in hospitalizations for injuries did not change dramatically over the 3-year period. The only exception was exhibited by personnel in the Army, who reduced the rate of injuries from 5,002 per 100,000 in 1995 to 4,321 per 100,000 in 1998. The more striking information in this figure, however, is that the Military has extremely high rates of hospitalization for injuries, much above the *Healthy People 2000* goal, and that effort will be needed in each of the Services to reduce the prevalence of injuries requiring hospitalization to no more than 754 per 100,000 personnel by the year 2000. These findings also suggest the need for further research on injuries among military

Figure 7.1 Comparisons of Rates of Hospitalization for Injuries, by Service, 1995 and 1998



¹The *Healthy People 2000* goal is 754 injuries per 100,000 personnel.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (1998 Question: Hospitalization for Injuries, Q71).

personnel to gain a better understanding of possible reasons underlying these rates of hospitalization.

It should be noted that the *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The 1995 and 1998 DoD survey measure of hospitalization for injuries does not distinguish between unintentional injuries and intentional injuries. Intentional injuries are those that result from deliberate intent to harm an individual or oneself (e.g., assault, suicide) and differ from injuries that result from other agents or events (e.g., running injury, motor vehicle crash). To have examined the distinction between unintentional and intentional injuries in the survey would have required the addition of a series of questions and skip patterns. Due to space limitations and the expectation that few injuries experienced by military personnel would be intentional injuries, we decided to ask just about the overall rate of injuries. Because the number of hospitalizations due to intentional injuries is likely to be small, the high rate of hospitalizations for injuries for both 1995 and 1998 cannot be explained by *intentional* injuries.

Notably, efforts to address high rates of injury in the Military are under way. Recently, the Injury Prevention and Control Work Group of the Armed Forces Epidemiologic Board was formed to investigate the impact that injuries have on the health and readiness of the U.S. Armed Forces (Jones & Hansen, 1996). A report compiled by this work group examined various angles of the injury problem (including hospitalizations, disabilities, and deaths due to injury) and made recommendations for future research, surveillance, and prevention. Using hospital discharge data from 1992, the report identified sports injuries, motor vehicle crashes, and falls or jumps as major causes of hospitalization for injury among military personnel. The work group recommended that research be focused on the prevention of sports injuries and falls. In addition, military discharge databases were identified as very useful sources of surveillance information and were recommended to be used routinely (Smith, Dannenberg, & Runyan, 1996). Thus, this report provides important baseline information about the underlying causes of hospitalization due to injury among military personnel. Using these data as a benchmark and supplemental information routinely collected in military databases, the military can continually evaluate the underlying causes of hospitalization due to injury and work toward the *Healthy People 2000* goal.

7.2.2 Seat Belt Use

Table 7.9 shows percentages of personnel who wore seat belts always or nearly always when they drove or rode in an automobile. Altogether, a high percentage of personnel in the total DoD (and in all Services) used seat belts always or nearly always when they drove or rode in an automobile, although the rates varied somewhat. Air Force and Navy personnel reported higher rates of seat belt use (95.9% and 93.2%, respectively) compared with the Marine Corps and the Army (88.4% and 87.5%, respectively). In the total DoD, about 91% reported regular seat belt use. Seat belt use in the total DoD differed by gender, with women reporting regular seat belt use at a higher rate than that of men (96.2% vs. 90.7%). Nonetheless, these overall population rates are all above the *Healthy People 2000* target of use of occupant protection systems by at least 85% of motor vehicle occupants.

Consistent with civilian survey data that show the highest rates of seat belt use in States with the most stringent seat belt laws (Siegel et al., 1993), these high rates of seat belt use among military personnel probably reflect regulations requiring personnel to use seat belts when they are driving or riding in motor vehicles on military installations. Comparison of civilian survey data on seat belt use with actual observation of people in motor vehicles, however, suggests that survey respondents may overreport their seat belt use (Siegel et al., 1991). Indeed, a recent study of the civilian population in which seat belt use was observed found that 61% of passengers (in all vehicles) wore seat belts, a rate much lower than that of the total DoD (91.4%) (NHTSA, 1997b). To the extent that

Table 7.9 Seat Belt Use, by Gender and Age

Gender/Age Group	Service				
	Army	Navy	Marine Corps	Air Force	Total DoD
Male					
20 or younger	67.5 (5.1)	87.9 (4.3)	81.0 (2.7)	92.8 (2.6)	79.0 (2.6)
21-25	78.3 (3.0)	87.7 (2.7)	83.5 (1.3)	91.2 (1.4)	83.9 (1.4)
26-34	91.6 (1.5)	93.8 (1.1)	95.1 (0.6)	96.1 (0.8)	93.9 (0.6)
35 or older	95.3 (0.9)	96.0 (0.8)	96.0 (0.7)	98.2 (0.6)	96.5 (0.4)
Total	86.3 (1.8)	92.8 (1.2)	88.1 (0.7)	95.5 (0.5)	90.7 (0.7)
Female					
20 or younger	94.1 (3.0)	+ (+)	89.1 (2.5)	100.0 (NA)	94.8 (1.7)
21-25	94.6 (1.1)	93.9 (1.0)	91.7 (2.6)	97.4 (1.0)	95.2 (0.6)
26-34	94.2 (1.5)	97.2 (1.2)	96.6 (1.2)	96.3 (1.4)	95.8 (0.8)
35 or older	97.6 (0.7)	99.1 (0.6)	97.3 (1.5)	100.0 (NA)	98.9 (0.3)
Total	95.1 (1.0)	96.1 (0.7)	93.3 (1.2)	97.7 (0.6)	96.2 (0.4)
Total					
20 or younger	73.2 (4.5)	88.2 (3.4)	81.6 (2.5)	94.7 (2.1)	81.8 (2.2)
21-25	80.7 (2.6)	88.8 (2.4)	84.0 (1.2)	92.7 (1.1)	85.7 (1.2)
26-34	92.0 (1.4)	94.2 (0.9)	95.2 (0.6)	96.1 (0.8)	94.1 (0.6)
35 or older	95.6 (0.8)	96.3 (0.8)	96.1 (0.7)	98.4 (0.5)	96.8 (0.4)
Total	87.5 (1.7)	93.2 (1.1)	88.4 (0.6)	95.9 (0.5)	91.4 (0.7)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported that they used seat belts "always" or "nearly always" when driving or riding in a car. Personnel who reported that they did not drive or ride in a car were excluded from these analyses. Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

NA = Not applicable.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Seat Belt Use, Q72).

military personnel also may tend to overreport their seat belt use, readers are cautioned that these estimates of regular seat belt use among military personnel may overestimate somewhat the percentages of personnel who actually use their seat belts regularly.

Findings in Table 7.9 also indicate that age had an impact on regular seat belt use. Specifically, young men aged 21 to 25 in the Army and young men aged 20 or younger in the total DoD (especially in the Army) were less likely than other groups to report wearing a seat belt always or nearly always. Overall, in the total DoD, about 79% of men 20 or younger reported regular seat belt use. Approximately 78% of young men aged 21 to 25 in the Army used seat belts always or nearly always. The rate of seat belt use for men aged 20 or younger in the Army was particularly low (67.5%). All of these rates are considerably

below the *Healthy People 2000* goal of 85%. Rates for Marine Corps men aged 20 or younger were slightly below this goal (81.0%).

In contrast to the self-reported seat belt behavior of these groups of young men, rates among males aged 21 to 25 in the total DoD were close to the 85% goal for the year 2000 (83.9%). Marine Corps men in this age group also approached the 85% goal (83.5%). Moreover, the *Healthy People 2000* objective had been met or exceeded for all other age, gender, and Service subgroups in the Military. Notably, regardless of age group and across all Services, female personnel reported rates of regular seat belt use that were much higher than 85%, with 100% of Air Force women 20 or younger and those 35 or older indicating they wore seat belts always or nearly always. In addition, in each Service and age group, rates of seat belt use were higher for women than men.

Findings for males aged 26 to 34 and those aged 35 or older suggest that younger males who do not use their seat belts regularly may eventually "mature into" the behavior of regular seat belt use. In the meantime, however, the males aged 20 or younger and those aged 21 to 25 who reported not using seat belts regularly place themselves at increased risk of serious injury or death should they be involved in a serious motor vehicle crash. Given that males, and particularly young males, were more likely to be heavy alcohol users (as shown in Tables 4.4 and 4.8), and that alcohol is commonly involved in motor vehicle fatalities (CDC, 1998c; NHSTA, 1997a), young military men who do not wear seat belts and who also drink and drive would be further adding to their risk of serious injury or death in a motor vehicle crash. These findings suggest that the DoD and the Services may want to consider additional efforts to encourage seat belt use among young males in order to bring the rates of seat belt use among this group more closely into line with the rates of seat belt use among other groups in the Military and with the *Healthy People 2000* objective.

7.2.3 Helmet Use

Table 7.10 shows the percentages of motorcyclists and bicyclists who wore helmets "always" or "nearly always" when they rode a motorcycle or bicycle in the past 12 months. We based the estimates of helmet use by motorcyclists on those personnel who rode a motorcycle at least once in the past 12 months (unweighted $N = 4,429$). Similarly, we based the estimates of helmet use by bicyclists on those personnel who rode a bicycle at least once in the past 12 months (unweighted $N = 10,075$). Personnel who reported that they never rode a motorcycle in the past 12 months or who never rode a bicycle were excluded from these estimates.

Among personnel in the total DoD who rode a motorcycle at least once in the past 12 months, 75.9% wore helmets always or nearly always; rates for men and women were

Table 7.10 Helmet Use Among Motorcyclists and Bicyclists, Past 12 Months, by Gender

Gender	N	Service				Total DoD
		Army	Navy	Marine Corps	Air Force	
Males						
Motorcyclists	3,542	73.6 (1.6)	76.1 (2.0)	70.1 (2.4)	82.7 (1.5)	75.8 (0.9)
Bicyclists	8,213	47.2 (3.1)	40.4 (3.7)	31.9 (2.4)	49.1 (3.2)	44.0 (1.7)
Females						
Motorcyclists	887	69.5 (2.8)	75.1 (4.8)	77.5 (6.6)	82.8 (3.5)	76.0 (2.0)
Bicyclists	1,862	47.9 (3.3)	44.2 (4.2)	30.6 (4.4)	48.1 (4.1)	46.3 (2.1)
Total						
Motorcyclists	4,429	73.2 (1.5)	76.0 (2.1)	70.5 (2.4)	82.7 (1.4)	75.9 (0.9)
Bicyclists	10,075	47.3 (2.9)	40.8 (3.6)	31.8 (2.4)	48.9 (3.2)	44.2 (1.7)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported wearing helmets "always" or "nearly always" when they rode a motorcycle or bicycle. *N*'s are unweighted counts of respondents in the total DoD sample who rode a motorcycle or bicycle in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Helmet Use for Motorcyclists, Q75; for Bicyclists, Q77).

similar. These overall rates for the Military were slightly below the *Healthy People 2000* objective of increasing helmet use to at least 80% of motorcyclists. The rate of regular helmet use among all Air Force personnel exceeded the *Healthy People 2000* goal, with about 83% reporting that they wore helmets always or nearly always; rates for Air Force men and women were similar to this rate. In addition, rates among Marine Corps women were close to this objective (77.5%). Army and Navy men and Navy women also reported rates of regular helmet use higher than 70% but slightly lower than the *Healthy People 2000* goal (73.6%, 76.1%, and 75.1%, respectively).

Progress in motorcycle helmet use also can be measured by comparing results to those of the Military in 1995. Notably, with the exception of Marine Corps women, self-reported rates of helmet use for the Military were higher than those reported in 1995. As shown in Table 3.3, the prevalence of helmet use in the total DoD discussed above represents a significant increase from 71.0% reported in 1995. Reported regular helmet use among Air Force women rose from 73.8% in 1995 to 82.8% in 1998 (Bray et al., 1995a). These results suggest that injury prevention efforts in the Military are yielding results. Given that the goal of 80% helmet use has not been achieved by all personnel, however, these findings indicate that some additional efforts may still be needed to encourage regular helmet use by motorcyclists in the Military.

Rates of bicycle helmet use reported in 1998 are very encouraging. Of DoD personnel who reported riding a bicycle at least once in the past 12 months, about 44% indicated that they always or nearly always wore a helmet. Rates for men were similar to the total DoD, while about 46% of women reported regular bicycle helmet use. These rates represent a marked increase since 1995, when only approximately 23% of all personnel indicated that they regularly wore helmets when bicycling (Bray et al., 1995a). Moreover, the 1998 rates approached the *Healthy People 2000* goal of increasing helmet use to 50% of bicyclists.

Examining bicycle helmet use by Service also reveals important progress. Air Force personnel reported the highest overall rate (48.9%) of regular helmet use, which was closest to the *Healthy People 2000* goal. Rates for personnel in other Services ranged from approximately 32% to almost 47%. In all branches of the Military, rates of regular bicycle helmet use were similar for men and women. Although rates for some personnel were not close to the *Healthy People 2000* goal, it is important to recognize that reported rates of bicycle helmet use among all Services (for both genders) increased since 1995 and in many instances the rates more than doubled. For example, 18.6% of all Army personnel in 1995 reported regular bicycle helmet use, and in 1998 these rates rose to 47.3% (Bray et al., 1995a). This large increase in the percentage of bicyclists who reported that they wore helmets regularly when they rode indicates an important trend in adherence to injury prevention behaviors and suggests that Military personnel may soon achieve and surpass the goal set for helmet use among bicyclists.

7.3 Sexually Transmitted Disease Risk Reduction

Although either abstinence from sexual intercourse or sexual activity within a mutually monogamous relationship is the most effective means of preventing sexually transmitted diseases (STDs, including AIDS), proper use of latex condoms can reduce the risk of contracting STDs among individuals who are sexually active but not in a monogamous relationship. In the United States, failure of condoms to prevent transmission of disease is due more often to improper use than to product defects (CDC, 1988c).

In this section, we present findings on military personnel's STD histories, condom use among sexually active unmarried personnel, and their beliefs about AIDS transmission. As part of this discussion, we compare findings on condom use among sexually active unmarried personnel with the following *Healthy People 2000* objective:

- increase to more than 50% the proportion of sexually active, unmarried people who used a condom at last sexual intercourse.

7.3.1 Prevalence of Sexually Transmitted Disease

Table 7.11 presents findings on the prevalence of STDs among military personnel over their lifetime and over the past 12 months. To estimate the lifetime prevalence of STDs, we asked personnel a "yes/no" question regarding whether they had ever had an STD in their entire lives. To help make it clear for personnel what we meant by "sexually transmitted disease," we also provided the following examples of STDs: gonorrhea, syphilis, chlamydia, or genital herpes. In our examples of STDs, we did not specifically mention such diseases as hepatitis B or HIV/AIDS, for which sexual transmission is a major route of infection, because important routes of nonsexual transmission also exist for these diseases.

As shown in Table 7.11, approximately 19% of all personnel in the total DoD, and approximately 21% of all personnel in the Navy, had an STD at least once in their lives; rates for military men in the total DoD and the individual Services were comparable to the overall rates. Among military women, the lifetime prevalence of STDs was approximately 26% for women in the total DoD and the Navy, 22% for Air Force women, 23% for Marine Corps women, and closer to 30% for women in the Army.

Table 7.11 Prevalence of Sexually Transmitted Disease, by Gender

Gender/Time Period	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Males					
Lifetime	18.3 (1.1)	20.2 (1.0)	15.8 (1.3)	15.4 (1.2)	17.7 (0.6)
Past 12 months	0.2 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (0.1)	0.1 (**)
Females					
Lifetime	29.5 (1.7)	26.3 (2.1)	23.3 (1.9)	22.2 (1.4)	25.8 (1.0)
Past 12 months	0.6 (0.2)	0.5 (0.3)	0.5 (0.2)	** (**)	0.4 (0.1)
Total					
Lifetime	19.9 (1.2)	20.9 (1.0)	16.2 (1.2)	16.6 (1.1)	18.8 (0.6)
Past 12 months	0.2 (0.1)	0.1 (0.1)	0.2 (0.1)	0.1 (**)	0.2 (**)

Note: Table entries are percentages of personnel (with standard errors in parentheses) who had had an STD in their lifetime or the past 12 months. Estimates have not been adjusted for sociodemographic differences among Services.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Sexually Transmitted Disease: Lifetime Q120, Past 12 Months, Q119).

Findings from the 1995 survey showed a clear, direct relationship between a person's lifetime number of sexual partners and the lifetime prevalence of STDs; this relationship held for both military men and women and across the Services (Bray et al., 1995a). A person's lifetime number of partners, however, is only part of the explanation for the lifetime prevalence of STDs. Another part of the explanation is related to gender. The 1998 data indicate a cause for concern over the lifetime prevalences among women, which were substantially higher than those among men. A similar difference between women and men is seen in the civilian population and may reflect the greater efficiency of STD transmission from male to female rather than from female to male in heterosexual intercourse (Fleming et al., 1997).

Less than 1% (0.2%) of all personnel in the total DoD had had an STD in the past 12 months, and this was true for both women and men across the individual Services. This very low level of disease in the past 12 months may be deceptive. These low numbers for the past 12 months probably underrepresent the true STD burden given the chronic and incurable viral infections carried in the population at any given time. Such infections include the herpes simplex virus (HSV) and the human papilloma virus (HPV), the viruses that cause genital herpes and genital warts. Genital HSV is one of the most common STDs in the United States, with HSV (type 2) detected in approximately one in five persons aged 12 years or older (Fleming et al., 1997). Even though the 1998 DoD survey questionnaire asked respondents about their experience with STDs in the past 12 months and specifically named genital herpes, it is possible that respondents did not answer affirmatively if a chronic viral STD was present prior to the past 12 months, or if they had an infection that was asymptomatic.

7.3.2 Condom Use

Table 7.12 presents findings on correlates of condom use at last encounter among sexually active unmarried personnel in the Military. For these estimates, we defined "sexually active" personnel as those who had vaginal or anal intercourse in the 12 months prior to the survey. For consistency with 1995 estimates, the 1998 estimates do not include personnel who were living as married with other individuals.

Approximately 42% of unmarried personnel in the total DoD and the Services who were sexually active in the 12 months before the 1998 survey used a condom the last time they had intercourse. These rates were all lower than the *Healthy People 2000* objective of condom use at the last episode of sexual intercourse by at least 50% of sexually active unmarried individuals, with the Army and Marine Corps somewhat closer to the objective than the Air Force and Navy.

Table 7.12 Condom Use at Last Encounter Among Sexually Active Unmarried Personnel, by Selected Sociodemographic Characteristics

Characteristic/Group	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
All Sexually Active Unmarried Personnel	44.3 (2.2)	38.9 (1.9)	42.4 (0.9)	40.3 (1.6)	41.8 (1.0)
Gender					
Male	46.2 (2.4)	40.4 (2.3)	43.7 (1.0)	42.0 (2.1)	43.4 (1.1)
Female	35.8 (2.7)	31.3 (2.6)	24.2 (3.7)	34.8 (2.7)	33.8 (1.5)
Age					
20 or younger	48.9 (3.3)	37.5 (5.4)	44.3 (2.1)	48.2 (3.2)	46.0 (1.8)
21-25	44.4 (3.1)	43.8 (3.9)	42.4 (1.6)	45.1 (2.7)	44.0 (1.6)
26-34	41.4 (3.7)	38.9 (3.2)	43.0 (4.9)	35.1 (3.1)	39.0 (1.8)
35 or older	40.2 (2.9)	25.7 (4.8)	28.0 (4.7)	29.8 (5.0)	31.7 (2.5)
Education					
High school or less	44.2 (2.5)	44.9 (2.4)	42.5 (1.2)	45.4 (4.1)	44.2 (1.3)
Some college	45.2 (3.3)	30.9 (3.4)	41.1 (2.4)	38.6 (1.7)	39.6 (1.5)
College graduate	41.8 (2.9)	43.5 (4.1)	47.9 (2.8)	38.2 (4.2)	41.7 (1.9)
Pay Grade					
Enlisted	44.4 (2.3)	38.4 (2.0)	42.2 (0.9)	40.2 (1.4)	41.6 (1.0)
Officer	43.7 (3.2)	44.0 (5.3)	48.1 (3.1)	41.4 (5.1)	43.5 (2.3)
Number of Partners, Past 12 Months					
1 partner	34.8 (3.2)	35.5 (2.7)	38.2 (2.1)	35.5 (2.2)	35.7 (1.4)
2-4 partners	46.2 (2.8)	42.4 (3.1)	44.0 (1.3)	41.8 (2.1)	43.9 (1.4)
5 or more partners	55.2 (3.1)	39.4 (3.1)	45.3 (2.0)	48.8 (4.7)	48.8 (1.7)

Note: Table entries are percentages (with standard errors in parentheses) of unmarried personnel who had one or more sexual partners in the past 12 months (N=4,932). For consistency with 1995 estimates, the 1998 estimates do not include personnel who are living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Condom Use, Q113 and 114; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Additional key findings about correlates of condom use among sexually active unmarried personnel in 1998 include the following:

- As might be expected, given that condoms are designed to be used by males, unmarried male personnel were generally more likely to indicate that they used a condom the last time they had sex than unmarried female personnel were to indicate that their partners had used a condom (43.4% vs. 33.8%, respectively).
- Younger unmarried personnel were more likely than older personnel to have used a condom the last time they had sex. Except for sexually active unmarried Navy personnel aged 20 or younger, more than 40% of sexually active unmarried personnel aged 25 or younger used a condom the last time they had sex. In comparison, only 26% to 40% of sexually active unmarried personnel who were 35 or older used a condom during their last sexual encounter.
- Differences in condom use by education and pay grade status were less apparent. In contrast to 1995 findings (Bray et al., 1995a), sexually active unmarried officers appeared to have somewhat higher rates of condom use the last time they had sex, although the estimates for this group were less precise than the estimates for sexually active unmarried enlisted personnel (43.5% officers vs. 41.6% enlisted in 1998; 36.0% vs. 40.8%, respectively, in 1995).
- Personnel who had more than one sexual partner in the past 12 months were more likely to have used a condom than were personnel who had only one partner. For personnel who had five or more partners in the past 12 months, rates of condom use at last encounter were generally higher in 1998 when compared to 1995 rates. In 1998, almost 49% of total DoD personnel who had five or more partners in the past 12 months used a condom at last encounter, as compared to 42% in 1995 (Bray et al., 1995a). Some rather large standard errors, however, among the individual Services' estimates suggest some caution in interpreting the strength of these relationships.

The generally higher rates of condom use among younger, unmarried personnel are encouraging because they suggest that younger personnel have been heeding the messages about the importance of using condoms if they are going to be sexually active. Conversely, the finding that sexually active unmarried personnel who were 35 or older were generally less likely to have used a condom the last time they had sex could be a cause for concern, as many of these personnel could still be engaging in behaviors that place them at increased risk for STD infection, including HIV infection.

For those at highest risk (i.e., personnel who had multiple partners in the past 12 months), continued emphasis needs to be placed on adopting the behavior of correct and consistent condom use. Although the incidence of HIV infection and seroconversion in the HIV antibody test is low among military personnel (Burrelli, 1992; Levin et al., 1995; McNeil et al., 1991), personnel who have multiple partners, but who use condoms

inconsistently (or not at all) are still at increased risk for infection with other STDs, such as gonorrhea, syphilis, chlamydia, and genital herpes.

The 1998 DoD survey questionnaire also included a question about the frequency with which personnel used condoms when they had sex in the past 12 months. Table 7.13 presents findings for the total DoD population comparing the frequency of condom use among sexually active personnel in the past 12 months with the type of encounter and the number of sexual partners that these personnel had in the past 12 months. Note that in

Table 7.13 Frequency of Condom Use Among All Sexually Active Personnel, by Type of Encounter and Number of Partners, Past 12 Months, Total DoD

Type of Encounter/Total Number of Partners, Past 12 Months ^b	Frequency of Condom Use ^a	
	Every Time/ Most of the Time	Half of the Time or Less
Any One-Time Encounter, Past 12 Months^c		
5 or more total partners	69.9 (2.1)	30.1 (2.1)
2-4 total partners	69.8 (1.2)	30.2 (1.2)
1 partner	51.9 (4.9)	48.1 (4.9)
Any Casual Partner, Past 12 Months^d		
5 or more total partners	42.4 (7.2)	57.6 (7.2)
2-4 total partners	37.4 (2.0)	62.6 (2.0)
1 partner	20.8 (1.8)	79.2 (1.8)
Only Ongoing Relationships, Past 12 Months^e		
5 or more total partners	48.4 (1.7)	51.6 (1.7)
2-4 total partners	39.1 (1.2)	60.9 (1.2)
1 partner	11.8 (0.5)	88.2 (0.5)

Note: Table entries are percentages (with standard errors in parentheses) of sexually active personnel in the past 12 months (N=15,844).

^aFrequency of condom use within the specific type of encounter.

^bTotal number of partners could include more than one type of encounter.

^cDefined as "someone you had sex with once and don't plan to have sex with again." This group could include people who had sex with casual partners or with someone on an ongoing basis (see below).

^dDefined as "someone you know and have sex with occasionally." This group could include people who have sex with someone on an ongoing basis.

^eDefined as someone such as a spouse, girlfriend, or boyfriend. This is the only type of relationship indicated in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Total Number of Partners, Q115; Type of Encounter: Any One Time, Q118, Any Casual Partner, Q117, On-Going Relationships, Q116).

contrast to the data in Table 7.12, which reports on condom use just for sexually active unmarried personnel, this table reports on condom use for all sexually active personnel, married and unmarried.

The majority of sexually active personnel who engaged in one-time encounters with one or more partners in the past 12 months used a condom every time or most of the time. This rate was as high as 70% among those with five or more partners in one-time encounters. One-time encounters were defined as “someone you had sex with once and don’t plan to have sex with again.” Approximately one-third (30.1%) to approximately one-half (48.1%) of those engaging in any one-time encounter used a condom half of the time or less, depending on their total number of partners. As might be expected, sexually active personnel who had only one sexual partner in the past 12 months used condoms less often. As long as both partners are monogamous, however, the risk of STD infection is virtually nonexistent.

Among personnel who had sex with any casual partner in the past 12 months, 58% to 79% used condoms only half of the time or less, depending on their total number of partners. A casual partner was defined as “someone you know and have sex with occasionally.” These findings are cause for concern, in that they indicate that over half of all military personnel who had one or more casual partners in the past 12 months were very inconsistent in their use of condoms, if they used condoms at all.

In those personnel involved in only ongoing relationships, the frequency of consistent condom use among those with one partner in the past 12 months was low (11.8%), as would be expected. Roughly half (48.4%) of those with five or more partners in ongoing relationships used condoms every time or most of the time. This means that the other half (52%) of those with five or more partners in ongoing relationships in the past 12 months used condoms half of the time or less. Sexually active personnel who are involved in ongoing relationships may have a false sense of “safety” because of the stability of the relationships, while perhaps overlooking the risks posed by having multiple partners over time. An important focus of future health education efforts needs to be on identifying effective ways to encourage high-risk personnel to reduce their risk of STD infection through reductions in their numbers of sexual partners, consistent use of condoms, or both.

7.3.3 Knowledge and Beliefs About AIDS

Because the consequences of HIV infection are fatal, and risk-reduction behaviors are the only preventive measures currently available, the Military has an inherent interest in assessing how well military personnel understand behaviors that place them at risk, and how much they appreciate the importance of avoiding risky behaviors at all times. In the 1998 DoD survey, we assessed military personnel's knowledge about HIV

and AIDS transmission. These data suggest that the levels of misinformation among military personnel in relation to how one becomes infected with HIV.

We know from the 1995 survey that virtually all personnel (nearly 99%) were aware that HIV could be sexually transmitted between a man and a woman (Bray et al., 1995a). In an environment such as the Military that involves close work situations, group eating arrangements, and communal living, it is also important for personnel to appreciate that the virus is *not* transmitted by way of casual contact. Thus, we asked respondents to rate the likelihood of HIV transmission by various situations, with the questions targeted at the possibility of casual transmission.

As shown in Table 7.14, approximately 6% of all military personnel thought that HIV infection was "very likely" or "somewhat likely" through working in an office with someone who has the AIDS virus. A higher proportion of personnel in 1995 held this belief about working with someone who was infected (11.6%) (Bray et al., 1995a). Table 7.14 also shows that approximately 15% of all military personnel thought that HIV infection was "very likely" or "somewhat likely" from sharing living quarters with someone with the AIDS virus.

Table 7.14 Beliefs About How AIDS Is Transmitted, by Service

Belief	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Working in an office with someone with AIDS virus	6.7 (0.8)	5.0 (0.7)	5.7 (0.4)	5.0 (0.5)	5.7 (0.4)
Eating in dining facility where cook has AIDS virus	22.9 (1.0)	20.4 (1.3)	22.5 (0.8)	21.7 (0.8)	21.8 (0.5)
Sharing eating utensils with someone with AIDS virus	24.3 (0.8)	21.4 (1.3)	22.2 (0.9)	26.3 (1.0)	23.9 (0.5)
Sharing living quarters with someone with AIDS virus	16.5 (1.4)	12.5 (0.8)	17.8 (0.7)	15.7 (0.8)	15.4 (0.6)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who believe that AIDS transmission is "very likely" or "somewhat likely" in the ways mentioned. Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Transmission of AIDS, Q121A-D).

There continues to be a significant amount of misconception about the risks of casual contact. Approximately 22% of all military personnel believed that eating in a dining facility where the cook has the AIDS virus would present a "very likely" or "somewhat likely" means of infection. Sharing eating utensils with someone who has the AIDS virus was perceived as somewhat more risky, with approximately 24% thinking that this would likely present a route of infection. These data represent a sizable amount of misinformation among military personnel, yet show a slight reduction compared to 1995 levels. More than a quarter of all military personnel in 1995 believed that eating in a dining facility where the cook was infected (27.4%), or by sharing eating utensils with someone who was HIV-positive (27.2%) were likely routes of infection (Bray et al., 1995a).

DoD policy states that HIV infection alone may not be the basis for forcibly separating anyone from the Services (DoD, 1991). Although there has been progress in educating personnel about the true routes of transmission of HIV, relatively high rates of concern about certain kinds of casual contact suggest that it would be difficult for a person known to be infected to live in close proximity to other personnel without encountering some kind of negative reaction. This finding underscores the need for absolute confidentiality of individual test results and medical records. Further educational efforts should work to counteract inaccurate information about AIDS and to dispel the misconceptions about risks involved in working or living with an infected person.

7.4 Summary

7.4.1 Fitness and Cardiovascular Disease Risk Reduction

Overweight

In this chapter, we presented data on the percentage of active-duty personnel classified as overweight using *Healthy People 2000* guidelines. We also compared the percentages of personnel considered overweight using these guidelines with the percentages classified as overweight using new guidelines released by the National Heart, Lung, and Blood Institute (NHLBI) in 1998.

- Among DoD personnel under age 20, 22.9% were overweight according to their Body Mass Index (BMI) (Table 7.1). This exceeds the *Healthy People 2000* objective of having a prevalence of no more than 15% overweight. Women in this age group (9.2%) met the objective, while males (25.9%) did not.
- Overall, members of the total DoD aged 20 or older (19.5%, Table 3.3) met the *Healthy People 2000* objective for their age group, which is no more than 20% prevalence of overweight. Examined separately, all personnel aged 20 to 25 (14.0%) met the objective, while those aged 26

to 34 (21.0%) and those aged 35 or older (24.5%) did not. Women in all three age groups met the objective, but only men aged 20 to 25 did (15.4%) (Table 7.1).

- For most subgroups in the Military, the prevalence of overweight increased from 1995 to 1998 (Table 7.1).
- Comparing the prevalence of overweight in 1995 and 1998 using *Health People 2000* guidelines and new NHLBI guidelines reveals that the latter greatly increase the percentage of personnel considered overweight. These findings are similar to those in a report by Harrison et al. (1998) (Table 7.3).

Underweight

We examined the prevalence of underweight among active-duty personnel using guidelines suggested by Brownell and Fairburn (1995). We also compared the percentages of personnel considered underweight using these guidelines with the percentages classified as underweight using the recently released guidelines by the NHLBI.

- The prevalence of underweight was highest among younger DoD personnel (Table 7.2). In the total DoD, 12.4% of personnel under 20 were underweight, including about 13% of males and about 9% of females.
- For both men and women in the total DoD, the prevalence of underweight decreased as age increased. Only 2.3% of all DoD personnel aged 35 or older were underweight.
- Consistent with the findings for overweight prevalence, the new NHLBI guidelines considerably decreased the percentage of personnel considered to be underweight.

Exercise

The total DoD and each Service met the *Healthy People 2000* objective for participating in strenuous exercise (Table 7.4). Strenuous exercise included two types of activities: (a) running, cycling, and walking, and (b) other strenuous exercise, such as swimming.

- More than two-thirds of DoD personnel (67.7%) engaged in one or both types of strenuous exercise at least 3 days per week for at least 20 minutes per occasion in the past 30 days. This exceeded the *Healthy People 2000* objective of 20% or more of the adult population exercising at this frequency and duration.

- Army (84.8%) and Marine Corps (78.6%) personnel were more likely to exercise than were Navy (58.9%) or Air Force (50.0%) personnel.

Blood Pressure Screening and Awareness

The total DoD was about 10 percentage points away from meeting the *Healthy People 2000* objective for blood pressure screening and awareness. No subgroup of the DoD met the objective (Table 7.5).

- About four-fifths (80.4%) of personnel in the total DoD reported that they had their blood pressure checked within the 2 years prior to the survey and knew the result.
- Sociodemographic groups associated with an increased likelihood of meeting these blood pressure criteria were females, non-Hispanic Caucasians, college graduates, those 35 or older, and those in the Air Force.

High Blood Pressure

Awareness of blood pressure status is important because high blood pressure does not usually have symptoms and can have long-term negative effects on health and well-being. Results of the 1998 DoD survey showed the following (Table 7.6):

- Approximately one in seven DoD personnel (14.2%) reported ever being diagnosed as having high blood pressure.
- About 66% of DoD personnel who had ever had high blood pressure had been advised to take one or more of the following actions to help lower their blood pressure: take blood pressure medication, diet to reduce weight, reduce sodium intake, or exercise. Recommendations to reduce salt in one's diet (51.3%) and to exercise (50.3%) were most common.
- About 47% of DoD personnel who had ever been diagnosed with hypertension reported currently taking one or more of these recommendations.
- Among probable current hypertensives, 54.0% of personnel were taking one or more of these actions. This is well below the *Healthy People 2000* goal of 90% or more people with hypertension taking action to control their blood pressure. Exercising (39.3%) and reducing salt (35.6%) were the most common actions taken within this group.

Cholesterol

Some subgroups of the DoD met the *Healthy People 2000* objective for receipt of cholesterol measurement, but the total DoD did not (Table 7.7). Military regulations may have a bearing on which groups meet this objective because older personnel are required to have cholesterol checks more frequently.

- In the total DoD, approximately 62% of personnel had their cholesterol checked within the 5 years before the 1998 survey. This is below the *Healthy People 2000* goal of 75% of adults having had their cholesterol measured in that time period.
- Subgroups of the DoD met the *Healthy People 2000* objective: personnel aged 25 to 49 in the Army and Air Force and personnel aged 50 or older in the total DoD, Army, Navy, and Marine Corps.
- Approximately 18% of the total DoD had ever been told by a health care provider that they had high cholesterol.
- Due to the advice of a health care provider, approximately 12% of the total DoD at the time of the survey were limiting their dietary fat, and about 1% were taking medication to lower cholesterol.

7.4.2 Injuries and Injury Prevention

Injuries

Hospitalization for injuries impacts the overall health and readiness of the military population. Efforts will be needed to reduce high rates of injury in the Military.

- In the total DoD in 1998, 3,271 per 100,000 personnel reported injuries that required overnight hospitalization (Figure 7.1). This is well above the *Healthy People 2000* objective to reduce these injuries to no greater than 754 per 100,000 people.
- In 1998, those in the Army were most likely to be injured (4,321 per 100,000), but this represents a decrease from 5,002 per 100,000 in 1995. For the other three Services and the total DoD, estimates did not change greatly from 1995 to 1998.

Seat Belt Use

Use of seat belts is an important injury prevention measure. The total DoD met the *Healthy People 2000* objective for seat belt use, although some subgroups did not (Table 7.9):

- About 91% of military personnel reported that they wore seat belts “always” or “nearly always” when driving or riding in a motor vehicle. This met the *Healthy People 2000* objective of 85% or more motor vehicle occupants using occupant protection systems.
- Males aged 25 or younger in the total DoD (and in the Army and Marine Corps separately) did not meet the *Healthy People 2000* objective for seat belt use.
- In the total DoD, females (96.2%) were more likely than males (90.7%) to report seat belt use “always” or “nearly always.” This pattern held in each age group and in each Service.

Helmet Use

Helmet use is another important injury prevention measure. The *Healthy People 2000* objectives for helmet use while riding a motorcycle or bicycle had not yet been attained in 1998 within the military population (Table 7.10):

- Among DoD personnel who rode a motorcycle in the past 12 months, 75.9% wore helmets “always” or “nearly always.” This rate was slightly below the *Healthy People 2000* objective of 80% or greater use of helmets among motorcyclists. All Air Force personnel (and men and women separately) exceeded this objective.
- About 44% of DoD personnel who rode a bicycle in the past 12 months wore a helmet “always” or “nearly always” while doing so. This represents an increase from approximately 23% in 1995, but it did not reach the *Healthy People 2000* goal of 50% or greater use of helmets among bicyclists.

7.4.3 Sexually Transmitted Disease Risk Reduction

Prevalence of Sexually Transmitted Disease

Military women reported a higher lifetime prevalence of STDs than did men. Lifetime prevalence of STDs was about one in five personnel, while prevalence in the past year was much lower (Table 7.11).

- About 19% of DoD personnel had ever had an STD. Lifetime prevalence rates for men in the total DoD and in individual Services were comparable to the overall rate.
- Women had higher lifetime prevalence of STDs, with approximately 26% of DoD women reporting ever having had an STD. Among DoD women, lifetime prevalence rates were approximately 22% in the Air Force, 23% in the Marine Corps, 26% in the Navy, and 30% in the Army.

- Fewer than 1% of personnel in the total DoD (0.2%) and in each Service reported having an STD in the preceding year. This was true for both male and female DoD personnel.

Condom Use

Condom use was measured among sexually active unmarried personnel (Table 7.12) and among *all* sexually active personnel (Table 7.13). We asked questions about condom use in a variety of situations, including onetime encounters, with casual partners, and in ongoing relationships:

- About 42% of sexually active unmarried personnel in the total DoD used a condom the last time they had intercourse. The rate of reported condom use was higher among males, younger personnel, and those who had more than one sexual partner in the past 12 months. Differences in condom use by educational attainment and pay grade status were small.
- The type of sexual relationship reported by sexually active personnel affected their condom use behavior (Table 7.13). The majority of those who engaged in one or more one-time encounters in the past 12 months used a condom every time or most of the time. Among these personnel who had sex with any casual partner in the past 12 months, 58% to 79% used condoms half the time or less. As might be expected, those personnel reporting one ongoing relationship used condoms least frequently, with only about 12% reporting condom use every time or most of the time.

Knowledge and Beliefs about AIDS

To gauge knowledge about HIV transmission, we asked personnel to respond to questions related to the possibility of HIV transmission through a variety of casual contacts (Table 7.14):

- There was evidence of misconceptions regarding the likelihood of HIV transmission through casual contact. For example, about 22% of DoD personnel believed that eating in a dining facility in which the cook has the AIDS virus would present a "very likely" or "somewhat likely" means of infection.
- Although significant misconceptions still exist, a decrease has occurred since 1995.

8. MENTAL HEALTH, STRESS, AND COPING

The demanding characteristics of the military environment are such that many stressors are inherent (Orasanu & Backer, 1996). To assess the impact of these stressors, the DoD survey series has contained a set of questions since 1988 about the mental health of active-duty personnel. As in previous surveys (Bray et al., 1988, 1992, 1995a), the 1998 survey asked respondents to appraise their levels of stress at work and in their intimate and family relationships. As they had in 1995, respondents also provided information on specific sources of stress and on the perceived impact of work-related, family-related, and interpersonal stress on their military performance. We also asked respondents to specify the methods that they used to cope with stress. In addition, we collected information on indicators of depressive symptoms for different time frames and examined relationships among stress, depression, and alcohol use. Finally, we assessed the use of, perceived need for, and perceived career damage associated with mental health counseling by Service, as well as the relationship between perceived career damage and selected mental health measures. In this chapter, we present findings related to the issues of mental health, exposure to stress, coping strategies, and functioning.

8.1 Appraisal of Stress

Psychosocial theories of stress generally recognize the importance of cognitive factors in the development and maintenance of stress-related symptoms and problems in life functioning. Folkman and Lazarus (1980, 1985), for example, proposed a psychosocial model that emphasizes the important role that appraisal plays in the development and maintenance of stress-related adjustment problems. Indeed, a number of experimental and applied studies have shown robust relationships between individuals' appraisal of the level of stress associated with specific life events and their capacity to function effectively (cf. Foa, Steketee, & Olasov Rothbaum, 1989).

We asked military personnel to appraise separately the levels of stress that they experienced at work and in their personal relationships and family life. Participants were asked the following questions:

- During the past 12 months, how much stress did you experience at work or while carrying out your military duties?
- During the past 12 months, how much stress did you experience in your family life or in a relationship with a person you live with or date seriously?

The findings in Table 8.1 show distributions across response categories indicating that personnel in each Service were more likely to report a "great deal" or a "fairly large

Table 8.1 Levels of Perceived Stress at Work and in Family Life, Past 12 Months, by Service

Type of Stress/ Level	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Stress at Work					
Great deal	18.1 (1.0)	15.1 (0.9)	16.5 (0.8)	14.6 (0.8)	16.1 (0.5)
Fairly large amount	22.2 (1.3)	20.7 (1.2)	23.0 (0.8)	23.0 (0.8)	22.1 (0.6)
Some	30.4 (0.8)	30.5 (0.9)	31.0 (0.9)	31.5 (0.5)	30.8 (0.4)
A little	18.7 (1.0)	21.4 (1.1)	18.8 (0.9)	20.5 (0.8)	19.9 (0.5)
None	10.6 (0.8)	12.4 (0.8)	10.7 (0.6)	10.4 (0.6)	11.0 (0.4)
Stress in Family					
Great deal	11.7 (0.7)	9.8 (0.6)	10.7 (0.3)	9.4 (0.6)	10.4 (0.3)
Fairly large amount	13.0 (0.5)	12.9 (0.5)	12.9 (0.6)	12.6 (0.7)	12.8 (0.3)
Some	26.5 (1.2)	27.5 (0.9)	27.8 (0.6)	28.0 (0.8)	27.3 (0.5)
A little	27.9 (0.9)	30.7 (0.9)	27.4 (0.8)	31.5 (1.0)	29.6 (0.5)
None	20.9 (0.9)	19.2 (0.9)	21.2 (1.0)	18.6 (0.6)	19.9 (0.5)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress at Work, Q82; Stress in Family, Q83).

amount” of stress associated with their military duties than with their family or personal lives. Among the total DoD, these high levels of stress were perceived by 38.2% at work, compared to 23.2% in their personal relationships. Personal relationships were perceived to be stress-free by almost twice as many military personnel (19.9%) as perceived no stress at work (11.0%). We found similar trends within each Service; personnel in the Army, Navy, Marine Corps, and Air Force all reported higher levels of stress associated with work than with their personal and family relationships. In addition, personnel in the Air Force were slightly less likely to report a “great deal” of stress at work than were members of the other three Services.

8.2 Specific Sources of Stress

We attempted to enhance our understanding of the nature of perceived stress through the following specific question on potential sources of stress in the domains of work and family life: During the past 12 months, how much stress did you experience from each of the following?

- being deployed at sea or in the field;
- having a permanent change of station (PCS);

- problems in your relationships with the people you work with;
- problems in your relationship with your immediate supervisor(s);
- concern about performance rating;
- increases in your work load;
- decreases in your work load;
- being away from your family;
- changes in your family, such as the birth of a baby, a divorce, or a death in the family;
- conflicts between your military and family responsibilities;
- problems with money;
- problems with housing;
- health problems that you had;
- health problems in your family; and
- behavior problems in some of your children.

Table 8.2 presents the percentage of respondents who indicated a “great deal” or “fairly large amount” of stress associated with each source. Because sources of stress may differ for men and women, the percentages are presented by gender as well as for the total DoD.

Overall, there was a great deal of similarity in sources of stress for men and women. Being away from family was the most frequently mentioned source of stress (reported by 19.5% of each gender), and increases in work load also caused high amounts of stress for both men (17.7%) and women (17.1%). Other sources of stress that affected men and women about equally included (in descending order) financial problems, conflicts between military and family responsibilities, having a permanent change of station (PCS), family health problems, concern about performance rating, housing problems, behavior problems in children, and decreases in work load.

For other sources of stress, men and women responded somewhat differently, although the differences were small in magnitude. Compared to women, somewhat more men reported higher levels of stress associated with deployment at sea or in the field (12.9% vs. 7.8%). In contrast, more women than men reported high levels of stress associated with changes in family, such as the birth of a baby, a divorce, or a death in the family (17.9% vs. 13.5%), work relationships (15.4% vs. 11.4%), problems with a

Table 8.2 Specific Sources of Stress, Past 12 Months, by Gender, Total DoD

Stressor	Gender		Total DoD
	Men	Women	
Deployment	12.9 (0.9)	7.8 (0.8)	12.2 (0.8)
Having a PCS ^a	9.4 (0.6)	10.1 (0.6)	9.5 (0.6)
Work relationships	11.4 (0.4)	15.4 (0.9)	12.0 (0.4)
Problems with supervisor	10.7 (0.4)	13.3 (0.7)	11.0 (0.4)
Concern about performance rating	8.1 (0.4)	7.8 (0.6)	8.1 (0.3)
Increases in work load	17.7 (0.5)	17.1 (0.9)	17.6 (0.5)
Decreases in work load	1.5 (0.1)	2.0 (0.3)	1.5 (0.1)
Being away from family	19.5 (1.0)	19.5 (1.0)	19.5 (0.9)
Changes in family	13.5 (0.5)	17.9 (0.8)	14.1 (0.4)
Conflicts between military and family responsibilities	14.0 (0.6)	13.6 (0.6)	14.0 (0.5)
Financial problems	15.5 (0.6)	14.2 (0.7)	15.3 (0.5)
Housing problems	7.3 (0.4)	5.7 (0.5)	7.1 (0.3)
Personal health problems	4.6 (0.3)	8.8 (0.6)	5.2 (0.3)
Family health problems	8.4 (0.3)	9.1 (0.5)	8.5 (0.3)
Behavior problems in children	4.2 (0.2)	4.9 (0.3)	4.3 (0.2)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported "a great deal" or a "fairly large amount" of stress in the past 12 months.

^aPCS = Permanent change of station.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Specific Sources of Stress, Q90A-O).

supervisor (13.3% vs. 10.7%), or personal health problems (8.8% vs. 4.6%). Any conclusions about these differences should be made with caution, however. Further analyses are needed to determine whether the small differences shown in Table 8.2 are statistically significant. From the percentages presented, the overall pattern seems to be toward gender similarities in perceived sources of stress.

8.3 Stress and Productivity Loss

We also asked respondents about loss of productivity at work associated with stress. Military personnel were asked to indicate on how many work days in the past 12 months any of the following things happened to them:

- they were late for work by 30 minutes or more;
- they left work early for a reason other than an errand or early holiday leave;
- they were hurt in an on-the-job accident;

- they worked below their normal level of performance; and
- they did not come to work at all because of an illness or a personal accident.

Table 8.3 shows the percentages of military personnel who reported these performance problems during the past year across five categories of occurrence: no days, 1 day, 2 or 3 days, 4 or more days, and any number of days (this last category was not a separate response option, but represents the sum percentage of personnel who endorsed 1 or more days). Findings are displayed for all military personnel and for personnel who reported a "great deal" or a "fairly large amount" of stress at work or in personal relationships within the past 12 months (high stress group) and for personnel who reported "some," "a little," or no stress both at work and in the family in the past 12 months (moderate/low-stress group). Note that personnel who reported a high level of stress in *either* the family or work environment were categorized into the "high level of stress" group.

The productivity loss most frequently reported by all personnel, for any number of days, was leaving work early (35.8%), closely followed by working below normal performance level (33.6%). Being late for work by at least 30 minutes and not coming to work because of injury or illness were reported by roughly a quarter of personnel. Being hurt in an on-the-job accident was a relatively rare occurrence, reported by 9.6% of respondents.

When the relationship between stress and productivity loss was examined, a consistent pattern emerged. As shown in the middle and lowest panels of Table 8.3, compared to military personnel who perceived low to moderate levels of stress, those who were experiencing high levels of job-related or personal stress seemed to be more likely to experience a corresponding productivity loss in the domains assessed. Overall productivity loss in each of the domains was greater for the group that experienced more stress. Two findings are especially noteworthy. Working below normal performance level was reported by 42.6% of the high-level stress group compared to 25.4% of the moderate/low-level stress group. Another important observation about this finding is that the high-stress group was much more likely to report frequently working below normal performance level; the groups essentially did not differ in their reporting of this happening on 1 day in the past 12 months, but the high-stress group was considerably more likely to report that it happened on 4 or more days. Finally, the incidence of injuries due to accidents in the workplace were twice as common for personnel in the high-stress group (12.9%) as they were for respondents in the moderate/low-stress group (6.4%).

Table 8.3 Perceived Stress and Productivity Loss, Past 12 Months, Total DoD

Group/Problem	N	Number of Work Days Affected, Past 12 Months					Any Number of Days
		No Days	1 Day	2 or 3 Days	4 or More Days		
All Personnel	17,264						
Late for work by 30 minutes or more		73.4 (0.7)	11.1 (0.3)	9.8 (0.3)	5.7 (0.3)	26.6 (0.7)	
Left work early		64.2 (0.7)	7.5 (0.3)	12.6 (0.4)	15.8 (0.5)	35.8 (0.7)	
Hurt in an on-the-job accident		90.4 (0.6)	5.8 (0.3)	2.6 (0.2)	1.2 (0.1)	9.6 (0.6)	
Worked below normal performance level		66.4 (0.6)	5.7 (0.2)	10.2 (0.3)	17.7 (0.5)	33.6 (0.6)	
Did not come into work because of illness or injury		77.4 (0.7)	7.8 (0.3)	8.6 (0.4)	6.3 (0.3)	22.6 (0.7)	
High Level of Stress, Past 12 Months^a	8,200						
Late for work by 30 minutes or more		69.3 (0.9)	11.7 (0.5)	11.7 (0.5)	7.2 (0.4)	30.7 (0.9)	
Left work early		62.0 (0.9)	7.3 (0.4)	12.8 (0.5)	17.9 (0.6)	38.0 (0.9)	
Hurt in an on-the-job accident		87.1 (0.8)	7.2 (0.5)	3.9 (0.3)	1.9 (0.2)	12.9 (0.8)	
Worked below normal performance level		57.4 (0.7)	6.0 (0.4)	12.4 (0.5)	24.3 (0.7)	42.6 (0.7)	
Did not come into work because of illness or injury		73.4 (1.0)	8.6 (0.4)	10.2 (0.7)	7.8 (0.4)	26.6 (1.0)	
Moderate or Low Level of Stress, Past 12 Months^b	8,933						
Late for work by 30 minutes or more		77.1 (0.8)	10.6 (0.5)	8.1 (0.4)	4.2 (0.3)	22.9 (0.8)	
Left work early		66.1 (0.8)	7.6 (0.4)	12.4 (0.6)	13.9 (0.6)	33.9 (0.8)	
Hurt in an on-the-job accident		93.6 (0.5)	4.5 (0.4)	1.4 (0.1)	0.6 (0.1)	6.4 (0.5)	
Worked below normal performance level		74.6 (0.7)	5.5 (0.3)	8.2 (0.4)	11.8 (0.5)	25.4 (0.7)	
Did not come into work because of illness or injury		80.9 (0.7)	7.1 (0.3)	7.2 (0.4)	4.8 (0.3)	19.1 (0.7)	

Note: Table entries are percentages (with standard errors in parentheses).

^aUnweighted number of respondents in the total DoD sample who reported a "great deal" or a "fairly large amount" of stress either at work or in the family in the past 12 months.

^bUnweighted number of respondents in the total DoD sample who reported "some," "a little," or no stress both at work and in the family in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress at Work, Q82; Stress in Family, Q83; Productivity Loss, Q69A-E).

These findings are consistent with an extensive body of research (e.g., Kanki, 1996; Orasanu & Backer, 1996) that shows a strong relation between high levels of stress and impaired occupational functioning, including increased absenteeism, lower levels of productivity, and more interpersonal problems. A caveat to this finding is that it cannot be stated definitively that higher levels of stress are *causing* reduced performance. It could be that lower productivity (e.g., frequently working below normal performance level, or being hurt on the job more often than others) causes individuals to feel higher levels of stress. Regardless of the direction of the relationship, however, it is clear that stress and job performance are related. It is likely that Service personnel who are experiencing high levels of stress at work, in their personal lives, or in both of these domains are at increased risk for a host of adverse psychological and health conditions. These conditions, in turn, could potentially compromise military readiness.

8.4 Coping with Stress and Depressive Symptoms

Coping has been defined in terms of the strategies and processes that individuals use to modify adverse aspects of their environment, as well as to minimize internal distress induced by environmental demands (Lazarus, 1966; Moos & Billings, 1982). An important dimension of coping is the distinction between problem-focused coping strategies (efforts to recognize, modify, or eliminate the impact of a stressor), emotion-focused coping strategies (efforts to regulate negative emotions that occur in reaction to a stressor event), and avoidance strategies (efforts to avoid dealing with the stressor). Although the utility of any approach depends on the demands of the situation and the skill and flexibility of individuals in using various coping strategies, preference for an avoidance strategy has been linked with a greater risk of mental health problems in military personnel, especially when they are faced with a radically changing environment (Johnsen, Laberg, & Eid, 1998).

We asked respondents to identify the types of strategies that they used to cope when they “feel pressured, stressed, depressed, or anxious.” The list of response categories included items that tap approach- and problem-oriented strategies (e.g., “think of plan to solve the problem”); emotion-focused strategies, such as seeking social support (“talk to friend or family member”); and avoidance strategies (e.g., “have a drink,” “smoke marijuana or use other illegal drugs,” “think about hurting yourself or killing yourself”). Table 8.4 shows the percentage of personnel, by Service, who commonly used specific coping strategies under conditions of stress. Table 8.5 shows the distribution of these percentages, by gender and for the total DoD.

As shown in Table 8.4, the patterns of coping strategies were very similar across the four Services. Military personnel seemed to be more likely to use problem- or emotion-oriented coping strategies than avoidance-oriented alternatives. When the responses of the

Table 8.4 Behaviors for Coping with Stress, by Service, Total DoD

Coping Behavior	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Talk to friend/family member	72.9 (0.9)	71.6 (1.1)	68.9 (0.6)	76.3 (0.8)	73.0 (0.5)
Light up a cigarette	26.6 (0.9)	25.2 (1.5)	28.1 (1.7)	21.5 (1.5)	25.0 (0.7)
Have a drink	26.5 (1.2)	21.8 (1.2)	27.8 (1.7)	18.9 (0.9)	23.3 (0.6)
Say a prayer	55.5 (1.3)	50.2 (1.3)	48.1 (1.2)	56.7 (1.7)	53.5 (0.7)
Exercise or play sports	62.1 (1.0)	58.4 (2.0)	66.6 (2.0)	61.4 (1.5)	61.5 (0.8)
Engage in a hobby	56.7 (0.7)	53.6 (0.9)	55.9 (1.4)	56.7 (0.9)	55.8 (0.4)
Get something to eat	43.7 (0.8)	43.7 (1.2)	40.0 (1.1)	44.4 (0.9)	43.5 (0.5)
Smoke marijuana/use illegal drugs	2.0 (0.4)	0.7 (0.2)	1.4 (0.3)	0.5 (0.1)	1.2 (0.2)
Think of plan to solve problem	86.4 (0.8)	86.5 (1.0)	85.3 (0.8)	88.3 (0.6)	86.8 (0.4)
Consider hurting or killing yourself	4.6 (0.6)	4.2 (0.3)	5.0 (0.6)	3.0 (0.3)	4.1 (0.3)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious. Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Coping Behavior, Q91A-J).

Table 8.5 Behaviors for Coping with Stress, by Gender, Total DoD

Coping Behavior	Gender		Total DoD
	Men	Women	
Talk to friend/family member	70.8 (0.5)	87.1 (0.7)	73.0 (0.5)
Light up a cigarette	25.3 (0.7)	23.1 (1.0)	25.0 (0.7)
Have a drink	24.6 (0.7)	15.5 (0.6)	23.3 (0.6)
Say a prayer	50.5 (0.7)	72.5 (1.1)	53.5 (0.7)
Exercise or play sports	61.9 (0.9)	58.7 (1.1)	61.5 (0.8)
Engage in a hobby	56.3 (0.5)	52.6 (1.0)	55.8 (0.4)
Get something to eat	41.9 (0.5)	53.4 (1.1)	43.5 (0.5)
Smoke marijuana/use illegal drugs	1.3 (0.2)	0.6 (0.2)	1.2 (0.2)
Think of plan to solve problem	86.4 (0.5)	89.4 (0.6)	86.8 (0.4)
Consider hurting or killing yourself	4.0 (0.3)	4.4 (0.3)	4.1 (0.3)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Coping Behavior, Q91A-J).

total DoD were rank ordered, each of the five problem- or emotion-oriented options were reported by more personnel than any of the five avoidance-oriented options. "Think of plan to solve problem" was overwhelmingly indicated by military personnel as a "frequently" or "sometimes" implemented coping strategy (86.8%), followed by "talk to friend or family member" (73.0%) and "exercise or play sports" (61.5%). A solid majority of personnel often used these potentially effective problem-focused and approach-oriented coping strategies to deal with stress, daily pressures, and feelings of depression. With respect to generally less effective avoidant coping strategies, 43.5% indicated that they "get something to eat" when confronted with stress, 23.3% "have a drink," 4.1% considered hurting or killing themselves, and 1.2% used illegal substances as a coping option for stress and/or depressive symptoms.

Table 8.5 shows some potentially significant gender differences in coping strategies. More women than men reported using social support (87.1% vs. 70.8%, respectively), prayer (72.5% vs. 50.5%), and food (53.4% vs. 41.9%). In contrast, men were more likely than women to report the use of alcohol as a method of coping (24.6% vs. 15.5%, respectively).

8.5 Screening for Depression

We also included four items similar to those frequently used in psychiatric epidemiologic surveys to screen for the presence of possible depressive symptoms and syndromes. One item was designed to screen for a possible major depressive syndrome by asking, "In the past 12 months, have you had 2 weeks or more during which you felt sad, blue, or depressed, or when you lost all interest in things that you usually cared about or enjoyed?" Two items screened for possible symptoms of depression by asking (a) "In the past 12 months, have you felt depressed or sad much of the time?" and (b) "In your entire life, have you ever had 2 years or more when you felt sad or depressed on most days, even if you felt okay sometimes?" A fourth item asked about the number of days of depressed mood during the past week.

We combined screening items to develop a composite indicator of respondents' probable need for further assessment for depression using clinical evaluation methods; we based the need for further depression evaluation on the brief scale developed by Rost, Burnam, and Smith (1993). Specifically, an individual had to meet two separate criteria to be categorized as needing further evaluation. The first was feeling depressed for at least a full day in the past week. The second criterion was *either* experiencing depressive symptoms for 2 or more weeks in the past 12 months, *or* feeling depressed at any time during the past 12 months, and on most days over 2 or more years over the lifetime. Table 8.6 shows, by selected sociodemographic characteristics, the percentages of military personnel who met this composite screening criterion. The sociodemographic

Table 8.6 Need for Further Depression Evaluation, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	18.1 (0.7)	15.0 (1.1)	16.6 (1.1)	11.6 (0.7)	15.3 (0.5)
Female	23.5 (1.8)	20.6 (1.9)	25.8 (2.6)	17.0 (0.7)	20.6 (0.8)
Race/Ethnicity					
Caucasian, non-Hispanic	18.0 (1.2)	14.6 (1.0)	16.9 (1.0)	12.6 (0.6)	15.2 (0.5)
African American, non-Hispanic	19.2 (1.7)	17.8 (2.0)	15.3 (1.4)	10.8 (1.3)	16.9 (1.0)
Hispanic	22.2 (3.0)	17.9 (2.6)	18.8 (2.1)	15.8 (2.7)	19.3 (1.5)
Other	18.9 (1.8)	17.8 (2.0)	19.4 (2.3)	11.4 (1.6)	16.6 (1.0)
Education					
High school or less	26.4 (1.0)	17.1 (1.4)	19.2 (1.5)	13.4 (1.3)	20.0 (0.8)
Some college	18.5 (0.9)	16.6 (1.1)	18.1 (1.1)	13.0 (0.9)	16.2 (0.5)
College graduate or higher	9.4 (0.8)	11.3 (1.6)	6.1 (1.1)	11.2 (0.7)	10.3 (0.5)
Age					
20 or younger	25.6 (2.2)	22.7 (4.1)	25.6 (1.5)	21.2 (2.0)	24.3 (1.2)
21-25	26.4 (1.0)	20.5 (1.6)	21.4 (1.4)	15.1 (0.9)	21.6 (0.7)
26-34	15.4 (1.0)	14.6 (1.2)	9.9 (1.2)	11.3 (0.8)	13.5 (0.5)
35 or older	10.3 (1.1)	11.8 (1.3)	6.8 (0.8)	10.2 (0.9)	10.4 (0.6)
Family Status^a					
Not married	24.2 (0.8)	21.9 (1.7)	22.8 (1.1)	16.5 (0.8)	21.5 (0.6)
Married, spouse not present	26.4 (4.2)	16.6 (2.9)	19.3 (3.5)	16.5 (1.9)	21.9 (2.3)
Married, spouse present	13.2 (0.8)	11.3 (0.9)	10.4 (1.0)	10.0 (0.7)	11.4 (0.4)
Pay Grade					
E1-E3	31.8 (1.9)	22.6 (3.4)	25.9 (1.5)	18.5 (1.4)	25.4 (1.1)
E4-E6	20.0 (0.6)	16.8 (1.3)	15.7 (1.3)	12.0 (0.9)	16.4 (0.5)
E7-E9	10.5 (1.3)	11.4 (1.5)	6.2 (1.1)	11.0 (1.6)	10.4 (0.8)
W1-W5	8.3 (1.0)	+ (+)	3.9 (1.4)	NA (NA)	9.1 (1.3)
O1-O3	8.7 (1.0)	9.5 (2.3)	4.3 (1.8)	9.8 (1.0)	9.0 (0.8)
O4-O10	8.2 (1.2)	6.6 (1.0)	4.5 (0.8)	10.3 (1.2)	8.3 (0.7)
Region					
CONUS ^b	18.7 (0.9)	14.3 (1.0)	16.4 (1.3)	12.4 (0.6)	15.6 (0.5)
OCONUS ^c	19.4 (0.8)	18.7 (1.7)	20.0 (0.4)	12.9 (1.3)	17.5 (0.7)
Total	18.9 (0.7)	15.7 (0.9)	17.1 (1.0)	12.5 (0.6)	16.1 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. The definition for need for further depression evaluation is given in Section 2.5.5.

+Low precision.
NA = Not applicable.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; refer to Section 2.5.1 for descriptions of these sociodemographic variables).

characteristics were gender, race/ethnicity, education, age, marital status, pay grade, and geographic region where the respondent was stationed.

Overall, 16.1% of the total DoD scored as needing further evaluation for depression. Consistent with findings on depression from major epidemiologic surveys of psychiatric disorders in the general civilian population of the United States, such as the Epidemiologic Catchment Area (ECA) Study (Regier et al., 1990) and the National Comorbidity Survey (Kessler et al., 1994), we find some evidence, albeit modest, for gender differences in the need for further assessment for depression. For the total DoD, a slightly higher percentage of women than men responded to the depression screening questions in a direction suggestive of need for more comprehensive evaluation for depression. The percentage of women who had a score suggestive of a need for further depression evaluation was 20.6% for the DoD and ranged from 17.0% of Air Force women to 25.8% of Marine Corps women. For men in the total DoD, 15.3% needed further assessment for depression, with percentages in specific Services ranging from 11.6% (Air Force) to 18.1% (Army). Rates for both men and women in the Army, Navy, and Marine Corps were similar and notably higher than for the Air Force.

Analysis of the apparent need for further evaluation for depression by race/ethnicity shows few differences. Although a somewhat higher percentage of Hispanic military personnel (19.3%) met the criteria for further depression evaluation compared to non-Hispanic African Americans (16.9%), non-Hispanic Caucasians (15.2%), and other racial/ethnic groups (16.6%), the differences were too small to indicate meaningful associations between race/ethnicity and need for further evaluation. Although the magnitude of these differences is modest, they are nonetheless consistent with findings from the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1990), which found higher rates of psychiatric disorder among Hispanic veterans in comparison to their counterparts in other racial/ethnic groups.

Educational attainment and age were inversely related to the need for further assessment for depression. For the total DoD as well as for each Service, those who were less educated and younger were more likely to screen high for depression. These rates were similar for personnel in the Army, Navy, and Marine Corps, all of which were higher than for personnel in the Air Force.

Family status also was related to the need for further evaluation. The presence of a spouse appeared to be a strong buffer; unmarried personnel (21.5%) and married personnel not living with their spouse (29.1%) scored considerably higher on need for further depression evaluation than did married personnel living with their spouse (11.4%). This pattern was consistent across all Services.

For enlisted personnel, higher pay grades were associated with less need for further depression evaluation, with the highest percentage of individuals scoring in need of further evaluation for depression in the lowest pay grades. For officers, there were no strong differences associated with pay grade. Finally, there was a slight tendency for personnel stationed OCONUS or aboard afloat ships to score higher on the need for further depression evaluation than there was those stationed CONUS. Although these differences were consistent across Services, they were of small magnitude.

The fact that a considerable proportion of military personnel were in need of further evaluation for depression is not surprising. Depression is among the most common mental health problems in the general population; it also is one of the most serious. Depression is associated with many symptoms that could reduce the military readiness of those it affects. These symptoms include disturbed sleep, fatigue, persistent physical problems (e.g., headaches), and difficulty concentrating, remembering, and making decisions. To better understand the consequences of personnel experiencing depressive symptoms, we re-examined some of the data reported in previous sections of this chapter and included data from personnel who were in need of further depression evaluation only.

First, we examined the perceived levels of stress associated with work and family among those in need of depression evaluation, by Service (see Table 8.7). There were no meaningful differences between the four Services in the amount of stress that personnel attributed to work and family. Overall, work was perceived as somewhat more stressful than family life among those in need of further depression evaluation. The most notable difference between work- and family-related stress was at the two highest levels of stress. Among personnel in need of further depression evaluation, these high levels of stress were associated with work by 69.2% and with family by 51.5%. Also noteworthy was that the most frequently endorsed stress level for both work (40.1%) and family (30.5%) was "a great deal." These data show a pattern that differs distinctly from that of personnel who did *not* meet the criterion for needing further depression evaluation (data not shown in a table). The percentages for levels of work-related stress among those who did *not* need further depression evaluation (total DoD) were

- a great deal, 11.5%;
- a fair amount, 20.8%;
- some, 32.9%;
- a little, 22.1%; and
- none, 12.7%.

For family-related stress, the percentages were

- a great deal, 6.5%;
- a fair amount, 11.4%;

Table 8.7 Levels of Perceived Stress at Work and in Family Life for Past 12 Months Among Personnel in Need of Further Depression Evaluation, by Service

Type of Stress/Level	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Stress at Work					
Great deal	41.6 (2.3)	40.3 (2.8)	39.0 (2.6)	37.9 (2.4)	40.1 (1.3)
Fairly large amount	28.2 (1.8)	30.5 (2.4)	29.8 (2.1)	28.9 (2.2)	29.1 (1.1)
Some	19.8 (1.6)	17.2 (1.8)	22.9 (1.4)	20.3 (2.0)	19.6 (0.9)
A little	7.5 (1.2)	9.9 (1.7)	6.8 (0.8)	10.0 (1.4)	8.6 (0.7)
None	3.0 (0.6)	2.1 (0.7)	1.6 (0.5)	3.0 (0.8)	2.6 (0.4)
Stress in Family					
Great deal	30.9 (1.9)	27.3 (2.5)	31.5 (2.2)	32.8 (1.2)	30.5 (1.1)
Fairly large amount	19.4 (1.6)	24.2 (2.3)	20.1 (1.5)	20.9 (1.4)	21.0 (0.9)
Some	23.0 (1.7)	21.7 (2.3)	22.8 (1.6)	23.8 (1.7)	22.8 (1.0)
A little	14.4 (1.2)	17.8 (1.8)	14.8 (1.3)	14.6 (1.6)	15.4 (0.8)
None	12.3 (2.0)	9.0 (1.2)	10.8 (1.8)	7.9 (1.3)	10.3 (0.9)

Note: Table entries are column percentages (with standard errors in parentheses) of personnel who are considered in need for further depression evaluation (N=2,585). Estimates have not been adjusted for sociodemographic differences among Services. Estimates may not sum to 100 due to rounding. The definition for need for further depression evaluation is given in Section 2.5.5.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; Stress at Work, Q82; Stress in Family, Q83).

- some, 28.2%;
- a little, 32.3%; and
- none, 21.7%.

When these percentages are compared to those in Table 8.7, clear distinctions are evident. Individuals in need of further depression evaluation reported much higher levels of stress associated with both work and family compared to those who did not need such evaluation.

Next, we inspected the coping behaviors used by personnel in need of further depression evaluation (see Table 8.8). In general, personnel who exhibited symptoms of depression were more likely to report using productive coping strategies (e.g., “think of a plan to solve the problem”) than less productive coping behaviors (e.g., “smoke marijuana/ use illegal drugs”). When this pattern of responses was compared to the pattern of responses given by individuals *not* in need of further depression evaluation (data not included in the table), however, some potentially significant differences were found. Perhaps the most disturbing finding was that in the total DoD, 18.3% of those in need of further evaluation had considered hurting or killing themselves compared to 1.3% of those who did not need further evaluation. Those in need of further evaluation also were more likely than others to report using illegal drugs (4.2% vs. 0.6%), drinking (41.7% vs. 19.8%), smoking cigarettes (38.5% vs. 22.4%), and getting something to eat (53.6% vs. 41.6%) as coping behaviors.

Finally, we examined the relationship between the need for further depression evaluation and productivity loss. Table 8.9 presents the types of productivity loss reported by all personnel, by those who reported needing further depression evaluation, and by those who reported that they did not need further depression evaluation. The last column shows the percentage who reported a given type of productivity loss on at least 1 day in the past 12 months. Personnel in need of further depression evaluation reported more losses. Two types of productivity loss are particularly striking. First, those who needed additional evaluation were more than twice as likely (18.5%) to be hurt on the job than were those who did not need further evaluation (7.8%). In addition, over half of those with depressive symptoms reported working below their normal performance level compared to less than a third among personnel without these symptoms.

It is clear from these findings that depressive symptoms are fairly common among military personnel and that these symptoms are associated with poor coping behaviors and decreased productivity. The analyses conducted on the 1998 data represent the first attempt in the series of DoD surveys to understand the outcomes associated with the need for further depression evaluation. Additional research is needed to fully understand the causes, outcomes, and treatment success of depression among military personnel. Depression is a complex illness and includes different subtypes that respond best to

Table 8.8 Behavior for Coping with Stress Among Personnel in Need of Further Depression Evaluation, by Service

Coping Behavior	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Talk to friend/family member	69.1 (1.5)	68.6 (2.4)	62.4 (2.6)	68.9 (2.6)	68.1 (1.1)
Light up a cigarette	38.3 (2.4)	38.0 (3.1)	46.2 (2.6)	34.7 (3.0)	38.5 (1.4)
Have a drink	43.9 (2.2)	39.1 (2.3)	49.5 (3.7)	36.2 (2.9)	41.7 (1.3)
Say a prayer	57.9 (1.9)	51.3 (3.0)	49.5 (1.7)	52.7 (3.9)	54.0 (1.4)
Exercise or play sports	48.8 (2.5)	47.4 (4.4)	54.6 (2.7)	52.2 (3.5)	50.0 (1.7)
Engage in a hobby	48.0 (1.2)	50.1 (2.9)	49.5 (2.8)	50.4 (2.9)	49.3 (1.1)
Get something to eat	53.3 (1.6)	52.8 (2.1)	50.1 (2.3)	57.4 (2.2)	53.6 (1.0)
Smoke marijuana/use illegal drugs	6.7 (1.4)	2.1 (0.9)	4.5 (1.4)	1.7 (0.4)	4.2 (0.7)
Think of plan to solve problem	81.8 (2.1)	83.2 (2.2)	81.6 (1.8)	82.1 (1.6)	82.2 (1.1)
Consider hurting or killing yourself	17.9 (1.8)	20.5 (2.0)	19.6 (1.9)	15.7 (1.9)	18.3 (1.0)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who are considered in need for further depression evaluation ($N=2,585$) who "frequently" or "sometimes" engage in a behavior when they feel pressured, stressed, depressed, or anxious. Estimates have not been adjusted for sociodemographic differences among Services. The definition for need for further depression evaluation is given in Section 2.5.5.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; Coping Behavior, Q91A-J).

Table 8.9 Productivity Loss in Past 12 Months Among Personnel in Need of Further Depression Evaluation

Group/Type of Loss	N	Number of Work Days Affected, Past 12 Months				
		No Days	1 Day	2 or 3 Days	4 or More Days	Any Number of Days
All Personnel	17,264					
Late for work by 30 minutes or more		73.4 (0.7)	11.1 (0.3)	9.8 (0.3)	5.7 (0.3)	26.6 (0.7)
Left work early		64.2 (0.7)	7.5 (0.3)	12.6 (0.4)	15.8 (0.5)	35.8 (0.7)
Hurt in an on-the-job accident		90.4 (0.6)	5.8 (0.3)	2.6 (0.2)	1.2 (0.1)	9.6 (0.6)
Worked below normal performance level		66.4 (0.6)	5.7 (0.2)	10.2 (0.3)	17.7 (0.5)	33.6 (0.6)
Did not come into work because of illness or injury		77.4 (0.7)	7.8 (0.3)	8.6 (0.4)	6.3 (0.3)	22.6 (0.7)
Need for Further Depression Evaluation	2,585					
Late for work by 30 minutes or more		64.1 (1.4)	12.5 (0.9)	13.9 (1.0)	9.6 (1.0)	35.9 (1.4)
Left work early		56.4 (1.2)	7.9 (0.6)	13.2 (0.7)	22.4 (1.1)	43.6 (1.2)
Hurt in an on-the-job accident		81.5 (1.1)	9.7 (0.8)	5.4 (0.5)	3.4 (0.5)	18.5 (1.1)
Worked below normal performance level		47.7 (1.2)	6.3 (0.6)	13.4 (0.7)	32.7 (1.1)	52.3 (1.2)
Did not come into work because of illness or injury		71.6 (1.2)	8.1 (0.8)	10.8 (0.9)	9.5 (0.8)	28.4 (1.2)
No Need for Further Depression Evaluation	14,587					
Late for work by 30 minutes or more		75.2 (0.7)	10.8 (0.3)	9.0 (0.3)	4.9 (0.3)	24.8 (0.7)
Left work early		65.6 (0.7)	7.4 (0.3)	12.5 (0.4)	14.5 (0.5)	34.4 (0.7)
Hurt in an on-the-job accident		92.2 (0.5)	5.0 (0.3)	2.0 (0.2)	0.8 (0.1)	7.8 (0.5)
Worked below normal performance level		70.0 (0.6)	5.6 (0.3)	9.6 (0.3)	14.9 (0.5)	30.0 (0.6)
Did not come into work because of illness or injury		78.4 (0.7)	7.8 (0.3)	8.2 (0.4)	5.6 (0.3)	21.6 (0.7)

Note: Table entries are percentages (with standard errors in parentheses). *N*'s are unweighted counts of respondents in each category. The definition of need for further depression evaluation is given in Section 2.5.5.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Need for Further Depression Evaluation, Q86-89; Productivity Loss, Q69A-E).

different treatments (Clayton, 1998). Fortunately, many cases can be treated successfully. Even major, chronic depression can be treated effectively with a combination of antidepressants (see Miller et al., 1998) and cognitive behavioral therapy (see Fava, Rafanelli, Grandi, Canestrari, & Morphy, 1998). Treatments such as these have the potential to significantly improve the functioning of those suffering from depression.

8.6 Alcohol Use, Stress, and Mental Health

We also examined the relationship of alcohol use during the past 30 days to perceived stress at work and in family life, to mental health, and to the need for further assessment for depression. Table 8.10 reports findings for those who did not use any alcohol (i.e., abstainers), those who used any alcohol, and those who were heavy drinkers. It should be noted that the measures of any alcohol use and heavy alcohol use are not mutually exclusive. Any use encompasses all levels of drinking, including heavy drinking.

As shown in Table 8.10, there was a relationship between alcohol use and the stress and mental health measures. The most notable differences occurred between abstainers and heavy drinkers. In particular, relative to abstainers, more heavy alcohol users

- perceived a great deal of stress at work (42.3% vs. 34.1%) or in their family life (27.4% vs. 20.0%),
- experienced 11 or more days during the month when their mental health was not good (15.8% vs. 9.9%), and
- met the criteria for needing further depression evaluation or assessment (23.4% vs. 13.7%).

Thus, we found a strong relationship between heavy drinking and mental health problems, including depression. Compared to abstainers, more heavy drinkers indicated a need for evaluation for depression and reported a higher number of days with mental health problems. These findings are consistent with other national studies showing high rates of comorbidity (i.e., the simultaneous occurrence of two or more disorders in one person) between substance use and mental health problems, both in the general population of the United States (Regier et al., 1990) and among military veterans (Kulka et al., 1990). Although it is clear that there is also a relationship between heavy drinking and stress at work, the data do not allow us to infer the direction of the relationship. It seems more likely, however, that alcohol would be used as a relatively ineffective avoidance strategy for coping with stress rather than as a precursor of stress.

Table 8.10 Alcohol Use, Stress, and Mental Health Problems, Total DoD

Problem/Level	Alcohol Use, Past 30 Days			Total
	None	Any	Heavy	
Stress at Work, Past 12 Months				
Great deal/large amount	34.1 (1.0)	39.6 (0.9)	42.3 (1.6)	38.3 (0.9)
Some/a little	52.1 (1.1)	50.3 (0.8)	46.8 (1.3)	50.7 (0.7)
None	13.8 (0.6)	10.2 (0.4)	10.8 (0.8)	11.0 (0.4)
Stress in Family, Past 12 Months				
Great deal/large amount	20.0 (0.6)	24.3 (0.5)	27.4 (1.5)	23.3 (0.5)
Some/a little	56.8 (0.9)	56.9 (0.6)	49.4 (1.4)	56.9 (0.6)
None	23.2 (0.8)	18.8 (0.5)	23.2 (1.1)	19.9 (0.5)
Days That Mental Health Was Not Good, Past 30 Days^a				
11 or more days	9.9 (0.5)	11.5 (0.5)	15.8 (1.0)	11.1 (0.4)
4-10 days	10.0 (0.5)	11.4 (0.4)	14.4 (0.9)	11.1 (0.4)
1-3 days	27.2 (0.9)	31.7 (0.6)	30.8 (1.3)	30.6 (0.5)
None	52.9 (0.9)	45.5 (0.7)	39.0 (1.2)	47.3 (0.6)
Need for Further Depression Evaluation				
Yes	13.7 (0.6)	16.8 (0.5)	23.4 (1.1)	16.1 (0.4)
No	86.3 (0.6)	83.2 (0.5)	76.6 (1.1)	83.9 (0.4)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding. The definition of need for further depression evaluation is given in Section 2.5.5.

^aBased on respondents' perception of number of days when mental health was not good.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress at Work, Q82; Stress in Family, Q83; Mental Health, Past 30 Days, Q80; Need for Further Depression Evaluation, Q86-89; Alcohol Use, Past 30 Days, Q15-18 and 20-23).

8.7 Selected Mental Health Issues

We asked respondents several questions about mental health care. These included whether they had felt a need for counseling within the past 12 months and whether they had received such care. Personnel also were questioned about their perception of whether mental health counseling would detrimentally impact their career. Table 8.11 presents distributions across response categories displayed separately for each Service.

Table 8.11 shows that the perceived need for mental health counseling was very similar across the four Services. Roughly 17% to 18% in each Service indicated that they

Table 8.11 Selected Mental Health Issues, Past 12 Months, Total DoD

Mental Health Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Perceived Need for Mental Health Counseling	17.8 (0.9)	17.5 (0.9)	16.7 (1.0)	17.9 (1.0)	17.6 (0.5)
Receipt of Mental Health Counseling					
Any counseling	10.4 (0.4)	8.5 (0.5)	7.7 (0.4)	9.5 (0.5)	9.3 (0.2)
From a military mental health professional	5.6 (0.4)	4.7 (0.4)	3.0 (0.3)	6.2 (0.5)	5.2 (0.2)
From a general physician at a military facility	1.8 (0.2)	2.0 (0.3)	1.5 (0.2)	1.5 (0.3)	1.7 (0.1)
From a military chaplain	5.8 (0.4)	3.0 (0.4)	4.7 (0.4)	3.2 (0.4)	4.2 (0.2)
From a civilian mental health professional	1.7 (0.3)	2.5 (0.3)	1.5 (0.2)	1.8 (0.3)	1.9 (0.1)
From a general physician at a civilian facility	0.5 (0.1)	0.8 (0.2)	0.8 (0.2)	0.2 (0.1)	0.5 (0.1)
From a civilian pastoral counselor	1.7 (0.2)	2.0 (0.3)	1.9 (0.4)	1.5 (0.2)	1.8 (0.1)
Perceived Damage to Career					
Definitely will	17.7 (1.0)	22.3 (1.0)	20.0 (0.6)	23.1 (0.9)	20.7 (0.5)
May or may not	58.1 (1.1)	58.7 (1.1)	59.8 (0.9)	63.0 (0.8)	59.8 (0.6)
Definitely will not	24.2 (0.9)	19.1 (1.0)	20.2 (1.1)	13.9 (0.7)	19.5 (0.5)

Note: Table entries are percentages (with standard errors in parentheses).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Perceived Need for Counseling Services, Q94; Receipt of Counseling, Q92A-F; Perceived Damage to Career, Q93).

had perceived a personal need for counseling in the past 12 months. Just over half (9.3% for the total DoD) of those who felt a need, however, actually received care. The majority of individuals received counseling from a military mental health professional (5.2%) or a military chaplain (4.2%).

The impact of mental health counseling on a military career appears to be uncertain in the minds of military personnel. Almost 60% of the total DoD were uncertain, responding that it “may or may not” damage a person’s career. The remainder were evenly divided between “definitely will” and “definitely will not” damage a military career. These patterns were fairly similar across the four Services. A majority in each Service was uncertain about the career impact of counseling. Some potentially significant differences did emerge, however. Members of the Army felt more optimistic about the impact of counseling (17.7% for “definitely will” damage career vs. 24.2% for “definitely will not”) than were personnel in the Air Force (23.1% “definitely will” vs. 13.9% “definitely will not”). In the Navy and Marine Corps, respondents were more equally divided as to whether counseling would damage a military career.

Because a majority of military personnel were not sure whether receiving mental health counseling would damage a military career, it may be more informative to examine the opinions of only those who perceived or indicated a need for this type of treatment. This may clarify whether the perception of repercussions is deterring some personnel from receiving mental health counseling. If personnel who needed treatment and received it perceived more positive career outcomes, this would indicate that these fears are largely unwarranted. If, however, those who had received treatment perceived a greater threat to their career than those who had not, this would indicate that they may have experienced negative career consequences as a result of their counseling.

Table 8.12 includes data only for those who (a) perceived a need for mental health services, (b) revealed a need for further depression evaluation, or (c) reported recent poor mental health. Within each group, respondents were divided into those who had received mental health care in the past 12 months and those who had not. Examination of each panel reveals that those who had *not* received mental health services (38.0%) were more likely than those who had received them (25.2%) to respond that such services "definitely would" damage a person's military career. Those who had received mental health care (57.4%) were more likely to respond that such services "may or may not" be detrimental to their career than those who had not received such services (49.9%). No clear pattern emerged for those who thought mental health services "definitely would not" damage a military career.

The general ambiguity surrounding the potential career impact of mental health counseling is clear. It is quite possible that the fear of negative career consequences is preventing some Service members from seeking mental health counseling. In recent years, the Military has taken steps to reduce the stigma associated with receiving mental health care. One step in this process has been to increase awareness of the importance of mental fitness. Mental health has been recognized as an essential aspect of military readiness; recent directives have specified routine medical surveillance (including mental health) for active-duty Service members (DoD, 1997b) in order to monitor the health of this population and intervene when necessary. Under this policy, all Service members must be mentally fit to carry out their missions, and their mental health must be maintained, assessed, and protected. In addition, the rights of Service members referred for mental health evaluation are protected (DoD, 1997a; Litts & Roadman, 1997). Empirical evidence also suggests that mental health evaluation will not necessarily have a negative impact on an individual's military career. In a survey of 138 commanding and executive officers in the Navy and Marine Corps, the majority of these officers reported a neutral view of Service members who received mental health counseling (Porter & Johnson, 1994).

Personnel who are in need of health services that they are reluctant to seek likely are not performing at their optimal level on the job. Therefore, the resolution of this

Table 8.12 Perceived Damage to Military Career for Seeking Mental Health Services, by Selected Mental Health Measures

Mental Health Measures	N	Perceived Damage to Career		
		Definitely Would	May or May Not	Definitely Would Not
Perceived Need for Mental Health Counseling, Past 12 Months				
Received mental health services	1,103 ^a	25.2 (1.7)	57.4 (2.0)	17.5 (1.7)
Did not receive services	1,933 ^b	38.0 (1.5)	49.9 (1.8)	12.1 (1.2)
Need for Depression Evaluation, Past 12 Months				
Received mental health services	641 ^c	30.7 (2.0)	53.6 (2.2)	15.7 (2.5)
Did not receive services	1,916 ^d	35.8 (1.5)	47.0 (1.6)	17.2 (1.5)
Mental Health Not Good for 11 or More Days in the Past 30 Days				
Received mental health services	483 ^e	30.5 (2.0)	51.6 (2.9)	17.8 (2.6)
Did not receive services	1,258 ^f	33.9 (1.3)	50.4 (1.9)	15.7 (1.5)

Note: Table entries are percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding. The definition of need for further depression evaluation is given in Section 2.5.5.

^aUnweighted number of respondents in the total DoD sample who perceived the need for mental health counseling in the past 12 months and received mental health services.

^bUnweighted number of respondents in the total DoD sample who perceived the need for mental health counseling in the past 12 months and did not receive services.

^cUnweighted number of respondents in the total DoD sample who revealed a need for depression evaluation in the past 12 months and received mental health services.

^dUnweighted number of respondents in the total DoD sample who revealed a need for depression evaluation in the past 12 months and did not receive services.

^eUnweighted number of respondents in the total DoD sample who reported their mental health was not good for 11 or more days in the past 30 days and received mental health services.

^fUnweighted number of respondents in the total DoD sample who reported their mental health was not good for 11 or more days in the past 30 days and did not receive services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Perceived Damage to Career, Q93; Receipt of Counseling Services, Q92A-F; Perceived Need for Counseling, Q94; Need for Further Depression Evaluation, Q86-89; Mental Health, Past 30 Days, Q80).

conflict (perhaps through education and assurance of anonymity) could increase the readiness of the U.S. military forces.

8.8 Summary

This chapter examines a variety of mental health issues among military personnel, including stress, coping mechanisms, symptoms of depression, relations between alcohol use and mental health problems, and perceptions and receipt of mental health counseling.

8.8.1 Levels and Sources of Stress

As shown in Table 8.1, higher percentages of military personnel rated their jobs as more stressful than their personal lives. When asked about the specific sources of stress listed in Table 8.2, military personnel reported the following:

- The most frequently indicated stressor for both men (19.5%) and women (19.5%) was separation from family.
- More men (12.9%) than women (7.8%) reported stress due to deployment.
- More women (17.9%) than men (13.5%) reported stress related to changes in the family.

8.8.2 Stress and Productivity Loss

Compared to their less-stressed counterparts, personnel experiencing high levels of job-related or family-related stress showed a greater prevalence of productivity loss in each of the domains assessed (see Table 8.3):

- Working below normal performance level was reported by 42.6% of the high-stress group compared to 25.4% of the moderate/low-stress group. This difference was especially salient at the highest frequency (i.e., 4 or more days in the past year).
- Injuries due to accidents in the workplace were twice as common in the high-stress group (12.9%) as in the moderate/low-stress group (6.4%).

Beyond the issue of productivity loss, the Services should consider the impact of other potential negative outcomes of stress on military functioning, including attrition, lower morale, and medical treatment costs for substance abuse, health, and mental health problems.

8.8.3 Coping with Stress and Depression

Coping behaviors are listed by Service in Table 8.4 and by gender in Table 8.5. The most commonly used strategies for coping with stress were using a problem-solving approach, seeking social support, and engaging in physical activity. These encouraging findings are tempered somewhat by the finding that nearly a quarter of military personnel commonly used alcohol to cope with stress, daily pressures, and feelings of depression:

- More men (24.6%) than women (15.5%) reported using alcohol as a coping behavior. Women were more likely than men to talk to a friend or family member (87.1% vs. 70.8%, respectively), or to use

prayer (72.5% vs. 50.5%, respectively) as a coping strategy. Women (53.4%) also were more likely than men (41.9%) to get something to eat as a coping strategy.

- Approximately 4% of both male and female military personnel had considered suicide as an option for dealing with stress and depression.

8.8.4 Depression

Table 8.6 shows the percentage of personnel who met the criterion for need for further depression screening, by Service and selected sociodemographic characteristics. Consistent with findings from psychiatric epidemiologic studies, a somewhat greater percentage of women (20.6%) scored above the threshold on a depression screener than did men (15.3%). Higher percentages of those who were younger, less educated, living without a spouse, and in the lower enlisted pay grades endorsed screening items indicative of need for further evaluation for depression. These differences should be interpreted with some caution, recognizing that the differences were relatively small in magnitude, and that comprehensive assessment procedures are required to identify cases of specific psychiatric disorders, such as major depressive disorder.

Because the symptoms of depression can affect military readiness, we further analyzed the data of personnel who met the criterion for need for further depression evaluation. These analyses revealed some potentially important findings:

- As shown in Table 8.7, personnel in need of further evaluation for depression reported more high-level stress associated with work (69.2%) than with family (51.5%). Also noteworthy was that, among this group of personnel, the most frequently endorsed stress level for both work (40.1%) and family (30.5%) was "a great deal."
- Although more personnel in need of further depression evaluation reported using productive coping strategies than less productive ones, several unproductive strategies were reported by a fairly large percentage (see Table 8.8). The most disturbing finding was the high rate among the "need further evaluation" group for considering self-injury or suicide as a coping mechanism (18.3%).
- Productivity loss was higher among personnel in need of further evaluation for depression than it was among those who did not need this evaluation (see Table 8.9). This was especially apparent in work-related injuries (18.5% vs. 7.8%) and working below normal performance level (52.3% vs. 30.0%).

8.8.5 Alcohol, Stress, and Mental Health

As shown in Table 8.10, heavy users of alcohol had more problems with stress, more mental health problems, and were more likely to exhibit depressive symptoms than did their counterparts who did not drink. This suggests that there is a strong

comorbid relationship between heavy alcohol use and mental health problems, and that this is an area needing further assessment. In particular, it is important to understand the extent of this relationship, the risk factors that contribute to it, and the potential clinical, research, and policy actions that should be taken to address it.

8.8.6 Selected Mental Health Issues

Roughly 17% of personnel in each Service personally had perceived a need for mental health care in the 12 months prior to the survey; only about half of them received this care (see Table 8.11). This may be due to a pervasive uncertainty regarding the impact of mental health counseling on a Service member's military career (see Table 8.12). If this ambiguity were reduced through education and assurance of anonymity for those receiving mental health care, the overall mental health status of the Military likely would improve, and the readiness of the U.S. Armed Forces could be increased.

9. SPECIAL ISSUES IN THE MILITARY

In Chapter 9, we present findings on special issues from the 1998 DoD survey. The areas of special interest include gender-specific health issues, oral health, and gambling in the Military. In the discussion of women's health issues, we examine stress among military women, cervical cancer risk reduction, and maternal and infant health. For oral health, we assess recency of dental check-ups, reasons for lack of dental check-ups, dental work prior to deployments, and tooth loss in the Military. In the section on gambling, we discuss the background and significance of the problem, the prevalence of problem gambling in the Military, and its relation to alcohol use. Some of the topics of discussion in this chapter are new to the DoD survey series, such as oral health and testicular self-exams.

9.1 Gender-Specific Health Issues

9.1.1 Stress Serving as a Military Woman

About one-third of military women reported being under a "great deal" or a "fairly large amount" of stress related to being a woman in the Military (Table 9.1). In the total DoD, 31.8% of military women reported these relatively high levels of stress. Women in the Marine Corps were most likely to report high stress (38.5%), followed closely by women in the Army (36.1%). Women in the Navy (31.4%) and Air Force (26.7%) reported slightly lower levels of stress related to being a military female. One possible cause of this stress may relate to the fact that women are a relatively small proportion of military personnel; in 1998, women comprised 13.7% of the Military (Table 2.4). Among Marine Corps personnel, whose women indicated the highest levels of stress, the proportion of women was lowest of all Services. Only 5.5% of Marine Corps personnel were women (Table 2.4).

In the total DoD, stress associated with being a woman in the Military differed slightly among racial/ethnic groups (Table 9.1). Hispanics most frequently reported experiencing high levels of stress (36.0%), while non-Hispanic Caucasians did so least frequently (30.3%). About one-third of non-Hispanic African Americans and those in other racial/ethnic groups reported high stress levels. Ethnic patterns in reported stress differed among Services. For example, Army women reporting high stress did not vary much across ethnic groups (range of 35.4% to 36.9%), while those in the Air Force reported stress at varied levels across ethnic groups (range of 20.1% to 35.3%). Hispanics were most likely to report high stress, and non-Hispanic African Americans were the least likely to report high stress associated with being a woman in the Air Force.

Table 9.1 Stress Associated with Being a Woman in the Military, by Selected Sociodemographic Characteristics

Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Race/Ethnicity					
Caucasian, non-Hispanic	35.4 (2.2)	28.8 (2.2)	40.4 (4.6)	26.9 (1.9)	30.3 (1.2)
African American, non-Hispanic	36.9 (3.2)	35.4 (2.7)	34.9 (6.4)	20.1 (4.5)	32.7 (2.2)
Hispanic	36.5 (5.3)	34.3 (4.8)	40.3 (6.0)	35.3 (4.3)	36.0 (2.7)
Other	35.5 (6.6)	37.9 (5.0)	+ (+)	28.6 (5.3)	32.9 (3.3)
Education					
High school or less	39.6 (4.1)	31.3 (3.7)	37.3 (4.9)	26.4 (3.7)	33.8 (2.1)
Some college	37.1 (1.9)	36.4 (2.4)	41.8 (3.6)	27.5 (1.9)	33.5 (1.2)
College graduate or higher	30.4 (3.1)	22.6 (1.7)	30.3 (6.0)	25.2 (2.3)	26.4 (1.5)
Age					
20 or younger	37.0 (4.0)	35.2 (7.4)	40.0 (6.3)	19.1 (4.9)	31.3 (2.7)
21-25	38.2 (2.3)	36.3 (3.9)	42.8 (3.4)	29.4 (3.2)	35.0 (1.7)
26-34	36.8 (3.1)	29.6 (3.1)	33.4 (4.6)	25.0 (2.8)	30.6 (1.8)
35 or older	31.5 (3.3)	25.7 (2.7)	32.4 (4.6)	28.7 (2.2)	29.0 (1.6)
Family Status^a					
Not married	36.4 (2.1)	30.4 (2.7)	41.1 (4.2)	25.5 (2.1)	31.6 (1.3)
Married, spouse not present	37.1 (3.8)	42.4 (7.6)	34.8 (7.9)	+ (+)	39.8 (3.8)
Married, spouse present	35.5 (2.6)	31.9 (2.9)	34.6 (5.2)	26.3 (1.6)	30.9 (1.3)
Pay Grade					
Enlisted	37.9 (1.8)	34.1 (2.3)	40.0 (3.9)	27.4 (1.9)	33.4 (1.1)
Officer	27.8 (3.1)	20.8 (2.2)	24.5 (4.9)	23.7 (2.4)	24.4 (1.5)
Region					
CONUS ^b	34.9 (2.0)	29.9 (2.8)	38.1 (3.8)	25.9 (1.7)	30.7 (1.2)
OCONUS ^c	39.9 (3.3)	35.6 (2.7)	+ (+)	29.1 (3.7)	35.0 (1.8)
Total	36.1 (1.7)	31.4 (2.1)	38.5 (3.7)	26.7 (1.6)	31.8 (1.0)

Note: Table entries are percentages (with standard errors in parentheses) of women who indicated "a great deal" or "a fairly large amount" of stress associated with being a woman in the Military. Estimates have not been adjusted for sociodemographic differences among Services.

^aLow precision.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Stress Associated With Being a Woman in the Military, Q136; refer to Section 2.5.1 for descriptions of sociodemographic variables).

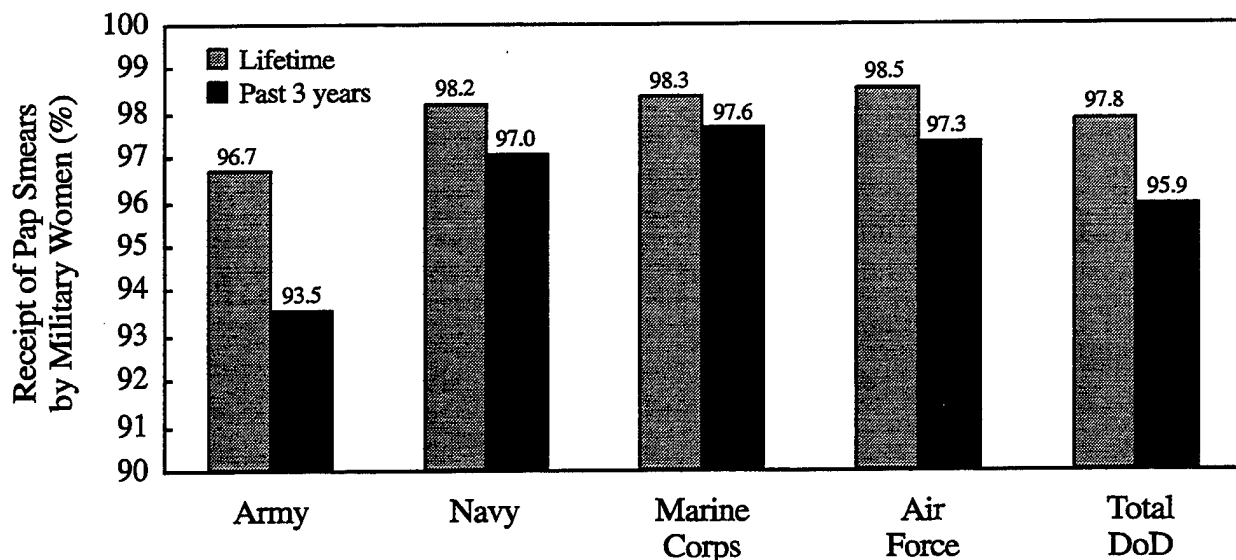
Other factors also were correlated with reports of stress related to being a woman in the Military (Table 9.1). College graduates were less likely to report high stress than nongraduates; only about 26% of those with a college education reported high stress compared to about 34% of those with less education. Respondents aged 21 to 25 were more likely to report high stress than other age groups. Married women with their spouse not present were more likely to report high levels of stress compared to those not married and to those married with their spouse present. Enlisted women were more likely to report high stress than officers. This disparity was largest in the Marine Corps, where 40.0% of enlisted women reported high stress compared to 24.5% of officers. Air Force officers and enlisted women differed least among Services in this gender-related stress, with about 27% of enlisted and 24% of officers reporting high stress levels. Women stationed outside the continental United States (OCONUS) were somewhat more likely to report high stress compared to those stationed within the continental United States (CONUS) (35.0% vs. 30.7%, respectively).

Levels of stress experienced at work and within the family, and behaviors used to cope with stress among military men and women, are investigated more fully in Chapter 8. As indicated in Table 8.2, military women's most frequently reported work-related causes of stress were "increases in work load" (17.1%), "work relationships" (15.4%), and "problems with supervisor" (13.3%). Stresses specific to the workplace, however, may not fully explain women's feelings of stress associated with being a female in the Military. For example, 19.5% of military women reported high stress related to "being away from family." Stress related to being a woman in the Military is likely to have complex causes, resulting from issues in the workplace, family, and other areas.

9.1.2 Cervical Cancer Risk Reduction

Having regular Pap smear tests and seeking necessary treatment decreases the risk of cervical cancer. As shown in Figure 9.1, receipt of Pap smears was nearly universal among military women. A commendable 97.8% of military women received a Pap smear in their lifetime, and 95.9% had the test within the past 3 years. These results are very similar to those from the 1995 survey in which 97.1% received a Pap smear in their lifetime and 95.2% had the test in the previous 3 years (Table 3.4). There was little variation in receipt of Pap smears across Services. Army women, however, were marginally less likely than women in the other Services to have had the tests within the past 3 years (93.5% vs. 97.0% to 97.6%) and within their lifetime (96.7% vs. 98.2% to 98.5%). Although not all the reported tests occurred after entering military service (not all military women who responded to the survey had been in the service 3 years), the slight difference among the Services in obtaining Pap smears may indicate where additional efforts should be targeted. It is possible, however, that some of these Service differences may reflect differential access or use of health care prior to joining the Military.

Figure 9.1 Receipt of Pap Smears by Military Women, Lifetime and Past 3 Years, by Service



Note: Estimates made for women with an intact uterine cervix (N=3,760).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Receipt of Pap Smear, Q134-135).

As noted in Chapter 3, military women overall exceeded the *Healthy People 2000* objectives of 95% having ever had a Pap smear and 85% having had one in the past 3 years (Table 3.4). In addition, each Service also exceeded these objectives. Military rates of obtaining Pap smears were higher than receipt rates among civilians, which probably results from ready access to medical services and mandatory care at specified intervals for military women. For example, according to the 1992 National Health Interview Survey (NHIS) Cancer Control Supplements, about 91% of all women aged 18 or older had ever had a Pap smear and 43% had the test in the past year (Martin et al., 1996). Data from the 1996 Behavioral Risk Factor Surveillance System (BRFSS) indicated these median percentages: 94.5% of women aged 18 or older had received a Pap smear in their lifetime, 86.4% had one within the past 3 years, and 68% had one within the past year (CDC, 1996). These data show that 1998 military lifetime Pap smear rates among women were about 3 to 7 percentage points higher than 1996 civilian rates, and that past 3-year rates were about 10 percentage points higher among military women.

9.1.3 Maternal and Infant Health

Regular prenatal care and the avoidance of substance use during pregnancy are important in ensuring maternal and infant health (American College of Obstetricians and Gynecologists [ACOG], 1994). Research studies consistently show that adequate

prenatal care is associated with decreased infant mortality rates and improved birth outcomes (Stringer, 1998). For example, infants whose mothers received adequate prenatal care may be delivered later in the pregnancy, have higher birth weights, and have shorter hospital stays following birth (Amini, Catalano, & Mann, 1996). Use of substances during pregnancy, including tobacco and alcohol, has been linked to a variety of negative birth and developmental outcomes, such as prematurity, low birth weight, and congenital malformations (McGann & Spangler, 1997; NIDA, 1995; Visscher, Bray, & Kroutil, 1999). Understanding factors that promote health among pregnant military women also is of interest because pregnancy and the health of female personnel affect military readiness.

9.1.3.1 Pregnancy. As shown in Table 9.2, 16.0% of military women reported that they had been pregnant within the past year, and another 1.2% reported that they may have been pregnant at the time of the survey but that they were unsure. The percentage who had been pregnant within the past year includes those who had a livebirth, those whose pregnancy was terminated, and those who were currently pregnant at the time of the survey. Across all the Services, 35.5% of military women had been pregnant within the past 5 years, although some of these pregnancies may have occurred prior to military service. The percentage of women who had been pregnant within the past year was higher in the Marine Corps (24.3%) and Army (20.1%) than in the Navy (14.1%) or Air Force (12.1%). The Air Force had the highest percentage of women who had never been pregnant (46.7%). These differences in pregnancy by Service may be related to differences in age and other sociodemographic characteristics among women across the Services.

9.1.3.2 Use of Prenatal Care Services. Sociodemographic characteristics were somewhat correlated with receipt of prenatal care (Table 9.3). Overall, nearly 85% of women received prenatal care during their first trimester. Army women were somewhat less likely to receive prenatal care in their first trimester and somewhat more likely to receive late or no prenatal care compared to women in the other Services. Education was associated with receiving prenatal care; college graduates were more likely than those with less education to receive prenatal care early in pregnancy. Higher age was linked to increased early prenatal care. For example, only 79.2% of those 20 or younger used prenatal services in the first trimester, while 90.7% of those 35 or older did. Unmarried personnel were more likely to receive late or no prenatal care compared to married personnel with their spouse present; 17.3% of unmarried respondents received care in the third trimester or never compared to 3.7% of married personnel with their spouse present. Officers were more likely to use prenatal services than enlisted personnel; about 5% of officers received prenatal care in the third trimester or never, compared to approximately 10% of enlisted personnel.

9.1.3.3 Alcohol and Cigarette Use During Pregnancy. A *Healthy People 2000* objective is to increase abstinence from alcohol use during pregnancy by at least 20%, as

Table 9.2 Pregnancy History Among Military Women

Recency	Service				
	Army	Navy	Marine Corps	Air Force	Total DoD
Never Been Pregnant	35.4 (2.3)	41.8 (2.8)	39.1 (3.0)	46.7 (1.6)	41.1 (1.2)
May Currently Be Pregnant ^a	+ (+)	+ (+)	+ (+)	+ (+)	1.2 (0.2)
Past Year ^b	20.1 (1.8)	14.1 (1.4)	24.3 (2.6)	12.1 (1.2)	16.0 (0.9)
Past 1 to 2 Years	6.9 (0.6)	7.3 (1.1)	6.2 (1.1)	6.1 (0.6)	6.7 (0.4)
Past 2 to 5 Years	11.9 (1.0)	13.0 (1.5)	12.4 (1.6)	13.5 (1.0)	12.8 (0.6)
More Than 5 Years Ago	24.0 (1.2)	22.7 (1.5)	16.1 (1.4)	20.8 (1.1)	22.2 (0.7)

Note: Table entries are column percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

^aEstimate based on women who indicated that they may have been pregnant at the time of the survey but did not know for certain.

^bIncludes women who were pregnant at the time of the survey.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Pregnancy History, Q137).

discussed in Chapter 3. That results in a target of greater than or equal to 88% of women who were pregnant during the past 5 years abstaining from alcohol use during their most recent pregnancy. Responses from the 1995 DoD survey provided a baseline from which to measure change within the military population (Table 3.4). Data collected in 1998 inform us regarding progress toward these goals (see Chapter 3 for discussion). As shown in Table 9.4, 85.8% of all military women who were pregnant in the past 5 years abstained from alcohol use during their most recent pregnancy; this number was comparable to 85.2% in 1995. This percentage was notably lower among older women and those who received late or no prenatal care. About 74% of those aged 35 or older abstained from alcohol during their last pregnancy and about 76% of those who did not receive prenatal care or received it in the third trimester abstained. Overall, the *Healthy People 2000* objective of increasing abstinence to 88% was not met between 1995 and 1998, although the level of abstinence is quite high.

In addition to showing rates of abstinence, Table 9.4 also indicates alcohol use in two groups—alcohol use once per month or less and more than once per month. Although any use during pregnancy is of concern, higher rates of use are of greater concern. As shown, about 2% of pregnant military women drank several times a month or more. The highest rates of more frequent drinking were among Navy women (3.3%) compared with

Table 9.3 Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics

Characteristic	Trimester of First Prenatal Care Visit ^a		
	First	Second	Third or None
Service			
Army	82.1 (1.7)	7.3 (1.1)	10.6 (1.4)
Navy	85.7 (2.8)	5.8 (1.0)	8.6 (2.5)
Marine Corps	84.1 (2.4)	7.7 (2.0)	8.3 (1.3)
Air Force	87.9 (2.6)	3.9 (1.3)	8.2 (2.2)
Race/Ethnicity			
Caucasian, non-Hispanic	86.2 (1.7)	4.8 (0.9)	9.0 (1.5)
African American, non-Hispanic	83.4 (1.7)	7.5 (1.5)	9.0 (1.4)
Hispanic	84.5 (3.0)	5.4 (1.8)	10.2 (2.6)
Other	83.6 (4.5)	6.9 (2.2)	9.5 (4.0)
Education			
High school or less	85.5 (2.1)	5.5 (1.1)	9.1 (1.8)
Some college	81.9 (1.7)	7.2 (0.9)	11.0 (1.4)
College graduate or higher	93.9 (1.5)	2.4 (1.1)	3.6 (1.3)
Age			
20 or younger	79.2 (3.4)	8.3 (2.4)	12.5 (2.4)
21-25	82.2 (1.9)	6.3 (1.1)	11.5 (1.7)
26-34	87.8 (1.8)	5.2 (1.2)	7.0 (1.5)
35 or older	90.7 (2.6)	4.3 (1.9)	5.1 (1.7)
Family Status^b			
Not married	76.3 (2.0)	6.5 (1.1)	17.3 (2.0)
Married, spouse not present	89.1 (5.4)	4.7 (2.7)	+ (+)
Married, spouse present	90.7 (1.3)	5.6 (1.0)	3.7 (0.9)
Pay Grade			
Enlisted	83.7 (1.3)	6.5 (0.8)	9.8 (1.1)
Officer	93.4 (1.9)	1.4 (0.9)	5.2 (1.7)
Total	84.9 (1.2)	5.9 (0.7)	9.2 (1.1)

Note: Table entries are percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years ($N=1,299$). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

^aFirst trimester = months 1 to 3 of pregnancy; second trimester = months 4 to 6 of pregnancy; third trimester = month 7 or later.

^bEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, Q137 and 138; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table 9.4 Alcohol Use During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics

Characteristic	Alcohol Use		
	None	Once a Month or Less ^a	More Than Once a Month ^b
Service			
Army	87.8 (1.8)	10.8 (1.7)	1.4 (0.6)
Navy	81.9 (1.8)	14.8 (1.8)	3.3 (1.1)
Marine Corps	86.9 (2.7)	11.6 (2.7)	1.5 (0.8)
Air Force	85.9 (2.8)	12.1 (2.5)	2.0 (0.7)
Race/Ethnicity			
Caucasian, non-Hispanic	82.2 (2.1)	14.8 (1.9)	2.9 (0.7)
African American, non-Hispanic	89.1 (1.8)	9.3 (1.7)	1.6 (0.6)
Hispanic	89.9 (2.8)	9.3 (2.7)	0.8 (0.8)
Other	88.0 (3.2)	11.4 (3.2)	0.6 (0.6)
Education			
High school or less	87.6 (2.0)	9.9 (2.0)	2.4 (0.7)
Some college	85.1 (1.5)	12.9 (1.5)	2.0 (0.6)
College graduate or higher	85.1 (2.7)	13.4 (2.5)	1.5 (0.8)
Age			
20 or younger	89.3 (2.3)	7.4 (2.2)	3.2 (1.3)
21-25	88.8 (1.8)	9.7 (1.8)	1.5 (0.5)
26-34	84.8 (1.6)	13.2 (1.5)	2.0 (0.7)
35 or older	73.8 (4.6)	23.1 (3.8)	3.0 (1.4)
Family Status^c			
Not married	84.0 (1.7)	13.2 (1.8)	2.8 (0.8)
Married, spouse not present	92.4 (3.7)	5.2 (2.7)	2.4 (1.7)
Married, spouse present	86.5 (1.6)	12.0 (1.4)	1.5 (0.5)
Pay Grade			
Enlisted	86.0 (1.2)	12.0 (1.1)	2.0 (0.5)
Officer	84.4 (3.1)	13.5 (2.7)	2.1 (1.1)
Prenatal Care			
Any in first or second trimester ^d	87.0 (1.2)	11.8 (1.1)	1.2 (0.3)
Third trimester or none	76.0 (4.0)	13.5 (3.4)	10.5 (2.9)
Total	85.8 (1.2)	12.2 (1.1)	2.0 (0.4)

Note: Table entries are row percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years ($N=1,299$). Estimates have not been adjusted for sociodemographic differences among Services.

^aDefined as alcohol use "once a month or less (but at least once)" during the most recent pregnancy.

^bDefined as alcohol use "several times a month (but less than once a week)," "1-2 days a week," "almost daily, or 3-6 days a week," or "daily" during the most recent pregnancy.

^cEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^dFirst trimester = months 1 to 3 of pregnancy; second trimester = months 4 to 6 of pregnancy; third trimester = month 7 or later.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Alcohol Use During Most Recent Pregnancy, Past 5 Years, Q137 and 141-142; refer to Section 2.5.1 for descriptions of sociodemographic variables).

women in the other Services, among those aged 20 or younger (3.2%), and among unmarried women (2.8%). The highest rate of drinking occurred among the approximately 9% of the women who received prenatal care only during the third trimester or not at all during their most recent pregnancy in the past 5 years (Table 9.3). Approximately 11% of these women drank several times a month or more, which could compound the negative effects of not receiving adequate prenatal care. Although some of these pregnancies may have occurred prior to military service, these findings suggest groups of military women to whom educational efforts regarding the effects of alcohol on fetal development should be targeted.

A related *Healthy People 2000* objective states that the proportion of women who do not smoke during pregnancy should be greater than or equal to 90%. As shown in Table 9.5 (see also discussion in Chapter 3), military women overall have not yet reached this objective. About 86% of military women who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy, about 12% reported some cigarette use, and approximately 2% reported heavy use (smoking a pack a day or more). Although the *Healthy People 2000* objective was not reached, cigarette use during the most recent pregnancy did decrease slightly since 1995, when 83.6% reported no use, 13.3% reported some use, and 3.1% reported heavy use. Although the *Healthy People 2000* objective was not met overall, the following subgroups of military women had obtained the 90% objective of not smoking at all during pregnancy: non-Hispanic African Americans, college graduates, and officers.

Higher rates of smoking during pregnancy were found among certain sociodemographic groups: women in the Marine Corps (20.5%), non-Hispanic Caucasians (21.0%), those with a high school education or less (17.2%), those 20 or younger (20.3%), unmarried personnel (16.8%), enlisted personnel (15.9%), and those women who began to receive prenatal care during the last trimester of their pregnancy or received no prenatal care at all (24.3%). Rates of heavy smoking during pregnancy were slightly higher among several subgroups: women who received prenatal care during the third trimester or not at all (7.2%), women 35 or older (4.7%), and Marine Corps women (3.5%).

Thus, greater preventive efforts need to be directed at those military women who used alcohol or smoked cigarettes during their last pregnancy. These efforts could be coupled with efforts to increase the percentage of women who receive prenatal care early in their pregnancies. The types of military women who drank during their last pregnancies, however, differ somewhat from those who smoked during their last pregnancy. This suggests that preventive efforts directed toward decreasing alcohol use or smoking during pregnancy should either be targeted to separate groups of military women or provided universally to all pregnant women.

Table 9.5 Cigarette Use During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics

Characteristic	Cigarette Use		
	None	Less Than One Pack ^a	One or More Packs ^b
Service			
Army	86.1 (1.9)	12.9 (2.0)	1.0 (0.5)
Navy	85.8 (2.7)	11.5 (2.7)	2.7 (1.0)
Marine Corps	79.6 (3.8)	17.0 (3.2)	3.5 (1.5)
Air Force	86.8 (2.6)	11.5 (2.0)	1.7 (0.9)
Race/Ethnicity			
Caucasian, non-Hispanic	79.0 (2.4)	18.1 (2.2)	2.9 (0.8)
African American, non-Hispanic	94.8 (1.2)	4.6 (1.1)	0.6 (0.4)
Hispanic	89.3 (2.3)	9.3 (2.2)	1.4 (1.1)
Other	87.1 (3.3)	12.9 (3.3)	** (**)
Education			
High school or less	82.9 (2.4)	15.2 (2.4)	2.0 (0.6)
Some college	84.2 (1.6)	13.9 (1.5)	2.0 (0.6)
College graduate or higher	96.3 (1.3)	2.9 (1.1)	0.8 (0.7)
Age			
20 or younger	79.7 (3.8)	18.3 (3.8)	2.0 (1.2)
21-25	86.7 (1.8)	13.0 (1.8)	0.4 (0.2)
26-34	87.3 (1.9)	10.3 (2.0)	2.4 (0.8)
35 or older	83.4 (3.5)	11.8 (2.5)	4.7 (2.5)
Family Status^c			
Not married	83.3 (2.1)	15.0 (1.8)	1.8 (0.6)
Married, spouse not present	89.6 (4.2)	10.4 (4.2)	** (**)
Married, spouse present	87.4 (1.6)	10.7 (1.5)	1.9 (0.6)
Pay Grade			
Enlisted	84.1 (1.4)	13.9 (1.3)	2.0 (0.5)
Officer	98.3 (0.7)	1.7 (0.7)	** (**)
Prenatal Care			
Any in first or second trimester ^d	86.9 (1.3)	11.9 (1.2)	1.2 (0.4)
Third trimester or none	75.7 (5.2)	17.1 (4.0)	7.2 (2.4)
Total	85.8 (1.3)	12.4 (1.2)	1.8 (0.4)

Note: Table entries are row percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years (N=1,299). Estimates have not been adjusted for sociodemographic differences among Services.

**Estimates round to zero.

^aDefined as usually smoking "less than 1 cigarette, on the average," "1-5 cigarettes," or "about ½ pack (6-15 cigarettes)" per day during the most recent pregnancy.

^bDefined as usually smoking "about 1 pack (16-25 cigarettes)," "about 1½ packs (26 to 35 cigarettes)," or "about 2 or more packs (more than 35 cigarettes)" per day during the most recent pregnancy.

^cEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status question did not distinguish between personnel who were married and those who were living as married.

^dFirst trimester = months 1 to 3 of pregnancy; second trimester = months 4 to 6 of pregnancy; third trimester = month 7 or later.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Cigarette Use During Most Recent Pregnancy, Past 5 Years, Q137 and 139-140; refer to Section 2.5.1 for descriptions of sociodemographic variables).

9.1.4 Testicular Self-Examinations

For the first time in the DoD survey series, the survey questionnaire included a pair of questions addressing the topic of testicular self-examinations among male personnel. The National Cancer Institute (NCI, 1999b) indicated that men can improve their chances of finding a tumor by performing a testicular self-examination once a month. As shown in Table 9.6, only one-third (33.1%) of all military men examined their testicles for lumps once a month or more often during the past 12 months. Among the individual Services, the proportion of men who practiced self-examination monthly or more often varied significantly, from a low of 24% in the Air Force to a high of 38% in the Army.

Table 9.6 Testicular Self-Examination Issues Among Military Men, by Service

Testicular Self-Examination Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Frequency of Examining Testicles, Past 12 Months					
Once a month or more often	38.4 (0.7)	36.0 (1.6)	31.9 (0.7)	24.4 (0.7)	33.1 (0.5)
Every other month	9.3 (0.5)	8.9 (0.4)	7.0 (0.5)	8.5 (0.5)	8.7 (0.2)
3-5 days	5.7 (0.4)	4.6 (0.3)	6.3 (0.5)	5.9 (0.4)	5.6 (0.2)
Once or twice	18.7 (0.7)	17.8 (0.8)	16.8 (0.8)	19.5 (0.7)	18.4 (0.4)
Never	27.9 (1.0)	32.7 (1.4)	38.0 (1.2)	41.6 (1.1)	34.2 (0.6)
Ever Received Education on Testicular Self-Examination	58.3 (2.4)	47.8 (1.8)	40.8 (2.1)	37.9 (1.9)	47.8 (1.1)

Note: Table entries are percentages (with standard errors in parentheses) of military men.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Testicular Self-Exam, Frequency, Q132; Education on Testicular Self-Exam, Q133).

Approximately 18% of all military men examined their testicles for lumps once or twice in the past 12 months. Roughly one-third (34.2%) of all military men never examined their testicles for lumps in the past 12 months, with the Air Force (41.6%) and Marine Corps (38.0%) showing the highest percentages. It is encouraging that the majority of military men across all the Services (65.8%) examined their testicles one or more times in the past 12 months for the early detection of testicular cancer lumps. Although the frequency of self-examination may not be often enough, at least there was an awareness among the majority of the need to practice self-examinations.

Only about half (48%), of all military men had ever received information or instruction on how to examine their testicles for lumps. As shown in Table 9.6, there was considerable variation among the individual Services, from a low in the Air Force of 38% to a high in the Army of 58% of males who had ever received education on testicular self-

examination. These findings suggested a positive relationship between education and self-care behavior. Higher percentages of self-examination once a month or more were found for those Services in which greater percentages of men reported receiving education. Direct experience and instruction on performing testicular self-examinations can increase later reported testicular self-examination behavior, as well as tend to increase positive attitude and intention (Steffen & Gruber, 1991). Military health care providers should take a more proactive approach to inform their male patients of this simple self-check, as well as the benefits of early detection of suspicious lumps.

9.2 Oral Health

Oral health and its relation to military readiness have become increasingly important in recent years. For the first time in the DoD survey series, respondents were asked a set of four questions pertaining to oral health issues. Tables 9.7 and 9.8 present survey findings on recency of dental check-up, reasons for the lack of a dental check-up, dental work prior to deployment, and tooth loss.

As shown in Table 9.7, approximately 90% of all military personnel had a dental check-up in the 12 months prior to the survey, with few differences among the Services. Of all military personnel across the total DoD, 16% were required to get dental work done in the past 12 months before they could be deployed at sea or in the field. Higher proportions

Table 9.7 Selected Oral Health Issues, Total DoD

Oral Health Measure	Service				
	Army	Navy	Marine Corps	Air Force	Total DoD
Had a Dental Check-Up, Past 12 Months	89.7 (0.6)	88.5 (1.3)	89.2 (0.7)	92.7 (1.7)	90.2 (0.6)
Required to Get Dental Work Before Deployment, Past 12 Months	22.9 (1.6)	12.3 (1.2)	20.3 (2.5)	9.1 (1.0)	16.0 (0.8)
Tooth Loss Since Joining Military					
Due to any problem	19.8 (0.7)	15.7 (1.0)	13.5 (0.6)	12.9 (0.6)	16.0 (0.4)
Due to gum disease	2.3 (0.3)	1.6 (0.2)	1.4 (0.3)	0.8 (0.1)	1.6 (0.1)
Due to dental cavities	12.1 (0.7)	7.5 (0.4)	6.4 (0.4)	6.3 (0.4)	8.6 (0.3)
Due to injury	3.9 (0.4)	3.2 (0.4)	3.4 (0.3)	1.6 (0.2)	3.0 (0.2)
Due to some other problem	6.4 (0.3)	6.4 (0.8)	4.4 (0.3)	5.7 (0.5)	5.9 (0.3)

Note: Table entries are percentages (with standard errors in parentheses).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Dental Check-Up Past 12 Months, Q108; Required Dental Work Prior to Deployment, Q110; Tooth Loss, Q111).

Table 9.8 Prevalence of Dental Check-Ups and Reasons for Not Having Dental Check-Ups, Past 12 Months

	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Dental Check-Up					
Yes	89.7 (0.6)	88.5 (1.3)	89.2 (0.7)	92.7 (1.7)	90.2 (0.6)
No	10.3 (0.6)	11.5 (1.3)	10.8 (0.7)	7.3 (1.7)	9.8 (0.6)
Reasons for Not Having Dental Check-Up^a					
Couldn't get time off from work	33.3 (2.7)	19.2 (3.1)	28.5 (3.2)	17.7 (2.6)	25.2 (1.9)
Couldn't get an appointment with a military dentist	33.7 (3.1)	23.1 (4.0)	36.0 (2.8)	26.9 (4.8)	29.4 (2.0)
Would have had to wait too long at military dental clinic before being seen	36.7 (3.3)	28.7 (3.3)	35.4 (3.5)	24.4 (2.6)	31.6 (1.7)
Couldn't afford to go to a civilian dentist	23.9 (2.0)	24.5 (2.1)	26.9 (1.7)	21.4 (2.6)	24.0 (1.2)
Didn't think I needed a check-up	27.3 (1.4)	28.2 (2.5)	26.1 (1.3)	14.5 (2.9)	24.8 (1.1)
Don't like going to the dentist at this installation	29.4 (2.9)	28.3 (3.1)	20.2 (2.2)	27.9 (5.0)	27.5 (1.8)
Don't like going to any dentists	34.3 (2.1)	35.6 (3.1)	22.0 (2.3)	23.5 (2.3)	30.8 (1.4)

Note: Table entries are percentages (with standard errors in parentheses).

^aBased on a sample size of 1,561 respondents who reported that they did not have a dental check-up in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Dental Checkup Past 12 Months, Q108; Reasons for Not Having Checkup, Q109A-G).

of Army (22.9%) and Marine Corps (20.3%) personnel required dental work before a deployment in the past 12 months.

Approximately 16% of all personnel, since joining the Military, had lost a permanent tooth due to one or more of the following problems: gum disease, cavities, a mouth injury, or some other problem. A somewhat higher proportion of Army personnel (19.8%) had suffered a tooth loss due to one or more of those problems since they joined the Military. Almost 9% of all personnel had lost a tooth because of dental cavities. Cavities were the cause most often responsible for tooth loss from among the four problems (gum disease, 1.6%; cavities, 8.6%; a mouth injury, 3.0%; or some other problem, 5.9%).

Reasons for *not* having a dental check-up in the 12 months before the survey were plentiful. Table 9.8 shows that of those 9.8% personnel who did not have a dental check-up in the past 12 months, almost one-third (31.6%) did not do so because they would have had to wait too long at a military dental clinic before being seen. Nearly 31% failed to do so because they did not like going to any dentists. This reason was more likely to be cited in the Navy (35.6%) and the Army (34.3%) than in the other Services.

Across the total DoD, approximately one-quarter of those who did not have a dental check-up in the past 12 months did not do so for each of the following reasons:

- they could not get time off from work;
- they could not get an appointment with a military dentist;
- they could not afford to go to a civilian dentist;
- they did not think they needed a check-up;
- or they did not like going to the dentist at their installation.

As seen in a study of military academy cadets, those who received an intervention of repeated oral health care instructions combined with a single prophylaxis showed significant and relevant improvements in dental knowledge, attitude, reported behavior, and perceptions of their own gingival health (Tan, Ruiter, & Verhey, 1981). To encourage better oral health care, military personnel in all the Services can be made more aware of the benefits of regular annual check-ups and of recent advances in modern dentistry, including better pain control during dental exams and procedures. Repeated reinforcement of oral health care instructions can lead to improvements in personnel's knowledge, attitudes, and behavior.

9.3 Gambling in the Military

9.3.1 Background and Significance

In recent years, there has been increasing interest and concern about pathological gambling in the Military. Problems related to excessive gambling can affect the financial and psychological well-being of military personnel and, thus, in turn, can have a negative effect on military readiness.

Several conceptualizations of the nature of pathological gambling behavior and its appropriate treatment are available, with excessive gambling often regarded as an addiction similar to drug dependence and alcoholism, but without the use of a psychoactive substance. Gamblers Anonymous (GA), for example, is a Twelve Step self-help program for pathological gamblers that has been patterned after Alcoholics Anonymous (AA). The Brecksville Treatment Program at the Cleveland Veterans Administration (VA) Hospital, the first inpatient treatment program for pathological gamblers, is a 30-day structured program whose treatment goals closely parallel those of many drug and alcohol treatment programs: complete abstinence from gambling, reduction of the urge to gamble, development of constructive substitutes for gambling, and restoration of social functioning (Custer, 1982; Lesieur, 1990; Russo, Taber, McCormick, & Ramirez, 1984).

Pathological gambling appears as a diagnostic category in the fourth edition of the American Psychiatric Association's (APA's) *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (1994). At least five of the following diagnostic criteria must be met to identify the pathological gambler:

1. preoccupation with gambling;
2. a need to gamble with increasing amounts of money to achieve the desired level of excitement;
3. repeated, unsuccessful attempts to control, cut back on, or stop gambling;
4. restlessness or irritability when unable to gamble;
5. gambling as a way of escaping from problems;
6. gambling losses, often followed by attempts to return another day to get even ("chasing" one's money);
7. lying to family members or others about the extent of one's gambling;
8. commission of illegal acts, such as forgery, fraud, or theft, to finance gambling;

9. jeopardizing or losing relationship, job, educational, or career opportunities because of gambling; and
10. relying on others to provide money to relieve a desperate financial situation caused by gambling.

Only a limited number of studies have been conducted on the prevalence of pathological gambling in the general population. A national study in 1975 by the Institute for Social Research at the University of Michigan for the Commission on the Review of National Policy Toward Gambling found that 61% of adults had placed some kind of bet involving money in 1974, and 48% had placed a bet with someone other than a friend (Kallick, Suits, Dielman, & Hybels, 1979). The survey estimated the prevalence of compulsive or pathological gambling at approximately 0.7% overall, with a higher rate among males (1.1%) than among females (0.5%). A State-level survey in Ohio in 1985 found the rate of probable pathological gambling to be 2.5% of the population (Culleton, 1985 as cited in Volberg, 1996).

A study in New York State using the South Oaks Gambling Screen (SOGS) of Lesieur and Blume (1987), a 20-item instrument designed to measure pathological gambling, found that 2.8% of the sample scored three or four points, indicating "problem gambling" (Volberg & Steadman, 1988). Another 1.4% scored five or more points on the SOGS and were classified as "probable pathological gamblers." Thus, 4.2% of the New York State population in the late 1980s could be classified as either problem or probable pathological gamblers. The authors also found that compared with all respondents, problem or probable pathological gamblers were more likely to be male, under the age of 30, non-white, of lower income, and less likely to have graduated from high school.

In comparable surveys in New Jersey and Maryland using the SOGS, Volberg and Steadman (1989a) found that 2.8% of the New Jersey sample and 2.4% of the Maryland sample could be classified as problem gamblers, and 1.4% of the New Jersey sample and 1.5% of the Maryland sample could be classified as probable pathological gamblers. Thus, the prevalence rates for problem and probable pathological gambling in these two East Coast States were comparable to the rates that had been found previously in New York State. As was the case in New York State, disproportionate numbers of males, nonwhites, and individuals with less than a high school education were problem or probable pathological gamblers in the New Jersey and Maryland surveys, as compared with all survey respondents. Unlike the results from the New York State survey, however, age and income were not significantly related to problem and pathological gambling in either New Jersey or Maryland.

Even higher rates were found in Texas, based on survey data collected in 1995 also using the SOGS (Wallisch, 1996). A total of 5.4% of adults received a score that qualified

them as lifetime problem or pathological gamblers. Examined separately, an estimated 3.6% of adults were considered problem gamblers, and 1.8% were considered probable pathological gamblers. Unfortunately, demographic data were not available for lifetime prevalence rates.

Lifetime rates of problem and probable pathological gambling based on the SOGS have been found to be lower in other parts of the United States. In surveys conducted in two Midwestern States, Iowa and South Dakota, the combined prevalences of problem and probable pathological gambling were 1.7% in Iowa and 2.8% in South Dakota, compared with combined prevalence rates of approximately 4% on the East Coast. In South Dakota, 1.0% of adults were considered probable pathological gamblers (Volberg & Steadman, 1989b; Volberg & Stuefen, 1991). In Iowa, the prevalence of probable pathological gambling was only 0.1% (Volberg, 1994). In South Dakota, problem and pathological gamblers were more likely than the general population to be male, nonwhite, younger than 30, unmarried, and to have an annual household income under \$25,000 (Volberg & Stuefen, 1991).

Surveys conducted more recently in North Dakota and Montana, also using the SOGS, have found combined lifetime prevalence rates for problem and probable pathological gambling that were lower than those found in East Coast States and Texas, but higher than Iowa and South Dakota. An estimated 3.6% of Montana adults and 3.5% of North Dakota adults were considered to be problem or probable pathological gamblers. Estimates for the two levels of gambling problems also were similar (Volberg, 1992; Volberg & Silver, 1993). In North Dakota, 2.5% of residents scored as problem gamblers and 1.0% scored as probable pathological gamblers, while 2.3% of Montana adults were problem gamblers and an additional 1.3% were probable pathological gamblers. Data from North Dakota also revealed that, in comparison with those remaining respondents who had no gambling problems, problem and probable pathological gamblers were significantly more likely to be male and younger than 30 (Volberg & Silver, 1993).¹ Notably, in contrast to data from North Dakota and other previous studies, Montana's data showed that gender was not associated with problem and probable pathological gambling. Problem and probable pathological gamblers, however, were more likely than the general population to be younger than 30 (Volberg, 1992).

Data also are available from studies conducted in three other States—Louisiana (Kroutil et al., 1997), Missouri (Kroutil et al., 1998), and Vermont (Bray et al., 1997). These studies, however, used the same set of questions as was used in the 1998 DoD

¹For both of these studies, the author cautioned that the estimates are conservative given that certain subgroups (Native Americans in Montana and young males in North Dakota) were underrepresented in the samples and that nonwhites and young males were more likely to score as problem or probable pathological gamblers.

Survey, rather than the SOGS. Although based on a different instrument, these surveys found lifetime prevalence rates similar to what were found in other States using the SOGS instrument. Estimates of problem gambling ranged from 3.8% in Vermont to 5.1% in Louisiana. These estimates include those considered probable pathological gamblers. Examined separately, 0.7% of adults in Missouri, 0.8% of adults in Vermont, and 1.4% of adults in Louisiana were considered probable pathological gamblers. Demographic correlates of probable pathological gambling were found only in Vermont. In that State, men were more likely than women to be probable pathological gamblers; among probable pathological gamblers, 1.3% were men and only 0.3% were women.

It should be noted that the estimates of problem and probable pathological gambling obtained from the above-mentioned surveys are not strictly comparable to estimates from the 1998 DoD survey because of methodological differences between studies ranging from sampling procedures to design of the survey instruments. Nevertheless, this range of studies provides important background for discussion of gambling in the Military. Importantly, based on the demographic characteristics of problem and probable pathological gamblers that were observed in many States, the prevalence of problem or pathological gambling in the Military could potentially be higher than the prevalence in the general population by virtue of the demographic composition of the Military, with higher proportions of males, younger persons, and nonwhites in the Military relative to the general population.

9.3.2 Prevalence of Problem Gambling

Respondents in the 1998 DoD survey were asked a series of eight questions on problems related to gambling in order to assess the lifetime prevalence of gambling problems and the lifetime prevalence of pathological gambling in the Military. Items on gambling-related problems correspond to the *DSM-IV* (1994) symptoms of pathological gambling. Specifically, respondents were asked whether they had ever had any of the following gambling-related problems:

- being increasingly preoccupied with gambling;
- needing to gamble with increased amounts of money to achieve the desired level of excitement;
- feeling restless or irritable when unable to gamble;
- gambling to escape from problems;
- going back to try to win back earlier gambling losses;
- lying to others about the extent of their gambling;

- having jeopardized or lost important relationships, a job, or career opportunities because of gambling; and
- borrowing money to relieve financial problems caused by gambling.

The 1998 DoD survey questionnaire did not include items measuring the *DSM-IV* (1994) symptoms of (a) repeated unsuccessful attempts to control, cut down on, or stop gambling (because multiple items would have been needed to establish that a repeated pattern had occurred and that these attempts had been unsuccessful); and (b) commission of illegal acts, such as forgery, fraud, or theft, to finance gambling (because this symptom was likely to be rare).

An affirmative answer to *at least one* of the eight items was considered to be indicative of *problem gambling* at some point in a person's life, but not necessarily pathological gambling. Answering affirmatively to *three or more* of the eight problem items was considered to indicate *probable pathological gambling* in the lifetime. The use of three items as the criterion for defining pathological gambling was based on guidance from Dr. H.R. Lesieur during the conduct of another study (H.R. Lesieur, personal communication, June 10, 1991). Dr. Lesieur is noted expert on issues of pathological gambling (Feigelman et al., 1998; Lesieur, 1989; Lesieur & Blume, 1987, 1991; Lesieur et al., 1986).²

Percentages of affirmative responses to each of the individual gambling items are shown in Table 9.9. For the total DoD and within each Service, personnel were more likely to indicate that they had experienced preoccupation with gambling or going back to win money that was lost. About 4% of all personnel reported an increased preoccupation with gambling; similar percentages were observed for the Army, Navy, and Air Force, with rates slightly higher for the Marine Corps (5.3%). Approximately 6% of all personnel indicated that they had gone back and gambled in order to win back earlier gambling losses (i.e. they "chased" their money). At the Service-level, rates were slightly above 6% for the Air Force (6.5%) and the Marine Corps (8.2%). An estimated 2.0% of personnel in the total DoD also felt the need to gamble with increased amounts of money in order to achieve a desired level of excitement; rates for the Army and Air Force were similar. Less than 1% of all personnel had ever jeopardized or lost an important relationship or their job because of gambling, or had to borrow money to relieve a serious financial problem caused by gambling. This pattern held for the Army, Navy, and Air Force, while the Marine Corps reported rates slightly above 1% for both problems.

²As noted above, two of the *DSM-IV* (1994) symptoms of pathological gambling were not measured in the 1998 DoD survey. Therefore, requiring affirmative answers to five symptoms in order to identify a respondent as being a probable pathological gambler, as specified by *DSM-IV* (1994), would likely underestimate the prevalence of pathological gambling in the Military.

Table 9.9 Lifetime Prevalence of Gambling Problems

Problem	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Increased preoccupation with gambling	4.2 (0.5)	3.1 (0.3)	5.3 (0.5)	3.8 (0.3)	3.9 (0.2)
Needed to gamble with increased amounts of money to achieve desired level of excitement	2.3 (0.3)	1.3 (0.2)	3.2 (0.3)	1.7 (0.2)	2.0 (0.1)
Restless or irritable when unable to gamble	1.7 (0.3)	1.0 (0.2)	1.8 (0.2)	1.1 (0.2)	1.3 (0.1)
Gambled to escape from problems	1.2 (0.2)	1.1 (0.2)	1.4 (0.3)	1.0 (0.2)	1.1 (0.1)
Went back to try to win back money lost	5.6 (0.4)	5.4 (0.6)	8.2 (0.4)	6.5 (0.5)	6.1 (0.3)
Lied to others about extent of gambling	1.2 (0.2)	1.5 (0.2)	2.1 (0.3)	1.3 (0.3)	1.4 (0.1)
Jeopardized or lost important relationships, job, or career opportunities because of gambling	0.7 (0.2)	0.4 (0.2)	1.1 (0.2)	0.4 (0.1)	0.6 (0.1)
Someone provided money to relieve financial problems caused by gambling	0.8 (0.2)	0.6 (0.2)	1.2 (0.2)	0.6 (0.1)	0.8 (0.1)
1 or more problems	8.0 (0.5)	7.3 (0.7)	10.3 (0.6)	8.2 (0.5)	8.1 (0.3)
3 or more problems^a	2.3 (0.3)	1.5 (0.2)	3.3 (0.4)	2.0 (0.3)	2.2 (0.1)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

^aIndication of three or more problems was interpreted to suggest probable pathological gambling.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Gambling Problems, Q122A-H).

Overall, the occurrence of specific gambling-related problems was somewhat more likely among Marine Corps personnel than among the other three Services and in the total DoD. This finding represents a change since 1992, where one Service was not consistently higher than all others and where Air Force personnel exhibited frequencies of gambling problems less often than those in other Services and in the total DoD (Bray et al., 1992).

Table 9.9 also presents information on the total number of gambling-related problems experienced by military personnel. For the total DoD, 8.1% of personnel had experienced at least one of the eight gambling-related problems in their lifetime, indicating problem gambling, and 2.2% experienced at least three of these gambling-related problems, the level constituting probable pathological gambling. The Army, Navy, and Air Force all had rates that were similar to those for the total DoD; the Marine Corps had higher percentages of personnel having had one or more (or three or more) gambling-related

problems. Notably, approximately 10% of Marine Corps personnel reported at least one gambling problem.

Table 9.10 compares the prevalence of individual gambling problems and the number of gambling problems for the total DoD for 1998 and 1992, the last time gambling behavior was assessed in the DoD surveys. As the data indicate, the prevalence of individual gambling problems showed little change since 1992. Though there were some small increases and decreases in gambling problem behavior, no clear pattern emerged. Notably, increased preoccupation with gambling and going back to win money lost were behaviors most frequently reported in both 1992 and 1998. Similar percentages of personnel reported an increased preoccupation with gambling in both years. Data in Table 9.10 also indicate that the number of gambling problems reported did not exhibit significant changes from 1992 to 1998. In fact, the prevalence of personnel reporting three or more problems, an indication of probable pathological gambling, was virtually unchanged (about 2%). Similarly, the rate for those who reported at least one gambling problem was comparable for both years—7.1% in 1992 and 8.1% in 1998.

Table 9.10 Lifetime Prevalence of Gambling Problems, 1992 and 1998, Total DoD

Problem	1992	1998
Increased preoccupation with gambling	4.1 (0.4)	3.9 (0.2)
Needed to gamble with increased amounts of money to achieve desired level of excitement	2.1 (0.2)	2.0 (0.1)
Restless or irritable when unable to gamble	1.4 (0.1)	1.3 (0.1)
Gambled to escape from problems	1.2 (0.2)	1.1 (0.1)
Went back to try to win back money lost	5.3 (0.3)	6.1 (0.3)
Lied to others about extent of gambling	1.1 (0.1)	1.4 (0.1)
Jeopardized or lost important relationships, job, or career opportunities because of gambling	0.4 (0.1)	0.6 (0.1)
Someone provided money to relieve financial problems caused by gambling	0.7 (0.1)	0.8 (0.1)
1 or more problems	7.1 (0.4)	8.1 (0.3)
3 or more problems^a	2.0 (0.2)	2.2 (0.1)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

^aIndication of three or more problems was interpreted to suggest probable pathological gambling.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1992 and 1998 (1998 Questions: Gambling Problems, Q122A-H.)

Although these data provide important information about gambling behaviors in the Military, they do have limitations. One limitation of these data is that they involve an assessment of only a subset of gambling-related behavior. Other measures might include the percentage of personnel who engaged in any kind of betting activity in their lifetime or in the past year, or the kinds of betting activities they engaged in, how often, and with whom. Consequently, we do not have a baseline measure of the prevalence of all types of gambling behavior among military personnel, regardless of whether that behavior was problematic in any way.

Furthermore, because no additional items on a person's involvement with gambling were included as part of the 1998 DoD survey, we cannot reach any conclusions regarding the association of different types of gambling behaviors, such as wagering on games of skill (e.g., golf, pool) with problem or pathological gambling. Such information could be useful to policymakers in the Military in developing interventions designed to discourage those gambling behaviors that are strongly associated with problem or pathological gambling.

An additional limitation of these data is that they are lifetime prevalence data; the 1998 DoD survey did not address whether any of these gambling-related problems occurred in the past year or since an individual joined the Military. Therefore, of the estimated 2% of all active-duty personnel who had experienced sufficient multiple problems with gambling during their lifetime and could be considered probable pathological gamblers, only a subset may currently (i.e., in the past year) have been showing signs of pathological gambling. At least some personnel may have been reporting about specific gambling-related problems that occurred prior to their joining the Military but that had not occurred since. Further, for those individuals who had at least three gambling-related problems in their lifetime, it is not possible to determine from the 1998 DoD survey data whether these problems all co-occurred during a set period of time (e.g., within the past year), or whether some problems preceded others by a year or more. Additional study will be needed to explore the time period during which gambling-related problems occurred among military personnel.

Despite these limitations, these data fill a gap in the literature, as studies of gambling thus far have been restricted to civilian populations. Notably, although these findings indicate that the lifetime prevalence of probable pathological gambling (2.2%) in the Military was relatively low, this rate was slightly higher than the rates that researchers observed using the SOGS instrument among civilian populations (0.1% to 1.8%) (Volberg, 1992, 1994; Volberg & Silver, 1993; Volberg & Steadman, 1988, 1989a, 1989b; Volberg & Stuefen, 1991; Wallisch, 1996). Rates among the Military also were higher than those observed in Missouri (Kroutil et al., 1998), Vermont (Bray et al., 1997), and Louisiana (Kroutil et al., 1997), States where the same instrument was used and the data therefore are more comparable. These higher rates among Military personnel may be

due to the demographic composition of the Military, as mentioned earlier. It would probably be most accurate, however, to consider these 1998 DoD survey findings, in combination with the 1992 DoD findings, as representing only an initial exploration of the issue of pathological gambling in the Military. These results should not be considered to be a conclusive indication that the prevalence of pathological gambling is higher in the Military than among civilians. Further study of pathological gambling, both in the Military and among civilians, would be needed before such a conclusion could be reached.

9.3.3 Problem Gambling and Alcohol Use

In this section, we examine the relationship between gambling problems and alcohol use. Investigation of the co-occurrence of gambling and alcohol use is important in the examination of gambling problems in that research has identified an association between these two addictive behaviors. Studies have been restricted, however, to civilian or military veteran populations. A study of adults in St. Louis found that problem gamblers were more likely than nongamblers to use alcohol and abuse or be dependent on alcohol (Cunningham-Williams, Cottler, Compton, & Spitznagel, 1998). Similarly, a survey of adults in Canada revealed a significant relationship between alcohol dependence and self-reported gambling problems (Smart & Ferris, 1996). Data from a State-level survey in Missouri found that 2.3% of those who used alcohol heavily in the year prior to the survey would be considered lifetime probable pathological gamblers (Kroutil et al., 1998). Studies of adults in treatment also have found similar associations. Daghestani, Elenz, and Crayton (1996) investigated rates and correlates of pathological gambling among substance abuse patients in a Veteran's Administration treatment program. They found that those patients identified as pathological gamblers used alcohol at a significantly higher rate than did those patients who were not pathological gamblers. Lessieur et al. (1986) reported that 5% of patients in an alcohol and drug abuse treatment center who only abused alcohol were pathological gamblers.

Table 9.11 presents findings on the percentage of military personnel at each drinking level who also had problems with gambling; the percentage of personnel who experienced negative effects due to alcohol use and who had gambling-related problems; and the percentage of personnel who received alcohol treatment since joining the Military who had problems with gambling. Data on drinking levels indicate an increased likelihood of a person in the Military being a problem or pathological gambler with higher drinking levels, although the vast majority (84.8%) of heavy drinkers had never experienced any gambling-related problems. An estimated 15.2% of heavy drinkers had at least one problem associated with gambling in their lifetime compared to 4.9% of abstainers and 8.1% of military personnel overall (see Table 9.10), regardless of drinking level. This pattern also was observed in 1992, though the number of heavy drinkers with at least one

Table 9.11 Alcohol Use and Gambling Problems, Total DoD

Alcohol Measure	Number of Gambling Problems			
	0	1	2	3 or More ^a
Drinking Level				
Abstainer	95.1 (0.4)	2.8 (0.3)	1.0 (0.2)	1.1 (0.2)
Infrequent/light or moderate	93.1 (0.5)	3.9 (0.4)	1.1 (0.2)	1.8 (0.2)
Moderate/heavy	91.2 (0.6)	5.1 (0.4)	1.5 (0.3)	2.2 (0.3)
Heavy	84.8 (0.8)	7.5 (0.7)	3.2 (0.4)	4.5 (0.5)
Negative Effects				
Serious consequences	82.4 (1.5)	7.3 (1.2)	3.2 (0.7)	7.1 (0.9)
Productivity loss	82.8 (1.2)	8.4 (1.0)	3.0 (0.5)	5.8 (0.7)
Dependence symptoms	79.6 (1.7)	9.0 (1.6)	2.6 (0.8)	8.8 (1.1)
Alcohol Treatment Since Entering Service				
Yes	86.8 (1.4)	6.3 (0.9)	3.1 (0.7)	3.9 (0.7)
No	91.6 (0.5)	4.4 (0.4)	1.5 (0.2)	2.5 (0.3)

Note: Table entries are row percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding.

^aIndication of three or more problems was interpreted to suggest probable pathological gambling.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Gambling Problems, Q122A-H; Drinking Level, Q15-18 and 20-23; Negative Effects: Serious Consequence, Q34 and 36, Productivity Loss, Q32A-F, Dependence Symptoms, Q33A-C and E-F; Alcohol Treatment, Q41).

gambling problem increased slightly; 12.9% of heavy drinkers reported one or more problems in 1992 (Bray et al., 1992).

In addition, Table 9.11 also indicates a strong relationship between gambling and symptoms of alcohol dependence. About one in five (20.4%) personnel who showed symptoms of alcohol dependence also had at least one gambling-related problem, and 8.8% could be classified as probable pathological gamblers. About 13% of the persons who had been treated for alcohol problems since joining the Military had at least one gambling-related problem, and 3.9% of the personnel who had been treated for alcohol problems could be classified as probable pathological gamblers. These same patterns also were observed in 1992 (Bray et al., 1992).

These findings highlight several issues. If personnel are not screened for gambling-related problems when they enter alcohol treatment, these problems may very well go undetected. Furthermore, an even higher prevalence of gambling-related problems might be found among those personnel whose alcohol problems are currently undetected or

untreated. Overall, these data support the relationship found in existing studies between alcohol use and abuse and gambling-related problems. Further, given that veterans have been found to have problems with pathological gambling and alcohol use (Daghestani et al., 1996), it is not surprising to find a similar situation among active-duty personnel.

9.4 Summary

This chapter investigated several health issues that may affect the readiness of the force: (a) women's health issues including stress associated with being a woman in the Military, cervical cancer risk reduction, and maternal and infant health; (b) testicular self-examination among men in the Military; (c) oral health; and (d) gambling in the Military, including the prevalence of problem gambling and the relation between problem gambling and alcohol use.

9.4.1 Stress Serving as a Military Woman

- About one-third (31.8%) of military women reported being under a "great deal" or a "fairly large amount" of stress related to being a woman in the Military (Table 9.1).
- In the total DoD, stress associated with being a woman in the Military was higher among women who were younger, less well-educated, married without a spouse present, and enlisted.

9.4.2 Cervical Cancer Risk Reduction

- Receipt of Pap smears was nearly universal among military women. Some 97.8% of military women received a Pap smear in their lifetime, and 95.9% had the test within the past 3 years (Figure 9.1).
- Military women overall exceeded the *Healthy People 2000* objectives of 95% having ever had a Pap smear and 85% having had one in the past 3 years. In addition, women in each Service also exceeded these objectives.

9.4.3 Maternal and Infant Health

- An estimated 16.0% of military women reported that they had been pregnant within the past year, and another 1.2% reported that they may have been pregnant at the time of the survey but that they were unsure (Table 9.2).
- Across all the Services, 35.5% of military women had been pregnant within the past 5 years, although some of these pregnancies may have occurred prior to military service.

- Demographic characteristics were correlated with receipt of prenatal care. Personnel *less* likely to have received prenatal care in the first trimester were those with less than a college degree, those aged 25 or younger, those who were unmarried, and those women who were enlisted (Table 9.3).
- Some 85.8% of all military women who were pregnant in the past 5 years abstained from alcohol during their most recent pregnancy. An estimated 2.0% of military women drank several times a month or more during their most recent pregnancy. More frequent drinking was more common among Navy women, those aged 20 or younger, unmarried women, and those who received prenatal care only during the third trimester or not at all (Table 9.4).
- About 86% of military women who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy, about 12% reported some cigarette use, and approximately 2% reported heavy use (smoking a pack a day or more) (Table 9.5).

9.4.4 Testicular Self-Examinations

- One-third (33.1%) of all military men examined their testicles for lumps once a month or more often during the past 12 months. Similarly, roughly one-third (34.2%) of all military men had never examined their testicles for lumps in the past 12 months. Air Force (41.6%) and Marine Corps (38.0%) men showed the highest percentages (Table 9.6).
- Only about half (48%) of all military men had ever received information or instruction on how to examine their testicles for lumps. The findings indicated a clear relationship between education and self-care behavior. Higher percentages of self-examination once a month or more were found for those Services in which greater percentages of men reported receiving education.

9.4.5 Oral Health

- Approximately 90% of all military personnel had a dental check-up in the past 12 months, with few differences among the Services. Of all military personnel across the total DoD, 16% were required to get dental work done in the past 12 months before they could be deployed at sea or in the field (Table 9.7).
- Approximately 16% of all personnel, since joining the Military, had lost a permanent tooth or teeth due to one or more of the following problems: gum disease, cavities, a mouth injury, or some other problem. Cavities were the cause most often responsible for tooth loss from among the four problems (8.6%).

- Of those personnel who did not have a dental check-up in the past 12 months, almost one-third (31.6%) did not do so because they would have had to wait too long at a military dental clinic before being seen. Nearly 31% of all personnel who did not have a dental check-up in the past 12 months failed to do so because they do not like going to any dentists (Table 9.8).
- Across the total DoD, about one-quarter of those who did not have a dental check-up in the past 12 months did not do so for each of the following reasons: they could not get time off from work; they could not get an appointment with a military dentist; they could not afford to go to a civilian dentist; they did not think they needed a check-up; or they did not like going to the dentist at their installation.

9.4.6 Gambling in the Military

- For the total DoD, 8.1% of personnel had experienced at least one of the eight gambling-related problems in their lifetime, and 2.2% experienced at least three of these gambling-related problems, the level constituting probable pathological gambling. The Marine Corps (10.3%) showed the highest rate of at least one gambling problem (Table 9.9).
- The prevalence of individual gambling problems for the total DoD did not change greatly since 1992. Increased preoccupation with gambling and going back to win money lost were behaviors most frequently reported in both the 1992 and 1998 surveys (Table 9.10).
- The prevalence of three or more problems (about 2%), an indication of probable pathological gambling, was virtually unchanged between 1992 and 1998. Similarly, the percentage of those who reported at least one gambling problem was about the same in 1992 (7.1%) and 1998 (8.1%) (Table 9.10).
- Gambling problems were related to alcohol use. An estimated 15.2% of heavy drinkers had at least one problem associated with gambling in their lifetime, compared to 4.9% of abstainers and 8.1% of military personnel overall, regardless of drinking level (Table 9.11).
- About one in five (20.4%) personnel who showed symptoms of alcohol dependence also had at least one gambling-related problem, and 8.8% could be classified as probable pathological gamblers (Table 9.11).
- About 13% of those who had been treated for alcohol problems since joining the Military had at least one gambling-related problem, and 3.9% could be classified as probable pathological gamblers (Table 9.11).

Taken together, these findings on health issues of special interest from the 1998 DoD survey suggest areas that will require further attention in coming years, especially stress levels experienced by military women because of their gender. Increased health education efforts need to be targeted at reducing alcohol and tobacco use during pregnancy among women and building awareness of the necessity for testicular self-examinations among men. The problem of long waits at military dental clinics at some installations should be addressed and rectified so that more personnel make and keep appointments for preventive dental care. Finally, the relationship between heavy alcohol use and gambling problems suggests that those undergoing care for alcohol problems also should be screened for gambling problems.

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APPENDIX A
SAMPLING DESIGN

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SAMPLING DESIGN

In this appendix, we describe the methodology used to develop and implement the sampling design for the 1998 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel (1998 DoD survey). Activities associated with the sampling design included the acquisition and construction of the sampling frames, the specification and allocation of the sample sizes, and the selection of the sample.

A.1 Sampling Frames

A primary objective of the sampling design was to facilitate the planned on-site group administration of the survey questionnaire to selected sample members whenever possible. Because of the worldwide geographic distribution of military personnel, we developed a dual-mode sampling design that called for the survey instrument to be group-administered at large installations, including aboard afloat ships (where hundreds of sample members could be assembled), and mailed to persons in smaller locations where it was not practical to conduct on-site group sessions. This resulted in the construction of two sampling frames for the study, one for each mode.

A.1.1 Installation-Level Sampling Frame

We began construction of the installation-level frame by obtaining a data file of counts of active-duty members by duty ZIP-code and military unit (as identified by the Unit Identification Code (UIC)). This file was created from the September 1997 version of the Active Duty Master File (ADMF) maintained by the Defense Manpower Data Center (DMDC). The data file contained 26,114 unique duty ZIP-UIC combinations that accounted for 1,379,789 persons. We identified and discarded 1,327 records (27,175 persons) with incomplete or unusable data. Most of these had a ZIP of "00000," which we know from prior experience to be persons undergoing a permanent change of station (PCS) to Europe. With the removal of the discarded records, the sampling frame accounted for 98.0% of the total persons provided.

We used the personnel counts to identify persons in the active-duty population who were stationed at an installation with 500 or more persons. This partitioning of the population was done to facilitate the dual-mode approach to data collection. For the group-administered portion of the sample, installations were considered first-stage sampling units (FSUs) and persons were second-stage sampling units (SSUs). For the mail-administered portion, persons were FSUs because they were selected directly (i.e., their selection did not depend on the selection of their installation).

To define a distinct geographic location, we used five-digit ZIP-codes of duty locations in the continental United States (CONUS), Army Post Office (APO) and Fleet Post Office (FPO) numbers outside the continental United States (OCONUS), as well as Navy geo-location codes to identify the home ports of Naval afloat units. We identified 397 installations where 500 or more active-duty persons were stationed. These installations accounted for more than 1.19 million persons or 88% of the active-duty population in 1998.

Many of the large installations housed hundreds of operational units making the coordination and notification of sample members time-consuming and burdensome. Therefore, we limited the number of units tasked to participate in the survey at large installations by subdividing them into clusters of units that satisfied the minimum size requirement. Subsequently, we treated them as separate FSUs.

In addition to Service, we stratified the installation frame by region of the world (i.e., CONUS vs. OCONUS) and, for Naval units, afloat status (Iannacchione, Liu, Kavee, & Crump, 1998). These strata were used to control the worldwide distribution of the sample, an important cost consideration. Table A.1 shows the distribution of active-duty personnel by Service and type of duty location.

A.1.2 Person-Level Sampling Frame

We selected a sample of 60 installations for the on-site group administrations from the installation-level frame based on the September 1997 distribution of active-duty personnel. Although individuals frequently transfer in and out of units, the timeliness of the installation frame was not essential at this stage because an installation's total strength is likely to remain fairly static. Timeliness does become essential at the second stage when individuals are selected. Therefore, we developed specifications for the DMDC to use the most current personnel files (December 31, 1997) available to select stratified samples of active-duty personnel. The person-level sampling frame was stratified by the 12 cross-classifications of gender by pay grade group. The strata were used to control the sample distribution of active-duty members to meet the precision requirements described in the next section.

A.2 Sample Allocation

The sample allocation problem can be stated in terms of determining the number of installations and active-duty members to include in the sample such that the precision requirements set for the survey are met for the least cost. That is, the sample sizes determined by the sampling design are a balance between satisfying analytical requirements of the survey and the fiscal constraints imposed on the survey.

Table A.1 Distribution of Active-Duty Personnel by Service, Location, and Mode of Administration

Service/Location	Mode of Administration		Total
	On-Site ^a	Mail	
Army			
CONUS	308,995	30,183	339,178
OCONUS	<u>83,492</u>	<u>32,657</u>	<u>116,149</u>
	392,487 (86.2%)	62,840 (13.8%)	455,327 (100.0%)
Navy			
CONUS	161,407	30,023	191,430
OCONUS	26,039	7,316	33,355
Afloat ^b	<u>144,937</u>	<u>4,506</u>	<u>149,443</u>
	332,383 (88.8%)	41,845 (11.2%)	374,228 (100.0%)
Marine Corps			
CONUS	110,934	21,473	132,407
OCONUS	<u>20,238</u>	<u>6,838</u>	<u>27,076</u>
	131,272 (82.2%)	28,311 (17.8%)	159,483 (100.0%)
Air Force			
CONUS	267,940	18,832	286,772
OCONUS	<u>66,062</u>	<u>10,742</u>	<u>76,804</u>
	334,002 (91.9%)	29,574 (8.1%)	363,576 (100.0%)
DoD	1,190,044 (88.0%)	162,570 (12.0%)	1,352,614 (100.0%)

Note: CONUS = within the continental United States; OCONUS = outside the continental United States.

^aOn-site administrations were done at duty locations with 500 or more persons on active-duty.

^bThe duty location of afloat units was their home port.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, September, 1997 Active Duty Master File.

The sample design of 1998 DoD survey is a stratified two-stage design with the second-stage stratification nested within FSUs. The first-stage sampling frame was stratified into eight first-stage strata, indexed by h . The SSUs were stratified into 12 second-stage strata, indexed by j . The FSUs were selected with probability proportional to size (PPS); a simple random sample (SRS) of SSUs was selected independently within each second-stage stratum within each FSU.

When the total number of active-duty members M_d are known for the d -th domain, p_d , the proportion of a certain attribute of the domain d population can be estimated using the following linear estimator:

$$\hat{p}_d = \bar{y}_d = \frac{1}{M_d} \hat{y}_d = \frac{1}{M_d} \sum_{h=1}^8 \hat{y}_{dh} \quad (1)$$

where \hat{y}_{dh} is the Horvitz-Thompson estimator of the total in the d -th domain and h^{th} first-stage stratum is given by

$$\hat{y}_{dh} = \sum_{i=1}^{n_h} \frac{\hat{y}_{dhi}}{\pi_{hi}} = \frac{1}{n_h} \sum_{i=1}^{n_h} \frac{\hat{y}_{dhi}}{z_{hi}} \quad (2)$$

Here, π_{hi} is the inclusion probability for the i^{th} FSU in the first-stage stratum h . The single-draw selection probability for the same FSU is z_{hi} . The domain total for the i^{th} FSU in the h^{th} first-stage stratum can be estimated as

$$\hat{y}_{dhi} = \sum_{j \in D_d} M_{hij} \bar{y}_{hij} = \sum_{j \in D_d} \frac{M_{hij}}{m_{hij}} \sum_{k=1}^{m_{hij}} y_{hijk} \quad (3)$$

where

m_{hij} = sample size in the j^{th} second-stage stratum within the i^{th} FSU of the h^{th} first-stage stratum, and

M_{hij} = population total for the j^{th} second-stage stratum within the i^{th} FSU of the h^{th} first-stage stratum.

In the above, we also define

$$M_{dhi} = \sum_{j \in D_d} M_{hij}, \quad M_{dh} = \sum_{i=1}^{N_h} M_{dhi}, \quad \text{and} \quad M_d = \sum_{h=1}^H M_{dh}.$$

We set up a nonlinear optimization problem using the Kuhn-Tucker conditions (Chong & Zak, 1996) to search for the optimal sample size and allocation. For a design like the 1998 DoD survey, the variance of the estimated proportion from domain d can be expressed as follows:

$$\begin{aligned}
\text{Var}(\bar{y}_d) &= \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{n_h} \left\{ \sum_{i=1}^{N_h} z_{hi} \left(\frac{Y_{dhi}}{z_{hi}} - Y_{dh} \right)^2 + \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{\text{Var}(\hat{y}_{hij})}{z_{hi}} \right\} \\
&= \frac{1}{M_d^2} \sum_{h=1}^8 \left\{ \sum_{i=1}^{N_h} z_{hi} \left(\frac{Y_{dhi}}{z_{hi}} - Y_{dh} \right)^2 \right\} + \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{n_h} \left\{ \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{\text{Var}(\hat{y}_{hij})}{z_{hi}} \right\} \quad (4) \\
&= \text{Var}_{PSU}(\bar{y}_d) + \text{Var}_{SSU}(\bar{y}_d).
\end{aligned}$$

If the SSUs are drawn by stratified simple random sampling, then

$$\begin{aligned}
\text{Var}_{SSU}(\bar{y}_d) &= \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{N_h} \left\{ \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{M_{hij}^2 (1-f_{hij}) S_{hij}^2}{z_{hi} m_{hij}} \right\} \\
&= \frac{1}{M_d^2} \sum_{h=1}^8 \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{M_{hij}^2 (1-f_{hij}) S_{hij}^2}{\pi_{hi} m_{hij}}.
\end{aligned}$$

Because the sample size for the j^{th} second-stage stratum, within the i^{th} FSU and the h^{th} first-stage stratum, is given by

$$m_{hij} = \frac{f_{hj} M_{hij}}{\pi_{hi}} = \frac{m_{hj} M_{hij}}{M_{hj} \pi_{hi}},$$

we have

$$\text{Var}_{SSU}(\bar{y}_d) = \frac{1}{M_d^2} \sum_{h=1}^8 \sum_{j \in D_d} \sum_{i=1}^N \frac{M_{hik} M_{hj} (1-f_{hij}) S_{hij}^2}{m_{hj}}. \quad (5)$$

Here,

S_{hij}^2 = population variance of the j^{th} second-stage stratum within the i^{th} FSU of the h^{th} first-stage stratum;

m_{hj} = number of sampled individuals in the j^{th} second-stage stratum within the h^{th} first-stage stratum;

M_{hij} = total number of individuals in the j^{th} second-stage stratum within the i^{th} FSU of the h^{th} first-stage stratum;

M_{hj} = total number of individuals in the j^{th} second-stage stratum within the h^{th} first-stage stratum; and

M_d = population size of the domain d .

The variance formula depends on the first- and second-stage sample size, n_h and m_{hj} , respectively. We can formulate the cost function for the survey in terms of n_h and m_{hj} as well:

$$C = C_0 + \sum_{h=1}^8 \left\{ c_{1h} n_h + \sum_{j=1}^{12} c_{2hj} m_{hj} \right\} \quad (6)$$

where C_0 is the fixed cost and is assumed zero for the optimization purpose. Parameters c_{1h} and c_{2hk} are the variable cost associated with adding an additional FSU and SSU, respectively.

If we denote the precision requirement for the sample proportion from the d^{th} domain as V_d , the sample allocation problem then can be formulated as minimizing the cost function (4) subject to the following constraints:

$$\text{Var}(\hat{p}_d) \leq V_d, \quad d=1,2,\dots,D, \quad (7)$$

and

$$n_h \geq 0, \quad m_{hj} \geq 0, \quad \text{for } h=1,2,\dots,8, \text{ and } j=1,2,\dots,12. \quad (8)$$

where D is the number of domains under consideration. The variance constraints are given in the form of the variance components of (4). The variance components were estimated from data collected in the 1995 DoD survey. To provide stable estimates, three groups of outcomes were used in the estimation (Table A.2). The variance components used in the variance constraints were calculated by averaging the estimated variance components of the outcome categories within each outcome group. Negative estimates were converted to zero. The domains on which constraints were imposed are given in Table A.3. The variance components estimated using the 1995 allocation and the 1998 allocation also are compared in this table.

In addition to the constraints in (4) and (5), we imposed the practical limitations that are listed in Table A.4. For example, we set an upper limit on the number of SSUs (active-duty members) to be selected from an installation so that the group sessions would not become unmanageable. The realized sample allocation from the constrained optimization is given in Table A.5.

Table A.2 Outcome Groups Used in the Calculation of Variance Constraints for the Sample Allocation

Outcome Group	Outcome Category
Drug Use	Marijuana Use
	Any Drug Except Marijuana
	Any Drug Use
Tobacco Use	Any Smoking in Past 30 Days
	Heavy Smoking in Past 30 Days
	Smokeless Tobacco Use (Males Only)
	Percent Attempted to Quit Smoking
Alcohol Use	Percent of Abstainers
	Percent of Infrequent to Light Drinkers
	Percent of Moderate Drinkers
	Percent of Moderate to Heavy Drinkers
	Percent of Any Drinking Versus Abstainers
	Percent with Serious Consequences Due to Alcohol
	Percent with Productivity Loss Due to Alcohol
Percent with Alcohol Dependence Symptoms	

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel.

Table A.3 Variance Constraints Used in the Sample Allocation

Reporting Domain	Alcohol			Drug			Smoking		
	1995	1998	Reduction	1995	1998	Reduction	1995	1998	Reduction
Service									
Army	8.57	6.77	21.03%	10.74	8.76	18.40%	8.25	6.63	19.56%
Navy	10.38	9.98	3.80%	6.89	6.50	5.68%	11.80	11.40	3.38%
Marine Corps	10.34	9.13	11.74%	11.45	10.02	12.51%	9.37	8.27	11.74%
Air Force	8.27	7.59	8.24%	4.98	4.65	6.66%	8.39	7.73	7.80%
Rank									
E1-E3	5.78	4.85	16.10%				5.68	4.65	18.14%
E4-E6	5.23	4.69	10.34%				5.45	4.99	8.42%
E7-E9	5.83	5.33	8.61%				6.87	6.22	9.42%
W1-W5	25.23	21.15	16.19%				10.74	9.15	14.86%
O1-O3	12.74	9.46	25.76%	7.25	5.03	30.55%	11.55	8.77	24.05%
O4-O10	18.17	13.80	24.05%	6.04	5.63	6.77%	10.55	8.74	17.10%
Service X Gender									
DoD, male	4.81	4.28	10.88%				4.64	4.19	9.66%
Army, female	12.16	8.14	33.10%				16.55	10.77	34.92%
Navy, female	13.97	11.93	14.59%				32.12	27.37	14.77%
Marine, female	15.55	12.04	22.58%				22.57	17.47	22.56%
Air Force, female	19.31	16.13	16.49%				17.13	14.16	17.34%

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel.

Table A.4 Design Constraints Used for the Sample Allocation

Design Constraints	Target	Achieved
Constraints on the Number of FSUs		
Minimum number of FSUs per stratum >=	2	2.0
Total number of FSUs <=	65	58.5
Maximum number of FSUs per Service <=	18	15.8
Maximum number of FSUs for Army OCONUS <=	6	6.0
Maximum number of FSUs for Navy OCONUS <=	6	6.0
Maximum number of FSUs for Marine OCONUS <=	2	2.0
Maximum number of FSUs for Air Force OCONUS <=	4	4.0
Minimum number of FSUs per Service >=	12	13.5
Constraints on the Number of SSUs		
Maximum total SSUs <=	18,000	18,000.0
Minimum SSUs per cell >=		
Male	2	12.5
Female	1	1.7
Maximum SSUs per cell <=		
Male	1,300	1,017.8
Female	300	300.0
Minimum number of DoD female SSUs >=	4,000	4,000.0
Minimum number of SSUs per FSU >=	250	275.0
Maximum number of SSU per FSU <=		
Army CONUS	300	300.0
OCONUS	350	350.0
Navy CONUS	300	275.0
OCONUS	350	350.0
Marine Corps CONUS	300	281.1
OCONUS	350	350.0
Air Force CONUS	300	300.0
OCONUS	350	350.0

Note: CONUS = within the continental United States; FSU = first-stage sampling unit; OCONUS = outside the continental United States; SSU = second-stage sampling unit.

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel.

Table A.5 Rounded Sample Allocations for the First- and Second-Stage Sample Sizes

	Army		Navy		Marine Corps		Air Force		DoD	
	CONUS	OCONUS	CONUS	OCON/Af*	CONUS	OCONUS	CONUS	OCONUS		
FSUs per Cost Stratum	10	6	10	6	12	2	10	4	60	
Males										
E1 - E3	300	246	272	265	879	209	295	147		
E4 - E6	616	501	625	608	1018	239	1001	499		
E7 - E9	588	472	508	485	275	65	512	255		
W1 - W5	168	143	39	37	100	13				
O1 - O3	177	145	194	192	177	42	228	113		
O4 - O10	282	230	194	166	184	40	189	96		
Females										
E1 - E3	214	68	200	113	157	32	192	81		
E4 - E6	266	145	256	154	288	53	300	143		
E7 - E9	123	90	91	52	67	5	94	34		
W1 - W5	19	8	10	2	24	2				
O1 - O3	101	30	100	21	37	4	91	21		
O4 - O10	80	30	80	11	24	3	89	16		
Summary										
FSUs / SSUs per Service	16	5,042	16	4,675	14	3,937	14	4,396	60	18,050
Total SSUs per stratum	2,934	2,108	2,569	2,106	3,230	707	2,991	1,405		18,050
Average SSUs per FSU	293	351	257	351	269	354	299	351		316
Total females per stratum	803	371	737	353	597	99	766	295		4,021
Total males per stratum	2,131	1,737	1,832	1,753	2,633	608	2,225	1,110		14,029
Females/males per Service	1,174	3,868	1,090	3,585	696	3,241	1,061	3,335	4,021	14,029
Percent of females/males	23.3%	76.7%	23.3%	76.7%	17.7%	82.3%	24.1%	75.9%	22.3%	77.7%
Total officers/enlisted	1,413	3,629	1,046	3,629	650	3,287	843	3,553	3,952	14,098
Percent of officer/enlisted	28.0%	72.0%	22.4%	77.6%	16.5%	83.5%	19.2%	80.8%	21.9%	78.1%

Note: CONUS = within the continental United States; FSU = first-stage sampling unit; OCONUS = outside the continental United States; SSU = second-stage sampling unit.

*OCONUS and Afloat Personnel.

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel.

A.3 Sample Selection

Before selecting the sample of FSUs for on-site data collection, we calculated the composite size measure for the i^{th} FSU in the h^{th} first-stage stratum as the following:

$$S_{hi} = \sum_{j=1}^{12} f_{hj} N_{hij}, \quad \text{for } i = 1, 2, \dots, n_h, \quad h = 1, 2, \dots, 8, \quad (9)$$

where

f_{hj} = sampling rate for the j^{th} second-stage stratum within the h^{th} first-stage stratum, and

N_{hij} = population total of the j^{th} second-stage stratum within the i^{th} FSU in the h^{th} first-stage stratum.

Given the size measure, S_{hi} , the selection probability of the i^{th} FSU in the h^{th} first-stage stratum can be calculated as

$$\pi_{hi} = n_h \frac{S_{hi}}{S_{h+}} = n_h \frac{S_{hi}}{\sum_{i=1}^{n_h} S_{hi}}, \quad \text{for } i = 1, 2, \dots, n_h \text{ and } h = 1, 2, \dots, 8, \quad (10)$$

where

n_h = number of FSUs selected from the h^{th} first-stage stratum, and

S_{h+} = total size measure of all FSUs in the h^{th} first-stage stratum.

To facilitate our selection routine and the actual implementation of the on-site data collection, we divided exceedingly large installations into multiple FSUs using the UIC codes provided by DMDC. We then selected an independent sample from each first-stage stratum with PPS. We used a systematic PPS sampling scheme (Kish, 1965) to ensure that the number of FSU subdivisions selected from each installation would be within one of the proportional allocations of the original FSU. This allowed the selection probability of the original FSU to be maintained across the FSU subdivisions. In all, 60 FSUs were selected from the September 1997 ADMF. An additional 20 FSUs were selected as alternate sample FSUs for substitution in the event that a primary installation was unable to participate.

The sample of active-duty members was selected from the December 31, 1997, version of the ADMF file in combination with the February 1998 version of the Defense Enrollment Eligibility Reporting System (DEERS) file. In the 4 months between sample

selection and data collection, some sample members were expected to become ineligible for the survey because they underwent a PCS, separated from the Service, were absent without leave (AWOL), died, or had an unknown status. We inflated the sample sizes to account for the likely reduction in sample yield using the eligibility rates found in the 1995 DoD survey.

Nonresponse is inevitable for a survey of the scale and complexity of the DoD survey series. To compensate for the anticipated nonresponse, we inflated the second-stage sample sizes to help attain the desired analysis domain sizes. Using the inflated sample sizes for each second-stage stratum, we selected independent stratified random samples of active-duty members within each FSU.

Unlike persons eligible for the on-site data collection, persons eligible for the mail survey were selected directly as FSUs. The sampling rates used in each stratum of the mail sample were the same as the overall sampling rates for the group-administered sample in CONUS. The assumed response rates were based on the 1995 Status of Armed Forces Surveys (1995 SAFS), which was a mail survey consisting of a notification letter and two questionnaire mailings (Mason, Kavee, Wheelless, & George, 1996). CONUS response rates by Service from the 1995 SAFS were assumed for both CONUS and OCONUS strata in the mail survey. We assumed that the response rates to the mail questionnaire would not differ significantly with location. A stratified random sample of active members stationed in remote locations was drawn independently for each Service. Overall, we selected a total of 36,806 active-duty members for the survey.

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APPENDIX B

**SAMPLE WEIGHTING AND
ESTIMATION PROCEDURES**

APPENDIX B

SAMPLE WEIGHTING AND ESTIMATION PROCEDURES

B.1 Sample Weighting

In this section, we describe how we assigned sampling weights to sampled members to reflect differences in sample selection rates, survey eligibility rates, and response rates.

B.1.1 Initial Sample Weights

We calculated initial sample weights as the inverse of the probability of selection at each stage of the design. At the first stage, the expected frequency of selecting the i -th first-stage sampling unit (FSU) from the h -th first-stage stratum was

$$\pi_{h,i} = n_h \cdot S_{h,i} / S_{h+},$$

where

n_h = number of FSUs selected from the h -th stratum,

$S_{h,i}$ = composite size measure assigned to the i -th FSU, and

S_{h+} = sum of the composite size measures in the h -th stratum.

At the second stage, we selected simple random samples of personnel from each gender and pay grade group with sampling rates that attained the desired stratum sizes, and we made the overall selection probabilities assigned to personnel in the same first- and second-stage strata equal whenever possible. The probability of selecting the k -th person from the j -th gender and pay grade stratum conditional on the selection of the i -th FSU from the h -th first-stage stratum was

$$\pi_{k|h,i,j} = \text{Min}[1, m_{h,i,j} / M_{h,i,j}],$$

where

$M_{h,i,j}$ = total number of personnel in the j -th gender and pay grade second-stage stratum of the i -th FSU from the h -th first-stage stratum, and

$m_{h,i,j}$ = targeted second-stage sample size for the j -th gender and pay grade second-stage stratum for FSUs in the h -th first-stage stratum.

Thus, the initial sample weight assigned to the k -th person of the j -th gender and pay grade second-stage stratum of the i -th FSU was

$$w_{h,i,j,k} = [\pi_{h,i} \cdot \pi_k |_{h,i,j}]^{-1}.$$

Persons eligible for the mail survey were sampled directly as FSUs. The sampling rates used in each stratum were the same as the overall sampling rates for the group-administered sample in the continental United States (CONUS). The initial sampling weight assigned was the inverse of the sampling rate. We assigned the initial sampling weight to each of the 36,806 personnel selected for the sample.

B.1.2 Adjustments for Survey Eligibility

As in previous surveys in this series, the 1998 DoD survey population comprised all military personnel on active duty in December 1997 and who were still on active duty when we conducted the survey (April to August 1998). The only exceptions were

- basic trainees,
- Service academy cadets and midshipmen,
- personnel undergoing a permanent change of station (PCS), and
- personnel absent without official leave (AWOL).

We excluded basic trainees, academy cadets, and midshipmen because of their lack of military experience. We excluded personnel who were either undergoing a PCS or were AWOL because of the difficulties associated with contacting them during the relatively short data collection period.

During the group administrations (Phase 1) of the survey questionnaire, we determined the eligibility status of sampled members. We considered the personnel who had left active duty, were PCS, or were AWOL to be ineligible for the survey. We considered personnel who were deployed, ill, on leave, or on temporary duty to be eligible but unavailable for the survey. We also considered eligible those personnel who were available but did not attend the group administrations. To give all eligible sampled members an opportunity to participate in the survey, we mailed questionnaires (Phase 2) to all eligible personnel not attending the group administrations.

We could not determine the exact size of the survey population (i.e., the total number of personnel eligible for the survey) because of the ever-changing assignment

status of military personnel. Instead, we applied the observed eligibility rates for sampled members for the group administration to the June 1998 personnel counts provided by the Defense Manpower Data Center (DMDC) to obtain accurate estimates of the total number of eligible personnel in each of the 96 sampling strata defined by intersection of Service, region, gender, and pay grade group. To ensure stable sampling estimates, we collapsed sampling strata with fewer than 30 respondents to form post-strata. When it was necessary to combine strata due to small sample sizes, collapsing was first done across regions. Next, warrant officers were combined with O1s to O3s. Then we applied the observed eligibility rate for each post-stratum to the corresponding personnel count to obtain the estimated number of eligible personnel.

We estimated the number of eligible personnel in each post-stratum using the group administration data as follows. First, we defined the following eligibility indicator for the k -th sampled member in the j -th pay grade group in the i -th FSU of the h -th first-stage stratum:

$$e_{h,i,j,k} = \begin{cases} 1 & \text{if he/she was eligible for the survey, and} \\ 0 & \text{otherwise.} \end{cases}$$

We set this indicator to 1 for the sampled members to the group administration whom we classified as eligible for the survey. Then we estimated the number of eligible personnel in each post-stratum c as

$$\hat{N}_{e,c} = \frac{\sum_{h,j \in c} \sum_{i \in h} \sum_{k \in j} w_{h,i,j,k} \cdot e_{h,i,j,k}}{\sum_{h,j \in c} \sum_{i \in h} \sum_{k \in j} w_{h,i,j,k}} \cdot N_c,$$

where

N_c = the June 1998 personnel count for post-stratum c .

Table B.1 compares these estimates to the entire active-duty population by Service, gender, and pay grade group. In the next section, we describe how we adjusted the initial sampling weights of survey participants so that the sum of their adjusted weights within a post-stratum equaled the estimated number of eligible personnel in the post-stratum.

B.1.3 Adjustments for Nonresponse

We considered a sampled member to be a respondent if he/she returned a usable questionnaire. Accordingly, we assigned the following response indicator to the k -th person of the j -th pay grade stratum in the i -th FSU of the h -th first-stage stratum:

Table B.1 Comparison of Total Personnel and Eligible Personnel

Pay Grade/ Gender	Army			Navy			Marine Corps			Air Force			Total DoD		
	Total Personnel	Estimated Eligible Personnel	(Estimated Eligible Personnel - Total Personnel)	Total Personnel	Estimated Eligible Personnel	(Estimated Eligible Personnel - Total Personnel)	Total Personnel	Estimated Eligible Personnel	(Estimated Eligible Personnel - Total Personnel)	Total Personnel	Estimated Eligible Personnel	(Estimated Eligible Personnel - Total Personnel)	Total Personnel	Estimated Eligible Personnel	(Estimated Eligible Personnel - Total Personnel)
E2-E3															
Male	74,030	58,578 (6,742)	15,282	58,634	32,625 (6,151)	26,483	56,303	44,781 (8,540)	11,522	46,358	39,185 (5,908)	6,173	235,325	175,168 (13,825)	161,500
Female	15,900	11,366 (766)	4,534	13,045	7,908 (1,356)	5,137	3,548	2,689 (269)	889	16,107	13,014 (1,408)	3,093	48,600	34,977 (2,116)	46,500
E4-E6															
Male	197,864	164,663 (14,216)	33,201	175,409	149,761 (16,869)	25,648	66,050	57,572 (5,827)	8,478	150,468	134,175 (10,130)	16,293	589,791	506,171 (24,964)	564,755
Female	35,439	28,886 (2,146)	6,553	22,210	18,888 (2,015)	3,322	3,928	3,507 (537)	421	30,244	26,857 (2,700)	3,387	91,821	78,087 (4,030)	85,467
E7-E9															
Male	46,389	39,026 (2,848)	7,363	32,162	27,756 (3,037)	4,406	12,507	11,096 (899)	1,411	34,787	31,590 (2,718)	3,197	125,845	109,468 (5,053)	120,671
Female	5,543	4,597 (482)	946	2,384	2,041 (282)	343	667	604 (151)	63	4,290	3,876 (487)	414	12,884	11,118 (757)	12,100
W1-W5															
Male	10,889	9,025 (1,700)	1,864	1,769	1,542 (192)	227	1,779	1,676 (217)	103		0(0)		14,437	12,244 (1,724)	13,261
Female	751	647 (131)	104	95	58 (22)	37	123	132 (36)	1		0(0)		969	838 (137)	870
O1-O3															
Male	34,289	29,261 (2,082)	5,028	27,565	23,392 (3,130)	4,173	9,688	7,753 (1,650)	1,935	33,850	27,999 (5,748)	5,851	105,392	88,406 (7,064)	98,470
Female	6,532	5,501 (880)	1,031	4,859	4,344 (1,266)	515	542	386 (112)	156	8,084	7,057 (1,488)	1,027	20,017	17,289 (2,146)	18,316
O4-O10															
Male	23,623	23,841 (1,318)	1,218	18,439	16,304 (3,639)	2,135	5,682	5,460 (1,258)	222	26,644	24,358 (4,826)	2,286	74,388	69,962 (6,313)	71,245
Female	3,157	3,419 (827)	262	2,848	2,733 (698)	115	166	222 (102)	44	3,914	3,610 (824)	304	10,085	9,983 (1,364)	10,387
Total	454,406	378,810 (20,798)	76,596	359,419	287,301 (23,355)	72,118	160,983	135,878 (13,169)	25,105	354,746	311,721 (14,824)	43,025	1,329,554	1,113,710 (37,048)	1,216,664

Note: "Total personnel" is the number of personnel, excluding cadets, midshipmen, and basic trainees, who were on active duty as of June 30, 1998. "Eligible personnel" is the estimated number of these personnel who had some chance of being selected for the survey. The standard errors for the estimated number of eligible personnel are given in parentheses beneath the estimates.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998.

$$r_{h,i,j,k} = \begin{cases} 1 & \text{if he/she provided a usable questionnaire, and} \\ 0 & \text{otherwise.} \end{cases}$$

We set this indicator to 1 for the 17,264 sampled members who provided a usable questionnaire.

To force the sum of the adjusted weights of respondents to equal the estimated number of eligible personnel, we calculated the following adjustment factor for each post-stratum c :

$$A_c = \frac{\hat{N}_{e,c}}{\sum_{h,j \in c} \sum_{i \in h} \sum_{k \in j} w_{h,i,j,k} \cdot r_{h,i,j,k}}.$$

Then we applied the adjustment factor to the initial sampling weight of each respondent to obtain the following adjusted weight:

$$w_{h,i,j,k}^* = A_c \cdot w_{h,i,j,k} \cdot r_{h,i,j,k}.$$

Nonzero values of this weight were assigned to the 17,264 respondents who provided questionnaires with usable information.

B.2 Estimation Procedures and Analysis Software

In this section, we discuss the statistical estimation procedures we used for the complex sample design of the 1998 survey. We produced estimates for different reporting domains, such as demographic groups defined by Service, race/ethnicity, gender, age, and family status. The main types of estimates we produced are means, such as the average ounces of ethanol consumed, and percentages, such as the percentage of persons reporting marijuana use in the past 30 days. We also computed differences, such as the change in mean ounces of alcohol (ethanol) consumed, or the change in the percentage of persons reporting drug use between 1995 and 1998. In addition, we fit logistic regression models to estimate the combined effect of sociodemographic variables on a variety of dependent variables.

The first step in the estimation process was the development of response-adjusted analysis weights (discussed in Section B.1). Next, we examined frequencies of categorical variables to ensure that there was an adequate sample size in each level. We also examined frequencies of continuous variables, such as age and ethanol consumption, and investigated and resolved unreasonably large or small values in the data.

We used estimation procedures appropriate for the two-stage, deeply stratified, two-phase design (e.g., see Cochran, 1977). Estimates of population totals are linear statistics, and their variances can be expressed in closed form. Proportions and ratios, which are nonlinear statistics, comprise most of the tabular results presented in this report. Such ratios are estimated by separately estimating the numerators and denominators of the ratios, then dividing to obtain the ratio. Because ratio estimates are nonlinear statistics, their sampling variance cannot be expressed in closed form. We calculated variance approximations using first-order Taylor series linearizations. The estimation of regression coefficients is a multivariate extension of the Taylor series linearization for ratios.

The majority of the estimates and the standard errors presented in the report were calculated using the SUDAAN analysis software. SUDAAN is a software package developed at the Research Triangle Institute for the specific purpose of analyzing data from complex surveys (Shah, Barnwell, & Bieler, 1997). The approach used for calculating the standard errors is a first-order Taylor series approximation of the deviation of the estimates from their expected values (Woodruff, 1971). The estimates in this report were produced using the SUDAAN procedures DESCRIPT, CROSSTAB, and LOGISTIC.

The DESCRIPT procedure in SUDAAN calculates weighted estimates of proportions, means, and totals along with estimates of their standard errors. Estimates are calculated separately for specified population domains. DESCRIPT also has the capability of producing standardized estimates for comparing the characteristics of two populations with differing distributions of confounding attributes. The CROSSTAB procedure produces weighted frequencies, percentages, and estimates of their standard errors for specified domains.

For fitting the logistic regression models, we used the SUDAAN procedure LOGISTIC, which (as suggested by Binder, 1981) fits logistic regression models using sample design weights and a design-consistent estimate of the model parameters and covariance matrix. The Horvitz-Thompson estimators (Cochran, 1977) of the regression coefficients are produced, as well as a Taylor series approximation of the variance-covariance matrix of the regression coefficients in which the mean square error between primary sampling units within strata is used to estimate the variance and covariance parameters. Tests of hypotheses about regression coefficients estimated using LOGISTIC were based on a Hotelling's T^2 -type statistic, which is assumed to have a transformed F -distribution in repeated samples (Shah, Holt, & Folsom, 1977).

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APPENDIX C
ESTIMATED SAMPLING ERRORS

APPENDIX C

ESTIMATED SAMPLING ERRORS

The procedures and methodology used for the 1998 DoD survey are described here to help the reader use the estimates of sampling errors that were calculated and printed for various proportions and means in this report. "Sampling errors" is the general term we used to describe all the sources of difference between an estimate based on a sample and the true value for the population. The difference arises because, as with most surveys other than a census, we observed only a sample rather than every member of the population. At the time of data collection for the 1998 survey, over 1.3 million officers and enlisted personnel in the four Services were on active duty worldwide. Samples of 17,264 such military personnel generally clustered at a sample of 397 central installations with 500 or more active-duty personnel provided close, but less than perfect, estimates of the responses that we would have obtained had we asked all officers and enlisted personnel to complete the survey.

C.1 Confidence Intervals and Significant Differences

For any particular percentage resulting from a sampling survey, it is not possible to know the exact amount of error that has resulted from sampling. It is possible, however, to establish estimated "confidence intervals" (i.e., ranges very likely to include the true population value). For example, Table 3.1 shows that 29.9%, with a standard error of 0.8%, of the military personnel in the 1998 sample reported that they smoked in the past 30 days. It is possible to set up a 95% confidence interval, which means that 95% of the time a computed interval can be expected to include the true (population) percentage. As a general rule, the 95% confidence interval is formed by doubling the standard error (multiplying by 1.96 is the precise value to use), adding this result to the estimate to form the upper bound, and subtracting it from the estimate to form the lower bound. In this case, the lower and upper limits of the 95% interval are 28.3% and 31.5%. A somewhat wider set of limits can be set up to indicate the 99% confidence interval.

It also is possible to construct a confidence interval for a difference between two estimated percentages. For example, we have estimated the difference between 1995 and 1998 in the percentages of all military personnel whom we classified as smokers as 2.0% (Table 3.1), and we have computed the 95% confidence limits for that difference as $\pm 2.4\%$ of that estimate. In other words, we can be 95% certain that the true difference between the 2 years' populations is somewhere between 2.4% below the estimated difference and 2.4% above it. Because that range includes zero difference between the two survey years, at the

95% level the estimated difference is not significantly different from zero, or just "not significant." If the interval had been smaller, the difference would have been "significant" at the 95% level.

C.2 Factors Influencing the Size of Confidence Intervals in This Report

From a statistical standpoint, the most straightforward types of samples are simple random samples. In such samples, the confidence limits for a percentage are simple functions of the percentage value and the size of the sample or subgroup on which it is based. For example, the 95% confidence interval for a proportion (p) can be approximated by $p \pm 1.96 \sqrt{p(1-p)/N}$. In a more complicated sample, such as the one we used in this survey, other factors also determine confidence limits. In this section, we discuss all of the factors, beginning with the basic ones and proceeding to those that are more complex.

C.2.1 Number of Cases (N)

When other things are equal, the larger a sample or subgroup, the more precise will be an estimate based thereon and, therefore, the narrower will be the confidence levels. One of the factors is $1/\sqrt{N}$, the reciprocal of the square root of the size of the sample or the subgroup. Thus, a sample of 400 will, all things being equal, have a confidence interval just half as wide as that for a sample of 100 because $1/\sqrt{400}$ is just about half of $1/\sqrt{100}$.

C.2.2 Percentage Size

Other things again being equal, percentage values around 50% have the largest confidence intervals because $\sqrt{p(1-p)}$ (where p is a proportion between 0.0 and 1.0) also is a factor affecting the size of the confidence interval. This factor will be only three-fifths as large for 10% or 90% as large for 50% because $\sqrt{.1 \times .9}$ is $3/5 \times \sqrt{.5 \times .5}$.

C.3 Design Effects in Complex Samples

Under simple random sampling (SRS), a confidence interval can be determined from the two factors we just described plus the appropriate constant for the confidence level desired (e.g., 1.96 for 95%). Where stratification, clustering, and differential weighting of responses are involved, as in this survey, all of these also influence sampling error. Stratification tends to increase precision, but the effects of clustering and weighting reduce it. The result is usually lower precision than would be obtained by the use of a simple random sample of the same size. Accordingly, using the simple formula generally underestimates the sampling error involved.

There are methods, however, to correct for this underestimation. Kish (1965, p. 258) defined a correction term known as the design effect (*DEFF*), where

$$DEFF = \frac{\text{Actual sampling variance}}{\text{SRS variance}}$$

If, therefore, the actual sampling variance for a proportion *p* is four times the value computed for a simple random sample of the same size *N*, the *DEFF* is 4.0. Because a confidence interval is based on the square root of the variance, any confidence interval would have to be twice as wide as the corresponding interval from a simple random sample of the same size.

A simple way of using a *DEFF* value is to divide the actual sample or domain size by it and obtain the "effective *N*," the size of a simple random sample that would have resulted in the same degree of precision. For example, with a *DEFF* of 4.0 and an actual sample size of 4,000, the "effective *N*" is 1,000. The value of the "effective *N*" can be used in the simple formula $\sqrt{p(1-p)/N}$ to compute standard errors of estimates and confidence interval limits for proportions. It is therefore possible to use formulas and tables appropriate for simple random samples, regardless of the actual type of sample, by converting the sample size to the "effective *N*."

Actually, every statistic derived from a complex sample has its own design effect, different from all of the others. In practice, however, *DEFF* values are generally computed only for a cross-section of the statistics, and averages are computed and applied to those of the same types. Often, a single average *DEFF* is used for all percentages.

In this study, we have computed standard errors for estimated proportions. We incorporated into our calculations the appropriate (sub)sample sizes, proportions, and correction for design effects.

C.4 Suppression Rule for Estimates

In this report, we suppressed unreliable estimates (indicated with a plus sign [+] in tables and figures). That is, we suppressed proportions and means that could not be reported with confidence because they were based on small sample sizes or had large sampling errors (i.e., had low precision). The sample size restriction we used was to suppress an estimate when the number of observations on which it was based (i.e., the denominator sample size) was fewer than 30 cases. We used two rules to suppress estimates with large sampling errors, one for means and one for proportions.

For estimates expressed as means (e.g., average ounces of ethanol), we also suppressed estimates with relative standard errors (*RSEs*) greater than 50% of the estimate. The *RSE* is computed by dividing the standard error of the estimate by the estimate.

For estimates expressed as proportions (e.g., the proportion of heavy drinkers), we used a suppression rule based on the *RSE* of the natural log of the estimated proportion (p). Specifically, we suppressed estimates in tables and figures when

$$RSE [-\ln(p)] > 0.225 \text{ for } p \leq 0.5, \text{ and}$$

$$RSE [-\ln(1-p)] > 0.225 \text{ for } p > 0.5.$$

Note that $RSE[-\ln(p)] = RSE(p)/(-\ln(p)) = SE(p)/(-p \ln(p))$, where $SE(p)$ denotes the standard error of p , the estimated proportion.

We chose to use this rule based on the natural log of the *RSE* rather than on the *RSE* itself because the latter has been observed to have some undesirable properties for proportions. Specifically, a rule based on the *RSE* of the estimate imposes a very stringent suppression requirement on small proportions but a very lax requirement on large proportions. That is, small proportions must have relatively large effective sample sizes to avoid being suppressed, whereas large proportions require much smaller sample sizes.

The rule based on the natural log of the *RSE* of the estimate is more liberal in allowing small proportions to avoid being suppressed but more stringent with regard to suppression of large proportions. For example, under the rule based on the $RSE[-\ln(p)]$, percentages of about 1% would be suppressed unless they were based on an effective sample size of about 100 or more respondents, and percentages of 20% would be suppressed unless they were based on an effective sample size of about 30 respondents. Using a rule for proportions based on $RSE(p) > 0.50$ would require an effective sample size of 400 respondents for percentages of about 1% and an effective sample size of only 16 respondents for percentage estimates of about 20%.

Very small estimates (i.e., < 0.05%) that were not suppressed under these rules, but that rounded to zero, also were suppressed and are shown as two asterisks (**) in the tables and figures.

Reference for Appendix C

Kish, L. (1965). *Survey sampling*. New York: John Wiley & Sons.

APPENDIX D
SUPPLEMENTAL TABLES

Table D.1 Substance Use Summary for the Army, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	15.5 (0.7)	11.7 (0.5) ^b	14.6 (0.7) ^b	17.0 (0.7) ^b	21.4 (1.4) ^b	20.6 (1.0)	23.1 (1.3) ^c
Infrequent/light	12.2 (0.9)	16.7 (1.0) ^b	16.4 (1.1)	16.8 (0.9)	17.2 (0.6)	18.0 (1.4)	18.8 (1.0) ^c
Moderate	19.9 (1.2)	16.6 (0.8) ^b	17.8 (0.7)	19.5 (0.7)	17.3 (0.8) ^b	18.0 (1.0)	16.9 (0.7) ^c
Moderate/heavy	32.0 (0.7)	30.3 (1.0)	25.7 (1.8) ^b	27.1 (0.8)	26.5 (1.4)	25.0 (1.1)	24.0 (0.8) ^c
Heavy	20.3 (1.6)	24.7 (1.4) ^b	25.5 (2.2)	19.7 (1.2) ^b	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)
Any Illicit Drug Use^a							
Past 30 days	30.7 (2.8)	26.2 (1.8)	11.5 (1.3) ^b	6.9 (0.7) ^b	3.9 (0.8) ^b	4.0 (0.9)	4.5 (0.8)
Past 12 months	39.4 (2.9)	32.4 (1.8) ^b	16.6 (1.3) ^b	11.8 (1.1) ^b	7.7 (0.8) ^b	9.2 (1.1)	9.8 (0.9)
Cigarette Use, Past 30 Days							
Any smoking	54.3 (0.7)	54.7 (1.8)	52.0 (1.8)	43.1 (1.1)	37.0 (2.0) ^b	34.1 (1.6)	31.1 (1.2) ^c
Heavy smoking	35.2 (0.7)	34.6 (1.4)	33.6 (1.4)	22.8 (0.7) ^b	18.0 (1.1) ^b	17.0 (1.0)	14.1 (0.8) ^{b,c}
Alcohol Use Negative Effects							
Serious consequences	17.9 (1.6)	16.3 (1.2)	13.5 (2.0)	10.3 (0.8)	8.0 (1.1) ^d	7.9 (0.9)	8.5 (0.9) ^c
Productivity loss	23.8 (1.3)	33.1 (0.8) ^b	27.2 (1.3) ^b	22.0 (1.0) ^b	14.8 (1.4) ^b	16.5 (1.5)	13.4 (0.7) ^{b,c}
Dependence	8.8 (1.0)	10.1 (0.8)	12.1 (1.5)	7.2 (0.6) ^b	5.4 (0.7)	6.4 (0.9)	6.2 (0.5) ^c

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 8.3 (1.2) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table D.2 Substance Use Summary for the Navy, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	10.0 (0.5)	10.5 (1.4)	9.6 (0.8)	15.7 (0.6) ^b	19.6 (1.9)	19.0 (0.9)	24.1 (1.0) ^{b,c}
Infrequent/light	11.7 (0.6)	20.7 (2.3) ^b	18.8 (2.0)	18.2 (0.9)	18.6 (0.9)	18.7 (1.1)	19.3 (0.9) ^c
Moderate	20.5 (1.3)	15.1 (1.1) ^b	18.7 (1.0) ^b	20.7 (1.2)	20.2 (1.2)	19.2 (0.9)	18.8 (1.2)
Moderate/heavy	32.2 (1.6)	26.1 (1.5) ^b	27.9 (1.4)	30.7 (1.5)	27.4 (0.7) ^b	24.0 (1.6)	24.3 (1.0) ^c
Heavy	25.6 (2.3)	27.7 (2.9)	25.0 (1.4)	14.7 (2.0) ^b	14.2 (1.7)	19.1 (1.5) ^b	13.5 (1.8) ^{b,c}
Any Illicit Drug Use^a							
Past 30 days	33.7 (2.1)	16.2 (2.2) ^b	10.3 (1.7) ^b	5.4 (0.7) ^b	4.0 (0.9)	3.6 (0.6)	1.8 (0.3) ^{b,c}
Past 12 months	43.2 (2.1)	28.1 (1.7) ^b	15.9 (2.3) ^b	11.3 (2.1)	6.6 (1.9)	7.3 (0.8)	4.2 (0.5) ^{b,c}
Cigarette Use, Past 30 Days							
Any smoking	53.8 (1.2)	55.4 (1.0)	47.9 (1.2) ^b	43.8 (1.8)	37.1 (1.7) ^b	34.9 (1.6)	30.6 (1.5) ^c
Heavy smoking	37.3 (1.3)	35.7 (1.4)	34.8 (1.6)	24.6 (2.0) ^b	20.4 (0.5) ^b	16.3 (1.4) ^b	14.8 (1.1) ^c
Alcohol Use Negative Effects							
Serious consequences	22.1 (2.1)	17.6 (1.4)	13.5 (2.0)	10.4 (1.5)	8.4 (3.2) ^d	8.6 (0.9)	4.8 (0.6) ^{b,c}
Productivity loss	34.7 (2.1)	41.8 (1.8) ^b	35.5 (2.4) ^b	26.4 (3.1) ^b	20.1 (4.1)	20.1 (1.9)	14.1 (1.5) ^{b,c}
Dependence	9.7 (1.0)	11.6 (1.0)	6.8 (0.8) ^b	7.2 (1.3)	5.2 (1.0)	6.1 (0.8)	3.3 (0.5) ^{b,c}

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 9.1 (3.9) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table D.3 Substance Use Summary for the Marine Corps, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	10.4 (1.0)	13.5 (2.0)	10.8 (2.5)	18.0 (0.9) ^b	14.6 (0.5) ^b	16.4 (0.7) ^b	19.1 (0.8) ^{b,c}
Infrequent/light	11.0 (0.5)	13.2 (1.8)	13.6 (1.7)	16.1 (2.9)	14.4 (1.2)	13.9 (0.7)	17.5 (0.8) ^{b,c}
Moderate	17.6 (1.2)	14.9 (0.3) ^b	15.1 (2.1)	13.9 (1.0)	19.5 (1.5) ^b	17.2 (1.1)	17.3 (1.2)
Moderate/heavy	32.4 (1.4)	27.8 (0.7) ^b	31.1 (1.8)	27.6 (1.9)	25.4 (1.9)	24.0 (0.9)	23.1 (1.1) ^c
Heavy	28.6 (2.5)	30.6 (0.9)	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)
Any Illicit Drug Use^a							
Past 30 days	37.7 (3.0)	20.6 (2.0) ^b	9.9 (3.2) ^b	4.0 (0.7)	5.6 (1.0)	3.6 (0.8)	3.3 (0.4) ^c
Past 12 months	48.0 (3.1)	29.9 (3.2) ^b	14.7 (3.8) ^b	7.8 (1.0)	10.7 (1.3)	7.3 (1.2)	7.2 (0.8) ^c
Cigarette Use, Past 30 Days							
Any smoking	53.4 (0.6)	48.7 (0.4) ^b	42.6 (3.1)	41.3 (1.8)	39.2 (2.3)	35.0 (1.8)	34.9 (2.1) ^c
Heavy smoking	34.5 (0.9)	31.6 (0.7) ^b	26.1 (0.8) ^b	18.7 (2.2) ^b	20.7 (1.8)	15.0 (1.2) ^b	13.5 (1.1) ^c
Alcohol Use Negative Effects							
Serious consequences	26.2 (2.2)	19.7 (1.0) ^b	12.3 (1.7) ^b	17.0 (3.4)	14.8 (2.1) ^d	14.7 (1.6)	12.5 (1.3) ^c
Productivity loss	34.1 (1.6)	37.6 (1.2)	29.0 (5.0)	32.0 (3.8)	25.6 (1.9)	21.8 (1.9)	19.2 (1.3) ^c
Dependence	11.8 (1.2)	10.2 (1.8)	7.6 (1.4)	9.8 (1.7)	11.2 (1.7)	9.6 (1.1)	8.2 (1.2)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 15.7 (1.8) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table D.4 Substance Use Summary for the Air Force, 1980-1998

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	1998
Alcohol Drinking Level							
Abstainer	15.0 (1.0)	12.6 (0.7) ^b	15.6 (1.0) ^b	18.4 (0.8) ^b	21.1 (0.8) ^b	24.2 (0.9) ^b	26.6 (1.1) ^c
Infrequent/light	12.6 (0.5)	17.3 (0.8) ^b	15.4 (0.8)	18.1 (0.8) ^b	21.3 (0.9) ^b	20.5 (0.9)	21.1 (0.8) ^c
Moderate	24.9 (1.2)	19.8 (0.7) ^b	20.9 (1.2)	19.7 (0.8)	21.5 (0.7)	20.5 (0.7)	19.4 (1.0) ^c
Moderate/heavy	33.2 (0.9)	32.6 (0.8)	31.5 (1.2)	29.2 (1.1)	25.4 (0.8) ^b	24.5 (1.0)	21.3 (0.9) ^{b,c}
Heavy	14.3 (1.4)	17.7 (1.2)	16.5 (1.4)	14.5 (1.0)	10.6 (0.8) ^b	10.4 (1.1)	11.7 (1.0)
Any Illicit Drug Use^a							
Past 30 days	14.5 (1.1)	11.9 (1.5)	4.5 (0.8) ^b	2.1 (0.4) ^b	1.2 (0.2) ^b	1.0 (0.2)	1.2 (0.1) ^c
Past 12 months	23.4 (1.7)	16.4 (1.8) ^b	7.2 (0.9) ^b	3.8 (0.6) ^b	2.3 (0.3) ^b	2.5 (0.4)	2.4 (0.2) ^c
Cigarette Use, Past 30 Days							
Any smoking	43.2 (1.8)	44.1 (1.6)	39.0 (2.3)	35.8 (1.2)	29.2 (1.4) ^b	25.1 (1.3) ^b	25.7 (1.5) ^c
Heavy smoking	29.7 (1.3)	30.6 (1.2)	26.8 (1.7)	22.0 (0.8) ^b	14.6 (1.0) ^b	11.2 (0.8) ^b	11.2 (1.0) ^c
Alcohol Use Negative Effects							
Serious consequences	9.0 (0.8)	8.0 (0.8)	4.7 (0.5)	3.9 (0.5)	3.5 (0.4) ^d	3.7 (0.5)	3.6 (0.3) ^c
Productivity loss	20.7 (1.2)	28.0 (2.7) ^b	19.4 (1.1)	15.5 (0.8) ^b	10.6 (0.5) ^b	9.9 (0.6)	10.8 (1.1) ^c
Dependence	4.3 (0.6)	3.7 (0.7)	3.3 (0.5)	3.8 (0.4)	2.7 (0.3) ^b	3.0 (0.6)	2.8 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3. The algorithm for computing drinking levels was altered for this report as follows: Estimates for drinking levels for 1998 take into account both 32-ounce or liter and 40-ounce size containers. Estimates for drinking levels for 1985 to 1995 take into account 32-ounce or liter containers, but not 40-ounce containers. Therefore, 1985 to 1995 drinking-level estimates differ slightly from those reported in previous DoD survey reports. Tables D.17 through D.21 compare drinking-level estimates for 1985 to 1998 based on the algorithm used in previous reports and the algorithm used in this report.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants. "Designer" drugs also are included for 1988, 1992, 1995, and 1998.

^bComparisons between this survey and the preceding survey are statistically significant at the 95% confidence level.

^cComparisons between 1980 and 1998 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 3.8 (0.4) in the 1995 report.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980-1998 (1998 Questions: Alcohol Drinking Level, Q15-18 and 20-23; Any Illicit Drug Use: Past 30 Days, Q60 and 67, Past 12 Months, Q60-61 and 67; Cigarette Use, Past 30 Days: Any Smoking, Q44 and 47, Heavy Smoking, Q45; Alcohol Use Negative Effects: Serious Consequences, Q34 and 36, Productivity Loss, Q32A-F, Dependence, Q33A-C and E-F).

Table D.5 Any Illicit Drug Use, Past 12 Months, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	10.4 (1.0)	4.1 (0.6)	7.3 (0.9)	2.4 (0.2)	6.2 (0.4)
Female	6.2 (0.5)	4.9 (0.7)	5.8 (1.5)	2.6 (0.5)	4.6 (0.3)
Race/Ethnicity					
Caucasian, non-Hispanic	9.6 (1.0)	4.3 (0.5)	7.5 (0.9)	2.3 (0.2)	5.6 (0.4)
African American, non-Hispanic	9.9 (1.2)	5.0 (1.4)	4.0 (1.5)	2.6 (0.8)	6.8 (0.7)
Hispanic	10.8 (1.6)	4.4 (1.6)	9.1 (1.5)	3.5 (1.1)	7.6 (0.8)
Other	9.3 (1.9)	2.6 (0.7)	6.8 (2.4)	2.1 (0.9)	4.8 (0.8)
Education					
High school or less	17.0 (1.4)	6.1 (1.0)	9.6 (1.4)	4.5 (0.7)	10.2 (0.8)
Some college	8.6 (1.0)	3.7 (0.5)	6.0 (0.5)	2.7 (0.3)	5.3 (0.4)
College graduate or higher	2.3 (0.5)	2.1 (0.6)	0.8 (0.6)	0.7 (0.2)	1.6 (0.2)
Age					
20 or younger	21.5 (2.1)	13.3 (2.1)	14.8 (1.6)	7.7 (1.9)	15.9 (1.3)
21-25	15.9 (1.7)	7.1 (1.2)	9.5 (0.9)	4.1 (0.6)	10.1 (0.8)
26-34	5.2 (0.4)	3.5 (0.7)	1.5 (0.4)	1.6 (0.4)	3.3 (0.3)
35 or older	1.9 (0.4)	1.1 (0.3)	0.6 (0.3)	1.0 (0.2)	1.3 (0.2)
Family Status^a					
Not married	15.3 (1.1)	6.4 (1.0)	11.9 (1.2)	3.8 (0.5)	9.7 (0.6)
Married, spouse not present	7.8 (2.6)	6.1 (2.2)	5.5 (1.7)	1.8 (0.5)	6.1 (1.4)
Married, spouse present	5.7 (1.0)	2.6 (0.4)	2.2 (0.3)	1.7 (0.3)	3.2 (0.4)
Pay Grade					
E1-E3	19.9 (2.1)	12.4 (1.9)	14.2 (1.6)	6.9 (1.2)	14.0 (1.0)
E4-E6	10.6 (0.9)	3.5 (0.6)	4.8 (0.6)	1.9 (0.3)	5.6 (0.4)
E7-E9	2.2 (0.5)	1.5 (0.4)	0.8 (0.4)	0.8 (0.2)	1.5 (0.2)
W1-W5	1.0 (0.5)	** (**)	** (**)	NA (NA)	0.8 (0.4)
O1-O3	3.2 (0.9)	2.3 (0.7)	** (**)	1.3 (0.4)	2.1 (0.4)
O4-O10	1.4 (0.5)	0.8 (0.5)	** (**)	0.6 (0.4)	0.9 (0.3)
Region					
CONUS ^b	9.6 (1.1)	3.7 (0.7)	7.1 (0.9)	2.2 (0.2)	5.8 (0.5)
OCONUS ^c	10.2 (1.5)	5.3 (0.9)	7.5 (1.9)	3.3 (0.3)	6.6 (0.7)
Total	9.8 (0.9)	4.2 (0.5)	7.2 (0.8)	2.4 (0.2)	6.0 (0.4)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

**Estimate rounds to zero.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Any Illicit Drug Use, Past 12 Months, Q60-61 and 67; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.6 Patterns of Cigarette Smoking, Past 30 Days, by Smoking Level

Smoking Level	Service				
	Army	Navy	Marine Corps	Air Force	Total DoD
Didn't Smoke	70.7 (1.2)	71.4 (1.5)	69.0 (1.8)	76.6 (1.5)	72.3 (0.7)
½ Pack or Less/Day (1-15 cig.)	15.0 (0.6)	13.7 (0.8)	17.4 (1.2)	12.1 (0.7)	14.2 (0.4)
About 1 Pack/Day (16-25 cig.)	9.9 (0.6)	10.3 (0.7)	9.4 (0.7)	8.3 (0.8)	9.5 (0.4)
About 1½ Packs/Day (26-35 cig.)	2.8 (0.3)	3.0 (0.3)	2.9 (0.4)	1.8 (0.2)	2.6 (0.1)
About 2 or More Packs/Day (>36 cig.)	1.5 (0.2)	1.6 (0.4)	1.3 (0.2)	1.2 (0.2)	1.4 (0.1)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Smoking Level, Q45).

Table D.7 Any Cigarette Smoking, Past 30 Days, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	32.7 (1.2)	31.1 (1.5)	35.1 (2.1)	25.4 (1.5)	30.6 (0.8)
Female	21.8 (1.2)	27.2 (2.2)	31.2 (2.9)	27.1 (1.9)	25.5 (1.0)
Race/Ethnicity					
Caucasian, non-Hispanic	35.9 (1.6)	34.0 (2.3)	37.9 (2.2)	27.8 (1.9)	33.0 (1.0)
African American, non-Hispanic	20.7 (2.0)	16.7 (1.8)	24.1 (2.4)	17.1 (2.0)	19.5 (1.1)
Hispanic	27.5 (2.2)	30.2 (3.1)	32.1 (3.4)	22.6 (2.4)	27.9 (1.4)
Other	36.8 (2.3)	29.2 (2.5)	38.6 (3.5)	22.4 (3.1)	30.6 (1.5)
Education					
High school or less	42.0 (1.2)	39.5 (1.4)	41.8 (1.9)	38.9 (2.5)	40.7 (0.8)
Some college	33.2 (1.9)	32.3 (1.5)	33.5 (2.1)	29.4 (1.0)	31.7 (0.8)
College graduate or higher	11.9 (1.1)	11.8 (1.1)	10.1 (0.9)	10.3 (1.4)	11.2 (0.7)
Age					
20 or younger	40.3 (2.8)	37.6 (6.1)	42.1 (1.8)	37.7 (3.5)	39.8 (1.7)
21-25	38.4 (1.8)	34.0 (2.3)	43.9 (2.1)	35.0 (2.0)	37.6 (1.1)
26-34	27.9 (1.6)	31.5 (2.0)	20.5 (2.4)	21.1 (2.0)	26.3 (1.0)
35 or older	21.0 (0.9)	25.6 (2.0)	24.7 (1.2)	21.5 (1.4)	22.8 (0.8)
Family Status^a					
Not married	36.9 (1.4)	34.8 (1.8)	41.7 (2.2)	32.1 (1.7)	35.9 (0.9)
Married, spouse not present	32.4 (2.5)	26.6 (3.2)	35.6 (3.5)	23.7 (2.9)	30.1 (1.6)
Married, spouse present	26.2 (1.4)	28.0 (1.9)	27.0 (2.1)	22.1 (1.7)	25.5 (0.9)
Pay Grade					
E1-E3	45.1 (1.7)	39.8 (2.5)	47.0 (1.9)	37.7 (1.4)	42.7 (1.0)
E4-E6	35.3 (1.6)	34.0 (1.5)	32.7 (2.6)	29.8 (1.5)	33.1 (0.9)
E7-E9	25.0 (1.4)	32.8 (1.6)	29.3 (2.9)	23.5 (2.3)	26.9 (1.0)
W1-W5	18.2 (2.1)	26.5 (6.0)	30.9 (4.7)	NA (NA)	21.0 (2.0)
O1-O3	8.6 (1.3)	11.5 (1.5)	7.6 (1.8)	7.8 (1.5)	9.0 (0.8)
O4-O10	8.7 (1.1)	5.9 (1.3)	8.2 (1.5)	4.6 (1.0)	6.6 (0.7)
Region					
CONUS ^b	30.1 (1.4)	29.9 (1.8)	34.4 (2.3)	26.1 (1.9)	29.5 (0.9)
OCONUS ^c	34.3 (2.3)	32.1 (2.6)	36.8 (4.6)	24.4 (2.0)	31.2 (1.3)
Total	31.1 (1.2)	30.6 (1.5)	34.9 (2.1)	25.7 (1.5)	29.9 (0.8)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Any Cigarette Smoking, Past 30 Days, Q44 and 47; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.8 Heavy Cigarette Smoking, Past 30 Days, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Gender										
Male	15.1	(0.9)	15.4	(1.1)	13.6	(1.1)	11.7	(1.0)	14.1	(0.5)
Female	8.2	(0.7)	10.8	(1.3)	11.0	(1.6)	9.1	(1.1)	9.2	(0.6)
Race/Ethnicity										
Caucasian, non-Hispanic	19.3	(1.2)	18.9	(1.5)	17.3	(1.2)	13.3	(1.2)	17.1	(0.7)
African American, non-Hispanic	6.4	(1.1)	3.7	(0.8)	5.6	(1.4)	5.2	(1.0)	5.5	(0.6)
Hispanic	7.4	(1.6)	9.2	(2.6)	6.0	(1.4)	6.4	(1.5)	7.3	(0.9)
Other	11.2	(2.2)	8.8	(1.7)	14.4	(2.5)	4.6	(1.4)	9.0	(1.0)
Education										
High school or less	22.5	(1.3)	20.0	(1.6)	15.7	(0.9)	17.6	(2.0)	19.6	(0.8)
Some college	13.5	(0.8)	15.5	(1.3)	14.0	(2.0)	13.1	(0.8)	13.9	(0.5)
College graduate or higher	3.8	(0.6)	4.3	(0.8)	2.9	(0.8)	3.5	(0.6)	3.8	(0.4)
Age										
20 or younger	20.2	(2.7)	14.5	(3.9)	12.3	(2.6)	12.1	(2.5)	15.8	(1.5)
21-25	17.2	(1.3)	14.7	(1.4)	17.7	(1.8)	13.9	(1.6)	16.0	(0.7)
26-34	11.6	(1.4)	13.9	(1.4)	7.6	(1.6)	8.6	(1.4)	11.0	(0.8)
35 or older	10.3	(0.9)	16.1	(1.5)	13.2	(1.5)	12.1	(1.1)	12.8	(0.7)
Family Status^a										
Not married	17.2	(1.2)	13.5	(1.1)	15.0	(1.6)	12.9	(0.9)	14.9	(0.6)
Married, spouse not present	13.1	(1.6)	15.7	(3.7)	11.6	(2.7)	11.8	(1.6)	13.2	(1.2)
Married, spouse present	11.7	(0.8)	15.6	(1.5)	12.1	(1.1)	10.2	(1.1)	12.3	(0.6)
Pay Grade										
E1-E3	22.7	(2.4)	16.7	(2.3)	16.9	(1.4)	13.3	(1.3)	17.9	(1.1)
E4-E6	15.4	(0.9)	16.7	(1.4)	12.9	(1.1)	13.4	(1.1)	15.0	(0.6)
E7-E9	12.5	(1.3)	20.2	(1.1)	15.9	(2.6)	15.0	(1.6)	15.5	(0.8)
W1-W5	7.6	(1.5)	13.4	(3.5)	14.1	(2.6)	NA	(NA)	9.2	(1.3)
O1-O3	1.8	(0.7)	3.6	(1.0)	1.6	(0.6)	2.0	(0.5)	2.3	(0.4)
O4-O10	3.3	(0.8)	1.5	(0.5)	4.0	(1.1)	1.6	(0.7)	2.3	(0.4)
Region										
CONUS ^b	13.6	(1.0)	15.1	(1.3)	13.2	(0.9)	11.7	(1.2)	13.4	(0.6)
OCONUS ^c	15.6	(1.6)	14.0	(1.8)	14.6	(3.8)	9.9	(1.2)	13.5	(0.9)
Total	14.1	(0.8)	14.8	(1.1)	13.5	(1.1)	11.2	(0.9)	13.4	(0.5)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Heavy Cigarette Smoking, Q45; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.9 Cigarette Use During Past 30 Days, by Pay Grade

Pay Grade/ Smoking Measure	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
E1-E3					
Any smoking	45.1 (1.7)	39.8 (2.5)	47.0 (1.9)	37.7 (1.4)	42.7 (1.0)
Heavy smoking	22.7 (2.4)	16.7 (2.3)	16.9 (1.4)	13.3 (1.3)	17.9 (1.1)
E4-E6					
Any smoking	35.3 (1.6)	34.0 (1.5)	32.7 (2.6)	29.8 (1.5)	33.1 (0.9)
Heavy smoking	15.4 (0.9)	16.7 (1.4)	12.9 (1.1)	13.4 (1.1)	15.0 (0.6)
E7-E9					
Any smoking	25.0 (1.4)	32.8 (1.6)	29.3 (2.9)	23.5 (2.3)	26.9 (1.0)
Heavy smoking	12.5 (1.3)	20.2 (1.1)	15.9 (2.6)	15.0 (1.6)	15.5 (0.8)
W1-W5					
Any smoking	18.2 (2.1)	26.5 (6.0)	30.9 (4.7)	NA (NA)	21.0 (2.0)
Heavy smoking	7.6 (1.5)	13.4 (3.5)	14.1 (2.6)	NA (NA)	9.2 (1.3)
O1-O3					
Any smoking	8.6 (1.3)	11.5 (1.5)	7.6 (1.8)	7.8 (1.5)	9.0 (0.8)
Heavy smoking	1.8 (0.7)	3.6 (1.0)	1.6 (0.6)	2.0 (0.5)	2.3 (0.4)
O4-O10					
Any smoking	8.7 (1.1)	5.9 (1.3)	8.2 (1.5)	4.6 (1.0)	6.6 (0.7)
Heavy smoking	3.3 (0.8)	1.5 (0.5)	4.0 (1.1)	1.6 (0.7)	2.3 (0.4)
Total DoD					
Any smoking	31.1 (1.2)	30.6 (1.5)	34.9 (2.1)	25.7 (1.5)	29.9 (0.8)
Heavy smoking	14.1 (0.8)	14.8 (1.1)	13.5 (1.1)	11.2 (0.9)	13.4 (0.5)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Any Smoking, Past 30 Days, Q44 and 47; Heavy Smoking, Q45).

Table D.10 Any Smokeless Tobacco Use, Past 30 Days, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	16.7 (1.3)	10.4 (0.7)	20.3 (1.5)	8.9 (0.8)	13.4 (0.6)
Female	0.7 (0.3)	0.2 (0.1)	0.4 (0.2)	0.1 (0.1)	0.3 (0.1)
Race/Ethnicity					
Caucasian, non-Hispanic	21.2 (1.5)	11.8 (1.1)	25.8 (2.3)	9.1 (0.9)	15.4 (0.7)
African American, non-Hispanic	2.8 (0.8)	2.5 (0.9)	3.1 (0.5)	0.4 (0.3)	2.3 (0.4)
Hispanic	7.3 (1.6)	5.3 (2.0)	9.3 (1.1)	4.3 (0.9)	6.6 (0.8)
Other	12.9 (3.0)	5.1 (1.3)	17.2 (3.1)	4.2 (1.1)	8.3 (1.1)
Education					
High school or less	17.9 (1.6)	12.0 (1.3)	20.8 (1.8)	9.9 (1.5)	15.4 (0.9)
Some college	14.0 (1.3)	9.4 (1.1)	18.0 (1.6)	8.0 (0.8)	11.3 (0.6)
College graduate or higher	10.5 (1.5)	3.7 (0.7)	15.5 (3.0)	4.4 (1.0)	7.0 (0.7)
Age					
20 or younger	16.2 (2.3)	14.2 (3.3)	18.9 (2.6)	7.4 (1.6)	14.8 (1.3)
21-25	17.3 (1.4)	13.4 (1.5)	22.6 (2.1)	10.7 (1.2)	15.8 (0.9)
26-34	16.1 (1.6)	10.7 (0.8)	19.9 (1.4)	9.0 (0.9)	12.7 (0.7)
35 or older	7.3 (1.0)	2.9 (0.6)	9.8 (1.2)	3.0 (0.9)	4.7 (0.4)
Family Status^a					
Not married	16.2 (1.4)	10.3 (1.5)	21.3 (2.2)	7.8 (0.9)	13.4 (0.8)
Married, spouse not present	15.9 (2.0)	9.7 (2.3)	17.9 (2.6)	8.6 (2.0)	13.6 (1.3)
Married, spouse present	12.7 (1.4)	8.3 (0.7)	16.9 (1.4)	6.9 (0.8)	10.1 (0.6)
Pay Grade					
E1-E3	16.6 (1.3)	12.9 (2.5)	21.1 (2.8)	9.1 (0.6)	15.0 (1.1)
E4-E6	15.9 (1.8)	10.2 (0.9)	20.0 (1.0)	8.5 (0.9)	12.6 (0.7)
E7-E9	9.5 (1.1)	6.9 (0.9)	10.6 (1.9)	4.1 (1.5)	7.4 (0.6)
W1-W5	11.3 (1.2)	+ (+)	9.7 (1.9)	+ (+)	9.9 (1.0)
O1-O3	14.8 (2.3)	5.4 (1.2)	21.2 (3.2)	6.3 (1.7)	10.0 (1.1)
O4-O10	6.8 (1.5)	2.0 (0.5)	11.7 (3.2)	2.6 (0.8)	4.5 (0.6)
Region					
CONUS ^b	14.0 (1.6)	8.0 (0.8)	18.9 (1.5)	7.7 (0.9)	11.4 (0.7)
OCONUS ^c	15.7 (1.9)	11.8 (1.8)	20.3 (5.3)	6.1 (0.7)	12.3 (1.1)
Total	14.4 (1.3)	9.2 (0.8)	19.1 (1.6)	7.3 (0.7)	11.7 (0.6)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

+Low precision.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Smokeless Tobacco Use, Past 30 Days, Q51 and 55; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.11 Drinking Level, by Sociodemographic Characteristics, for the Total DoD

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/Light		Moderate		Moderate/Heavy		Heavy	
Gender										
Male	21.7	(0.6)	18.0	(0.5)	18.2	(0.6)	24.9	(0.5)	17.2	(0.9)
Female	37.4	(0.9)	28.2	(0.7)	17.6	(0.7)	12.7	(0.6)	4.1	(0.4)
Race/Ethnicity										
Caucasian, non-Hispanic	20.9	(0.8)	19.0	(0.5)	19.2	(0.6)	24.3	(0.6)	16.5	(0.9)
African American, non-Hispanic	33.3	(1.5)	17.0	(1.0)	14.9	(0.7)	23.4	(1.2)	11.5	(1.2)
Hispanic	23.8	(1.1)	22.7	(1.3)	16.8	(1.1)	18.4	(1.2)	18.3	(1.3)
Other	26.8	(1.5)	23.8	(1.4)	18.5	(1.6)	19.8	(1.4)	11.1	(1.2)
Education										
High school or less	20.7	(0.8)	17.1	(0.8)	16.1	(0.7)	21.7	(0.8)	24.3	(1.2)
Some college	24.7	(0.7)	19.8	(0.6)	17.6	(0.7)	23.8	(0.6)	14.2	(0.8)
College graduate or higher	26.4	(1.1)	21.8	(0.8)	22.0	(0.8)	24.2	(1.1)	5.6	(0.5)
Age										
20 or younger	27.0	(1.6)	19.4	(1.2)	14.2	(1.2)	15.2	(1.1)	24.2	(1.9)
21-25	16.2	(0.9)	17.5	(0.8)	18.0	(0.8)	22.8	(0.9)	25.6	(1.3)
26-34	24.0	(0.8)	20.1	(0.6)	18.4	(0.6)	26.3	(0.7)	11.3	(0.9)
35 or older	30.5	(0.7)	20.5	(0.7)	19.4	(0.8)	22.8	(0.7)	6.7	(0.6)
Family Status^a										
Not married	19.7	(0.8)	16.6	(0.6)	15.9	(0.6)	24.0	(0.7)	23.9	(1.2)
Married, spouse not present	21.0	(1.4)	16.1	(1.6)	18.9	(1.4)	25.5	(1.6)	18.5	(1.6)
Married, spouse present	27.3	(0.7)	21.9	(0.6)	19.7	(0.6)	22.4	(0.5)	8.8	(0.7)
Pay Grade										
E1-E3	21.9	(1.1)	18.0	(1.0)	15.7	(0.9)	18.5	(0.8)	25.9	(1.3)
E4-E6	23.1	(0.8)	19.3	(0.7)	17.3	(0.6)	23.7	(0.6)	16.6	(1.0)
E7-E9	30.2	(0.8)	18.3	(0.7)	18.2	(0.6)	25.3	(0.9)	8.1	(0.5)
W1-W5	24.8	(1.8)	21.3	(1.4)	19.1	(1.8)	28.3	(2.4)	6.5	(1.3)
O1-O3	23.9	(1.6)	21.5	(1.1)	21.6	(1.2)	25.7	(1.7)	7.3	(0.9)
O4-O10	24.4	(1.4)	22.6	(1.3)	25.8	(1.3)	25.0	(1.7)	2.2	(0.4)
Region										
CONUS ^b	25.3	(0.8)	19.9	(0.6)	17.9	(0.6)	22.5	(0.5)	14.3	(0.9)
OCONUS ^c	19.5	(0.9)	17.8	(0.9)	18.8	(0.7)	25.3	(0.9)	18.6	(1.9)
Total	23.8	(0.6)	19.4	(0.5)	18.1	(0.5)	23.2	(0.5)	15.4	(0.8)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Drinking Level, Q15-18 and 20-23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.12 Drinking Level, by Sociodemographic Characteristics, for the Army

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/Light		Moderate		Moderate/Heavy		Heavy	
Gender										
Male	19.5	(1.2)	17.7	(1.1)	17.3	(0.8)	26.0	(1.0)	19.4	(1.7)
Female	44.1	(1.6)	25.1	(1.3)	14.8	(0.9)	12.0	(0.8)	3.9	(0.6)
Race/Ethnicity										
Caucasian, non-Hispanic	18.3	(1.3)	18.0	(0.9)	18.2	(1.2)	25.7	(0.9)	19.7	(1.8)
African American, non-Hispanic	33.2	(2.4)	17.8	(1.6)	13.9	(1.0)	24.2	(1.8)	11.0	(1.3)
Hispanic	23.4	(1.5)	22.7	(2.0)	17.1	(1.9)	17.1	(2.0)	19.6	(2.3)
Other	24.9	(3.3)	22.6	(2.8)	17.0	(1.9)	21.3	(3.1)	14.2	(2.7)
Education										
High school or less	17.0	(1.1)	18.6	(1.7)	15.9	(0.9)	20.5	(1.6)	28.1	(2.0)
Some college	25.8	(1.7)	18.6	(1.2)	15.8	(1.0)	24.9	(1.0)	14.9	(1.4)
College graduate or higher	25.7	(1.8)	19.5	(1.4)	20.8	(1.7)	27.0	(1.6)	7.0	(0.8)
Age										
20 or younger	22.6	(2.6)	21.6	(2.3)	14.5	(1.9)	14.5	(2.0)	26.8	(3.8)
21-25	17.6	(1.6)	17.0	(1.7)	16.4	(1.3)	22.9	(1.6)	26.1	(2.3)
26-34	22.6	(1.5)	19.4	(1.1)	16.9	(0.9)	28.6	(1.0)	12.5	(1.4)
35 or older	31.2	(1.3)	18.9	(1.4)	19.1	(1.3)	24.0	(1.1)	6.8	(0.8)
Family Status^a										
Not married	19.5	(1.3)	17.0	(1.2)	14.7	(0.9)	22.2	(1.2)	26.7	(2.1)
Married, spouse not present	20.6	(1.7)	16.4	(2.2)	16.6	(2.0)	26.2	(2.1)	20.2	(2.8)
Married, spouse present	26.4	(1.4)	20.7	(1.2)	18.9	(0.8)	25.1	(1.0)	8.9	(1.0)
Pay Grade										
E1-E3	21.2	(1.4)	18.1	(2.2)	17.5	(1.6)	17.4	(1.3)	25.8	(2.1)
E4-E6	21.0	(1.5)	19.1	(1.4)	15.3	(1.1)	24.3	(1.4)	20.3	(1.8)
E7-E9	34.3	(1.4)	16.3	(1.0)	16.1	(0.8)	25.3	(1.8)	7.9	(0.8)
W1-W5	24.6	(2.2)	21.7	(1.6)	18.2	(1.9)	28.3	(2.9)	7.2	(1.6)
O1-O3	23.8	(2.5)	20.7	(1.6)	18.5	(2.2)	28.4	(3.0)	8.7	(1.7)
O4-O10	22.8	(3.1)	18.8	(2.3)	25.9	(2.4)	29.7	(3.1)	2.8	(0.7)
Region										
CONUS ^b	24.2	(1.7)	19.4	(1.2)	17.2	(0.9)	23.4	(0.9)	15.8	(1.6)
OCONUS ^c	19.6	(1.2)	17.0	(1.6)	16.2	(0.8)	25.7	(1.8)	21.4	(3.9)
Total	23.1	(1.3)	18.8	(1.0)	16.9	(0.7)	24.0	(0.8)	17.2	(1.6)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Drinking Level, Q15-18 and 20-23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.13 Drinking Level, by Sociodemographic Characteristics, for the Navy

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/Light		Moderate		Moderate/Heavy		Heavy	
Gender										
Male	22.8	(1.1)	18.0	(0.9)	18.7	(1.3)	25.7	(1.0)	14.7	(2.0)
Female	33.1	(2.0)	28.0	(1.1)	19.4	(1.4)	14.5	(0.7)	5.0	(0.7)
Race/Ethnicity										
Caucasian, non-Hispanic	21.9	(1.7)	19.0	(1.2)	19.9	(1.3)	25.9	(1.3)	13.2	(1.5)
African American, non-Hispanic	29.9	(3.1)	15.4	(2.2)	13.9	(2.0)	24.0	(2.4)	16.9	(4.1)
Hispanic	28.9	(3.3)	20.0	(2.9)	16.4	(2.5)	17.6	(2.3)	17.1	(3.4)
Other	26.2	(2.2)	26.2	(2.7)	21.1	(3.4)	20.0	(2.4)	6.4	(1.2)
Education										
High school or less	23.7	(1.8)	17.4	(1.4)	15.8	(1.5)	23.7	(1.4)	19.3	(2.4)
Some college	24.4	(1.2)	19.1	(1.1)	18.9	(1.8)	24.8	(1.3)	12.8	(1.7)
College graduate or higher	24.3	(1.8)	22.8	(1.9)	23.7	(1.1)	24.5	(2.3)	4.7	(0.9)
Age										
20 or younger	31.3	(3.7)	19.5	(2.2)	14.7	(2.8)	17.2	(3.0)	17.4	(2.9)
21-25	14.6	(1.7)	17.1	(1.8)	18.4	(1.8)	25.7	(2.0)	24.2	(3.2)
26-34	23.7	(1.7)	19.4	(1.3)	18.6	(1.2)	27.0	(1.4)	11.3	(2.0)
35 or older	30.8	(1.5)	20.8	(1.3)	20.1	(1.5)	21.3	(1.1)	7.0	(1.4)
Family Status^a										
Not married	20.8	(1.7)	16.4	(1.2)	16.0	(1.6)	27.8	(1.4)	19.1	(2.0)
Married, spouse not present	22.7	(4.8)	17.4	(4.4)	20.7	(3.4)	23.9	(4.6)	15.2	(3.1)
Married, spouse present	26.5	(1.3)	21.4	(1.1)	20.6	(1.6)	22.0	(0.9)	9.5	(1.9)
Pay Grade										
E1-E3	21.5	(2.7)	19.0	(2.2)	13.9	(1.6)	22.3	(2.0)	23.2	(2.8)
E4-E6	25.4	(1.5)	18.2	(1.3)	17.8	(1.2)	24.2	(1.2)	14.4	(2.1)
E7-E9	26.7	(1.1)	21.1	(1.5)	17.8	(1.4)	24.9	(1.7)	9.6	(1.0)
W1-W5	19.5	(4.1)	22.9	(5.5)	+ (+)		26.0	(7.2)	5.1	(2.6)
O1-O3	18.4	(2.2)	21.3	(2.4)	25.1	(1.8)	28.5	(3.7)	6.7	(1.4)
O4-O10	23.2	(2.1)	23.0	(1.8)	29.6	(2.1)	22.6	(1.6)	1.5	(0.6)
Region										
CONUS ^b	26.8	(1.2)	19.7	(1.2)	17.6	(1.4)	23.5	(1.1)	12.4	(2.3)
OCONUS ^c	18.3	(1.9)	18.3	(1.1)	21.4	(2.1)	26.2	(1.8)	15.8	(3.1)
Total	24.1	(1.0)	19.3	(0.9)	18.8	(1.2)	24.3	(1.0)	13.5	(1.8)

Note: Table entries are row percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aLow precision.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Drinking Level, Q15-18 and 20-23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.14 Drinking Level, by Sociodemographic Characteristics, for the Marine Corps

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/Light		Moderate		Moderate/Heavy		Heavy	
Gender										
Male	18.1	(0.8)	16.8	(0.8)	17.2	(1.2)	23.9	(1.1)	24.1	(2.1)
Female	35.1	(2.8)	29.6	(3.1)	19.0	(1.8)	10.5	(2.2)	5.9	(1.1)
Race/Ethnicity										
Caucasian, non-Hispanic	17.0	(1.1)	15.5	(1.1)	16.8	(1.3)	24.6	(0.9)	26.2	(2.3)
African American, non-Hispanic	31.0	(1.6)	18.4	(1.2)	17.3	(1.1)	21.6	(2.2)	11.7	(1.8)
Hispanic	16.7	(1.4)	23.0	(2.2)	19.0	(2.0)	20.0	(1.7)	21.3	(2.3)
Other	17.7	(3.0)	21.6	(2.9)	18.0	(2.4)	18.9	(2.5)	23.7	(3.5)
Education										
High school or less	18.5	(1.2)	15.2	(1.0)	16.4	(1.8)	21.2	(1.0)	28.6	(2.6)
Some college	20.1	(1.3)	20.6	(1.6)	16.5	(1.5)	23.2	(1.5)	19.6	(1.4)
College graduate or higher	18.7	(2.0)	18.2	(1.7)	23.1	(1.7)	30.7	(2.0)	9.3	(2.1)
Age										
20 or younger	23.0	(2.0)	16.5	(2.1)	12.9	(2.6)	18.9	(1.0)	28.8	(3.2)
21-25	11.9	(0.9)	15.1	(1.0)	17.7	(1.4)	22.4	(1.4)	33.0	(2.1)
26-34	23.0	(1.6)	21.9	(1.4)	18.1	(1.7)	24.9	(2.0)	12.1	(1.3)
35 or older	26.4	(1.4)	18.2	(1.3)	20.5	(0.9)	27.6	(2.0)	7.4	(1.4)
Family Status^a										
Not married	15.3	(1.2)	13.9	(1.1)	15.2	(1.6)	22.5	(1.2)	33.2	(2.7)
Married, spouse not present	16.0	(4.1)	19.4	(2.1)	17.8	(2.5)	26.8	(4.5)	19.9	(2.8)
Married, spouse present	23.8	(0.8)	21.3	(1.2)	19.6	(1.1)	23.4	(1.5)	11.9	(1.1)
Pay Grade										
E1-E3	18.3	(1.4)	15.6	(1.4)	13.6	(2.2)	19.9	(1.3)	32.6	(2.6)
E4-E6	18.3	(1.4)	19.1	(1.2)	18.1	(1.4)	22.2	(1.4)	22.3	(1.8)
E7-E9	27.8	(2.2)	15.7	(1.4)	19.3	(1.4)	28.8	(2.2)	8.4	(1.8)
W1-W5	30.7	(3.8)	17.9	(2.9)	17.4	(3.0)	30.2	(4.6)	3.9	(1.7)
O1-O3	15.7	(2.4)	16.3	(1.9)	23.5	(2.5)	32.1	(2.4)	12.4	(3.3)
O4-O10	17.7	(2.1)	21.1	(2.1)	25.5	(1.9)	33.0	(3.1)	2.7	(0.8)
Region										
CONUS ^b	19.9	(0.7)	18.0	(1.1)	17.2	(1.3)	23.4	(1.3)	21.5	(2.5)
OCONUS ^c	15.8	(2.6)	15.4	(0.7)	17.5	(2.3)	21.8	(1.6)	29.4	(2.7)
Total	19.1	(0.8)	17.5	(0.8)	17.3	(1.2)	23.1	(1.1)	23.0	(2.1)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Drinking Level, Q15-18 and 20-23); refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.15 Drinking Level, by Sociodemographic Characteristics, for the Air Force

Sociodemographic Characteristic	Drinking Level								
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy
Gender									
Male	25.0	(1.3)	18.9	(0.9)	19.4	(1.2)	23.2	(0.8)	13.4 (1.2)
Female	33.8	(1.2)	31.2	(1.3)	19.1	(1.4)	12.4	(1.2)	3.6 (0.6)
Race/Ethnicity									
Caucasian, non-Hispanic	24.1	(1.3)	21.3	(0.8)	20.5	(0.9)	21.6	(1.0)	12.5 (1.2)
African American, non-Hispanic	38.6	(2.6)	16.3	(1.9)	17.2	(1.6)	21.6	(2.4)	6.2 (1.6)
Hispanic	25.7	(2.4)	25.0	(3.1)	14.6	(1.9)	20.3	(3.0)	14.4 (2.1)
Other	32.8	(2.5)	22.6	(2.3)	16.8	(3.1)	18.4	(2.5)	9.4 (2.0)
Education									
High school or less	25.5	(2.3)	16.0	(1.6)	17.0	(1.2)	21.2	(1.7)	20.4 (1.5)
Some college	25.0	(1.1)	21.2	(0.9)	19.0	(1.3)	22.0	(0.9)	12.8 (1.3)
College graduate or higher	30.3	(2.3)	24.0	(1.2)	21.7	(1.4)	19.9	(1.8)	4.2 (1.0)
Age									
20 or younger	37.7	(4.2)	18.2	(2.2)	15.1	(2.0)	10.8	(2.2)	18.3 (2.0)
21-25	18.6	(2.0)	20.4	(1.1)	20.4	(1.3)	20.1	(1.5)	20.5 (2.5)
26-34	25.9	(1.5)	21.0	(1.1)	20.0	(1.4)	23.4	(1.1)	9.6 (1.4)
35 or older	30.6	(1.0)	22.3	(1.4)	19.0	(1.4)	22.0	(1.4)	6.2 (0.9)
Family Status^a									
Not married	21.4	(1.5)	17.9	(1.1)	18.1	(1.0)	23.6	(1.2)	19.0 (1.8)
Married, spouse not present	23.4	(2.2)	12.0	(2.1)	23.9	(2.3)	24.2	(2.6)	16.5 (2.5)
Married, spouse present	29.9	(1.3)	23.6	(0.8)	19.8	(1.3)	19.7	(1.0)	7.0 (0.6)
Pay Grade									
E1-E3	26.4	(2.9)	19.1	(1.5)	16.6	(1.3)	15.9	(1.6)	22.1 (1.5)
E4-E6	25.1	(1.3)	20.7	(1.1)	18.8	(1.1)	23.0	(0.9)	12.5 (1.4)
E7-E9	28.9	(1.5)	19.1	(1.3)	20.7	(1.1)	24.3	(1.4)	6.9 (1.2)
W1-W5	NA	(NA)	NA	(NA)	NA	(NA)	NA	(NA)	NA (NA)
O1-O3	30.3	(3.5)	23.6	(2.3)	21.6	(2.6)	19.2	(2.5)	5.2 (1.9)
O4-O10	28.0	(1.9)	26.3	(2.2)	23.2	(2.5)	20.3	(2.9)	2.1 (0.7)
Region									
CONUS ^b	28.1	(1.4)	21.7	(0.8)	19.4	(1.4)	20.1	(1.0)	10.8 (1.1)
OCONUS ^c	22.1	(1.8)	19.1	(2.5)	19.5	(0.8)	24.8	(1.7)	14.5 (2.7)
Total	26.6	(1.1)	21.1	(0.8)	19.4	(1.0)	21.3	(0.9)	11.7 (1.0)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable (there are no warrant officers in the Air Force).

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 (Drinking Level, Q15-18 and 20-23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.16 Heavy Alcohol Use, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	19.4 (1.7)	14.7 (2.0)	24.1 (2.1)	13.4 (1.2)	17.2 (0.9)
Female	3.9 (0.6)	5.0 (0.7)	5.9 (1.1)	3.6 (0.6)	4.1 (0.4)
Race/Ethnicity					
Caucasian, non-Hispanic	19.7 (1.8)	13.2 (1.5)	26.2 (2.3)	12.5 (1.2)	16.5 (0.9)
African American, non-Hispanic	11.0 (1.3)	16.9 (4.1)	11.7 (1.8)	6.2 (1.6)	11.5 (1.2)
Hispanic	19.6 (2.3)	17.1 (3.4)	21.3 (2.3)	14.4 (2.1)	18.3 (1.3)
Other	14.2 (2.7)	6.4 (1.2)	23.7 (3.5)	9.4 (2.0)	11.1 (1.2)
Education					
High school or less	28.1 (2.0)	19.3 (2.4)	28.6 (2.6)	20.4 (1.5)	24.3 (1.2)
Some college	14.9 (1.4)	12.8 (1.7)	19.6 (1.4)	12.8 (1.3)	14.2 (0.8)
College graduate or higher	7.0 (0.8)	4.7 (0.9)	9.3 (2.1)	4.2 (1.0)	5.6 (0.5)
Age					
20 or younger	26.8 (3.8)	17.4 (2.9)	28.8 (3.2)	18.3 (2.0)	24.2 (1.9)
21-25	26.1 (2.3)	24.2 (3.2)	33.0 (2.1)	20.5 (2.5)	25.6 (1.3)
26-34	12.5 (1.4)	11.3 (2.0)	12.1 (1.3)	9.6 (1.4)	11.3 (0.9)
35 or older	6.8 (0.8)	7.0 (1.4)	7.4 (1.4)	6.2 (0.9)	6.7 (0.6)
Family Status^a					
Not married	26.7 (2.1)	19.1 (2.0)	33.2 (2.7)	19.0 (1.8)	23.9 (1.2)
Married, spouse not present	20.2 (2.8)	15.2 (3.1)	19.9 (2.8)	16.5 (2.5)	18.5 (1.6)
Married, spouse present	8.9 (1.0)	9.5 (1.9)	11.9 (1.1)	7.0 (0.6)	8.8 (0.7)
Pay Grade					
E2-E3	25.8 (2.1)	23.2 (2.8)	32.6 (2.6)	22.1 (1.5)	25.9 (1.3)
E4-E6	20.3 (1.8)	14.4 (2.1)	22.3 (1.8)	12.5 (1.4)	16.6 (1.0)
E7-E9	7.9 (0.8)	9.6 (1.0)	8.4 (1.8)	6.9 (1.2)	8.1 (0.5)
W1-W4	7.2 (1.6)	5.1 (2.6)	3.9 (1.7)	NA (NA)	6.5 (1.3)
O1-O3	8.7 (1.7)	6.7 (1.4)	12.4 (3.3)	5.2 (1.9)	7.3 (0.9)
O4-O10	2.8 (0.7)	1.5 (0.6)	2.7 (0.8)	2.1 (0.7)	2.2 (0.4)
Region					
CONUS ^b	15.8 (1.6)	12.4 (2.3)	21.5 (2.5)	10.8 (1.1)	14.3 (0.9)
OCONUS ^c	21.4 (3.9)	15.8 (3.1)	29.4 (2.7)	14.5 (2.7)	18.6 (1.9)
Total	17.2 (1.6)	13.5 (1.8)	23.0 (2.1)	11.7 (1.0)	15.4 (0.8)

Note: Table entries are percentages (with standard errors in parentheses). Definitions and measures of substance use are given in Section 2.5.3.

NA = Not applicable.

^aEstimates by family status in 1998 are not strictly comparable to those from other survey years. In 1998, personnel who reported that they were living as married were classified in the "not married" group. In prior years, the marital status questions did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behavior Among Military Personnel, 1998 (Heavy Alcohol Use, Q15-18 and 20-23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.17 Trends in Drinking Levels Based on Two Estimation Procedures for the Total DoD, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	13.4 (0.6)	17.2 (0.4)	20.4 (0.8)	21.1 (0.5)	24.3 (0.6)
Procedure B ^b	13.3 (0.6)	17.2 (0.4)	20.0 (0.8)	20.7 (0.5)	23.8 (0.6)
Infrequent/Light					
Procedure A ^a	16.6 (0.7)	17.6 (0.5)	18.9 (0.5)	18.6 (0.6)	19.7 (0.5)
Procedure B ^b	16.5 (0.7)	17.5 (0.5)	18.5 (0.4)	18.5 (0.6)	19.4 (0.5)
Moderate					
Procedure A ^a	18.6 (0.6)	19.5 (0.5)	19.6 (0.5)	18.9 (0.5)	18.2 (0.5)
Procedure B ^b	18.7 (0.6)	19.4 (0.5)	19.6 (0.5)	19.0 (0.5)	18.1 (0.5)
Moderate/Heavy					
Procedure A ^a	28.5 (0.8)	28.7 (0.7)	26.0 (0.6)	24.2 (0.6)	22.8 (0.4)
Procedure B ^b	28.5 (0.8)	28.8 (0.7)	26.3 (0.6)	24.5 (0.6)	23.2 (0.5)
Heavy					
Procedure A ^a	22.9 (1.1)	17.0 (0.9)	15.1 (0.7)	17.1 (0.8)	15.0 (0.8)
Procedure B ^b	23.0 (1.1)	17.2 (0.9)	15.5 (0.8)	17.4 (0.9)	15.4 (0.8)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table D.18 Trends in Drinking Levels Based on Two Estimation Procedures for the Army, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	14.9 (0.7)	17.1 (0.7)	21.8 (1.4)	21.1 (1.0)	23.7 (1.3)
Procedure B ^b	14.6 (0.7)	17.0 (0.7)	21.4 (1.4)	20.6 (1.0)	23.1 (1.3)
Infrequent/Light					
Procedure A ^a	16.6 (1.1)	17.0 (0.9)	17.7 (0.6)	18.1 (1.4)	19.5 (1.1)
Procedure B ^b	16.4 (1.1)	16.8 (0.9)	17.2 (0.6)	18.0 (1.4)	18.8 (1.0)
Moderate					
Procedure A ^a	17.6 (0.7)	19.5 (0.8)	17.3 (0.8)	18.1 (0.9)	17.0 (0.7)
Procedure B ^b	17.8 (0.7)	19.5 (0.7)	17.3 (0.8)	18.0 (1.0)	16.9 (0.7)
Moderate/Heavy					
Procedure A ^a	25.6 (1.8)	27.0 (0.8)	26.1 (1.4)	24.7 (1.0)	23.4 (0.8)
Procedure B ^b	25.7 (1.8)	27.1 (0.8)	26.5 (1.4)	25.0 (1.1)	24.0 (0.8)
Heavy					
Procedure A ^a	25.2 (2.2)	19.4 (1.1)	17.1 (1.5)	18.0 (1.8)	16.5 (1.5)
Procedure B ^b	25.5 (2.2)	19.7 (1.2)	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table D.19 Trends in Drinking Levels Based on Two Estimation Procedures for the Navy, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	9.6 (0.8)	15.7 (0.6)	19.9 (2.1)	19.4 (0.9)	24.4 (1.0)
Procedure B ^b	9.6 (0.8)	15.7 (0.6)	19.6 (1.9)	19.0 (0.9)	24.1 (1.0)
Infrequent/Light					
Procedure A ^a	18.8 (2.0)	18.3 (0.9)	19.1 (1.1)	19.0 (1.1)	19.5 (0.9)
Procedure B ^b	18.8 (2.0)	18.2 (0.9)	18.6 (0.9)	18.7 (1.1)	19.3 (0.9)
Moderate					
Procedure A ^a	18.7 (1.1)	20.8 (1.2)	20.2 (1.2)	19.0 (1.0)	19.0 (1.1)
Procedure B ^b	18.7 (1.0)	20.7 (1.2)	20.2 (1.2)	19.2 (0.9)	18.8 (1.2)
Moderate/Heavy					
Procedure A ^a	27.9 (1.4)	30.6 (1.5)	27.0 (0.7)	23.8 (1.6)	24.0 (0.9)
Procedure B ^b	27.9 (1.4)	30.7 (1.5)	27.4 (0.7)	24.0 (1.6)	24.3 (1.0)
Heavy					
Procedure A ^a	24.9 (1.4)	14.6 (2.0)	13.8 (1.4)	18.8 (1.4)	13.2 (1.7)
Procedure B ^b	25.0 (1.4)	14.7 (2.0)	14.2 (1.7)	19.1 (1.5)	13.5 (1.8)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table D.20 Trends in Drinking Levels Based on Two Estimation Procedures for the Marine Corps, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	10.8 (2.5)	18.0 (0.9)	15.0 (0.6)	16.9 (0.7)	19.7 (0.9)
Procedure B ^b	10.8 (2.5)	18.0 (0.9)	14.6 (0.5)	16.4 (0.7)	19.1 (0.8)
Infrequent/Light					
Procedure A ^a	13.6 (1.7)	16.1 (2.9)	15.4 (1.2)	14.2 (0.6)	17.8 (0.9)
Procedure B ^b	13.6 (1.7)	16.1 (2.9)	14.4 (1.2)	13.9 (0.7)	17.5 (0.8)
Moderate					
Procedure A ^a	15.1 (2.1)	14.0 (1.0)	19.2 (1.4)	17.4 (1.1)	17.3 (1.2)
Procedure B ^b	15.1 (2.1)	13.9 (1.0)	19.5 (1.5)	17.2 (1.1)	17.3 (1.2)
Moderate/Heavy					
Procedure A ^a	31.1 (1.8)	27.8 (1.6)	25.1 (1.9)	23.6 (1.0)	22.7 (1.0)
Procedure B ^b	31.1 (1.8)	27.6 (1.9)	25.4 (1.9)	24.0 (0.9)	23.1 (1.1)
Heavy					
Procedure A ^a	29.4 (3.7)	24.1 (3.9)	25.3 (1.3)	27.8 (2.4)	22.4 (2.0)
Procedure B ^b	29.4 (3.7)	24.4 (4.2)	26.0 (1.3)	28.6 (2.5)	23.0 (2.1)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table D.21 Trends in Drinking Levels Based on Two Estimation Procedures for the Air Force, 1985-1998

Drinking Level/ Procedure	Year				
	1985	1988	1992	1995	1998
Abstainer					
Procedure A ^a	15.8 (1.0)	18.5 (0.8)	21.3 (0.9)	24.4 (0.9)	27.0 (1.2)
Procedure B ^b	15.6 (1.0)	18.4 (0.8)	21.1 (0.8)	24.2 (0.9)	26.6 (1.1)
Infrequent/Light					
Procedure A ^a	15.4 (0.8)	18.2 (0.8)	21.3 (0.9)	20.5 (0.9)	21.1 (0.8)
Procedure B ^b	15.4 (0.8)	18.1 (0.8)	21.3 (0.9)	20.5 (0.9)	21.1 (0.8)
Moderate					
Procedure A ^a	20.8 (1.2)	19.8 (0.8)	21.5 (0.8)	20.5 (0.7)	19.3 (1.0)
Procedure B ^b	20.9 (1.2)	19.7 (0.8)	21.5 (0.7)	20.5 (0.7)	19.4 (1.0)
Moderate/Heavy					
Procedure A ^a	31.5 (1.1)	29.1 (1.1)	25.4 (0.9)	24.3 (1.0)	21.0 (0.9)
Procedure B ^b	31.5 (1.2)	29.2 (1.1)	25.4 (0.8)	24.5 (1.0)	21.3 (0.9)
Heavy					
Procedure A ^a	16.4 (1.4)	14.4 (1.0)	10.5 (0.8)	10.3 (1.1)	11.6 (1.1)
Procedure B ^b	16.5 (1.4)	14.5 (1.0)	10.6 (0.8)	10.4 (1.1)	11.7 (1.0)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Drinking Level, Q15-18 and 20-23).

Table D.22 Trends in Average Daily Ounces of Ethanol Consumed Based on Two Estimation Procedures, 1985-1998

Service/ Average Ounces	Year				
	1985	1988	1992	1995	1998
Total DoD					
Procedure A ^a	1.22 (0.06)	0.90 (0.03)	0.75 (0.04)	0.83 (0.04)	0.72 (0.02)
Procedure B ^b	1.24 (0.06)	0.92 (0.03)	0.79 (0.04)	0.87 (0.04)	0.79 (0.04)
Army					
Procedure A ^a	1.38 (0.12)	1.09 (0.06)	0.83 (0.06)	0.92 (0.07)	0.84 (0.06)
Procedure B ^b	1.42 (0.13)	1.12 (0.06)	0.90 (0.06)	0.98 (0.07)	0.94 (0.07)
Navy					
Procedure A ^a	1.33 (0.10)	0.86 (0.07)	0.80 (0.10)	0.91 (0.08)	0.66 (0.06)
Procedure B ^b	1.34 (0.10)	0.88 (0.08)	0.85 (0.11)	0.93 (0.08)	0.70 (0.07)
Marine Corps					
Procedure A ^a	1.47 (0.22)	1.16 (0.12)	1.00 (0.06)	1.11 (0.07)	1.00 (0.11)
Procedure B ^b	1.49 (0.23)	1.20 (0.11)	1.04 (0.06)	1.19 (0.07)	1.08 (0.11)
Air Force					
Procedure A ^a	0.86 (0.07)	0.65 (0.03)	0.52 (0.03)	0.53 (0.04)	0.52 (0.04)
Procedure B ^b	0.87 (0.07)	0.66 (0.03)	0.52 (0.03)	0.54 (0.04)	0.54 (0.04)

Note: Estimates are percentages (with standard errors in parentheses).

^aBased on procedure used in the 1980 and 1982 surveys. Does not take into account reports of typical consumption of beer in 32-ounce or liter containers or 40-ounce containers. Response category for typical consumption of beer in 32-ounce or liter containers and 40-ounce containers was not included in the 1980 and 1982 surveys.

^bTakes into account reports of typical consumption of beer in 32-ounce or liter containers for 1985 to 1995 and 32-ounce and 40-ounce containers for 1998. Response category for typical consumption of beer in 32-ounce or liter containers was included beginning with the 1985 survey, and response category for 40-ounce containers was included in the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 1998 (1998 Questions: Average Daily Ounces of Ethanol, Q15-23 and 28-30).

APPENDIX E
CALCULATION OF ALCOHOL
SUMMARY MEASURES

APPENDIX E

CALCULATION OF ALCOHOL SUMMARY MEASURES

This appendix provides details about the construction of two summary measures of alcohol use that we use throughout this report. Both of these measures combine information on quantity and frequency of alcohol consumption across three types of beverages: beer, wine, and liquor. We first describe the drinking-level classification measure and then the average daily ounces of ethanol index.

E.1 Drinking-Level Classification Measure

The drinking-level classification scheme was adapted from Mulford and Miller (1960; also see Rachal et al., 1980; Rachal, Hubbard, Williams, & Tuchfeld, 1976) and used previously in the 1982, 1985, 1988, 1992, and 1995 DoD surveys (Bray et al., 1983, 1986, 1988, 1992, 1995). The classification scheme used (a) the "quantity per typical drinking occasion" and (b) the "frequency of drinking" for the type of beverage (beer, wine, or liquor) with the largest amount of absolute alcohol consumed per day to fit individuals into 1 of the 10 categories resulting from all combinations of quantity and frequency of consumption.¹ The 10 categories describe whether individuals abstained, drank once a month, three to four times a month, or at least once a week and whether small, medium, or large amounts of alcohol were drunk during a typical drinking occasion.

The second step in forming the classification scheme was to combine the 10 quantity/frequency categories into five drinking levels: abstainers, infrequent/light drinkers, moderate drinkers, moderate/heavy drinkers, and heavy drinkers. The resulting five drinking levels and their definitions are presented in Table E.1.

E.2 Average Daily Ounces of Ethanol Index

The average daily ethanol consumption index used in this study combines measures of both the typical drinking pattern of an individual over the past 30 days and any episodes of heavier consumption during the past year. For all respondents, we

¹Calculations to identify the beverage with the largest amount of absolute alcohol consumed per day in the past 30 days were changed slightly compared with how this measure was calculated in earlier surveys. Prior to the 1985 survey, calculations for beer were based on reported consumption of beer only in 8-, 12-, 16-ounce containers. For the 1985 and subsequent data, the algorithm for calculating the drinking-level index was modified slightly to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995 surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. Thus, the trend data presented for drinking levels show slightly different estimates from those present in prior reports. Tables D.17 through D.22 compare estimates for the drinking levels depending on whether the larger beer containers were included in or excluded from the calculations.

Table E.1 Drinking-Level Classification Scheme

Drinking-Level Groups	Definition
Abstainer	Drinks once a year or less
Infrequent/Light Drinker	Drinks 1-4 drinks per typical drinking occasion 1-3 times per month
Moderate Drinker	Drinks 1 drink per typical drinking occasion at least once a week, <i>or</i> 2-4 drinks per typical drinking occasion 2-3 times per month <i>or</i> 5 or more drinks per typical drinking occasion once a month or less
Moderate/Heavy Drinker	Drinks 2-4 drinks per typical drinking occasion at least once a week <i>or</i> 5 or more drinks per typical drinking occasion 2-3 times per month
Heavy Drinker	Drinks 5 or more drinks per typical drinking occasion at least once a week

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel (Q15-18 and 20-23).

computed daily volume separately for beer, wine, and hard liquor, using parallel procedures. The first step in these calculations was to determine the frequency with which respondents consumed each beverage during the past 30 days (Questions 15, 18, and 21). We computed each frequency in terms of the daily probability of consuming the given beverage. The response alternatives and corresponding frequency codes are listed in Table E.2.

The second step in computing the daily volume resulting from typical drinking days was to determine the typical quantity (Q_n) of each beverage that respondents consumed during the past 30 days, on days when they consumed the given beverage (Questions 17, 20, and 23). For quantities up through eight beers, glasses of wine, or drinks of liquor, the code we used was the exact number that the respondent indicated on Questions 17, 20, and 23.

For larger quantities of each beverage for which the answer was a range, the value we used was the midpoint of the range (e.g., we coded 9 to 11 beers as 10). The codes we used for the highest quantity were 22 beers, 15 glasses (for wine), and 22 drinks (for liquor). We specified the size of a glass of wine as 4 ounces (standard wine glass). We employed two additional questionnaire items to account for variations in the size of beer containers (Question 16) and strength of drinks containing liquor (Question 22). Respondents indicated the size can or bottle of beer they usually drank (Question 16), with

Table E.2 Frequency Codes for Typical Drinking Days

Response Alternative^a	Frequency Code (F)	Method of Calculation
28-30 Days (About Every Day)	0.967	29/30
20-27 Days (5-6 Days a Week, Average)	0.786	5.5/7
11-19 Days (3-4 Days a Week, Average)	0.500	3.5/7
4-10 Days (1-2 Days a Week, Average)	0.214	1.5/7
2-3 Days in the Past 30 Days	0.083	2.5/30
Once in the Past 30 Days	0.033	1/30
Didn't Drink Any Beer/Wine/Liquor in the Past 30 Days	0.000	0/30

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

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel (Q15, 18, and 21).

alternatives of 8-, 12-, 16-, 32- or 40-ounce containers,² and the number of ounces of liquor in their average drink (Question 22), with alternatives of 1, 1.5, 2, 3, 4, and 5 or more (coded as 5) ounces.

Using the measures described in the preceding paragraph, we determined typical quantities for beer and liquor by multiplying (a) the number of cans or drinks typically consumed by (b) the number of ounces of the given beverage they contained. Because we used the standard 4-ounce size for wineglasses, the typical quantity for wine was simply four times the number of glasses consumed on a typical day when the respondent drank wine. Once we had determined the typical quantity for each beverage, we multiplied it by the code for the frequency of drinking that beverage. The resulting product constituted a measure of the average 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. We made the transformations by weighting ounces of beer by 0.04, wine by 0.12, and liquor by 0.43.

²As for the drinking-level index, the algorithm for calculating the ethanol index was modified slightly in 1998 to take into account information about consumption of beer in 32-ounce containers in the 1985 to 1995 surveys and consumption of beer in 32- and 40-ounce containers in the 1998 survey. Thus, the trend data presented for average ounces of ethanol show slightly different estimates from those present in prior reports. Tables D.17 through D.22 compare estimates depending on whether the larger beer containers were taken into account in calculating the ethanol index.

We determined these weights by using the standard alcohol content (by volume) of the three beverages. There was one exception to this weighting procedure. Because individuals consuming large quantities of wine on a regular basis may typically drink a "fortified" wine with a higher alcohol content than regular "table" wine, we included a question to measure the type of wine usually consumed by the respondent during the past 30 days (i.e., regular or fortified; see Question 19). If the respondent indicated fortified wine, the weight we used for ethanol content was 0.18 (rather than 0.12).

The procedures described above measure daily ethanol volume resulting from the individual's typical drinking days. Many people who drink also experience "atypical" days during which they consume larger quantities of alcohol than what they usually consume. 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. As the quantity of alcohol consumed or the number of atypical days becomes larger, however, these episodes of heavier drinking can have a considerable impact on the individual's mean daily volume. Moreover, estimates of mean daily volume in the total population will be incomplete if they ignore the episodic heavier consumption of such individuals.

In light of the importance of accounting for the volume of alcohol consumed on atypical days, we also measured the frequency of consuming eight or more cans, glasses, or drinks of beer, wine, or liquor in the past year (Questions 28, 29, and 30). Because the intention was to measure episodic behavior, the frequency questions pertained to the past year (rather than the past 30 days, the time period used to measure typical consumption). We coded the quantity of ethanol consumed on such atypical drinking days as 5 ounces (i.e., 10 cans, glasses, or drinks, each containing 0.5 ounce of ethanol). The response alternatives and corresponding frequency codes for these questions are listed in Table E.3. The sum of these three frequency codes (beer, wine, and liquor) constitutes the measure of the "frequency of heavy drinking" (i.e., days of atypical high consumption).

We combined the volumes resulting from typical and atypical consumption days in a straightforward manner. For each beverage, we estimated the number of days during the past year on which the beverage was consumed by multiplying the likelihood of consuming it on a given day (F) by 365. We then partitioned this number into the number of days on which atypical high consumption occurred, (D), according to the frequency codes in Table E.3, and the number of typical days, $365 \times F$, minus the number of atypical days. If the respondent typically consumed 8 or more drinks of the given beverage (i.e., had a Q_n greater than or equal to 5), the number of atypical days for that beverage was 0. If the number of atypical days was greater than or equal to the number of typical days, we set the term $(365 \times F - D)$ to 0. We then multiplied each number of days by the ounces of ethanol consumed on such days (i.e., 5 for atypical days and the typical quantity Q_n for

Table E.3 Frequency Codes for Atypical High-Consumption Days

Response Alternative^a	Frequency Code (D)	Method of Calculation
About Every Day	338	6.5 X 52
5-6 Days a Week	286	5.5 X 52
3-4 Days a Week	182	3.5 X 52
1-2 Days a Week	78	1.5 X 52
2-3 Days a Month	30	2.5 X 12
About Once a Month	12	12
7-11 Days in the Past 12 Months	9	9
3-6 Days in the Past 12 Months	4.5	4.5
Once or Twice in the Past 12 Months	1.5	1.5
Never in the Past 12 Months	0	0

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

Source: 1998 DoD Survey of Health Related Behaviors Among Military Personnel (Q28-30).

typical days). We summed these products and then divided by 365. The resulting composite estimates refer to daily volume for the given beverage. The formula may be written as

$$A_{QnF} = \frac{5D + Qn (365 \times F - D)}{365}$$

where

A_{QnF} = average daily volume of ethanol consumed in the form of the given beverage,

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

Qn = volume of ethanol consumed on typical drinking days for the given beverage, and

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

We then summed the composite volume measures for the three beverages to equal the total average daily volume measure. In so doing, we applied the following constraints: (a) we did not compute the composite and total volume measures for individuals for whom we could not calculate any typical beverage-specific volume, and (b) the maximum value we permitted for the composite and total volume measures was 30 ounces of ethanol per day.

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APPENDIX F

**TECHNICAL DISCUSSION OF STANDARDIZATION
APPROACH AND MULTIVARIATE ANALYSES**

APPENDIX F

TECHNICAL DISCUSSION OF STANDARDIZATION APPROACH AND MULTIVARIATE ANALYSES

In this appendix, we present technical details of the standardization procedures and multivariate analyses described in chapters of the report. We first describe our approach to standardization and follow this with a discussion of logistic regression.

F.1 Standardization Approaches

An important part of many analyses is the assessment of differences between two or more groups with respect to a population characteristic. For instance, in this report we have compared substance use between Services, between the Military and the civilian population, and between the Military in 1998 and the Military in prior survey years. When estimating such differences, however, it is often necessary or informative to take into account other confounding factors that are not of interest themselves but that could cloud the effect being studied. For example, we expected substance use to vary by demographic characteristics, such as age, race/ethnicity, gender, marital status, and education, and we expected to see differences in the distributions of some or all of these variables in the various groups we compared in this report.

Standardization is a technique commonly used to control for important differences (such as demographic characteristics) between groups that are related to the outcome in question (Kalton, 1968; Konijn, 1973). The standardized estimate (or adjusted mean) can be interpreted as the estimate that would have been obtained had the population had the distribution of the standardizing variables, all other things being equal (Little, 1982).

We used the technique of direct standardization for the standardized comparisons presented in this report (Kalton, 1968). With direct standardization, cells defined by the complete cross-classification of the standardizing variables are formed. Then the cell means are weighted by the proportions in the standardizing population. Direct standardization requires separate cell estimates for the complete cross-classification of all of the confounding and study variables. Although this requirement can limit the number of confounding variables that can be controlled (i.e., due to small sample sizes in each cell of the cross-classification), our sample sizes in 1998 permitted use of this approach. In particular, the oversampling of women in 1998 resulted in adequate cell sizes formed by the cross-tabulation of gender with other variables.

We used SUDAAN (SURvey DATA ANalysis) software developed at Research Triangle Institute for direct standardizations in this report (Shah, Barnwell, & Bieler,

1997). In particular, we used SUDAAN's DESCRIPT procedure that provides sample design-based estimates of the standard errors of the standardized and unstandardized estimates. We calculated *t* tests to assess the statistical significance of the differences between comparison groups (e.g., military and civilian populations, Services).

F.1.1 Demographic Variables Included in Standardizations

We considered the following demographic characteristics for standardization variables: age, race/ethnicity, gender, educational attainment, and marital status. It should be noted that we did not use the same set of demographic variables in all of the standardized comparisons presented in this report. To have an effect on the standardized estimates or differences, the distribution of the potential confounding variable in question must differ in the two populations, and the outcome variable also must vary by the levels of the confounding variable. For example, if the racial/ethnic composition of the Military in 1998 was very similar to that found in prior years, then it makes no difference in the estimate if race/ethnicity is or is not included as a standardizing variable in an analysis of trends. Similarly, if the estimates of the outcome variable are similar for men and women, for example, then it makes no difference in the standardized estimate if gender is included.

Including the same set of demographic variables in every standardization that we did for this report would have been ideal for the sake of consistency. Including extra variables, however, also may increase the variance of the estimate without appreciably changing the estimate. As discussed above, if two populations do not differ appreciably with respect to some characteristic (e.g., race/ethnicity), or if the outcome of interest does not differ appreciably according to a particular demographic characteristic, then including these variables would add little to the standardized comparison. Further, incorporating additional variables increases the number of standardizing cells, and this decreases the sample size in each cell.

F.1.2 Standardized Comparisons in This Report

Standardization of the 1982 through 1998 DoD Distributions to the 1980 Distribution. In examining trends in substance use that took into account demographic changes in the Military since 1980, we standardized the 1998 DoD survey data (and the 1995, 1992, 1988, 1985, and 1982 data) to the 1980 population distribution of Service, age, education, and marital status. In this case, the 1980 population was considered the "control" population or baseline for adjusting the age, education, and marital status characteristics of the other populations. Prior examination of demographic changes in the Military indicated that age, education, and marital status were the characteristics that exhibited the greatest change since 1980 (Bray, Kroutil, & Marsden, 1995).

For each measure (proportion of illicit drug users, proportion of smokers, ounces of ethanol, etc.), we first calculated the estimate of 1998 use for each of the standardizing cells formed by the cross-tabulation of Service, age, education, and marital status. We then weighted these estimates by the estimated proportion of the 1980 military population that fell into each cell. Hence, the 1998 data were standardized to the joint population distribution in 1980 of the standardizing variables, and the standardized estimate was an estimate of what illicit drug use, smoking, and so on might be in 1998 if the 1998 military population were younger, had a lower level of education, and were less likely to be married, as in 1980. We did not include gender and race/ethnicity in this standardization. Although the proportion of women in the Military increased from approximately 9% in 1980 to 14% in 1998 (Table 2.4), these increases were not large ones, and the military population in the 1990s continued to be predominantly male. Similarly, 19% of the military population in 1980 was non-Hispanic African American (Bray et al., 1995) compared with 18% in 1998 (Table 2.4). These data suggest that the inclusion or exclusion of these variables would have had little effect on the standardized estimates.

Standardization of Services to the DoD Distribution for Service-Level Comparisons of Substance Use in 1998. Examination of the descriptive statistics of substance use by demographics indicates that there were differences in rates of use among the Services and also among demographic groups. Further, the demographic distributions of age, race/ethnicity, gender, education, and family status differed by Service. For this reason, we chose to compare Service-specific estimates after standardizing to the total DoD distribution of these five demographic characteristics. The oversampling of women and Marine Corps personnel in 1998 permitted use of the direct standardization approach. Sample sizes were sufficiently large to produce stable estimates, with standardizing cells formed by the cross of gender, age, race/ethnicity, educational attainment, and marital status.

Standardization of Civilian Data to the Military Distribution. We compared data on substance use from the 1997 National Household Survey on Drug Abuse (NHSDA) with that from the 1998 military population (Office of Applied Studies, in press). For this analysis, we compared rates of substance use in the military and civilian populations by standardizing the civilian data to match the military population. For comparability, we restricted the NHSDA dataset to persons between the ages of 18 and 55 who were not currently on active duty in the Military, and we restricted the military data to persons between the ages of 18 and 55 who were stationed in the United States (including Alaska and Hawaii) but were not deployed at sea at the time of data collection. Sample sizes were large enough to permit us to use direct standardization, with standardizing cells formed by the cross of gender, age, race/ethnicity, educational attainment, and marital status.

F.2 Multivariate Regression Analyses

For Chapters 4, 5, and 6, we conducted multivariate logistic regression analyses to examine the independent relationships between different demographic characteristics and heavy alcohol use, illicit drug use, and cigarette smoking, respectively. We used logistic regression to model binary dependent measures (e.g., illicit drug use vs. no illicit drug use). Multiple logistic regression expresses the natural logarithm of the individual's odds (i.e., $\ln[p/1-p]$) of exhibiting the outcome behavior as a linear function of the independent variables.

There are several reasons for using logistic regression instead of ordinary least squares regression for binary variables:

- it assumes a more reasonable nonlinear relationship between the independent variables and the probability of the outcome;
- it does not permit negative predicted probabilities; and
- it makes the proper assumption that the error has a binomial rather than a normal distribution. (Note, however, that the methods used by the SUDAAN linear regression procedure do not depend on homoscedasticity.)

In its natural form, the parameters of a logistic regression model indicate the change in the log odds due to a one-unit change in the independent variable. When the independent variable is a 0,1 indicator variable (e.g., no illicit drug use = 0; any illicit drug use = 1), the regression parameter indicates the difference in the log odds between the category coded 1 and the category coded 0 for that independent variable. An estimated parameter that is not significantly different from 0 indicates that the associated independent variable is not associated with the probability of the outcome occurring; a significant negative estimated regression parameter indicates a negative relationship with the outcome probability; and a significant positive estimated regression indicates a positive relationship with the outcome probability.

It is easier to interpret the parameters of a logistic regression model if the original parameters are exponentiated (i.e., $\exp(B)$) because the exponentiated parameters indicate the relative change in the odds for each unit increase in the associated independent variable. For a 0,1 indicator variable, the transformed parameter indicates the ratio of the odds of the outcome occurring for the category coded 1 to the odds of the outcome occurring for the category coded 0.

As discussed above, we fitted separate logistic regression models for heavy alcohol use in the past 30 days, any illicit drug use in the past 12 months, and cigarette smoking in

the past 30 days. For each of the models, we modeled the outcome variable as a function of the following demographic variables: Service, gender, race/ethnicity, education, age, family status (i.e., marital status and presence/absence of spouse if married), pay grade, and region (i.e., stationed within the continental United States [CONUS] or outside the continental United States [OCONUS]).

We used the SUDAAN regression procedure LOGIST (discussed in Appendix B) for estimating the parameters, preparing the variance-covariance matrix, and performing statistical tests about the parameters. The results of the logistic regression analyses were expressed as odds ratios, or the odds of a comparison group (e.g., Army personnel) having the outcome of interest (e.g., heavy alcohol use), relative to the odds for the reference group (e.g., Air Force personnel). The odds ratios of the reference groups were expressed as 1.00. Odds ratios greater than 1.00 indicate a greater likelihood of the comparison group exhibiting the outcome of interest (e.g., heavy alcohol use) relative to the reference group. Odds ratios less than 1.00 indicate a lower likelihood of the comparison group exhibiting the outcome of interest.

We also show 95% confidence intervals for the odds ratios based on these logistic regression analyses. If the odds of a person being a heavy alcohol user, illicit drug user, or smoker in a comparison group (e.g., Army, Navy, or Marine Corps) were significantly different from the odds of a person in the reference group having this outcome, then the odds ratio of the comparison group to the reference group (e.g., Army vs. Air Force) was significantly different from 1.00. An odds ratio that is significantly different from 1.00 is indicated by a 95% confidence interval that does not include 1.00 in the interval.

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APPENDIX G

DoD's SURVEY LIAISON OFFICERS

1998 DoD Survey Liaison Officers

ARMY LTC Shirley Newcomb (HLO)	NAVY LT Tim Williams (HLO)
MAJ Lynn Conners MAJ Richard Edwards LTC Brian Feighner 1LT Ethan Ford MAJ Janice Fulton Ms. Pat Inglett Mr. Charles Kennedy Ms. Anita Kolb CPT Mack David Lacey MAJ Dave Mitchell CPT Scott Mower LTC Craig Ono Ms. Joyce Patrick LTC Bruno Petruccelli 1LT Stephan Porter SFC Lance Tomiczek	LT Barry Adams LT David Collins CDR Christine Edwards Ms. Linda Fentress SCPO Madge Houghton LCDR Ally Hutto LT Ralph Jesse LCDR Larue, MD LT Rob Metz LT Kari Mills LT John Payne MCPO Gary Schiffert LT Tracey Swanson
MARINE CORPS Terrance Zline (HLO)	AIR FORCE LTC James Fraser (HLO)
MAJ B.L. Barnes 1LT Linwood Bridgeforth Mr. David Forkenbrock MAJ Carlos Kizzee Mr. George Mangual LTC Dave Reintjes MAJ Mark Roberts MAJ Michael Spartonos	TSGT Breuer 2LT Scott Clark LTC Edward Cotton LTC Lou Daniels MSGT Donna Ferguson MAJ Sandra Gatewood CAPT Alina Khalife CAPT James King CAPT Joseph Narrigan MAJ Sherry Sasser CAPT Lisa Schmidt CAPT Naomi Strano MAJ Susan Weddle

Note: Names below each Service are the Military Liaison Officers who coordinated data collection field operations at participating installations.

HLO = Headquarters Liaison Officer.

APPENDIX H

1998 DOD SURVEY QUESTIONNAIRE



1998 DEPARTMENT OF DEFENSE SURVEY OF HEALTH RELATED BEHAVIORS AMONG MILITARY PERSONNEL

RCS # DD-HA(AR)1785

HEALTH AFFAIRS

INTRODUCTION

Who are we? We are from Research Triangle Institute, a not-for-profit research company under contract to the Assistant Secretary of Defense—Health Affairs.

How were you selected? You were randomly selected to participate in this important research survey.

Must you participate? Your participation in this survey is voluntary. We encourage you to answer all of the questions honestly, but you are not required to answer any question to which you object.

What are the questions about? Mainly about alcohol, tobacco, and drug use. Additional questions ask about health attitudes and behavior, such as questions on stress, exercise, high blood pressure, and sexual behavior. We also ask some questions about gambling.

Who will see your answers? Only civilian researchers. No military personnel will see your answers. Your answers will be combined with those from other military personnel to prepare a statistical report. This questionnaire will be anonymous if you **DO NOT WRITE YOUR NAME OR SOCIAL SECURITY NUMBER ANYWHERE ON THIS BOOKLET.**

INSTRUCTIONS FOR COMPLETING THE QUESTIONNAIRE

- Most questions provide a set of answers. Read all the printed answers before marking your choice. If **none** of the printed answers exactly applies to you, mark the circle for the one answer that **best** fits your situation.

- Use only the pencil you were given.
 - Make heavy black marks that **fill** the circle for your answer.
- CORRECT MARK**

INCORRECT MARKS
- Erase **cleanly** any answer you wish to change.
 - Do not make stray marks of any kind anywhere in this booklet.
 - For many questions, you should mark only **one** circle for your answer in the column below the question, as shown here:

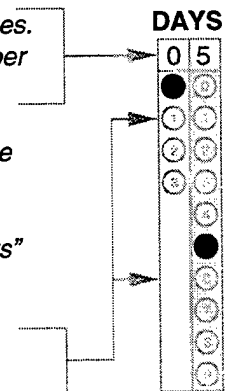
EXAMPLE: How would you describe your health?

- Excellent
- Good
- Fair
- Poor

- If you are asked to give numbers for your answer, please complete the grid as shown below.

EXAMPLE: During the **past 30 days**, how many full 24-hour days were you deployed at sea or in the field?

- First, write your answer in the boxes. Use **both** boxes. Write **ONE** number in each box.
- Always write the last number in the **right-hand box**. Fill in any **unused** boxes with zeros. For example, an answer of "5 days" would be written as "05."
- Then, **darken** the matching circle below each box.



- Sometimes you will be asked to "Darken one circle on each line." For these questions, record an answer for **each part** of the question, as shown here:

EXAMPLE: How often do you do each of the following?

(Darken one circle on each line)

	Often	Sometimes		Never
Swim	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bowl	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Play tennis	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

NOW PLEASE TURN THE PAGE AND BEGIN WITH QUESTION 1.

1. What Service are you in?

- Army
- Navy
- Marine Corps
- Air Force

2. What is your pay grade?

- | <u>ENLISTED</u> | | <u>OFFICER</u> | |
|---------------------------|---------------------------|-----------------------------------|------------------------------|
| <input type="radio"/> E-1 | <input type="radio"/> E-6 | <input type="radio"/> Trainee | <input type="radio"/> O-4 |
| <input type="radio"/> E-2 | <input type="radio"/> E-7 | <input type="radio"/> W1-W5 | <input type="radio"/> O-5 |
| <input type="radio"/> E-3 | <input type="radio"/> E-8 | <input type="radio"/> O-1 or O-1E | <input type="radio"/> O-6 |
| <input type="radio"/> E-4 | <input type="radio"/> E-9 | <input type="radio"/> O-2 or O-2E | <input type="radio"/> O7-O10 |
| <input type="radio"/> E-5 | | <input type="radio"/> O-3 or O-3E | |

3. What is your highest level of education now?

- Did not graduate from high school
- GED or ABE certificate
- High school certificate
- Trade or technical school graduate
- Some college but not a 4-year degree
- 4-year college degree (BA, BS, or equivalent)
- Graduate or professional study but no graduate degree
- Graduate or professional degree

4. How old were you on your last birthday?

- First, enter your age in the boxes. Use both boxes. Write ONE number in each box.
- Then, darken the matching circle below each box.

AGE

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

5. Are you male or female?

- Male
- Female

6. What is your marital status?

- Married
- Living as married
- Separated and not living as married
- Divorced and not living as married
- Widowed and not living as married
- Single, never married and not living as married

If you are married or living as married, the term "spouse," as used in this questionnaire, refers to your wife or husband or to the person with whom you live as married.

7. Is your spouse now living with you at your present duty location?

- Yes
- No
- I have no spouse

8. Do you have any children living with you at your present duty location?

- Yes
- No
- I have no children

9. Are you of Spanish/Hispanic origin or descent?

- No (not Spanish/Hispanic)
- Yes, Mexican/Mexican-American/Chicano
- Yes, Cuban
- Yes, Puerto Rican
- Yes, Central or South American
- Yes, other Spanish/Hispanic

10. Which of these categories best describes you?

- American Indian/Eskimo/Aleut
- Black/African-American
- Asian/Chinese/Japanese/Korean/
Filipino/Pacific Islander
- White/Caucasian
- Other (Please specify below)

11. Are you currently serving on a ship that is deployed?

- Yes
- No

12. In what type of housing do you currently live? (If your dependents are with you mark type of family housing.)

- Housing that you rent or lease from a civilian or that you personally own
- On board ship
- Military barracks/dormitory or bachelor quarters
- On-base military family housing
- Off-base military family housing

13. Here are some statements about things that happen to people. How many times in the past 12 months did each of the following happen to you?

	NUMBER OF TIMES IN PAST 12 MONTHS				
	3 or More	2	1	Never	Doesn't Apply
<i>(Darken one circle on each line)</i>					
I had an illness that kept me from duty for a week or longer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I didn't get promoted when I thought I should have been	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got a lower score than I expected on my efficiency report or performance rating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I received UCMJ punishment (Court Martial, Article 15, Captain's Mast, Office Hours)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was arrested for a driving violation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was arrested for an incident not related to driving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spent time in jail, stockade, or brig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was hurt in an accident (any kind)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I caused an accident where someone else was hurt or property was damaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I hit my spouse or the person I date	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I hit my child(ren) for a reason other than discipline (spanking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got into a fight where I hit someone other than a member of my family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My wife or husband threatened to leave me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My wife or husband left me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

14. The statements below are about some other things that happen to people. How many times in the past 12 months did each of the following happen to you?

	NUMBER OF TIMES IN PAST 12 MONTHS				
	3 or More	2	1	Never	Doesn't Apply
<i>(Darken one circle on each line)</i>					
I had heated arguments with family or friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had trouble on the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was involved in a motor vehicle accident while I was driving (regardless of who was responsible)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had health problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I drove unsafely	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I neglected my family responsibilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had serious money problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had trouble with the police (civilian or military)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I found it harder to handle my problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had to have emergency medical help (for any reason)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got into a loud argument in public	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next group of questions is about past and current use of alcoholic beverages – that is, beer, wine, and liquor. By "liquor," we mean whiskey, rum, gin, vodka, bourbon, scotch, tequila, or any other type of alcoholic beverage. Please take your time on these questions and answer each one as accurately as possible. If the answers provided are more exact than you can remember, mark your best estimate. If you can't decide between two answer choices because you drink different amounts at different times, answer for the time you drank the most.

15. During the past 30 days, on how many days did you drink beer?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Didn't drink any beer in the past 30 days

16. During the past 30 days, what size cans or bottles of beer did you usually drink? (Beer is most commonly sold and served in 12-ounce cans, mugs, bottles, or glasses in the U.S.)

- 8-ounce can, bottle, or glass
- Standard 12-ounce can, bottle, or mug
- 16-ounce ("tall boy") can, bottle, or mug (½ liter)
- Liter or quart (32-oz.) bottle or mug
- 40-ounce bottle (a "forty")
- Some other size
- Didn't drink any beer in the past 30 days

17. Think about the days when you drank beer in the past 30 days. How much beer did you usually drink on a typical day when you drank beer?

- 18 or more beers
- 15-17 beers
- 12-14 beers
- 9-11 beers
- 8 beers
- 7 beers
- 6 beers
- 5 beers
- 4 beers
- 3 beers
- 2 beers
- 1 beer
- Didn't drink any beer in the past 30 days

18. During the past 30 days, on how many days did you drink wine?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Didn't drink any wine in the past 30 days

19. During the past 30 days, did you usually drink a regular wine or a fortified wine?

- Regular wine (also called "table" or "dinner" wine)
- Fortified wine (like Thunderbird, Night Train, sherry, port, vermouth, brandy, Dubonnet, champagne, etc.)
- Wine cooler (such as Bartles & Jaymes, etc.)
- Didn't drink any wine in the past 30 days

20. Think about the days when you drank wine in the past 30 days. How much wine did you usually drink on a typical day when you drank wine? (The standard wineglass holds about 4 ounces of wine. The standard wine bottle holds 750 ml.)

- 12 or more wineglasses (2 bottles or more)
- 9-11 wineglasses
- 8 wineglasses
- 7 wineglasses
- 6 wineglasses (about 1 bottle)
- 5 wineglasses
- 4 wineglasses
- 3 wineglasses (about ½ bottle)
- 2 wineglasses
- 1 wineglass
- Didn't drink any wine in the past 30 days

21. During the past 30 days, on how many days did you drink liquor?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Didn't drink any liquor in the past 30 days

22. During the past 30 days, about how many ounces of liquor did you usually have in your average drink? (The average bar drink, mixed or straight, contains a "jigger" or 1½ ounces of liquor.)

- 5 or more ounces
- 4 ounces
- 3 ounces (a "double")
- 2 ounces
- 1½ ounces (a "jigger")
- 1 ounce (a "shot")
- Didn't drink any liquor in the past 30 days

23. Think about the days when you drank liquor in the past 30 days. How much liquor did you usually drink on a typical day when you drank liquor?

- 18 or more drinks
- 15-17 drinks
- 12-14 drinks
- 9-11 drinks
- 8 drinks
- 7 drinks
- 6 drinks
- 5 drinks
- 4 drinks
- 3 drinks
- 2 drinks
- 1 drink
- Didn't drink any liquor in the past 30 days

24. During the **past 30 days**, on how many days did you have 5 or more drinks of beer, wine, or liquor on the same occasion? (By "drink," we mean a bottle or can of beer, a wine cooler or a glass of wine, a shot of liquor, or a mixed drink or cocktail. By "occasion," we mean at the same time or within a couple of hours of each other.)

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- I drank during the past 30 days, but I never had 5 or more drinks on the same occasion
- I didn't drink in the past 30 days

25. Think about the days you worked during the **past 30 days**. How often did you have a drink **2 hours or less before going to work?**

- Every work day
- Most work days
- About half of my work days
- Several work days
- One or two work days
- Never in the past 30 days
- Don't drink

26. On those days when you worked during the **past 30 days**, how often did you have a drink **during your lunch break?** (Answer for the main meal that occurred during your usual duty hours.)

- Every work day
- Most work days
- About half of my work days
- Several work days
- One or two work days
- Never in the past 30 days
- Don't drink

27. During the **past 30 days**, how often did you have a drink **while you were working (on-the-job) or during a work break?**

- Every work day
- Most work days
- About half of my work days
- Several work days
- One or two work days
- Never in the past 30 days
- Don't drink

The next three questions ask about your use of beer, wine, and liquor during the **past 12 months** – that is, since this time last year.

28. During the **past 12 months**, how often did you drink **8 or more cans, bottles, or glasses of beer (3 quarts or more) in a single day?**

- About every day
- 5-6 days a week
- 3-4 days a week
- 1-2 days a week
- 2-3 days a month
- About once a month
- 7-11 days in the past 12 months
- 3-6 days in the past 12 months
- Once or twice in the past 12 months
- Never in the past 12 months
- Don't drink beer

29. During the **past 12 months**, how often did you drink **8 or more glasses of wine (more than a 750 ml bottle) in a single day?**

- About every day
- 5-6 days a week
- 3-4 days a week
- 1-2 days a week
- 2-3 days a month
- About once a month
- 7-11 days in the past 12 months
- 3-6 days in the past 12 months
- Once or twice in the past 12 months
- Never in the past 12 months
- Don't drink wine

30. During the **past 12 months**, how often did you drink **8 or more drinks of liquor (a half-pint or more) in a single day?**

- About every day
- 5-6 days a week
- 3-4 days a week
- 1-2 days a week
- 2-3 days a month
- About once a month
- 7-11 days in the past 12 months
- 3-6 days in the past 12 months
- Once or twice in the past 12 months
- Never in the past 12 months
- Don't drink liquor

31. The following list includes some of the reasons people give for drinking beer, wine, or liquor. Please tell us how important each reason is to you, for your drinking.

<i>(Darken one circle on each line)</i>	Very Important	Fairly Important	Slightly Important	Not at All Important	Don't Drink
To be friendly or social	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To forget my worries	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To relax	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To help cheer me up when I am in a bad mood	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To help me when I am depressed or nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To help me when I am bored and have nothing to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To increase my self-confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get drunk or "high".	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Now think about your use of beer, wine, or liquor over the past 12 months—that is, since this time last year. The term "work day," as used in this questionnaire, refers to days when you worked at your duty station or were on quick-response (30 minutes or less) call.

32. The following statements describe some things connected with drinking that affect people on their work days. Please indicate on how many work days in the past 12 months these things ever happened to you.

<i>(Darken one circle on each line)</i>	NUMBER OF WORK DAYS IN PAST 12 MONTHS									Don't Drink
	40 or More	21- 39	12- 20	7-11	4-6	3	2	1	None	<input type="radio"/>
I was hurt in an on-the-job accident because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was late for work or left work early because of drinking, a hangover, or an illness caused by drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I did not come to work at all because of a hangover, an illness, or a personal accident caused by drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worked below my normal level of performance because of drinking, a hangover, or an illness caused by drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was drunk or "high" while working because of drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was called in during off-duty hours and reported to work feeling drunk or "high" from alcohol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

33. For each statement below, please indicate how often you have had this experience during the past 12 months.

<i>(Darken one circle on each line)</i>	About Every Day	5-6 Days a Week	3-4 Days a Week	1-2 Days a Week	1-3 Days a Month	Less Often Than Monthly	Never	Don't Drink
My hands shook a lot after drinking the day before	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I awakened unable to remember some of the things I had done while drinking the day before	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could not stop drinking before becoming drunk	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was sick because of drinking (nausea, vomiting, severe headaches, etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I took a drink the first thing when I got up for the day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had the "shakes" because of drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got drunk or very high from drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

34. Here are some statements about things that happen to people while or after drinking or because of using alcohol. How many times in the past 12 months did each of the following happen to you?

NUMBER OF TIMES IN PAST 12 MONTHS

(Darken one circle on each line)

	3 or More	2	1	Never	Don't Drink
I didn't get promoted because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got a lower score on my efficiency report or performance rating because of drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had an illness connected with my drinking that kept me from duty for a week or longer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I received UCMJ punishment (Court Martial, Article 15, Captain's Mast, Office Hours) because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was arrested for driving under the influence of alcohol	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was arrested for a drinking incident not related to driving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I spent time in jail, stockade, or brig because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was hurt in any kind of accident because of drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My drinking caused an accident where someone else was hurt or property was damaged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I got into a fight where I hit someone other than a member of my family when I was drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My wife or husband threatened to leave me because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My wife or husband left me because of my drinking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The word "installation," as used in this questionnaire, refers to your post, camp, base, station, or other geographic duty location. Navy and Marines Assigned to Ships: The word "installation" refers to your ship when in home port.

35. Please indicate how much you agree or disagree with each of the following statements.

(Darken one circle on each line)

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know/No Opinion
Drinking will interfere with my health or physical fitness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It's hard to fit in at this installation if you don't drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disciplinary action will be taken against any person identified as having a drinking problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Driving while intoxicated on-base at this installation is a sure way to get arrested	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At this installation, we should receive more education about alcohol use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of alcohol is against my basic values or beliefs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seeking help for a drinking problem will damage one's military career	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are some times at work when I could use a drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most of my friends drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking is part of being in the military	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My spouse or the person I date disapproves of my drinking (or would disapprove if I did drink)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drinking is just about the only recreation available at this installation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My drinking sometimes interferes with my work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At parties or social functions at this installation, everyone is encouraged to drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

36. The statements below are about some other things that happen to people because of using alcohol. How many times in the past 12 months did each of the following happen to you?

NUMBER OF TIMES IN PAST 12 MONTHS

(Darken one circle on each line)

3 or More 2 1 Never Don't Drink

- I had to be detoxified because of my drinking
- I had trouble on the job because of my drinking
- I had trouble with the police (civilian or military) because of my drinking
- I found it harder to handle my problems because of my drinking
- I had to have emergency medical help because of my drinking
- I was not able to deploy or go into the field because of my drinking
- I was delayed in being deployed or going into the field because of my drinking
- I had to return early from a deployment because of my drinking

37. In the past 12 months, how often did you drive a car or other motor vehicle within 2 hours of drinking any amount of beer, wine, or liquor? Your best estimate is fine.

- About every day
- 5-6 days a week
- 3-4 days a week
- 1-2 days a week
- 2-3 days a month
- About once a month
- 7-11 days in the past 12 months
- 3-6 days in the past 12 months
- Once or twice in the past 12 months
- I drove in the past 12 months, but I never drove within 2 hours of drinking
- I didn't drive in the past 12 months

38. On those occasions when you drove within 2 hours of drinking beer, wine, or liquor in the past 12 months, about how many drinks did you usually have before you drove? (By "drink," we mean a bottle or can of beer, a wine cooler or a glass of wine, a shot of liquor, or a mixed drink or cocktail.)

- 9 or more drinks
- 5-8 drinks
- 4 drinks
- 3 drinks
- 2 drinks
- 1 drink
- I drove in the past 12 months, but I never drove within 2 hours of drinking
- I didn't drive in the past 12 months

39. About how old were you when you first began to use alcohol once a month or more often?

• First, enter the age in the boxes. Use both boxes. Write ONE number in each box.

• Then, darken the matching circle below each box.

I have never used alcohol at least once a month.

AGE

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

40. Are you now drinking more, about the same, or less than you did before you entered the Service?

- Drink more now
- Drink about the same
- Drink less now (but still drink)
- Drank before entering the Service but do not drink now
- Did not drink before entering the Service and do not drink now

41. Since you joined the Service, have you received professional counseling or treatment for a drinking-related problem from any of the following sources? (Darken one circle on each line)

	Don't Drink
Have Had No Problem	
No	
Yes	
Through a military clinic, hospital, or other military medical facility . . .	○ . . . ○ . . . ○ . . . ○ . . . ○
Through a military counseling center or other military alcohol treatment or rehabilitation program	○ . . . ○ . . . ○ . . . ○ . . . ○
Through a civilian doctor, clinic, hospital, or other civilian medical facility	○ . . . ○ . . . ○ . . . ○ . . . ○
Through a civilian alcohol counselor, mental health center, or other civilian alcohol treatment or rehabilitation program	○ . . . ○ . . . ○ . . . ○ . . . ○

Now we would like to ask some questions about cigarettes and other tobacco products.

42. How old were you when you first started smoking cigarettes fairly regularly?

• First, enter the age in the boxes. Use both boxes. Write ONE number in each box.

• Then, darken the matching circle below each box.

I have never smoked at least one cigarette a day for a week or longer.

AGE

0	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

43. For how many years altogether have you smoked daily? (Do not count any time when you quit smoking.)

• First, enter the number of years in the boxes. Use both boxes. Write ONE number to a box.

• If you have smoked regularly for less than 1 year, record "01."

• Then, darken the matching circle below each box.

I have never smoked at least one cigarette a day for a week or longer.

YEARS

0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

44. When was the last time you smoked a cigarette?

- Today
- During the past 30 days
- 5-8 weeks ago
- 2-3 months ago
- 4-6 months ago
- 7-12 months ago
- 1-3 years ago
- More than 3 years ago
- Never smoked cigarettes

45. Think about the past 30 days. How many cigarettes did you usually smoke on a typical day?

- About 3 or more packs a day (more than 55 cigarettes)
- About 2½ packs a day (46-55 cigarettes)
- About 2 packs a day (36-45 cigarettes)
- About 1½ packs a day (26-35 cigarettes)
- About 1 pack a day (16-25 cigarettes)
- About ½ pack a day (6-15 cigarettes)
- 1-5 cigarettes a day
- Less than 1 cigarette a day, on the average
- Did not smoke any cigarettes in the past 30 days

46. For about how many years have you smoked the number of cigarettes in question 45? (Do not count any time when you quit smoking.)

• First, enter the number of years in the boxes. Use both boxes, ONE number in each box.

• If you have smoked regularly for less than 1 year, record "01."

• Then, darken the matching circle below each box.

I did not smoke in the past 30 days, or I have never smoked cigarettes.

YEARS

0	1
1	2
2	3
3	4
4	5
5	6
6	7
7	8
8	9

47. Have you smoked at least 100 cigarettes in your entire life? (That would be 5 packs or more in your entire life.)

- Yes
- No

48. During the past 12 months, have you made a serious attempt to stop smoking cigarettes; that is, did you go for at least a week without smoking?

- Yes
- No
- Didn't smoke cigarettes in the past 12 months
- Never smoked cigarettes

49. Are you seriously intending to quit smoking cigarettes in the next 6 months?

- Yes
- No
- Don't smoke cigarettes

50. Are you planning to quit smoking cigarettes in the next 30 days?

- Yes
- No
- Don't smoke cigarettes

51. When was the last time you used chewing tobacco, snuff, or other smokeless tobacco?

- During the past 30 days
- More than 1 month ago but within the past 6 months
- More than 6 months ago but within the past year
- More than 1 year ago but within the past 2 years
- More than 2 years ago
- Never used smokeless tobacco

52. How old were you when you first used chewing tobacco, snuff, or other smokeless tobacco?

• First, enter the age in the boxes. Use both boxes, ONE number to a box.

• Then, darken the matching circle below each box.

I have never used smokeless tobacco.

AGE

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

53. For how many years have you used chewing tobacco, snuff, or other smokeless tobacco?

• Enter the number of years in the boxes. Use both boxes, ONE number to a box.

• If you have used smokeless tobacco for less than 1 year, record "01."

• Then, darken the matching circle below each box.

I have never used smokeless tobacco.

YEARS

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

54. During the past 12 months, how often on the average have you used chewing tobacco, snuff, or other smokeless tobacco?

- About every day
- 5-6 days a week
- 3-4 days a week
- 1-2 days a week
- 2-3 days a month
- About once a month
- 7-11 days in the past 12 months
- 3-6 days in the past 12 months
- Once or twice in the past 12 months
- Never in the past 12 months
- Never used smokeless tobacco

55. Have you used chewing tobacco, snuff, or other smokeless tobacco at least 20 times in your entire life?

- Yes
- No

56. Have you started using chewing tobacco, snuff, or other smokeless tobacco because of military restrictions on where you can smoke cigarettes?

- Yes
- No
- Don't use smokeless tobacco

57. During the past 12 months, how often on the average have you smoked cigars or a pipe?

- | | |
|------------------------------------------|-----------------------------------------------------------|
| <input type="radio"/> About every day | <input type="radio"/> 7-11 days in the past 12 months |
| <input type="radio"/> 5-6 days a week | <input type="radio"/> 3-6 days in the past 12 months |
| <input type="radio"/> 3-4 days a week | <input type="radio"/> Once or twice in the past 12 months |
| <input type="radio"/> 1-2 days a week | <input type="radio"/> Never in the past 12 months |
| <input type="radio"/> 2-3 days a month | <input type="radio"/> Never smoked cigars or a pipe |
| <input type="radio"/> About once a month | |

58. Please indicate how much you agree or disagree with each of the following statements.

<i>(Darken one circle on each line)</i>	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know/No Opinion
Smoking will harm my health or physical fitness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The number of places to buy cigarettes at this installation makes it easy to smoke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Disciplinary action will be taken against any person smoking indoors while at work	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of tobacco is against my basic values or beliefs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are times at work when I could use a cigarette	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most of my friends smoke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Smoking is part of being in the military	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My spouse or the person I date disapproves of my smoking (or would disapprove if I did smoke)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't like being around people when they're smoking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being around people who are smoking will harm my health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
So many things cause cancer that it really doesn't matter if you smoke	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Smokers should be allowed extra break time to get to a designated smoking area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

59. The following list includes reasons that people sometimes give for why they started smoking cigarettes regularly. If you have ever smoked cigarettes regularly, please tell us how important each reason was for you starting to smoke.

<i>(Darken one circle on each line)</i>	Very Important	Fairly Important	Slightly Important	Not at All Important	Never Smoked Regularly
To fit in with my friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To fit in with my military unit	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To rebel against my parents or others in authority	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To look "cool" or be "cool"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To help relieve stress	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To help me relax or calm down	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To relieve boredom	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
So I wouldn't want to eat as much	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To look or feel like an adult	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because most people in my family smoked cigarettes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To prove I could handle it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be like someone I admired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To show I was tough	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next set of questions is about use of drugs for non-medical purposes. First, we list the types of drugs we are interested in, along with some of their most common trade and clinical names.

DRUG TYPES	COMMON TRADE/CLINICAL NAMES
Marijuana or Hashish	Cannabis, THC
PCP (alone or combined with other drugs)	Phencyclidine (PCP)
LSD and Other Hallucinogens	LSD, Mescaline, Peyote, DMT, Psilocybin
Cocaine	Cocaine (including "crack")
Amphetamines, Methamphetamines, and Other Stimulants	Ice, crystal meth, Preludin, Benzedrine, Biphedamine, Cylert, Desoxyn, Dextroamphetamine, Dexamyl, Dexedrine, Didrex, Eskatrol, Ionamin, Methedrine, Obedrin-LA, Plegine, Pondimin, Pre-Sate, Ritalin, Sanorex, Tenuate, Tepanil, Voranil
Tranquilizers and Other Depressants	Ativan, Meprobamate, Librium, Valium, Atarax, Benadryl, Equanil, Libritabs, Meprospan, Miltown, Serax, SK-Lygen, Thorazine, Tranxene, Verstran, Vistaril, Xanax
Barbiturates and Other Sedatives	Seconal, Alurate, Amobarbital, Amytal, Buticaps, Butisol, Carbrital, Dalmane, Dorden, Eskabarb, Luminal, Mebaral, Methaqualone, Nembutal, Noctec, Noludar, Optimil, Parest, Pentobarbital, Phenobarbital, Placidyl, Quaalude, Secobarbital, Sopor, Tuinal
Heroin and Other Opiates	Heroin, Morphine, Opium
Analgesics and Other Narcotics	Darvon, Demerol, Percodan, Tylenol with Codeine, Codeine, Cough Syrups with Codeine, Dilaudid, Dolene, Dolophine, Leritine, Levo-Dromoran, Methadone, Propoxyphene, SK-65, Talwin
Inhalants	Lighter fluids, aerosol sprays like Pam, glue, toluene, amyl nitrite, gasoline, poppers, locker room deodorizers, spray paints, paint thinner, halothane, ether or other anesthetics, nitrous oxide ("laughing gas"), correction fluids, cleaning fluids, degreasers
"Designer" Drugs	These drugs, with names like "Ecstasy," "Adam," "Eve," are made by combining two or more, often legal, drugs or chemicals to produce drugs specifically for their mood-altering or psychoactive effects.
Anabolic Steroids	Testosterone, Methyltestosterone, or other drugs taken to improve physical strength

Although some of the drugs listed above may be prescribed for medical reasons, the questions that follow refer to use of these drugs for non-medical purposes. By non-medical purposes, we mean any use of these drugs on your own—that is, either without a doctor's prescription, or in greater amounts or more often than prescribed, or for any reasons other than a doctor said you should take them, such as to get high, for thrills or kicks, to relax, to give insight, for pleasure, or curiosity about the drug's effect. Please take your time and answer the questions as accurately as possible. Remember, **NO ONE will ever link your answers with your identity.**

60. During the past 30 days, on about how many days did you use each of the following drugs for non-medical purposes?

(Darken one circle on each line)

	11 or More Days	4-10 Days	1-3 Days	Never in Past 30 Days
Marijuana or hashish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PCP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LSD or other hallucinogens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cocaine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amphetamines or other stimulants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tranquilizers or other depressants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Barbiturates or other sedatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heroin or other opiates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analgesics or other narcotics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inhalants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Designer" drugs ("Ecstasy," etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anabolic steroids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

61. On the average, how often in the past 12 months have you taken each of the following drugs for non-medical purposes?

USED THIS TYPE OF DRUG IN PAST 12 MONTHS

(Darken one circle on each line)	52 Days or More	25-51 Days	12-24 Days	6-11 Days	3-5 Days	1-2 Days	Never in Past Year
Marijuana or hashish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PCP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LSD or other hallucinogens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cocaine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amphetamines or other stimulants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tranquilizers or other depressants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Barbiturates or other sedatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heroin or other opiates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analgesics or other narcotics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inhalants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Designer" drugs ("Ecstasy," etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anabolic steroids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

62. Please indicate how much you agree or disagree with each of the following statements.

(Darken one circle on each line)	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know/No Opinion
Anyone detected using marijuana should be discharged	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At this installation or command we need more education about drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I don't mind if personnel in my Service use marijuana when they're off-duty	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most of my friends use drugs, at least marijuana	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My spouse or the person I date disapproves of drug use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In our training sessions, we don't spend enough time talking about drug abuse issues	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

63. When was the last time you had to give a urine sample for drug testing?

- In the past 30 days
- 5-8 weeks ago
- 2-6 months ago
- 7-12 months ago
- 13 months to 3 years ago
- More than 3 years ago
- I've never given a urine sample for drug testing

64. Think about the last time you had to give a urine sample for drug testing. How easy was it for you to predict that you were going to be tested?

- Very easy to predict
- Somewhat easy to predict
- Somewhat hard to predict
- Very hard to predict
- I've never given a urine sample for drug testing

65. If the military stopped testing people for drugs, how likely do you think you would be to try drugs once or twice?

- Very likely
- Somewhat likely
- Somewhat unlikely
- Very unlikely
- Definitely wouldn't try drugs

66. If the military stopped testing people for drugs, how likely do you think you would be to use drugs once a month or more often?

- Very likely
- Somewhat likely
- Somewhat unlikely
- Very unlikely
- Definitely wouldn't use drugs

67. When did you last use each type of drug listed below for non-medical purposes?

LAST USED THIS TYPE OF DRUG

	1-30 Days Ago	5-8 Weeks Ago	2-6 Months Ago	7-12 Months Ago	13 Months to 3 Years Ago	More Than 3 Years Ago	Never Used
<i>(Darken one circle on each line)</i>							
Marijuana or hashish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PCP	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
LSD or other hallucinogens	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cocaine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amphetamines or other stimulants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tranquilizers or other depressants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Barbiturates or other sedatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Heroin or other opiates	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Analgesics or other narcotics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inhalants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Designer" drugs ("Ecstasy," etc.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anabolic steroids	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next question deals with general health behaviors.

68. During the past 30 days, how often did you do each of the following?

(Darken one circle on each line)

	About Every Day	5-6 Days a Week	3-4 Days a Week	1-2 Days a Week	1-3 Days in Past Month	Never in Past Month
Run, jog, bicycle, or briskly walk or hike for 20 minutes or more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eat at least two full meals in 1 day (count breakfast, if eaten)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engage for 20 minutes or more in other strenuous physical activity (e.g., handball, soccer, racquet sports, swimming laps)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eat breakfast	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get more than 6 consecutive hours of sleep in 1 day	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Floss between your teeth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engage in mild physical activity (e.g., baseball, bowling, volleyball, other sports) more for the recreation than for the exercise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next question asks about some things that affect people on their work days.

69. Please indicate on how many work days in the past 12 months these things ever happened to you.

NUMBER OF WORK DAYS IN PAST 12 MONTHS

(Darken one circle on each line)

	40 or More	21-39	12-20	7-11	4-6	3	2	1	None
I was late for work by 30 minutes or more	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I left work early for a reason other than an errand or early holiday leave	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was hurt in an on-the-job accident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worked below my normal level of performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I did not come to work at all because of an illness or a personal accident	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The next question asks about medical care that you received and illnesses that you had in the past 12 months. Do not count any times when you took another family member or someone else to receive medical care.

70. In the past 12 months, how many times were you ...

NUMBER OF TIMES IN PAST 12 MONTHS

<i>(Darken one circle on each line)</i>	40 or More	21-39	12-20	7-11	4-6	3	2	1	None
Seen as a patient in a hospital emergency room?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Admitted to a hospital or similar facility for a stay of at least 1 night?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hospitalized for a week or longer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seen as an outpatient by a general medical doctor at a military facility?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seen as an outpatient by a general medical doctor at a civilian facility?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Seen as an outpatient by a medical specialist (either military or civilian)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sick with symptoms such as runny nose or eyes, feeling flushed or sweaty, chills, nausea or vomiting, stomach cramps, diarrhea, muscle pains, or severe headaches?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

71. In the past 12 months, did you have any overnight hospital stays for treatment of an injury?

- Yes
- No

72. How often do you use seat belts when you drive or ride in a car?

- Always
- Nearly always
- Sometimes
- Seldom
- Never
- Don't drive or ride in a car

73. In your entire life, how many times did you drive or ride on a motorcycle?

- 100 or more times
- 40-99 times
- 21-39 times
- 11-20 times
- 1-10 times
- Never in my life

74. In the past 12 months, how many times did you drive or ride on a motorcycle?

- 40 or more times
- 21-39 times
- 11-20 times
- 1-10 times
- Never in the past 12 months

75. In the past 12 months, how often did you wear a helmet when you drove or rode on a motorcycle?

- Always
- Nearly always
- Sometimes
- Seldom
- Never
- Didn't drive or ride on a motorcycle in the past 12 months

76. In the past 12 months, how many times did you ride a bicycle?

- 40 or more times
- 21-39 times
- 11-20 times
- 1-10 times
- Never in the past 12 months

77. In the past 12 months, how often did you wear a helmet when you rode a bicycle?

- Always
- Nearly always
- Sometimes
- Seldom
- Never
- Didn't ride a bicycle in the past 12 months

78. In general, how would you describe your health?

- Excellent
- Very good
- Good
- Fair or poor

79. Thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Never in the past 30 days

80. Now, thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Never in the past 30 days

81. During the past 30 days, how often did poor physical or mental health keep you from doing your usual activities, such as work or recreation?

- 28-30 days (about every day)
- 20-27 days (5-6 days a week, average)
- 11-19 days (3-4 days a week, average)
- 4-10 days (1-2 days a week, average)
- 2-3 days in the past 30 days
- Once in the past 30 days
- Never in the past 30 days

82. During the past 12 months, how much stress did you experience at work or while carrying out your military duties?

- A great deal
- A fairly large amount
- Some
- A little
- None at all

83. During the past 12 months, how much stress did you experience in your family life or in a relationship with a person you live with or date seriously?

- A great deal
- A fairly large amount
- Some
- A little
- None at all

84. During the past 12 months, how much did stress at work interfere with your ability to perform your military job?

- A lot
- Some
- A little
- Not at all
- Had no stress at work in the past 12 months

85. During the past 12 months, how much did stress in your family life interfere with your ability to perform your military job?

- A lot
- Some
- A little
- Not at all
- Had no stress in the family in the past 12 months

86. In the past 12 months, have you had 2 weeks or more during which you felt sad, blue, or depressed, or when you lost all interest in things that you usually cared about or enjoyed?

- Yes
- No

87. In the past 12 months, have you felt depressed or sad much of the time?

- Yes
- No

88. In your entire life, have you ever had 2 years or more when you felt sad or depressed on most days, even if you felt okay sometimes?

- Yes
- No

89. How much of the time during the past week did you feel depressed?

- 5-7 days
- 3-4 days
- 1-2 days
- Less than 1 day or never in the past week

90. During the past 12 months, how much stress did you experience from each of the following:

AMOUNT OF STRESS IN PAST 12 MONTHS

(Darken one circle on each line)

	A Great Deal	A Fairly Large Amount	Some	A Little	None at All	Doesn't Apply
Being deployed at sea or in the field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having a permanent change of station (PCS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problems in your relationships with the people you work with	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problems in your relationship with your immediate supervisor(s)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Concern about your performance rating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Increases in your work load	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decreases in your work load	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being away from your family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Changes in your personal life, such as the birth of a baby, a divorce or breakup, or a death in the family	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conflicts between your military and family responsibilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problems with money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problems with housing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health problems that you had	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health problems that your family members had	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Behavior problems in some of your children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

91. When you feel pressured, stressed, depressed, or anxious, how often do you engage in each of the following activities?

(Darken one circle on each line)

	Frequently	Sometimes	Rarely	Never
Talk to a friend or family member	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Light up a cigarette	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Have a drink	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Say a prayer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exercise or play sports	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engage in a hobby	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Get something to eat	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Smoke marijuana or use other illegal drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Think of a plan to solve the problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Think about hurting yourself or killing yourself	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

For these next questions, "mental health professional" refers to a psychologist, psychiatrist, clinical social worker, or other mental health counselor.

92. In the past 12 months, did you receive mental health counseling or therapy ...

	Yes	No
From a mental health professional at a military facility? (see the above box)	<input type="radio"/>	<input type="radio"/>
From a general doctor at a military facility?	<input type="radio"/>	<input type="radio"/>
From a military chaplain?	<input type="radio"/>	<input type="radio"/>
From a civilian mental health professional? (see the above box)	<input type="radio"/>	<input type="radio"/>
From a general medical doctor at a civilian facility?	<input type="radio"/>	<input type="radio"/>
From a civilian pastor, rabbi, or other pastoral counselor?	<input type="radio"/>	<input type="radio"/>

93. Do you think it would damage a person's military career to seek mental health counseling through the military?

- Yes, seeking any mental health counseling will damage a person's career, regardless of the problem
- It may or may not damage a person's career, depending on the problem
- No, it definitely wouldn't damage a person's career

94. At any time in the past 12 months, did you feel you needed counseling or therapy from a mental health professional (either military or civilian)?

- Yes
- No

The next questions refer to your height, weight, and general health.

95. About how tall are you without shoes on?

- 4 feet, 7 inches
- 4 feet, 8 inches
- 4 feet, 9 inches
- 4 feet, 10 inches
- 4 feet, 11 inches
- 5 feet, 0 inches
- 5 feet, 1 inch
- 5 feet, 2 inches
- 5 feet, 3 inches
- 5 feet, 4 inches
- 5 feet, 5 inches
- 5 feet, 6 inches
- 5 feet, 7 inches
- 5 feet, 8 inches
- 5 feet, 9 inches
- 5 feet, 10 inches
- 5 feet, 11 inches
- 6 feet, 0 inches
- 6 feet, 1 inch
- 6 feet, 2 inches
- 6 feet, 3 inches
- 6 feet, 4 inches
- 6 feet, 5 inches
- 6 feet, 6 inches
- 6 feet, 7 inches
- 6 feet, 8 inches
- 6 feet, 9 inches

96. About how much do you weigh without shoes on? (WOMEN: If you are currently pregnant, please enter your usual weight before you became pregnant.)

- Enter your weight in the boxes. Use all three boxes. Write ONE number in each box.
- Then, darken the matching circle below each box.

POUNDS

0	1	2
3	4	5
6	7	8
9	0	1
2	3	4
5	6	7
8	9	0
1	2	3
4	5	6
7	8	9
8	9	0
9	0	1

97. When was the last time you had your blood pressure checked by a doctor or other health professional?

- During the past 30 days
- More than 1 month ago but within the past 6 months
- More than 6 months ago but within the past year
- More than 1 year ago but within the past 2 years
- More than 2 years ago
- Don't know/don't remember
- Never had my blood pressure checked

98. The last time you had your blood pressure checked, did the doctor or other health professional say your blood pressure was high, low, or normal?

- High
- Low
- Normal
- Something else
- Not told
- Don't know/don't remember
- Never had my blood pressure checked

99. Have you ever been told by a doctor or other health professional that you had high blood pressure?

- Yes
- Yes, but only when I was pregnant
- No
- Don't know

100. Has a doctor ever prescribed medication to help lower your high blood pressure?

- Yes
- No
- Never had high blood pressure

101. Has a doctor or other health professional ever advised you to take any of the following actions to help lower your blood pressure? (Darken one circle on each line)

- Never had high blood pressure [Go to Question 103]

Doesn't Apply

To lower my blood pressure, a health professional has advised me to:	Yes	No
Diet to lose weight	<input type="radio"/>	<input type="radio"/>
Cut down on salt or sodium in my diet	<input type="radio"/>	<input type="radio"/>
Exercise	<input type="radio"/>	<input type="radio"/>
Stop smoking	<input type="radio"/>	<input type="radio"/>
Cut down on my use of alcohol	<input type="radio"/>	<input type="radio"/>

102. Are you currently taking any of the following actions to help lower your blood pressure? (Darken one circle on each line)

Doesn't Apply

To lower my blood pressure, I am currently:	Yes	No
Dieting to lose weight	<input type="radio"/>	<input type="radio"/>
Cutting down on salt or sodium in my diet	<input type="radio"/>	<input type="radio"/>
Exercising	<input type="radio"/>	<input type="radio"/>
Not smoking	<input type="radio"/>	<input type="radio"/>
Cutting down on my use of alcohol	<input type="radio"/>	<input type="radio"/>
Taking prescribed blood pressure medication	<input type="radio"/>	<input type="radio"/>

103. When was the last time you had your cholesterol checked by a doctor or other health professional?

- During the past 30 days
- More than 1 month ago but within the past 6 months
- More than 6 months ago but within the past year
- More than 1 year ago but within the past 2 years
- More than 2 years ago but within the past 5 years
- More than 5 years ago
- Don't know/don't remember
- Never had my cholesterol checked

104. Have you ever been told by a doctor or other health professional that your cholesterol level was high?

- Yes
- No
- Don't know/don't remember
- Never had my cholesterol checked

105. Has a doctor or other health professional ever advised you to cut down on fat and cholesterol in your diet—regardless of whether your cholesterol level was high?

- Yes
- No

106. Has a doctor ever prescribed medication to help lower your cholesterol level?

- Yes
- No
- Never had high cholesterol

107. Are you currently taking any of the following actions to help lower your cholesterol level?

- Never had high cholesterol [Go to Question 108]

To lower my cholesterol level, I'm currently:

- | | Yes | No |
|-----------------------------------------------------------------------|-----------------------|-----------------------|
| Cutting down on fat and cholesterol in my diet | <input type="radio"/> | <input type="radio"/> |
| Taking prescribed medication to help lower my cholesterol level | <input type="radio"/> | <input type="radio"/> |

108. In the past 12 months, did you have a dental check-up?

- Yes
- No

109. If you did not have a dental check-up in the past 12 months, please indicate whether each of the following reasons for not having a dental check-up applied to you. (If you had a dental check-up in the past 12 months, please go to Question 110.)

I did not have a dental check-up in the past 12 months because ...

- | | Yes | No |
|----------------------------------------------------------------------------------------------|-----------------------|-----------------------|
| I could not get time off from work | <input type="radio"/> | <input type="radio"/> |
| I could not get an appointment with a military dentist | <input type="radio"/> | <input type="radio"/> |
| I would have had to wait too long at the military dental clinic before I could be seen | <input type="radio"/> | <input type="radio"/> |
| I couldn't afford to go to a civilian dentist .. | <input type="radio"/> | <input type="radio"/> |
| I didn't think I needed a check-up | <input type="radio"/> | <input type="radio"/> |
| I don't like going to the dentist(s) at this installation | <input type="radio"/> | <input type="radio"/> |
| I don't like going to any dentists | <input type="radio"/> | <input type="radio"/> |

110. In the past 12 months, were you required to get dental work done before you could be deployed at sea or in the field?

- Yes
- No
- I wasn't deployed in the past 12 months

111. Since you joined the military, have you ever lost any permanent teeth (not counting wisdom teeth) because of ...

- | | Yes | No |
|--------------------------------|-----------------------|-----------------------|
| Gum disease? | <input type="radio"/> | <input type="radio"/> |
| Cavities? | <input type="radio"/> | <input type="radio"/> |
| An injury to your mouth? | <input type="radio"/> | <input type="radio"/> |
| Some other reason? | <input type="radio"/> | <input type="radio"/> |

The next set of questions asks about sexual behavior. When we ask if you have "had sex" with a person, we are asking if you had vaginal or anal intercourse with that person. Specifically:

VAGINAL INTERCOURSE is when a man's penis is inside a woman's vagina.

ANAL INTERCOURSE is when a man's penis is inside his partner's anus or rectum.

Please answer these questions as accurately as you can. Remember, **NO ONE** will ever link your answers with your identity.

112. In your **entire life**, how many people have you had sex with? (Remember, we mean vaginal or anal intercourse.)

- 20 or more people
- 10-19 people
- 5-9 people
- 2-4 people
- 1 person
- I have never had sex

113. When was the **last** time you had sex?

- During the past 30 days
- More than 1 month ago but within the past 6 months
- More than 6 months ago but within the past 12 months
- More than 12 months ago but within the past 2 years
- More than 2 years ago
- I have never had sex

114. The **last** time you had sex, did you or your partner use a condom?

- Yes
- No
- I have never had sex

115. In the **past 12 months**, how many people have you had sex with? (Remember, we mean vaginal or anal intercourse.)

- 20 or more people
- 10-19 people
- 5-9 people
- 2-4 people
- 1 person
- I did not have sex in the past 12 months

116. In the **past 12 months**, about how often did you or your partner(s) use a condom when you had sex with someone on an **on-going basis**, such as your spouse, a girlfriend, or boyfriend?

- Every time
- Most of the time
- About half of the time
- Hardly any of the time
- I had sex with someone on an on-going basis in the past 12 months, but never used a condom
- I did not have sex with someone on an on-going basis in the past 12 months
- I never had sex with someone on an on-going basis in my entire life

117. In the **past 12 months**, about how often did you or your partner(s) use a condom when you had sex with a **casual partner**—that is, someone you **know** and have sex with occasionally?

- Every time
- Most of the time
- About half of the time
- Hardly any of the time
- I had sex with a casual partner in the past 12 months, but never used a condom
- I did not have sex with a casual partner in the past 12 months
- I never had sex with a casual partner in my entire life

118. In the **past 12 months**, about how often did you or your partner(s) use a condom when you had sex in a **one-time encounter**—that is, someone you had sex with once and don't plan to have sex with again?

- Every time
- Most of the time
- About half of the time
- Hardly any of the time
- I had sex in a one-time encounter in the past 12 months, but never used a condom
- I did not have sex in a one-time encounter in the past 12 months
- I never had sex in a one-time encounter in my entire life

119. In the **past 12 months**, did you have a sexually transmitted disease, such as gonorrhea, syphilis, chlamydia, or genital herpes?

- Yes
- No

120. In your **entire life**, have you ever had a sexually transmitted disease, such as gonorrhea, syphilis, chlamydia, or genital herpes?

- Yes
- No

121. How likely do you think it is that a person will get AIDS or the AIDS virus infection from the following:

(Darken one circle on each line)

	Very Likely	Somewhat Likely	Somewhat Unlikely	Very Unlikely	Definitely Not Possible	Don't Know
Working in an office with someone who has the AIDS virus?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eating in a restaurant or dining facility where the cook has the AIDS virus?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing plates, forks, or glasses with someone who has the AIDS virus?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sharing a barracks, room, or other living quarters with someone who has the AIDS virus?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The following question deals with gambling, placing bets, or playing games for money. This would include buying lottery tickets or taking part in a sport pool.

122. The following statements describe some things connected with placing bets or gambling that happen to people. Please indicate whether any of these things has ever happened to you.

(Darken one circle on each line)

	Yes	No
You found yourself more and more preoccupied with gambling	<input type="radio"/>	<input type="radio"/>
You needed to gamble with more and more money to achieve the excitement you desired	<input type="radio"/>	<input type="radio"/>
You felt restless or irritable when you were unable to gamble, or when you tried not to gamble	<input type="radio"/>	<input type="radio"/>
You found yourself gambling to escape from problems	<input type="radio"/>	<input type="radio"/>
After losing money gambling, you went back another day to try to win back your money	<input type="radio"/>	<input type="radio"/>
You lied to your family, employer, or other important people in your life to hide the extent of your gambling	<input type="radio"/>	<input type="radio"/>
You jeopardized or lost relationships, a job, school opportunities, or career opportunities because of gambling	<input type="radio"/>	<input type="radio"/>
Someone provided you with money to relieve a desperate financial situation caused by gambling	<input type="radio"/>	<input type="radio"/>

This next set of questions deals mainly with your length of service, military job, and recent duty assignments.

123. As of today, how many months have you been assigned to your present permanent post, base, ship, or duty station? (Include any extension of your present tour. Do not count previous tours at the duty station.)

- 1 month or less
- 2-3 months
- 4-6 months
- 7-12 months
- 13-18 months
- 19-24 months
- 25-36 months
- More than 3 years

124. How long have you been on active duty? If you had a break in service, count current time and time in previous tours, but not time during the break in service.

For partial year periods of less than 6 months, round down to the last full year of service. For partial year periods of 6 months or more, round up to the next year.

- Enter the number of years in the "Years" boxes. Use both boxes. Write ONE number in each box.
- If you have been on active duty for less than 6 months, enter "00" in the "Years" boxes.
- Then, darken the matching circle below each box.

YEARS

125. During the past 30 days, how many days were you on official leave? (Do not include overnight pass, 3-day pass, shore leave, or liberty.)

DAYS

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

- Use both boxes. Write ONE number in each box.
 - Then, darken the matching circle below each box.
- I had no official leave in the past 30 days.

126. During the past 30 days, how many full 24-hour days were you deployed at sea or in the field?

DAYS

0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

- Use both boxes. Write ONE number in each box.
 - Then, darken the matching circle below each box.
- I was not deployed in the past 30 days.

127. Think about the last time you were deployed at sea or in the field for 24 hours or more. When did your last deployment end?

- Never deployed at sea or in the field
- 1-7 days ago
- 8-13 days ago
- 2-4 weeks ago
- 5-7 weeks ago
- 2-3 months ago
- 4-6 months ago
- 7-12 months ago
- More than 1 year ago

128. During the past 30 days, how much of the time did you work in jobs outside your current primary MOS/PS/Rating/Designator/AFSC?

- All of the time
- Most of the time
- About half of the time
- Some, but less than half of the time
- None of the time

129. What is the ZIP code or APO or FPO number for the post, base, ship, or other duty station where you spent most of your duty time during the past 12 months?

ZIP/APO/FPO

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

- First, enter the ZIP/APO/FPO number in the boxes. Use all five boxes. Write ONE number in each box.
- Then, darken the matching circle below each box.

130. Which of the following categories best describes your military job? (If you need to, please refer to the handout giving examples for different job categories.) (Darken only one circle)

ENLISTED

- Infantry, Gun Crew, or Seamanship Specialist
- Electronic Equipment Repairman
- Communications or Intelligence Specialist
- Health Care Specialist
- Other Technical or Allied Specialist
- Functional Support and Administration
- Electrical/Mechanical Equipment Repairman
- Craftsman
- Service and Supply Handler
- Non-Occupational

OFFICER

- General Officer or Executive
- Tactical Operations Officer
- Intelligence Officer
- Engineering or Maintenance Officer
- Scientist or Professional (not involved with health care)
- Health Care Officer
- Administrator
- Supply, Procurement, or Allied Officer
- Non-Occupational

131. All in all, how satisfied or dissatisfied are you with your work assignment?

- Very satisfied
- Satisfied
- Dissatisfied
- Very dissatisfied

- If you are **FEMALE**, PLEASE GO TO QUESTION 134.
- **MALES**, PLEASE CONTINUE WITH QUESTION 132.

MALES

132. In the **past 12 months**, about how often did you examine your testicles for lumps?

- More than once a month
- About once a month
- Every other month or so
- 3-5 days in the past 12 months
- Once or twice in the past 12 months
- Never in the past 12 months

133. Have you **ever** received information or instruction on how to examine your testicles for lumps?

- Yes
- No

FEMALES

134. When was the **last** time you had a Pap test or Pap smear to check for cancer of the cervix?

- Within the past year
- More than 1 year ago but within the past 2 years
- More than 2 years ago but within the past 3 years
- More than 3 years ago
- Don't know/don't remember
- Never had a Pap test

135. Have you had a hysterectomy, or operation to remove your uterus?

- Yes
- No

136. In the **past 12 months**, how much stress did you experience as a woman in the military?

- A great deal
- A fairly large amount
- Some
- A little
- None at all

137. To the best of your knowledge, when was the **last** time you were pregnant?

- Currently pregnant
- May be pregnant now, but don't know for certain
- Within the past year but not now
- More than 1 year ago but within the past 2 years
- More than 2 years ago but within the past 5 years
- More than 5 years ago
- Have never been pregnant

MALES PLEASE STOP HERE.

PLACE THE QUESTIONNAIRE IN THE BOX AS YOU LEAVE THE ROOM. THANK YOU FOR YOUR TIME AND COOPERATION.

FEMALES, PLEASE CONTINUE WITH THE NEXT QUESTIONS ON PAGE 24

The next set of questions refers to the last time you were pregnant. If you are currently pregnant, please answer these questions for this pregnancy. "Pregnancy checkups" refer to checkups for weight, blood pressure, physical exams, procedures such as ultrasound, or other medical procedures related to pregnancy.

138. Think about your last pregnancy (or your current pregnancy). How long after you became pregnant did you have your first pregnancy checkup?

- Within the first 3 months after becoming pregnant
- 4-6 months after becoming pregnant
- More than 6 months after becoming pregnant
- Did not have any pregnancy checkups, or have not had first checkup
- Have never been pregnant

139. During your last pregnancy (or your current pregnancy), about how often did you smoke a cigarette, even if one or two puffs?

- Daily
- Almost daily, or 3-6 days a week
- 1-2 days a week
- Several times a month (but less than once a week)
- Once a month or less (but at least once)
- Never smoked cigarettes during last (or current) pregnancy
- Never been pregnant

140. On those days when you smoked cigarettes during your last pregnancy (or your current pregnancy), how many cigarettes would you usually smoke?

- About 2 or more packs (more than 35 cigarettes)
- About 1½ packs (26 to 35 cigarettes)
- About 1 pack (16-25 cigarettes)
- About ½ pack (6-15 cigarettes)
- 1-5 cigarettes
- Less than 1 cigarette, on the average
- Never smoked cigarettes during last (or current) pregnancy
- Never been pregnant

[Please continue with Question 141]

141. During your last pregnancy (or your current pregnancy), about how often did you drink alcoholic beverages (i.e., beer, wine, or liquor)?

- Daily
- Almost daily, or 3-6 days a week
- 1-2 days a week
- Several times a month (but less than once a week)
- Once a month or less (but at least once)
- Never drank alcohol during last (or current) pregnancy
- Never been pregnant

142. On those days when you drank alcoholic beverages during your last pregnancy (or your current pregnancy), how many drinks would you usually have?

- 5 or more drinks
- 4 drinks
- 3 drinks
- 2 drinks
- 1 drink
- Less than 1 drink, on the average
- Never drank alcohol during last (or current) pregnancy
- Never been pregnant

THANK YOU VERY MUCH FOR YOUR TIME, EFFORT, AND COOPERATION IN COMPLETING THIS QUESTIONNAIRE.

PLEASE PLACE THE QUESTIONNAIRE IN THE BOX AS YOU LEAVE THE ROOM.

FSU			
THIS BLOCK FOR OFFICE USE ONLY	1	2	3
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	9	0	1
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