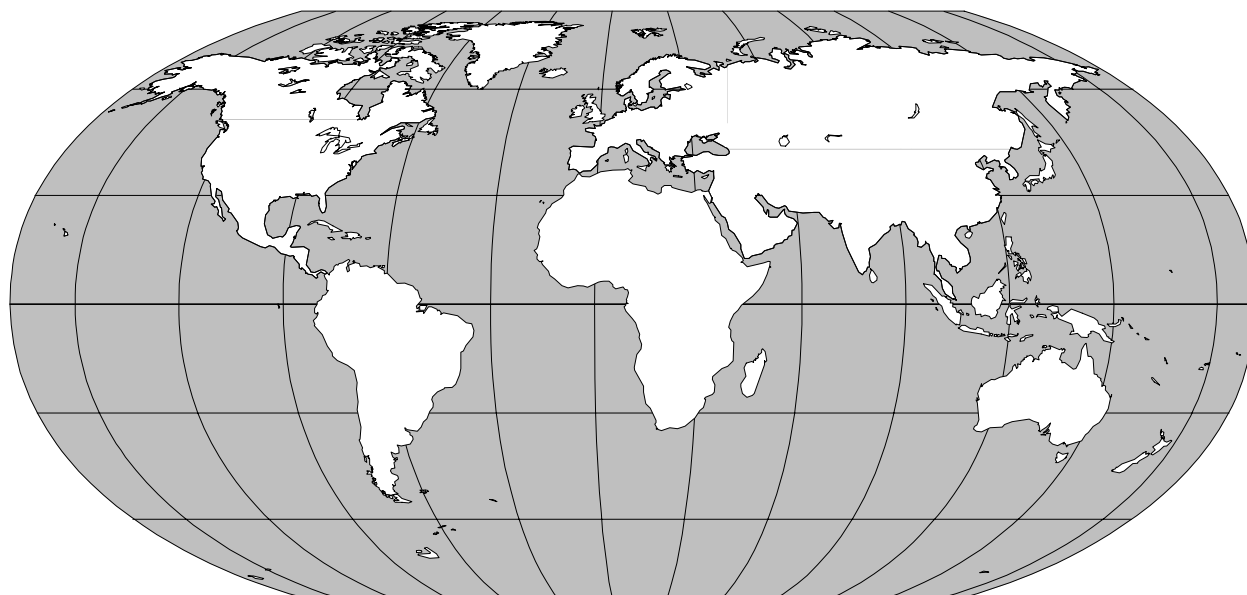


2002 Department of Defense Survey of Health Related Behaviors Among Military Personnel



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This report has been prepared for the Assistant Secretary of Defense (Health Affairs) under Cooperative Agreement No. DAMD17-00-2-0057 by RTI International,* P.O. Box 12194, Research Triangle Park, North Carolina 27709 (Phone: 919-541-6433). 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.

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PREFACE AND ACKNOWLEDGMENTS

The 2002 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel was conducted by RTI International under the sponsorship of the Office of the Assistant Secretary of Defense (Health Affairs). The survey is the eighth in a series of DoD surveys conducted since 1980 and has three broad aims: (a) to continue the survey of substance use among active-duty military personnel, (b) to assess progress toward selected *Healthy People 2000* objectives for active-duty military personnel, and (c) to provide baseline data regarding progress toward selected *Healthy People 2010* 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 to Ms. Kim Frazier, Lieutenant Colonel Michael Hartzell, Lieutenant Colonel Tom Williams, and Dr. Michael Peterson, 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 Colonel Regina Curtis for the Army, Mr. Linden Butler and Mr. William Flannery for the Navy, Lieutenant Danisha Robbins and Mr. Cruz Martinez for the Marine Corps, and Dr. Paul DiTullio and Mr. Charlie Hamilton for the Air Force. We also gratefully acknowledge the efforts of Mr. Robert Hamilton, Ms. Carole Massey, and Ms. Sue Reinhold of the Defense Manpower Data Center for constructing the installation-level sampling frame, selecting the sample of military personnel, and relaying current military population counts used for the analysis weights. 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 and Dr. Charlene Lewis of the Substance Abuse and Mental Health Services Administration, Office of Applied Studies, provided access to the data from the 2001 National Household Survey on Drug Abuse to enable military and civilian comparisons of substance use. Under subcontract to RTI, Pearson NCS 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, Amy Vincus coordinated questionnaire development,

Mr. Russ Vandermaas-Peeler led the data collection task, and Ms. Antonieta Diaz coordinated day-to-day activities with the field sites. Ms. Kristine Rae oversaw all data management activities, and Ms. Jill Dever led the sampling and weighting tasks. Dr. Jun Liu and Mr. Doug Kendrick played a key role in developing the sample allocation methodology. Mr. Luhua Zhao provided invaluable statistical programming support. Ms. Lily Trofimovich assisted in constructing the analysis weights; Ms. Dever, Mr. Zhao, and Ms. Ruby Johnson performed data imputations, analysis variable construction, and tabulations. Dr. Laurel Hourani had major responsibility for the analyses. Members of the RTI field teams are commended for accomplishing their data collection tasks under rigorous travel and scheduling demands. Finally, thanks are due to Ms. Wallace Campbell, who copyedited and proofread the report; Ms. Catherine Boykin, Ms. Linda Fonville, Ms. Keri Kennedy, Ms. Terri Kissiah, and Ms. Roxanne Snaauw, who completed the enormous word processing requirements; and Ms. Diane Caudill and Ms. Sharon Davis, who provided graphics support.

Robert M. Bray, Ph.D.
Project Director

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EXECUTIVE SUMMARY

This report presents the primary results of the 2002 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel. This study is the eighth in a series of surveys of active-duty military personnel conducted in 1980, 1982, 1985, 1988, 1992, 1995, 1998, and 2002 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 2002 survey continued the focus of the 1998 survey and expanded it to include *Healthy People 2010* objectives. It also augmented the items on nutrition and mental health and added new items on supplement use, risk taking and impulsive behavior, job satisfaction, and religiosity/spirituality.

The eligible population for the 2002 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 12,756 military personnel (3,269 Army, 3,625 Navy, 3,008 Marine Corps, and 2,854 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; they were obtained by mail for those not attending the sessions. The overall response rate was 56%. The data were weighted to represent all active-duty personnel. Some of the key findings from the 2002 survey are noted below.

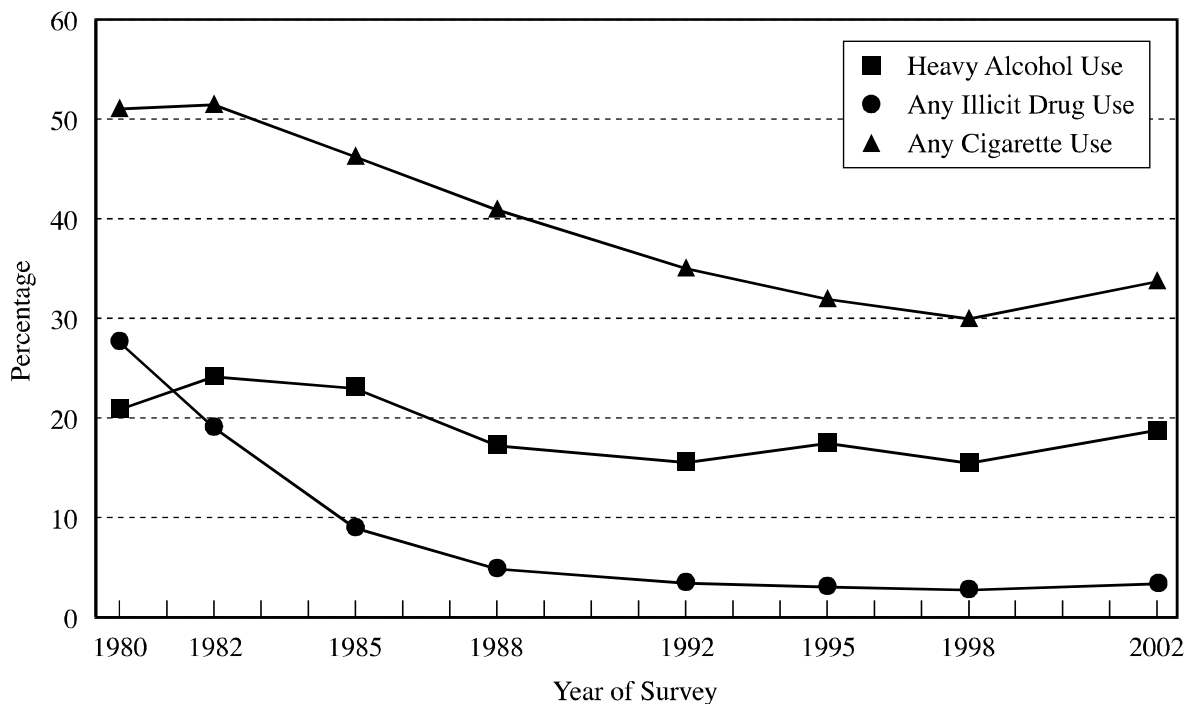
Substance Use and Negative Effects

Overall Trends

The 2002 survey obtained data on alcohol, tobacco, and illicit drug use to assess prevalence rates of the use of these substances among military personnel. These data were combined with data from prior surveys to examine trends in substance use and negative effects of alcohol use from 1980 to 2002. 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, there has been a statistically significant downward trend in past month use of cigarettes and illicit drugs from 1980 to 2002 for the total DoD. Cigarette smoking decreased from 51.0% in 1980 to 33.8% in 2002, and use of any illicit drugs declined from 27.6% in 1980 to 3.4% in 2002. In contrast, the change for heavy alcohol use (five or more drinks per typical drinking occasion at least once a week) from 20.8% in 1980 to 18.1% in 2002 was not statistically significant.

Figure ES.1 Trends in Substance Use, Past 30 Days, Total DoD, 1980-2002



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 to 2002 (2002 Questions: Heavy Alcohol Use, Q15-Q18 and Q20-Q23; Any Illicit Drug Use, Q60 and Q62; Any Cigarette Smoking, Q45 and Q47).

- ! Comparisons of findings between the 1998 and 2002 surveys showed statistically significant increases in the rates of heavy alcohol use (15.4% to 18.1%) and cigarette smoking (29.9% to 33.8%) but no statistically significant change for illicit drug use (2.7% to 3.4%) across the total DoD. In general, all Services showed an upswing in the prevalence of use for all substances between 1998 and 2002, but the only statistically significant increases occurred in the Navy for heavy drinking and illicit drug use and in the Army for cigarette smoking.

Alcohol Use

The following findings are not adjusted for age or other sociodemographic distribution differences among the Services or over time:

- ! Among the Services in 2002, the Marine Corps had the highest prevalence rate of heavy alcohol use (27.7%) and the Air Force had the lowest (12.3%). The rates for the Army (18.8%) and the Navy (18.3%) were similar.
- ! Binge drinking rates (consuming five or more drinks on the same occasion at least once during the past 30 days) were high among military personnel (41.8%) compared with civilians (16.6%) but were similar to rates found among college populations (44.8% in 2001). For most military personnel, binge drinking is a social occasion.

- ! Despite the lack of change in heavy alcohol use over the years, the data showed a general shift toward lighter use of alcohol over time. The percentage of people who abstained from alcohol or who were infrequent/light drinkers increased significantly from 25.6% in 1980 to 41.3% in 2002.
- ! Alcohol-related serious consequences declined significantly from 17.3% in 1980 to 6.7% in 1998 and then increased significantly to 9.6% in 2002; productivity loss fell from 26.7% in 1980 to 13.6% in 1998 and then increased significantly to 17.3% in 2002.
- ! A new measure of alcohol dependence used in the 2002 survey indicated that over 12% of military personnel reported symptoms of dependence due to their alcohol use.

Tobacco Use

- ! Cigarette smoking remains a common behavior in one-third of military personnel. The statistically significant increase from 1998 to 2002 in the prevalence of cigarette smoking marks the first increase since 1980 and is of concern in that it signals a change in a pattern of declines that has prevailed for the past 2 decades.
- ! Among past year smokers in 2002, 49% had previously tried to quit, and 10% quit within the past year. Some 35.6% of current smokers indicated that they planned to quit within the next 30 days, and an additional 26.4% reported an intention to quit within the next 6 months.
- ! Overall in 2002, 12.2% of military personnel had used smokeless tobacco in the 30 days prior to the survey, and nearly one in five had used it in the past 12 months. The prevalence rate of past month use among males aged 18 to 24 was 17.1%, a somewhat lower but statistically nonsignificant change from 19.0% in 1998 and 21.9% in 1995.

Military-Civilian Comparisons

Standardized comparisons showed substantial differences between substance use patterns of military personnel and civilians (using data from the 2001 National Household Survey on Drug Abuse) (Office of Applied Studies [OAS], 2002). After adjusting for sociodemographic differences between military and civilian populations:

- ! Military personnel aged 18 to 25 were significantly more likely to engage in heavy drinking than were their civilian counterparts (27.3% vs. 15.3%), whereas personnel aged 26 to 55 showed rates of heavy drinking similar to their civilian counterparts (8.9% vs. 8.0%).
- ! Military personnel were significantly less likely than civilians to have used any illicit drugs in the past 30 days (3.3% vs. 12.1%).
- ! Military personnel were equally likely as civilians to smoke cigarettes in the past 30 days (31.6% vs. 31.1%).

Overall findings indicated that the Military made steady and notable progress during the 22 years from 1980 to 2002 in combating substance use and its associated problems. However, there is room for

considerable improvement in some areas, particularly in reducing heavy alcohol use, binge drinking, cigarette smoking, and smokeless tobacco use.

Progress Toward *Healthy People 2000* and *2010* Objectives

After the publication of *Healthy People 2000* (Public Health Service [PHS], 1991), the DoD identified a subset of objectives of most relevance to the Military. In 2000, *Healthy People 2010* was published and includes goals and objectives for the improved health of the Nation (Department of Health and Human Services [DHHS], 2000). These objectives have, in part, focused attention on specific health-related behavior changes that are desirable to achieve during the present decade. A major aim of the 2002 DoD survey was to provide the end-of-the-decade final measure on progress toward selected *Healthy People 2000* objectives for a variety of health behaviors and to provide baseline data for comparable *Healthy People 2010* objectives. The objectives that were measured were classified into three groups for presentation and discussion:

- ! substance use objectives (cigarette smoking, cigar use, smokeless tobacco use, binge drinking, and illicit drug use)
- ! health promotion objectives (weight, exercise, blood pressure, cholesterol, injuries, seat belt use, helmet use, and condom use)
- ! women's health objectives (Pap smears, substance use during pregnancy)

Table ES.1 summarizes these objectives and the corresponding prevalence rates from the 1995 to 2002 surveys for these behaviors. Key findings are as follows:

- ! Overall in 2002, the Military met or exceeded 7 of the 22 *Healthy People 2000* objectives (strenuous exercise, seat belt use, helmet use for motorcycles, helmet use for bicycles, Pap smears ever received, Pap smears received in the past 3 years, and no alcohol use during pregnancy).
- ! Other objectives have been met by at least some sociodemographic subgroups in the Military, even if not by the entire force; for example, personnel aged 35 or older (but not those younger) exceeded the target of 75% having their cholesterol checked within the preceding 5 years.
- ! Military personnel were within 5 percentage points of reaching the *Healthy People 2000* targets for another 2 of the 22 behaviors (overweight for personnel over age 20, no cigarette use during pregnancy).

Thus, the Military met about a third of the 22 *Healthy People 2000* objectives examined here by the year 2002 and nearly met 2 additional objectives. It has also met 5 of the *Healthy People 2010* objectives (strenuous exercise, seat belt use, helmet use for motorcyclists, Pap smears ever received, Pap smears received in the past 3 years). The areas where objectives have been met are those where military regulations help ensure compliance with the desired behaviors (exercise, seat belt use, helmet use, Pap tests). The largest gaps and greatest challenges will be to meet the objectives for smoking, cigar use,

Table ES.1 Achievement of Selected *Healthy People 2000* and 2010 Health Promotion Objectives, Total DoD, 1995-2002

Characteristic/Group	2000 Objective	2010 Objective	Year		
			1995	1998	2002
Cigarette Smoking, Past 30 Days	≤ 20%	12.0%	31.9	29.9	33.8 ^a
Cigar Use, Past 12 Months	NA	1.2%	18.7	32.6	32.6
Smokeless Tobacco Use, Past 12 Months					
Males, aged 18–24	≤ 4%	NA	21.9	19.0	17.1
All personnel	NA	0.4%	13.2	11.7	12.2
Binge Drinking, Past 30 Days	NA	6.0%	NA	NA	41.8
Any Illicit Drug Use, Past 30 Days	NA	2.0%	3.0	2.7	3.4
Overweight—<i>Healthy People 2000</i> Guidelines					
Under age 20	≤ 15%	NA	19.0	22.9	23.8
Aged 20 or older	≤ 20%	NA	16.7	19.5	24.0 ^a
Healthy Weight—<i>Healthy People 2010</i>					
Aged 20 or older	NA	60.0%	NA	NA	40.7
Strenuous Exercise, Past 30 Days					
All personnel	≥ 20%	≥ 30.0%	65.4	67.7	70.2 ^b
Blood Pressure, Checked Past 2 Years and Know Result					
All personnel	≥ 90%	≥ 95.0%	76.3	80.4	77.9 ^a
Taking Action to Control High Blood Pressure					
Personnel with history of high blood pressure	≥ 90%	≥ 95.0%	49.3	46.5	49.0
Cholesterol Checked, Past 5 Years					
All personnel	≥ 75%	≥ 80.0%	60.1	62.4	56.3 ^a
Hospitalization for Injuries, Past 12 Months					
All personnel	≤ 754 per 100,000	NA	3,388	3,271	3,625
Seat Belt Use					
All personnel	≥ 85%	≥ 92.0%	90.6	91.4	92.1 ^b
Helmet Use, Past 12 Months					
Motorcyclists	≥ 80%	≥ 79.0%	71.0	75.9	82.1 ^{a,b}
Bicyclists	≥ 50%	NA	22.8	44.2	51.9 ^{a,b}
Condom Use at Last Encounter					
Sexually active unmarried personnel	≥ 50%	≥ 50.0%	40.4	41.8	42.1
Pap Smear					
Ever received	≥ 95%	97.0%	97.1	97.8	98.4
Received in past 3 years	≥ 85%	90.0%	95.2	95.9	97.2
Substance Use During Last Pregnancy					
No alcohol use	≥ 88%	94.0%	85.2	85.8	89.9 ^b
No cigarette use	≥ 90%	99.0%	83.9	85.8	88.5

Note: Table entries are percentages (with standard errors in parentheses), except for hospitalization for injuries, which is expressed per 100,000 personnel. NA = not applicable. Definitions and referent items can be found in Tables 3.3 to 3.5.

^aComparisons between 1998 and 2002 are statistically significant at the 95% confidence level.

^bMet or exceeded *Healthy People 2000* objective.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1995 to 2002.

smokeless tobacco use, binge drinking, overweight, controlling high blood pressure, obtaining cholesterol checks, and reducing hospitalization rates for injuries.

Stress and Mental Health

The 2002 DoD survey examined a variety of mental health issues among military personnel, including stress, coping mechanisms, symptoms of anxiety and depression, suicidal ideation, relationships between alcohol use and mental health problems, and perceptions of the potential career impact of mental health counseling.

Stress

- ! Military personnel were more likely to describe their military duties (32.3%) as more stressful than their family or personal lives (18.7%). The most frequently indicated stressors for men were deployment (18.9%) and separation from family (18.7%), whereas the most frequently indicated stressors for women were changes in personal life (21.4%), separation from family (21.2%), and deployment (19.6%).
- ! Personnel who experienced higher levels of stress were more likely than those with lower levels of stress to work below normal performance levels (43.8% vs. 25.0%). In addition, illness, injuries, and accidents in the workplace on 4 or more days in the past year were twice as common among high-stressed personnel (10.7%) than among moderate/low-stressed personnel (4.6%).

Coping

- ! The three most commonly used strategies for coping with stress and feelings of depression or anxiety were thinking of a plan to solve the problem (83.1%), talking to a friend or family member (75.1%), and exercising or playing sports (60.8%). About a quarter of military personnel, however, used alcohol to cope with stress and depression. Men were more likely than women to light a cigarette or have a drink, whereas women were more likely than men to talk to a friend or family member, to say a prayer, or to get something to eat.

Mental Health

- ! Anxiety and depressive symptoms were highest among personnel who were women, had a high school education or less, were younger, were living without a spouse, and were in lower enlisted pay grades. Personnel who met the criterion for needing further anxiety or depression evaluation reported higher levels of stress at work and in their family lives. An estimated 5.1% of all military personnel had considered suicide or self-injury within the year prior to the survey.
- ! Compared with abstainers, heavy users of alcohol had more problems with stress at work (40.1% vs. 29.6%) or in their family (22.3% vs. 16.1%), were more likely to exhibit anxiety symptoms (21.3% vs. 16.6%) and depressive symptoms (26.4% vs. 18.0%), and reported more limitations in activities due to poor mental health (5.9% vs. 3.1%). This finding suggests that there is a strong comorbid relation between heavy alcohol use and mental health problems and that this is an area needing further assessment.

- ! Some 18.7% of personnel had perceived a need for mental health care in the 12 months prior to the survey, and about two-thirds of them received this care. The absence of care may in part be due to concerns among personnel that obtaining mental health counseling would damage their military career (48.8%).

A sizable group experienced problems in the areas of stress and mental health, 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.

Other Specific Issues

The 2002 DoD survey also investigated several other specific issues that may affect the health of the Active 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; (d) gambling, including the prevalence of problem gambling and the relation between problem gambling and alcohol use; and (e) job satisfaction. Overall findings suggest that several of these topics will require further attention in coming years.

Women's Health Issues

- ! Some 41.2% of women reported a "great deal" or a "fairly large amount" of stress associated with being a woman in the Military. Women in the Navy had the highest prevalence rate (49.4%), followed by women in the Army (45.9%), Marine Corps (43.9%), and Air Force (30.6%). Rates were higher among women who were younger, less educated, married without a spouse present, enlisted, and serving in assignments outside the continental United States.
- ! Nearly 90% of military women reported receiving their first prenatal care during their first trimester. First trimester care was less likely among women who were enlisted, were unmarried, were aged 25 or younger, and had less than a college degree.
- ! Some 89.9% of all military women who were pregnant in the past 5 years abstained from alcohol during their most recent pregnancy. Women who drank during pregnancy were more likely to be officers (21.6%) and have a college degree (20.4%). An estimated 88.5% of women reported not smoking cigarettes during their most recent pregnancy. Women who smoked were more likely to be white non-Hispanic (17.2%), to be age 34 or younger (12% to 13%), to have less than a college degree (12% to 13%), and to be enlisted (12.5%).

Men's Health Issues

Cancer of the testicle is the most common cancer in men 15 to 35 years old—a high-risk age cohort among military personnel. The National Cancer Institute indicated that men can improve their chances of finding a tumor by performing a testicular self-examination once a month.

- ! During the 12 months prior to the survey, about 40% of military men examined their testicles for lumps at least once a month; 25% had never examined their testicles for

lumps in the past 12 months. About 62% of men had received information or instruction on testicular self-examination.

Oral Health

- ! An estimated 89.7% of all military personnel had received a dental check-up in the past 12 months. Some 34.0% were required to get dental work done in the past 12 months before they could be deployed at sea or in the field, a figure notably higher than the 16.0% required to have dental work before deployment in the 1998 survey. 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 (32.0%), not being able to get an appointment with a military dentist (30.0%), and disliking going to the dentist (29.3%).

Gambling

- ! For the total DoD, 6.3% of personnel had experienced at least 1 of 10 gambling-related problems in their lifetime, 2.3% experienced at least 3 of these problems, and 1.2% had 5 or more gambling-related problems, suggestive of probable pathological gambling. The prevalence rates of gambling problems overall were similar to those seen previously in 1998 and 1992.
- ! Probable pathological gambling problems appeared to be related to alcohol use and alcohol-related problems. Heavy drinkers had the highest rate of having five or more gambling-related problems (5.1%). Similarly, having five or more gambling problems was related to serious consequences (8.5%), dependence symptoms (7.4%), and productivity loss due to alcohol use (5.8%).

Job Satisfaction

- ! Overall, 65.3% of military personnel indicated they were either “satisfied” or “very satisfied” with their current work assignment. Satisfaction was highest in the Air Force (72.0%) and lowest in the Army (60.9%). Males and females indicated similar job satisfaction. Officers were more satisfied than enlisted personnel.

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 this 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 in the early 21st century.

1. INTRODUCTION AND BACKGROUND

In this report, we present findings from the 2002 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel, conducted by RTI International of Research Triangle Park, North Carolina. We describe trends in substance use since 1980, health behaviors related to selected *Healthy People 2000* and *2010* objectives (Public Health Service [PHS], 1991; Department of Health and Human Services [DHHS], 2000), 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, pipes, and cigars).

This study is the eighth in a series of surveys of military personnel across the world conducted in 1980, 1982, 1985, 1988, 1992, 1995, 1998, and 2002 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. The 2002 survey has been revised to reflect the continuing need for the Services to better understand substance use and mental health issues. Specifically, we broadened the assessment of alcohol dependence to reflect symptomatology consistent with diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* (American Psychiatric Association [APA], 1994), and we added items to assess selected *Healthy People 2010* objectives, risk taking and impulsiveness, reasons for limiting drinking, expectancies and/or beliefs about smoking, anxiety, suicide ideation, and spiritual practices.

In this chapter, we discuss the relevance of health promotion to the Military, provide background on the DoD survey series, describe objectives for the 2002 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 2002. We describe the general methodology for the 2002 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 DoD-level findings for selected *Healthy People 2000* and *2010* objectives. Trend analyses presented in Chapter 3 compare findings from the 2002 DoD survey with findings from the seven 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 7 examines health behavior and health promotion, including behaviors related to fitness and cardiovascular disease risk reduction, injuries and injury prevention, and sexually transmitted disease (STD) risk reduction. Included is an assessment of progress toward *Healthy People 2000* and *2010* objectives for 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 focuses on sources of stress and coping mechanisms, symptoms of anxiety and depression, suicidal ideation, and relations 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 screening 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 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 2002 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 2002 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 chronic diseases. For example, nearly two-thirds of all deaths in the United States in 2000 were caused by heart disease, cancer, and stroke; unintentional injuries were the fifth leading cause of death in the United States in 2000, after heart disease, cancer, stroke, and chronic lower respiratory

diseases, such as bronchitis and emphysema (Minino & Smith, 2001). In 2000, among adolescents and young adults aged 15 to 24, however, unintentional injuries were reported as the leading cause of death, followed by homicides and suicides (Minino & Smith, 2001).

In 2000, human immunodeficiency virus (HIV) infections fell to 18th among the leading causes of death for all persons; for adolescents and young adults, HIV was the 10th leading cause of death (Minino & Smith, 2001). 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 (Centers for Disease Control and Prevention [CDC], 1997c). Even though the death rate from AIDS is decreasing, the number of people infected with the AIDS virus is not, indicating a need to strengthen prevention efforts.

Although 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 most important preventable cause of death and disease in the United States (Office on Smoking and Health, 1989). More than one in four 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 eighth leading cause of death among persons aged 18 to 65 in 2000 (Minino & Smith, 2001). In 2001, alcohol was also involved in about 41% 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 (National Highway Traffic Safety Administration [NHTSA], 2002).

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, 1993, 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 composed 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 and grounds for dismissal from service. 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 mid-1980s. In the remainder of this chapter, we briefly describe DoD health promotion policies and discuss health objectives for the Nation and the Military and their relevance to the 2002 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 (Directive No. 1010.2 [DoD, 1972]) that set forth prevention and treatment policies for alcohol abuse and alcoholism among military personnel. Other DoD policy directives (e.g., DoD Directive Nos. 1010.3 and 1010.4 and Instruction Nos. 1010.5 and 1010.6 [DoD, 1985b, 1980a, 1980b, 1985a, respectively]) 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)
- ! 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 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 presented to 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). Personnel are prohibited from smoking during basic training and, in some Services, during part of their next phase of technical or advanced training. 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 [DoD, 1991]). 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.

After the publication of *Healthy People 2000* (PHS, 1991), the DoD identified a subset of objectives of most relevance to the Military. In 2000, *Healthy People 2010* was published and includes goals and objectives for the improved health of the Nation (DHHS, 2000). 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, Healthy People 2010, 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 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 *Healthy People 2010: Understanding and Improving Health* (DHHS, 2000).

The purpose of *Healthy People 2000*, which set out health objectives to be achieved by the year 2000, was 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
- ! achieve access to preventive services for all Americans

Healthy People 2010 aims to continue to improve the health of individuals, communities, and the Nation through the following two goals:

- ! increase the quality and years of healthy life for all Americans
- ! eliminate health disparities among segments of the population

Responding effectively to the health challenges of the 21st century 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 28 focus areas, broadly grouped into four categories (health promotion, health

protection, preventive services, and surveillance and data systems) based on *Healthy People 2000*, as follows:

- ! Health Promotion
 - 1. Physical Activity and Fitness
 - 2. Nutrition and Overweight
 - 3. Substance Abuse
 - 4. Injury and Violence Prevention
 - 5. Family Planning
 - 6. Mental Health and Mental Disorders
 - 7. Tobacco Use
 - 8. Educational and Community-Based Programs

- ! Health Protection
 - 9. Environmental Health
 - 10. Occupational Safety and Health
 - 11. Medical Product Safety
 - 12. Food Safety
 - 13. Oral Health

- ! Preventive Services
 - 14. Maternal and Infant Health
 - 15. Heart Disease and Stroke
 - 16. Cancer
 - 17. Diabetes
 - 18. Chronic Kidney Disease
 - 19. Disability and Secondary Conditions
 - 20. HIV Infection
 - 21. Sexually Transmitted Diseases
 - 22. Immunization and Infectious Diseases
 - 23. Clinical Preventive Services
 - 24. Respiratory Diseases
 - 25. Vision and Hearing

- ! Surveillance and Data Systems
 - 26. Access to Quality Health Services
 - 27. Health Communication
 - 28. Public Health Infrastructure

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 is noted. The key to the effort is a set of 467 measurable national health objectives for reducing preventable death, disease, and disability.

Healthy People 2000 called for individuals, families, communities, health professionals, the media, and government to share the responsibility to improve the Nation's health profile. *Healthy People 2010* 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 1.3, 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 2002 survey will assess how well the *Healthy People 2000* objectives were met and also serve as a baseline measure for *Healthy People 2010* 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* and *Healthy People 2010* objectives examined through the 2002 DoD survey include the following:

- ! Reduce the prevalence of cigarette smoking among military personnel for persons aged 18 or older (2000 objective: 20% or less; 2010 objective: 12%).
- ! Reduce cigar use among adults (2010 objective: 1.2%).
- ! Reduce smokeless tobacco use (2000 objective: 4% or less by males aged 24 or younger; 2010 objective: 0.4% for all personnel).
- ! Reduce binge drinking among adults (2010 objective: 6.0%).

- ! Reduce illicit drug use, past 30 days among adults (2010 objective: 2.0%).
- ! Reduce overweight, as measured by the Body Mass Index (BMI) (2000 objective: 15% or less among people under age 20, and 20% or less among people aged 20 or older).
- ! Increase healthy weight as measured by BMI (2010 objective: 60% for persons aged 20 or older).
- ! Increase 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 (2000 objective: 20% or more; 2010 objective: 30% or more).
- ! Increase 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 (2000 objective: 90% or more; 2010 objective: 95% or more).
- ! Increase the proportion of people with high blood pressure who are taking action to help control their blood pressure (2000 objective: 90% or more; 2010 objective: 95% or more).
- ! Increase the proportion of adults who had their blood cholesterol checked within the preceding 5 years (2000 objective: 75% or more; 2010 objective: 80% or more).
- ! Reduce nonfatal unintentional injuries that require hospitalization (2000 objective: no more than 754 per 100,000 people).
- ! Increase the use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats (2000 objective: 85% or more of motor vehicle occupants; 2010 objective: 92% or more).
- ! Increase the use of helmets by motorcyclists and bicyclists (2000 objective: 80% or more for motorcyclists, 50% or more for bicyclists; 2010 objective: 79% or more for motorcyclists).
- ! Increase the proportion of sexually active, unmarried people who used a condom at last sexual intercourse (2000 and 2010 objective: 50% or more).
- ! Increase the proportion of women aged 18 or older with an intact uterine cervix who have ever received a Pap test (2000 objective: 95% or more; 2010 objective: 97% or more) and the proportion of those who received a Pap test within the preceding 3 years (2000 objective: 85% or more; 2010 objective: 90% or more).
- ! Increase abstinence from alcohol during pregnancy (2000 objective: 88%; 2010 objective: 94%).
- ! Increase abstinence from tobacco use during pregnancy (2000 objective: 90% or more; 2010 objective: 99% or more).

The 2002 DoD survey provides measures of progress for *Healthy People 2000* objectives since 1998, when the last DoD survey was conducted, and serves as a baseline year for *Healthy People 2010* objectives.

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, 1995, and 1998 surveys, as well as the current 2002 survey that is the topic of this report, were conducted by Research Triangle Institute (Bray et al., 1983, 1986, 1988, 1992, 1995b, 1999). All eight 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 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., 1995b). 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
- ! to establish baseline data to assess progress toward selected *Healthy People 2000* objectives

The 1998 survey also maintained a focus on health promotion and continued to place an emphasis on assessing *Healthy People 2000* objectives (Bray et al., 1999):

- ! 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
- ! where appropriate, to compare health behavior data between 1995 and 1998

1.4 Overview and Objectives of the 2002 DoD Survey

In keeping with the broad aims of the 1998 survey, major objectives of the 2002 survey were as follows:

- ! to assess the health behaviors of Service members with regard to smoking, fitness, diet, and other health behaviors
- ! to describe the prevalence of substance use (alcohol, illicit drugs, and tobacco) among military personnel

- ! to identify the physical and social effects and the consequences on work of substance use and high-risk behavior
- ! to identify the sociodemographic and behavioral characteristics of substance users, including rank/pay grade, branch of Service, social and family climate, and reported reasons for using, not using, or discontinuing use
- ! to compare reported drug and alcohol use and smoking habits in 2002 with prior survey results and with comparable civilian populations
- ! to assess the extent of pathological gambling in the Military
- ! to assess the degree to which active-duty members perceive organizational or cultural barriers to receiving health care treatment from traditional sources to address their behavioral health problems or concerns
- ! to estimate the difference between the observed demand for mental health services in military treatment facilities and the latent demand identified through self-reported levels of distress or visits made to address mental health concerns outside of the military health system (either to traditional mental health providers outside of the on-base, military treatment facility—a medical clinic or hospital—or to nontraditional care providers, such as chaplains)

Thus, this report for the 2002 survey continues to provide estimates of the use of alcohol, illicit drugs, and cigarettes among military personnel, 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 2002 survey also included more detailed questions about mental health services. Specifically, the questionnaire contained questions about receipt of mental health services within and outside the Military. We have also included a measure of the unmet need for mental health services.

Finally, the 2002 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-examination and receipt of information about self-examination because testicular cancer is the most common cancer found among non-Hispanic white men aged 20 to 34 (National Cancer Institute [NCI], 1999a, 1999b; Ries, Kosary, Hankey, Miller, & Edwards, 1998). Also, the survey included questions concerning perceptions of barriers to receiving health care services.

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 (MTF) 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 2002 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, 1995b, 1999; Bray, Kroutil, & Marsden, 1995a; Kroutil, Bray, & Marsden, 1994) indicate steady and notable reductions in overall alcohol use, illicit drug use, and cigarette smoking. However, the DoD made less progress in reducing heavy drinking; almost one in six active-duty personnel reported being heavy drinkers in 1998. Although the prevalence of heavy alcohol use declined from 1980 to 1998, this decline could largely be explained by changes in the sociodemographic composition of the Military since 1980. Detailed findings on substance use and negative effects of substance use are described by Bray et al. (1995a, 1999). Specific highlights related to substance use among military personnel are noted below:

- ! Comparisons of findings across the survey series demonstrate a significant downward trend in the use of alcohol, illicit drugs, and cigarettes since 1980. For the total population, heavy drinking declined from 20.8% in 1980 to 15.4% in 1998; use of any illicit drugs declined from 27.6% in 1980 to 2.7% in 1998; and cigarette smoking decreased from 51.0% in 1980 to 29.9% in 1998 for the 30-day period prior to the date the survey was conducted.
- ! Declines also were seen in the overall use of alcohol, as measured by average daily consumption of ethanol. However, the prevalence of heavy drinking (defined as having five or more drinks per typical occasion at least once a week) remained problematic. As noted above, nearly one in six military personnel in 1998 engaged in heavy drinking. Further, much of the observed decline in heavy drinking from 20.8% in 1980 to 15.4% in 1998 could be attributed to changes in the sociodemographic composition of the Military since 1980. The Military in recent years has become older, better educated, and more likely to be married, factors all associated with lower rates of substance use.
- ! Between the 1995 and 1998 surveys, decreases in the rates of illicit drug use, heavy alcohol use, and cigarette smoking among military personnel were not statistically significant. In 1998, 2.7% were current illicit drug users, 15.4% were heavy drinkers, and 29.9% were current cigarette smokers, whereas in 1995 3.0% used illicit drugs, 17.4% drank heavily, and 31.9% smoked in the month before the survey.¹

¹Current cigarette smoking was defined as (a) having smoked 100 or more cigarettes in the lifetime, and (b) smoking 1 or more cigarettes in the 30 days prior to the survey.

- ! Significant declines since 1980 were found in the percentage of military personnel experiencing serious alcohol-related consequences, productivity loss, and symptoms of dependence. Serious consequences declined from 17.3% in 1980 to 6.7% in 1998, productivity loss from 26.7% in 1980 to 13.6% in 1998, and symptoms of dependence from 8.0% in 1980 to 4.8% in 1998.
- ! Overall in 1998, 11.7% of military personnel were current smokeless tobacco users.² Rates of current smokeless tobacco use were higher among military men (13.4%) than among military women. Use was highest among men in the Marine Corps (20.3%) and lowest among men in the Air Force (8.9%). Use among men was also inversely related to age, being highest among men aged 18 to 24 (19.0%) and lowest among men aged 35 or older (5.3%).
- ! Standardized comparisons that adjusted for sociodemographic differences among military personnel in 1998 and civilians in 1997 (the most recent civilian data available from the Office of Applied Studies [OAS, 1999]) showed notable variation in the substance use patterns between these two populations. Military personnel were significantly more likely to drink heavily than were their civilian counterparts (14.2% vs. 9.9%), significantly less likely than civilians to use any illicit drugs in the past 30 days (2.6% vs. 10.7%), and significantly less likely to be current cigarette smokers (29.1% vs. 32.8%).

As noted above, the 1995 DoD survey data provided baseline measures of selected *Healthy People 2000* objectives, and the 1998 DoD survey provided data to assess change in those baselines among military personnel 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.

In 1998, highlights of progress toward the *Healthy People 2000* objectives included the following:

- ! The rate of cigarette use among military personnel (29.9%) was still considerably above the objective of reducing the prevalence of cigarette smoking among military personnel 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 no more than 4% for males aged 24 or younger.
- ! Overall, the Military had met or exceeded 5 of the 17 targets examined (overweight for personnel aged 20 or older, strenuous exercise, seat belt use, Pap tests ever received, and Pap tests received in the past 3 years).
- ! Other targets had been met by at least some sociodemographic subgroups in the Military, even if not by the entire force. For example, the objective of 75% of people having had their cholesterol checked in the past 5 years had not been reached among younger personnel (aged 25 to 49) but had been achieved by those aged 50 or older in all Service branches.

²Current smokeless tobacco use was defined as having used smokeless tobacco (a) at least 20 times in the lifetime, and (b) 1 or more times in the 30 days prior to the survey.

- ! 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 checked in past 2 years and knowing the result, helmet use for motorcyclists, helmet use for bicyclists, condom use, no alcohol use during pregnancy, and no cigarette use during pregnancy).
- ! The percentage of personnel with a history of high blood pressure who were taking action (i.e., taking medication, dieting, cutting down on salt intake, exercising) to control their blood pressure (46.5%) was considerably lower than the *Healthy People 2000* objective of at least 90%. Among personnel who had a greater likelihood of being currently hypertensive, the percentage who were taking action to control their blood pressure (54.0%) was still considerably lower than the target of 90%.
- ! The rate of hospitalization for injuries in the past 12 months (approximately 3,271 per 100,000 personnel) was more than four times higher than the targeted rate of 754 per 100,000 personnel.

Thus, the Military progressed by 1998 in a number of areas but faced considerable challenges in meeting the targets in all areas by the year 2000. Targets were met where military regulations helped ensure compliance with the desired behaviors (e.g., weight control, exercise, seat belt use, and Pap tests). Achieving targets in areas dependent on individual initiative and behavior modification posed a greater challenge. The most demanding objectives to meet were those for smoking, smokeless tobacco, blood pressure screening, controlling high blood pressure, reducing injuries that require hospitalization, and increasing helmet use by bicyclists.

The Military will need to maintain its *Healthy People 2000* achievements while focusing attention on the new targets set forth by *Healthy People 2010*.

1.5.2 Civilian Population Studies

As with 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 (OAS, 1998b).

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 2001 NHSDA (OAS, 2002), the MTF study of high school seniors and young adults (Johnston, O'Malley, & Bachman, 1998a, 1998b; University of Michigan, 2003), and the NHIS (CDC, 2002) include the following:

- ! In 2001, about 5.7% of the civilian population were heavy drinkers (OAS, 2002). Approximately 13.6% of young adults aged 18 to 25 in 2001, 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 (CDC, 2002).

- ! Trend data on illicit drug use from the NHSDA (OAS, 2002) indicate that use of illicit drugs among the civilian population generally peaked during the late 1970s, declined through 1992, and remained relatively stable through 2002. Although trend data indicate declines since the late 1970s, the 2001 data indicate a slight increase in illicit drug use. About 12.6% of the 2002 U.S. civilian, noninstitutionalized population aged 12 or older, or roughly 28 million civilian Americans, used at least one illicit drug in the past year.
- ! According to the 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 2002 (University of Michigan, 2003). 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-fifth (21.5%) of 12th graders had used marijuana in the past 30 days, up from 15.5% in 1993 (Johnston et al., 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 2001 NHSDA indicate an increase in the prevalence of past month marijuana use among youths aged 12 to 17, from 9.7% in 2000 to 10.8% in 2001 (OAS, 2002).
- ! 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), and data for 2001 indicate a continuing decline in smoking among adults to 22.5%.
- ! 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 2001, the prevalence of smoking declined such that 25.2% of men and 20% of women were current smokers in 2001 (CDC, 2002).
- ! 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 2001, about 19% of the household population aged 12 or older had ever used smokeless tobacco (4.3% in the past year and 3.2% in the past month) (OAS, 2002).

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 sociodemographic differences. For example, as shown in this 2002 report and the past two reports in the DoD series, approximately 85% of the Military in the 1990s was male (Bray et al., 1992, 1995b, 1999). 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 with 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 sociodemographic 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 sociodemographic 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 sociodemographic 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 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 1995 and 1998.
- ! 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.
- ! Rates of cigarette smoking among military personnel were equal to or lower than civilian rates in 1998 for the first time in the DoD series of surveys.
- ! 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 sociodemographic 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, 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 1998 (29.9%) 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 and considerably higher than the *Healthy People 2010* target of 12%.

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 until 1998, but this decline appears to have been due to changes in the sociodemographic composition of the Military; recently, the Military has shown an increased prevalence of heavy alcohol use.

Findings from civilian surveys indicate that the prevalence of smokeless tobacco use was highest among young adult males. Findings from the 1998 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 sociodemographic differences between the two populations indicated consistently higher rates of heavy alcohol use and lower rates of cigarette use and illicit drug use in the Military. In particular, rates of heavy alcohol use in the past 30 days among military men aged 18 to 25 were nearly 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* and *Healthy People 2010* (PHS, 1991; DHHS, 2000), 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, 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 have been 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, 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 1998, over two-thirds (67.7%) of personnel in the total DoD, over half of personnel in the Navy and the Air Force, and 70% to 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., 1999). 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 1998 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 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., 1999). However, the prevalence of overweight personnel in the Military increased from 16.4% in 1995 to 19.1% in 1998.

In 1998, approximately 80% of personnel in the total DoD had had their blood pressure checked in the past 2 years (Bray et al., 1999). 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 14% of active-duty military personnel (14.2%) in 1998 indicated a lifetime prevalence of high blood pressure (Bray et al., 1999). Of that group, approximately 46% 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, or (c) exercising. 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 (49.1%) in 1998 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., 1999). Most personnel, however, may have needed to get their cholesterol checked only within the past 5 years.

With regard to seat belt use, over 90% reported using seat belts all or almost all of the time (Bray et al., 1999) and nearly three-quarters of all personnel wore a helmet when driving or riding on a motorcycle. The authors noted that personnel are required to use seat belts and wear helmets on-base. They also suggested that legislation requiring seat belt and helmet use in many States could be contributing to high rates of use in the Military.

The 1998 DoD survey included questions to measure condom use by military personnel. In 1998, 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 Army used a condom during their last sexual encounter, while only 38.9% of Navy personnel did so (Bray et al., 1999).

Thus, the 1998 DoD survey provided some indication of progress toward a number of *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 that fewer than one in five adults (19%) engage in a high level of physical activity (defined as very active during usual daily activities and engaged in regular leisure-time physical activity) (CDC, 2003). In general, men are more likely than women to engage in a high level of overall physical activity, and these rates decline with age. Results from the 1999–2000 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, indicate that an estimated 64% of U.S. adults are either overweight or obese. This represents a prevalence that is approximately 8% higher than the age-adjusted overweight estimates obtained from NHANES III (1988–1994). 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 15% by the year 2010.

In 2000, nearly one-third of all persons over age 20 were diagnosed with hypertension. 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, 2002). 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 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, 1988a) 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 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.

Seat belt use reached 75% nationwide in 2002, which is the highest rate yet observed and continues a relatively steady pattern of increase since use was first measured by a comprehensive national survey at 58% in 1994. States that allow more stringent enforcement of their seat belt use laws (“primary” States) reached a milestone of 80% belt use in 2002, and substantial gains were also seen in the Northeast and in vans and sport utility vehicles (SUVs). On the other hand, motorcycle helmet use declined sharply, to 58% from 71% two years ago. These rates were obtained from the National Occupant Protection Use Survey (NOPUS) conducted by NHTSA in June 2002. Although the Northeast remains the region with the lowest belt use, its 7-point gain to 69% makes this region much more comparable to the rest of the country. Approximately one out of every five nonusers in the Northeast in 2001 used belts in 2002, a substantial conversion rate. Vans and SUVs saw a 3-point increase to 78% belt use, which is reassuring in light of recent news on SUV rollover crashes, since belts are particularly effective in such crashes.

Data from 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). However, because many of the helmets being used did not provide sufficient protection in a crash, starting in 1996 NOPUS categorized helmets into “legal” and “illegal” helmets, as defined in the Federal Motor Vehicle Safety Standard (FMVSS-218) (NHTSA, 2002). In 1996 and later, only the use of “legal” helmets is considered to constitute use, whereas in 1994 the use of any helmet was considered to constitute use. It is now illegal to sell any motorcycle helmet that does not comply with FMVSS-218. Although a sticker reading “DOT” is affixed to every compliant helmet, it is difficult to observe a sticker from the roadside. Consequently, data collectors characterize as illegal any helmets that

have features typically seen in illegal ones, such as protruding objects (e.g., spikes in costume World War II vintage helmets) or small “beanie” helmets.

Helmet use declined 13 percentage points over 2 years, from 71% in 2000 to 58% in 2002. This drop is statistically significant and corresponds to a striking 45% increase in nonuse. Some of this decline might be due to the time of year in which use was observed. Use in 1994 to 2000 was observed in the fall months, while in 2002 it was observed in June. Use might be lower in warmer months, when the higher temperatures may make helmets less comfortable. The sharp decline in helmet use, which is significant with 95% confidence, is troubling since it comes at a time when motorcyclist fatalities have been increasing (NHTSA, 2002).

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 BRFSS, in 2001 about 95% of all women aged 18 or older had ever had a Pap smear, and 83% had had the test in the past 2 years (CDC, 1995–2001). 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 nearly been achieved (PHS, 1991). As early as 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 2 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 1994–1995, 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 1998 DoD survey suggest that the Military in 1998 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 2002 compares with these objectives because of turnover in military personnel since 1998. Findings from the 2002 survey are important for identifying whether the Military continues to meet or exceed these targets.

Some features of military life may facilitate the Military in achieving some of these objectives by the year 2010. Given the emphasis in the Military on fitness and readiness, one might expect its 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 2010*.

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 among 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), and 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 coworkers 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 are 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 2002 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 2002 DoD survey included a series of questions about the mental health of active-duty personnel. As in the 1992, 1995, and 1998 surveys (Bray et al., 1992, 1995b, 1999), the 2002 survey asked respondents to appraise their levels of stress at work and in their intimate and family relationships. 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, and we assessed the respondents' perceived need for mental health services and their receipt of services. In addition, we collected information on indicators of anxiety and depressive symptoms and prevalence of suicidal ideation, and we examined the relationships among stress, mental health problems,

and alcohol use. In this report, we present findings on mental health, exposure to stress, coping, and functioning.

2. METHODOLOGY OF THE 2002 DOD SURVEY

In this chapter, we describe the methodology used for the 2002 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 2002 survey respondents and sociodemographic characteristics of the eligible 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 2002 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 2002 DoD survey included all military personnel who were on active duty at the time of data collection (September 2002 through mid-February 2003) 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. As in the 1998 DoD survey (Bray et al., 1999), 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. However, due to budget constraints we eliminated the “mail only” portion of the design, reduced the number of study installations, and increased the number of sample members selected for the study within the installations. We discuss this further in Section 2.8.2 and Appendix A.

During the construction of the sampling frame, we identified 240 military installations where 1,000 or more active-duty persons were stationed in January 2002. These installations were deemed large enough to support the on-site administration of the survey to at least 800 sample persons. The person-

level sample was drawn from the Defense Manpower Data Center's (DMDC's) May 2002 files. Approximately 85.2% of all active-duty personnel were found to be stationed at these installations.

Systematic nonresponse to the survey may introduce bias into the survey estimates. For example, the results of the 1998 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 were selected but 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 29,787 active-duty members for the 2002 DoD survey sample. We determined these sample sizes by first 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). Given the budgetary constraints and the desire to have comparable sample sizes from the 2002 DoD survey as in previous rounds of the survey, we reduced the number of installations by half (from 60 to 30) and doubled the number of persons selected to attend the group administrations. Applying the eligibility and response rates realized for the 1998 DoD survey and an estimated increase in PCS rates, we expected approximately 17,000 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, 30 installations were selected with probabilities proportional to the weighted number of persons assigned to each. 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 30 installations were replaced—2 from the Army and 1 from the Navy. 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 1.2 million. 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: (a) to measure progress of the Military in meeting selected *Healthy People 2000* and *2010* 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. We obtained 91% 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 1998 questionnaire for 2002 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;
- ! context for alcohol use;
- ! reasons for drinking and limiting drinking;
- ! 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 supplement use;
- ! use of seat belts and helmets;
- ! stress experienced at work or in family life, specific sources of stress, and coping behaviors;
- ! perceived physical health status;
- ! height and weight (to identify personnel who might be considered overweight or underweight);
- ! mental health status (including anxiety, depression, and suicidal ideation);

- ! drug testing receipt, predictability, and impact;
- ! risk-taking and impulsive behavior;
- ! other cardiovascular health risks, including having high blood pressure or cholesterol, and actions taken to reduce these risks;
- ! oral health and dental checkups;
- ! sexual practices and sexually transmitted diseases (STDs);
- ! gambling behaviors; and
- ! spiritual practices.

The questionnaire also contained items about gender-specific health issues, including testicular self-examination (for military men) and the following issues pertaining to military women: stress as a woman in the Military, 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 fall 2000, 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 initially began in early September 2001. As a result of the September 11 attacks and heightened security in military installations, data collection was suspended and modifications to the original design were made to compensate for the reduction in available resources. Questionnaire administrations were resumed in September 2002 and continued through mid-February 2003 at 30 selected installations located worldwide. An HLO was appointed for each Service, and one or more Military Liaison Officers (MLOs) at each participating installation were 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 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,
- ! scheduling personnel into one of the survey sessions, and
- ! distributing introductory handouts describing the study and detailing each participant's rights.

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. The level of effort required by each MLO varied depending on the size of the sample of personnel selected at his/her installation and by the turnout of participants in response to their initial notification. At those installations where turnout was high, the MLOs spent considerably less time than at those where turnout was low. In the latter case, the MLO duties were more time consuming, since a higher percentage of “no shows” had to be contacted and rescheduled into a new data collection session. Eight two-person RTI field teams collected Phase 1 data in survey sessions at the 30 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 3- to 4-day visit. We allowed additional time at locations that had large numbers of personnel selected or that had personnel dispersed over larger geographical areas. On these data collection days, team members typically started a group session every 90 minutes, usually holding five or six sessions per day. If necessary, the two-member teams split and worked alone to conduct concurrent sessions at the installation. Five field teams were assigned to the CONUS region only, two were assigned solely to the OCONUS region, and one team had both CONUS and OCONUS assignments. 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, distributed

introductory handouts, ensured that an ombudsperson was present for each group administration to attest that teams explained the voluntary nature of participation, and showed personnel the correct procedures for marking the questionnaire. Then team members distributed the optical-mark questionnaires to participants, who completed them and returned them. On average, the questionnaire required about 55 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 or reasons for absences. Any eligible personnel who failed to attend their scheduled session were contacted and asked to attend a subsequent one. 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 NCS Pearson in Minnesota for optical-scan processing and transmitted attendance data to RTI.

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 (which 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, an introductory handout explaining the study and each participant’s rights, 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.

2.3 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 2002 survey, we** computed several different performance rates, which we define and describe in the following paragraphs: 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, combined Phase 1 and Phase 2 eligibles, and an overall response rate among all eligible personnel. Data for these rates are provided in Table 2.1, along with the corresponding response data that we used to compute them. In this table, Phase 1 refers to the group administration of the questionnaire, and Phase 2 refers to the follow-up of Phase 1 nonattendeers.

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 was lowest for the Army (73.3%) and highest for the Air Force (81.6%). The rate across all Services was 77.1%, which was 2.4% lower than the 1998 DoD survey rate of 79.5%. We attribute this difference from the 1998 eligibility rate to the fall data collection implemented for this survey and a sample selected during the summer, when troop movement is higher.

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 74.2%. The availability rate suggests that we needed the Phase 2 data to compensate for the potential for nonresponse bias in Phase 1. The availability rate is comparable to the 1998 survey (74.3%).

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 68.7% completion rate

Table 2.1 Survey Response Data and Performance Rates

Item	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Response Data					
1. Persons selected for survey (total sample)	7,684	8,902	6,846	6,355	29,787
2. Number of eligible persons identified ^a	5,629	6,603	5,536	5,188	22,956
3. Eligibles available during Phase 1	4,441	4,689	3,704	4,199	17,033
4. Total questionnaires from Phase 1 ^b	3,088	3,124	2,819	2,673	11,704
5. Usable questionnaires from Phase 1	3,070	3,069	2,796	2,616	11,551
6. Eligible persons for Phase 2 (follow-up to Phase 1) (Item 2 - Item 4)	2,476	3,455	2,813	2,361	11,105
7. Total questionnaires from Phase 2 ^c	205	570	216	251	1,242
8. Usable questionnaires from Phase 2	199	556	212	238	1,205
9. Total questionnaires from all sources	3,293	3,694	3,035	2,924	12,946
10. Usable questionnaires from all sources	3,269	3,625	3,008	2,854	12,756
Performance Rates (%)					
11. Phase 1 eligibility rate = (Item 2/ Item 1*100)	73.3	74.2	80.9	81.6	77.1
12. Phase 1 availability rate = (Item 3/ Item 2*100)	78.9	71.0	66.9	80.9	74.2
13. Phase 1 completion rate = (Item 4/ Item 3*100)	69.5	66.6	76.1	63.7	68.7
14. Phase 1 response rate among eligibles = (Item 5/Item 2*100)	54.5	46.5	50.5	50.4	50.3
15. Phase 2 response rate among eligibles = (Item 8/Item 6*100)	8.0	16.1	7.5	10.1	10.9
16. Overall response rate among eligibles = (Item 10/Item 2*100)	58.1	54.9	54.4	55.0	55.6

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

^aExcludes 6,831 individuals from the sample who had a permanent change of station (PCS) (5,565) or who were separated (1,173), unknown (76), absent without official leave (14), or deceased (3).

^bIncludes 859 records with missing phase data reclassified as Phase I responses based on date questionnaire received—146 Army, 90 Navy, 72 Marine Corps, and 551 Air Force records.

^cIncludes 59 records with missing phase data reclassified as Phase II responses based on date questionnaire received—1 Army, 6 Navy, 1 Marine Corps, and 51 Air Force records.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

reflects the success of the field teams in obtaining questionnaires from eligible personnel who were available to be surveyed. This value is similar to the rate achieved in 1998 (71.3%). For the 2002 survey, this rate indicates that if personnel were available at the installations, the MLOs were more effective in getting them to attend group sessions in the Marine Corps (76.1%) and the Army (69.5%), but less successful in the Navy (66.6%) and the Air Force (63.7%). It also indicates that a substantial proportion did not attend the sessions or did not take a survey.

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) indicate that Phase 1 group sessions provided the higher response rate at 50.3%, well above the Phase 2 response rate (10.8%).

The overall response rate among eligibles combines data from all data collection activities. As shown in Table 2.1 (line 16), the overall response rate is 55.6%. This rate ranges from 58.1% for the Army to 54.4% for the Marine Corps. This overall rate is approximately 3.4% lower than in the 1998 survey and reflects higher response from sampled members primarily in the Navy (51.5% in 1998) and Marine Corps (50.4% in 1998). The 2002 rates from the Army (58.1%) and Air Force (55.0%) are lower than rates experienced in the previous survey (64.3% and 71.4%, respectively). As a result, estimates for the Navy and Marine Corps may be subject to less bias than those for the Army and Air Force relative to the 1998 estimates.

2.4 Sample Participants and Military Population Characteristics

Table 2.2 displays the distribution of eligible survey respondents for each Service by region and pay grade. Overall, we obtained 12,756 questionnaires from sampled personnel with sufficient information for analysis purposes. The Navy had the largest number of respondents (3,625), followed by the Army (3,268), Marine Corps (3,009), and Air Force (2,854). 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 (5,183), followed by E7s to E9s (2,544), E1s to E3s (2,516), O1s to O3s (1,189), O4s to O10s (932), and W1s to W5s (392). This pattern also was consistent across the CONUS region. The pattern varied slightly, however, across the OCONUS region, with E1s to E3s and E7s to E9s switching orders.

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. The smallest group (Navy warrant officers [W1-W5]) had 51 respondents. Many tables in subsequent chapters of the report present data in the form

Table 2.2 Distribution of 2002 Survey Respondents, by Region and Pay Grade

Region/Pay Grade	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
CONUS ^a					
E1-E3	415	296	711	276	1,698
E4-E6	896	755	831	624	3,106
E7-E9	511	417	530	474	1,932
W1-W5	206	26	72	0	304
O1-O3	250	273	170	191	884
O4-O10	103	267	154	247	771
Total	2,381	2,034	2,468	1,812	8,695
OCONUS ^b					
E1-E3	142	293	194	189	818
E4-E6	552	859	142	524	2,077
E7-E9	81	256	100	175	612
W1-W5	46	25	17	0	88
O1-O3	57	105	54	89	305
O4-O10	10	53	33	65	161
Total	888	1,591	540	1,042	4,061
Total Worldwide					
E1-E3	557	589	905	465	2,516
E4-E6	1,448	1,614	973	1,148	5,183
E7-E9	592	673	630	649	2,544
W1-W5	252	51	89	NA	392
O1-O3	307	378	224	280	1,189
O4-O10	113	320	187	312	932
Total	3,269	3,625	3,008	2,854	12,756

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

NA = Not applicable.

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

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

Table 2.3 Distribution of 2002 Respondents, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	2,333	2,479	2,561	2,133	9,506
Female	936	1,146	447	721	3,250
Race/Ethnicity					
White, non-Hispanic	1,912	2,429	2,133	2,120	8,594
African American, non-Hispanic	960	668	505	463	2,596
Hispanic	244	250	259	156	909
Other	153	278	111	115	657
Education					
High school or less	1,020	1,207	1,358	487	4,072
Some college	1,500	1,507	1,135	1,505	5,647
College graduate or higher	749	911	515	862	3,037
Age					
20 or younger	403	430	497	227	1,557
21-25	888	1,007	1,031	653	3,579
26-34	1,053	947	647	768	3,415
35 or older	925	1,241	833	1,206	4,205
Family Status					
Not married ^a	1,317	1,689	1,348	1,010	5,364
Married, spouse not present	180	206	151	87	624
Married, spouse present	1,772	1,730	1,509	1,757	6,768
Pay Grade					
E1-E3	557	589	905	465	2,516
E4-E6	1,448	1,614	973	1,148	5,183
E7-E9	592	673	630	649	2,544
W1-W5	252	51	89	NA	392
O1-O3	307	378	224	280	1,189
O4-O10	113	320	187	312	932
Total Personnel	3,269	3,625	3,008	2,854	12,756

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

NA = Not applicable.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (refer to Section 2.5.1 for descriptions of sociodemographic variables).

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 2002 eligible population. These estimates are based on data from the sample respondents that were weighted and post-stratified to represent the eligible population (see Appendix B for a discussion of weighting procedures). This eligible 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 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 (83.1%), non-Hispanic whites (67.3%), educated beyond high school (64.0%), aged 34 or younger (75.5%), married (55.7%), and in pay grades E1 to E6 (73.9%).

Table 2.4 shows some notable differences in sociodemographic composition among the Services. The most striking contrasts occur when comparing the Air Force and the Marine Corps to the Army and Navy. Personnel in the Air Force were more likely than those in other Services to be female (21.3%), to have a college education (26.3%), to be aged 26 or older (62.3%), and to be commissioned officers O1-O10 (19.2%). In contrast, Marine Corps personnel were more likely to be male (88.9%), to have a high school education or less (53.1%), to be aged 25 or younger (65.5%), to be unmarried (52.2%), and to be of junior pay grade E1 to E3 (38.0%). The differences among Marine Corps personnel are of particular interest because these demographics correspond closely to those of personnel in prior surveys in this series (e.g., Bray et al., 1988, 1992, 1995b, 1999) 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 sociodemographic differences suggest that the Marine Corps may face greater challenges than the other Services in addressing substance use issues and that the challenges for the Air Force may not be as great as for the other Services.

2.5 Key Definitions and Measures

2.5.1 Sociodemographic Characteristics

The sociodemographic 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.

Table 2.4 Sociodemographic Characteristics of Eligible Participant Population

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	83.1	(0.9)	85.0	(1.4)	88.9	(3.1)	78.7	(1.8)	83.1	(0.8)
Female	16.9	(0.9)	15.0	(1.4)	11.1	(3.1)	21.3	(1.8)	16.9	(0.8)
Race/Ethnicity										
White, non-Hispanic	60.6	(1.8)	65.6	(2.4)	71.8	(1.9)	74.9	(2.7)	67.3	(1.3)
African American, non-Hispanic	27.5	(1.5)	19.8	(4.5)	15.2	(1.0)	15.9	(1.7)	20.7	(1.4)
Hispanic	7.2	(0.3)	7.4	(0.9)	9.0	(0.8)	5.6	(1.1)	7.1	(0.4)
Other	4.7	(0.3)	7.2	(1.8)	3.9	(0.9)	3.6	(0.7)	5.0	(0.5)
Education										
High school or less	37.1	(3.2)	42.0	(1.9)	53.1	(5.5)	20.7	(3.3)	36.0	(1.7)
Some college	44.4	(1.2)	39.4	(1.5)	35.6	(3.5)	53.0	(2.2)	44.3	(1.2)
College graduate or higher	18.5	(2.1)	18.6	(2.5)	11.3	(2.9)	26.3	(5.0)	19.7	(1.6)
Age										
20 or younger	13.3	(1.2)	15.3	(0.9)	20.3	(4.8)	9.9	(2.0)	13.8	(1.0)
21-25	31.4	(2.6)	33.9	(1.5)	45.2	(2.4)	27.8	(2.7)	32.9	(1.2)
26-34	32.9	(1.3)	25.5	(1.4)	21.8	(1.9)	30.0	(0.6)	28.8	(0.7)
35 or older	22.4	(3.1)	25.3	(1.5)	12.7	(3.0)	32.3	(5.0)	24.5	(1.7)
Family Status										
Not married ^a	40.9	(1.5)	49.3	(1.1)	52.2	(4.4)	40.1	(3.0)	44.3	(1.2)
Married, spouse not present	5.5	(0.5)	6.6	(0.6)	5.2	(0.4)	2.3	(0.2)	4.9	(0.3)
Married, spouse present	53.6	(1.6)	44.1	(1.1)	42.7	(4.7)	57.6	(2.9)	50.8	(1.2)
Pay Grade										
E1-E3	17.9	(1.7)	20.5	(1.5)	38.0	(6.6)	20.7	(3.5)	22.0	(1.6)
E4-E6	56.1	(1.4)	54.2	(1.4)	44.7	(3.4)	48.0	(2.3)	51.9	(1.0)
E7-E9	11.6	(1.5)	10.3	(1.1)	7.3	(1.3)	12.2	(2.0)	10.8	(0.8)
W1-W5	2.7	(0.4)	0.5	(0.1)	1.2	(0.3)	NA	(NA)	1.2	(0.2)
O1-O3	7.1	(0.7)	8.6	(1.0)	5.7	(0.9)	10.8	(0.9)	8.3	(0.5)
O4-O10	4.6	(1.2)	6.0	(1.7)	3.1	(1.8)	8.4	(3.6)	5.8	(1.1)
Total Personnel	100.0	(**)	100.0	(**)	100.0	(**)	100.0	(**)	100.0	(**)

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

NA = Not applicable.

**Estimate rounds to zero.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (refer to Section 2.5.1 for descriptions of sociodemographic variables).

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: “white, non-Hispanic”; “African American, non-Hispanic”; “Hispanic”; 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 those four, the 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 2002 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.

However, some estimates related to specific *Healthy People 2000* objectives (PHS, 1991) or *2010* objectives (DHHS, 2000) 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 2002 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, 1995b, 1999) 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 2002 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, 1995b, 1999). 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], 2002) and the Monitoring the Future study (Johnston, O’Malley, & Bachman, 1998a, 1998b; University of Michigan, 2003). Additional details about the procedures for creating the drinking-level classification scheme are described in Appendix E.

In addition to this drinking-level classification scheme, we examined binge drinking among military personnel. We defined binge drinking as having five or more drinks on a single occasion at least once in the past 30 days.

There was a slight change in the calculation of the ethanol index and the drinking-level measures in the 1998 and 2002 DoD surveys 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 and subsequent surveys. 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 in Appendix D provide a comparison of estimates for these measures using the two different calculation procedures (one that included larger beer containers and one that did not).

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) lower score on performance rating because of drinking; (c) loss of 1 week or more from duty because of a drinking-related illness; (d) Uniform Code of Military Justice (UCMJ) punishment because of drinking; (e) arrest for driving while impaired (DWI); (f) alcohol-related arrest other than DWI; (g) alcohol-related incarceration; (h) alcohol-related injury to service person; (i) alcohol-related accident resulting in someone else’s injury or property damage; (j) physical fights while drinking; (k) spouse threatened to leave or left because of drinking; and (l) spouse asked Service person to leave or the person did leave.

The measure of alcohol-related “productivity loss” refers to one or more occurrences in the past 12 months of (a) being late for work, (b) leaving early for a reason other than an errand or early holiday leave, (c) being hurt in an on-the-job accident, (d) performing below a normal level of performance, and (e) not coming to work because of an illness or a personal accident.

The measure of symptoms of alcohol dependence was based on the occurrence in the past 12 months of (a) tolerance (e.g., need for markedly increased amounts of alcohol to achieve desired effect or markedly diminished effect with continued use of the same amount of alcohol); (b) withdrawal symptoms; (c) drinking larger amounts or over a longer period of time than intended; (d) the inability to cut down or control drinking; (e) a great deal of time spent drinking or trying to recover from the effects of drinking; (f) reducing or giving up important social, occupational, or recreational activities because of alcohol use; and (g) continued drinking despite physical or psychological problems caused or exacerbated by alcohol use. Respondents reported whether they experienced these symptoms during the past 12 months, and we summed these frequencies over the seven symptoms (two items per symptom are included in the questionnaire). Individuals reporting four or more of these symptoms were deemed dependent.

For 2002, we revised our measure of dependence symptoms based on expert input from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). Our previous measure of dependence symptoms had been based on the Rand Air Force study definition (Polich & Orvis, 1979). The 1980 to 1998 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. Although our new set of items addresses the seven symptoms of dependence as described in the *DSM-IV* (American Psychiatric Association [APA], 1994), we would caution against comparisons to results from prior surveys in this DoD series because of the item change.

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, anabolic steroids, and gamma hydroxybutyrate (GHB). 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 commonly used in the NHSDA (e.g., OAS, 2002). 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 in their lifetime).

The 2002 survey also measured the prevalence of use of other forms of tobacco besides cigarettes (i.e., 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 2002 DoD survey was the investigation of health behaviors of military personnel other than use of alcohol, illicit drugs, or tobacco. As we transition into the 21st century, we will examine the *Healthy People 2000* objectives that were achieved as well as progress toward *Healthy People 2010* goals for the Military. In particular, we measured the following health behaviors or factors related to specific *Healthy People* objectives:

- ! substance use
- ! weight 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
- ! substance use during pregnancy

We defined overweight and underweight in terms of the Body Mass Index (BMI), where BMI is weight (in kilograms) divided by the square of height (in meters). We defined military men as being overweight by *Healthy People 2000* criteria 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), which 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). In contrast to *Healthy People 2000* goals related to people being overweight, *Healthy People 2010* sets goals to encourage people to maintain a healthy weight, defined as a BMI greater than 18.5 and less than 25.0.

During the summer of 1998, the National Heart, Lung, and Blood Institute (NHLBI) developed new national 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 of 40.0 or greater. Underweight was defined as BMI less than 18.5 for both men and women regardless of age (NHLBI, 1998). We conducted selected analyses using these NHLBI BMI criteria to allow the Military to compare its active-duty population with other populations. For these analyses, we combined the four NHLBI overweight categories into a single category and classified military personnel as overweight for a BMI of 25.0 or greater.

The *Healthy People 2000* objective for hospitalization for injuries refers specifically to unintentional injuries. The measure of hospitalization for injuries in prior versions of the DoD survey did 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). The 2002 survey asked specifically about unintentional injuries. However, we believe there is little difference in the measures in that there are few intentional injuries. *Healthy People 2010* does not have an objective related to hospitalization for injury.

Measures for the other *Healthy People 2000* and *2010* 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.

In addition to behaviors measured by *Healthy People* objectives, we assessed impulsivity and sensation-seeking behaviors (Cherpitel, 1999). The impulsivity items included the following: (a) I often act on the spur of the moment without stopping to think; (b) I get a real kick out of doing things that are a little dangerous; (c) you might say I act impulsively; (d) I like to test myself every now and then by doing something a little chancy; and (e) many of my actions seem hasty. The set of sensation-seeking items included the following: (a) I'm always up for a new experience; (b) I like to try new things just for the excitement; (c) I go for the thrills in life when I get a chance; and (d) I like to experience new and different sensations. For our analyses, we combined the items of these scales and scored each question from 0 to 4, generating a range of scores from 0 to 36. Respondents were then categorized into low, moderate, or high levels in terms of their overall risk-taking behaviors.

2.5.5 Mental Health

The 2002 DoD survey included the following set of questions on mental health issues:

- ! levels of stress at work and in family life
- ! sources of stress
- ! behaviors for coping with stress
- ! perceived quality of mental health
- ! symptoms of anxiety and depression
- ! suicidal ideation
- ! 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
- ! 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. To determine personnel in need of further depression screening, we used an eight-item set of symptoms that included six items from the Center for Epidemiologic Studies–Depression Scale (CES-D; Radloff, 1977) as well as two items from the Diagnostic Interview Schedule (Robins, Helzer, Croughan, & Ratcliff, 1981) to assess need for further depression evaluation. Need for further depression evaluation was scored according to a multiple logistic regression probability formula, using a cutpoint of 0.060, based on Burnam and Wells' (1990) method for attaining at least 85% sensitivity and high positive values when using these eight items. To allow for some missing data, if at least two of five CES-D items or both of the Diagnostic Interview Schedule items were answered positively, we categorized the respondent as being in need of further depression evaluation.

To determine personnel in need of further screening for anxiety, we used a set of items adapted from the Patient Health Questionnaire (Spitzer, Kroenke, & Williams, 1999). If respondents told us that they had been feeling nervous, anxious, or on edge or that they had been worrying a lot about different things (the first questions in the set) for several days or more, then we examined whether they reported any of the other symptoms. If they reported experiencing two or more symptoms on more than half of the days in the past 30 days, then they were considered to be in need of further screening for anxiety.

2.5.6 Other Behaviors of Interest

Respondents in the 2002 survey were asked about gambling behaviors as well as spiritual practices. For gambling behaviors, we asked respondents a series of 10 questions that assessed their lifetime prevalence of gambling problems patterned after symptoms of pathological gambling listed in the *DSM-IV* (APA, 1994). This represents a slight change from the 1992 and 1998 surveys, where 8 items were used to assess problematic 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
- ! trying unsuccessfully to control or stop gambling
- ! feeling restless or irritable when unable to gamble
- ! gambling to escape from problems
- ! trying to win back earlier gambling losses
- ! lying to others about the extent of their gambling
- ! breaking the law to pay for gambling

- ! having jeopardized or lost important relationships, a job, or career opportunities because of gambling
- ! 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 person's life but not necessarily pathological gambling. It is important to note that these measures of gambling have been adapted from those used in clinical settings and, therefore, can only indicate the need for further examination; definitive diagnoses cannot be drawn from these measures (National Research Council, 1999). In addition, given that this series of DoD surveys is population based, it should be assumed that these estimates are likely to be liberal (National Research Council, 1999). For past DoD surveys, we have used three items as the cutpoint for defining pathological gambling consistent with an earlier *DSM-III* definition (APA, 1980) and based on guidance from Dr. H.R. Lesieur (H.R. Lesieur, Institute for Problem Gambling, personal communication, June 10, 1991; Feigelman, Wallisch, & Lesieur, 1998; Lesieur, 1989; Lesieur & Blume, 1987, 1991; Lesieur, Blume, & Zoppa, 1986). For this report, we used the criterion of five or more items to define probable pathological gambling consistent with the most recent definition of pathological gambling in the *DSM-IV* (APA, 1994). It should be noted that scales to measure gambling problems and pathological gambling are still being developed (National Research Council, 1999). Thus, we present indicators of one or more problems, three or more problems, and five or more problems but classify probable pathological gamblers as those with five or more gambling problems, recognizing that our survey screening tool is likely to be liberal and is not equivalent to a clinical diagnosis.

In terms of spiritual practices, respondents were asked to what extent they agreed with two questions regarding importance of religious/spiritual beliefs and the degree to which religious/spiritual beliefs influence their decision making. Respondents were categorized as High if they reported "strongly agree" to both items, Medium if they reported either "strongly agree" or "agree" to at least one of the questions, and Low if they reported either "disagree" or "strongly disagree" to both questions. These items were drawn from those used in the NHSDA.

2.6 Analytical Approach

The focus of our analyses of the 2002 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, these analyses provide baseline estimates of selected *Healthy People 2000* and *2010* objectives and other selected behaviors of interest. They 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* and *2010* objectives in 2002, and gambling behaviors

- ! comparisons of trends in substance use and negative effects from 1980 to 2002 (including standardized comparisons of substance use to control for changes in sociodemographic composition)
- ! standardized comparisons of the extent of substance use among personnel in the four active Services in 2002
- ! standardized comparisons of military and civilian rates of substance use
- ! 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 some of these data using *t* tests.

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 policy makers 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, 1995, and 1998 (years when the surveys were administered) were no longer in the Military in 2002. 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 partly the result of 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 22 years can be explained by changes in the sociodemographic composition of the Services. Unadjusted or “raw” estimates are the *observed* substance use rates estimated for the population 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 sociodemographic 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 sociodemographic 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 2002 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 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 sociodemographic 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 sociodemographic 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 for 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

2.8.1 Data Collection Methodology

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 2002 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 2002 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 2002 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 2002 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, 1990) 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 2002 and earlier DoD surveys 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).

2.8.2 Modified Sampling Design

As mentioned in earlier sections, the 2002 DoD survey design had to be modified due to a reduction in available resources following the interruption of data collection after the events of September 11. Because it was necessary to derive a new sampling frame following the postponement of the survey, we were unable to utilize the data that had been collected prior to September 11. The optimal allocation originally called for the selection of 60 military installations and the use of a dual-mode data collection methodology as with the 1998 design. The design was revised to include only 30 installations, and a larger sample of military personnel was selected for the study within the installations. Additionally, we excluded the mail-only portion of the design, referred to as “remote personnel” in the 1998 report. We examined potential bias implications and decreased precision prior to the implementation of the revised design. However, we acknowledge the preference for the original design in future rounds of the survey:

- ! **Bias.** We examined several data items from the 1998 survey and determined that the “remote personnel” estimates did not differ significantly from the “full survey” estimates. Therefore, we predict that excluding the “remotes” from the 2002 study would not greatly impact the bias of our results. Given this, we post-stratified the analysis weights to the global military population to have comparable results in the analysis tables included in this report (see Appendix B).
- ! **Decreased Precision.** The truncated design reduced the number of Service-specific installations selected for the study in comparison to the 1998 design and increased the number of persons selected within each installation. By reducing the number of selected installations specified in the optimization procedure while maintaining the overall sample size for the study, we introduced additional sample members from the same installation that are correlated with those already in the sample. Therefore, the efficiency of our design has decreased below the optimal design and resulted in larger standard errors for several of the study estimates.

3. OVERVIEW OF TRENDS IN SUBSTANCE USE AND *HEALTHY PEOPLE 2000 AND 2010 OBJECTIVES*

In this chapter, we provide a brief overview of the prevalence of alcohol use, illicit drug use, and tobacco use from the 2002 DoD survey and examine the trends in substance use and negative effects due to alcohol use from 1980 to 2002. 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 from 1995 to 2002 for these objectives. For the Military, the 2002 survey represents the final survey to track progress and achievement for the *Healthy People 2000* objectives. In addition, the 2002 DoD survey provides baseline data for the Military for selected *Healthy People 2010* objectives. Our focus in this chapter is to provide a broad overview of data and findings for the entire DoD. These findings are considered in more detail in later chapters, both for the total DoD and for the individual Services.

3.1 Trends in Substance Use

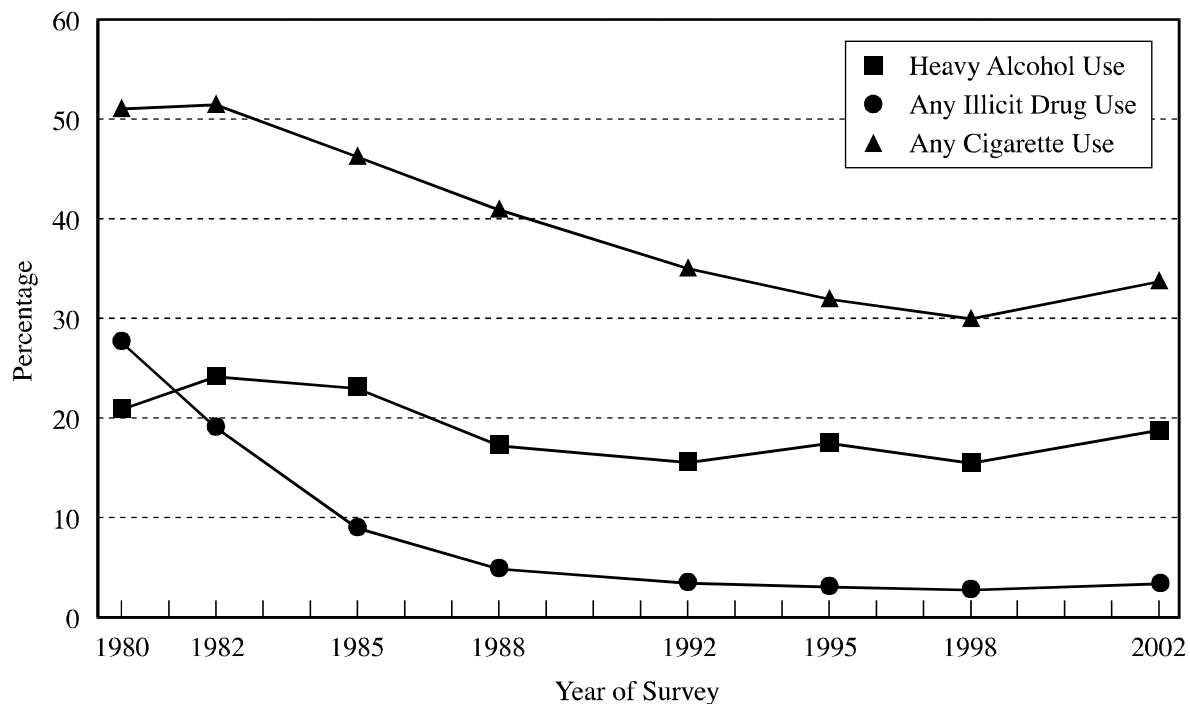
In this section, we present two types of estimates: unadjusted and adjusted prevalence rates. Unadjusted data are the observed rates reported in the surveys of the DoD series from 1980 to 2002 and reflect the challenges facing the Services in reducing substance use. Adjusted rates, on the other hand, 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 2002 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 lower rates of 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 eight 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 eight 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 and 2002 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 and 2002 surveys. 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, the trend data presented in Figure 3.1 and Table 3.1 for drinking levels show slightly different estimates from those presented in reports prior to

Figure 3.1 Trends in Substance Use, Past 30 Days, Total DoD, 1980-2002



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 to 2002 (2002 Questions: Heavy Alcohol Use, Q15-Q18 and Q20-Q23; Any Illicit Drug Use, Q60 and Q62; Any Cigarette Smoking, Q45 and Q47).

1998. 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 across the surveys and do not alter the pattern of results observed with the prior algorithm. They do result, however, in slightly higher prevalence estimates of heavy alcohol use when the data from the larger containers are included. In this report, we have calculated heavy drinking with the larger containers because they provide a more comprehensive view of drinking behavior in the Military.

As shown in Figure 3.1 and Table 3.1, any illicit drug use and cigarette use both declined significantly between 1980 and 2002, although the rate of decline varied for each of the substances and between each of the eight surveys. In contrast, the rates of heavy alcohol use did not show a significant decline between 1980 (20.8%) and 2002 (18.1%), although the 1998 survey showed a significant decline from the 1980 rate of use (i.e., from 20.8% to 15.4%). When we examine the trend in heavy drinking over the eight surveys, we see that heavy alcohol use increased from 1980 to 1982, was relatively stable between 1982 and 1985, decreased significantly between 1985 and 1988, remained relatively stable with some up and down fluctuations between 1988 and 1998, and then showed a significant increase from 1998 to 2002. Overall, the heavy drinking rate for 2002 was very similar to the rate when the survey series began in 1980.

Table 3.1 Substance Use Summary for Total DoD, 1980-2002

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	2002
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
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)
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)
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)
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)
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)
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)
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)
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)
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)
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
Dependence symptoms ^c	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)
Dependence symptoms ^d							12.3 (0.9)

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced for each algorithm.

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

^bComparisons between 1980 and 2002 are statistically significant at the 95% confidence level.

^cHaving experienced alcohol dependence symptoms on at least 48 days during the past year.

^dHaving experienced four or more alcohol dependence symptoms at any time during the past year.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Alcohol Drinking Levels, Q15-Q18 and Q20-Q23; Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60 and Q61; Cigarette Use, Past 30 Days: Any Smoking, Q45 and Q47, Heavy Smoking, Q46; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35).

Examination of drinking levels in Table 3.1 shows that across the survey years, the majority of military personnel had used at least some alcohol. For example, in 2002, more than three-fourths of the total DoD consumed alcohol in the past 30 days. These data also show a pattern from 1980 to 2002 toward 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 and moderate/heavy drinkers. This may suggest a pattern toward more responsible alcohol use among the large majority of military personnel. The exception to this pattern, however, is among the heavy alcohol users, who show little overall change across the survey series, especially since 1988, and who show a significant increase from 1998 to 2002. This increase among heavy drinkers is also reflected in a substantial increase in the volume of ethanol consumed in 2002, as discussed in Chapter 4.

The prevalence of any reported illicit drug use during the past 30 days declined sharply from 27.6% in 1980 to 3.4% in 2002. The decreases were statistically significant between each of the surveys from 1980 to 1992 and have remained relative stable around 3% for the decade from 1992 to 2002. Rates of illicit drug use during the past 12 months showed a parallel pattern to the 30-day use except at a higher level, as would be expected. Use declined from 36.7% in 1980 to 6.9% in 2002. Rates have been relatively constant since 1992 at around 6% to 7%.

The percentage of military personnel who smoked cigarettes in the past 30 days also decreased significantly from 51.0% in 1980 to 33.8% in 2002. Smoking rates showed no significant change between 1980 and 1982, decreased significantly between each of the survey years from 1982 to 1995, did not change significantly between 1995 and 1998, but then showed an increase from 1998 to 2002. This change from 1998 to 2002 marks the first time in the past 20 years when cigarette smoking rates showed a significant increase and suggests that additional attention may be needed to find ways to further reduce cigarette smoking in the Military.

Considered together, these trend data on substance use are notable in several regards. Illicit drug use and cigarette smoking showed large, statistically significant reductions in use across the total time period from 1980 to 2002. This indicates that the Military has made important progress in reducing use of these substances over the past 22 years. Heavy alcohol use did not show the same decline. Although there have been some reductions in heavy drinking over the years, there have also been offsetting increases such that the 1980 and 2002 rates were not statistically different. In contrast to these long-term patterns, changes from 1998 to 2002 are noteworthy. During this period, there were significant increases in heavy alcohol use and cigarette use from 1998 to 2002 but no significant change for illicit drug use. The 2002 survey is the first time heavy alcohol use has increased significantly since 1988. These increases are the first for cigarettes since 1980 and are of concern in that they signal changes in a pattern of declines that has prevailed for the past two decades. The findings for illicit drug use in 2002 are in line with the low rates that have been found since 1992, suggesting that it may not be feasible to assume that the rate will drop much lower in the Military. It also may suggest that fewer efforts were made to further reduce substance use rates or that such efforts were not effective. Although there are some exceptions, these overall patterns observed for the total DoD generally hold for each of the Services, as we see in later chapters and appendices.

The significant increase from 1998 to 2002 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 six military personnel in 2002 was likely to be a heavy drinker. The finding of no significant change in illicit drug use between 1998 and 2002 and the relatively low rates of use for both surveys suggest 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. The 1992 through 2002 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 increase in the rates of cigarette smoking between 1998 and 2002 is of concern and unexpected 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 2002 remained the highest of the three substances, over one and three-fourths as high as heavy alcohol use and about 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 sociodemographic composition explain the pattern of results, we used direct standardization methods to adjust the rates of use for the 1982 through 2002 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 sociodemographic 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 sociodemographic characteristics of the Military from 1980 to 2002.

In Table 3.2, we present the trends in unadjusted (i.e., observed) and adjusted (i.e., standardized or constructed) rates of heavy alcohol use, any illicit drug use, and cigarette smoking for the total DoD during the eight 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 2002. For heavy alcohol use, adjusted rates increased the estimates of heavy alcohol use by about 1 to 4 percentage points for the 1982 to 2002 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 adjusted rates are nearly identical across the entire survey period (with the exception of the 1982 and 1985 surveys, which were even higher). This suggests that some of the decline in heavy alcohol use observed in the unadjusted rates can be explained by the changes in the demographics of the Military over the period from 1980 to 2002. The implication is that military programs and practices have had little effect on rates of heavy alcohol use during the 22-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 both adjusted and unadjusted data were significantly lower in 1988 than in 1982. This could be interpreted to mean that the

Table 3.2 Trends in Substance Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Characteristics for Total DoD, 1980-2002

Substance/Type of Estimate	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	18.1 (1.1) ^a
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)	20.7 (1.0)
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)	3.4 (0.4) ^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)	3.9 (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)	33.8 (1.3) ^{a,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)	37.1 (0.9) ^{a,c}

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced for each algorithm.

^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 2002 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Heavy Alcohol Use, Q15-Q18 and Q20-Q23; Any Illicit Drug Use, Q60 and Q62; Cigarette Use, Q45-Q47).

Military made significant progress in reducing heavy alcohol use during the 1980s that cannot be explained just by sociodemographic 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 with the re-introduction of urinalysis testing in the early 1980s. 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 2002 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 2002. 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 2002. If the demographics of the Military, however, had been the same in 2002 as in 1980, the rate of illicit drug use in 2002 would be expected to be about 0.5 percentage points higher and the rate of cigarette smoking would be nearly 3 percentage points higher.

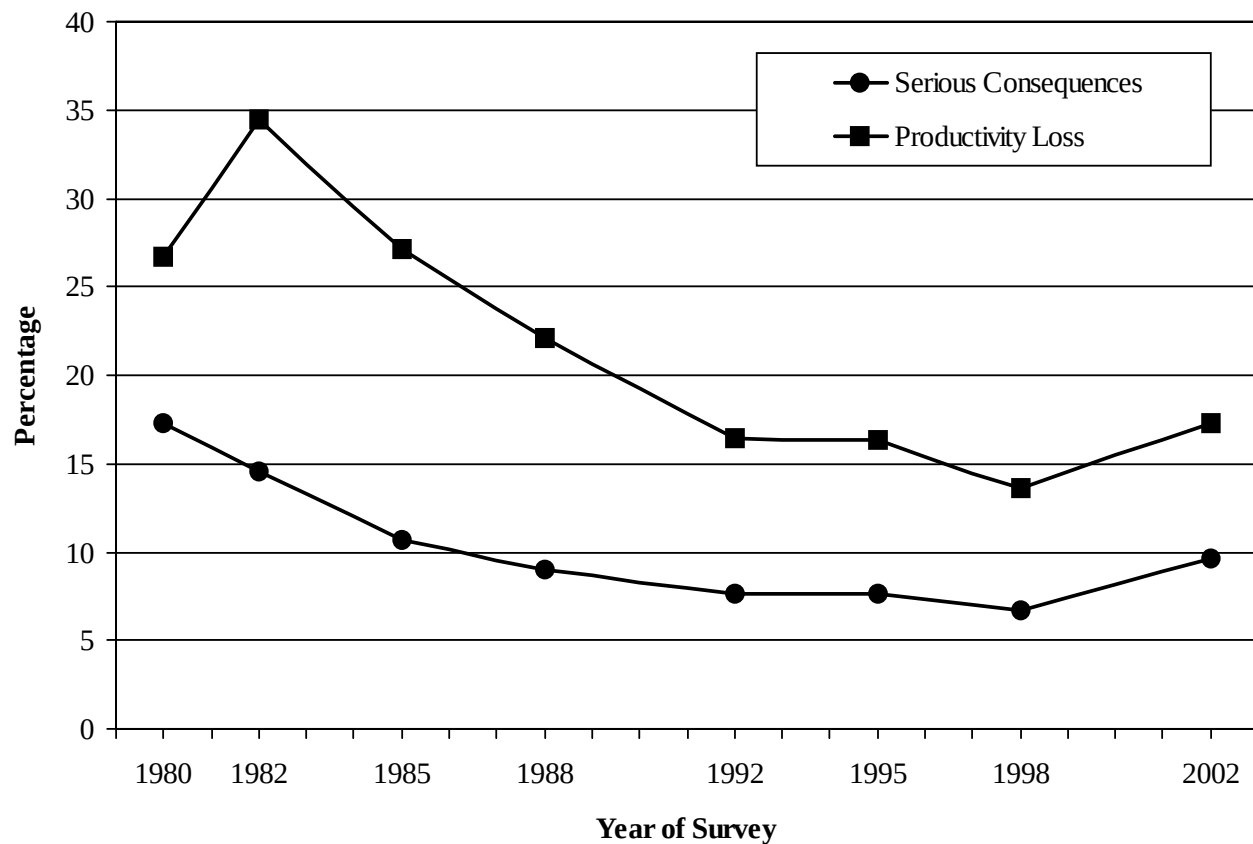
3.1.3 Trends in Alcohol-Related Negative Effects

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 2002. In 1980, 17.3% of military personnel experienced one or more serious consequences associated with alcohol use during the year. This rate declined to 6.7% in 1998 and then increased significantly to 9.6% in 2002. Even though there is an overall decline from 1980 to 2002, the increase between 1998 and 2002 is of concern.

Alcohol use productivity loss (Table 3.1, Figure 3.2) decreased significantly between 1980 and 2002, from 26.7% to 17.3%. The pattern for this measure shows a significant increase between 1980 and 1982 (consistent with the increase in heavy drinking between 1980 and 1982 noted above), a significant decrease for each survey from 1982 to 1992, no change from 1992 to 1995, a significant decline from 1995 to 1998, followed by a significant increase from 1998 to 2002. As shown in Figure 3.2, the increase in rates from 1988 to 2002 for both measures is the first in the past 20 years.

For alcohol use dependence symptoms, we report on two separate measures (see discussion in Section 2.5.3). Table 3.1 shows trends in our initial measure, which was used in the surveys from 1980 to 1998. This measure showed a significant decline over the 18-year period in past year symptoms from 8.0% in 1980 to 4.8% in 1998 (significance test not shown). The measure appears somewhat conservative and likely underrepresents the level of dependence symptoms as indicated by *DSM-IV* criteria (American Psychiatric Association [APA], 1994). In 2002, a different measure of dependence symptoms was introduced patterned more closely after *DSM-IV* criteria (see Section 2.5.3). The new

Figure 3.2 Trends in Alcohol Use Negative Effects, Past 12 Months, Total DoD, 1980-2002



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 to 2002 (2002 Questions: Productivity Loss, Q34; Serious Consequences, Q36 and Q38; Dependence Symptoms, Q35).

measure indicates that in 2002 over 12% of military personnel reported symptoms of dependence due to their alcohol use. Even though it is not appropriate to compare the differences in use between the two measures, the rates for the new measure are substantial and we believe provide a better indication of the rate of symptoms. The relatively high rates of all three measures and the increases in rates for serious consequences and productivity loss signal the need for greater attention to be given to addressing alcohol problems in the Military.

3.2 Progress Toward *Healthy People 2000* and 2010 Objectives

A major aim of the 2002 DoD survey was to provide the end-of-the-decade final measure on progress toward selected *Healthy People 2000* objectives for a variety of health behaviors and to provide baseline data for comparable *Healthy People 2010* objectives. The objectives that were measured were classified into three groups for presentation and discussion:

1. substance use objectives (cigarette smoking, cigar use, smokeless tobacco, binge drinking, and illicit drug use)
2. health promotion objectives (weight, exercise, blood pressure, cholesterol, injuries, seat belt use, helmet use, and condom use)
3. women's health objectives (Pap smear, substance use during pregnancy)

Some of the *Healthy People 2000* objectives have been continued for *Healthy People 2010*, a few have been modified, others have been discontinued, and new ones have been added. For this report, we provide information as applicable for the following objectives:

1. Reduce the prevalence of cigarette smoking among military personnel for persons aged 18 or older (2000 objective: 20% or less; 2010 objective: 12%).
2. Reduce cigar use among adults (2010 objective: 1.2%).
- 3.-4. Reduce smokeless tobacco use (2000 objective: 4% or less by males aged 24 or younger; 2010 objective: 0.4% for all personnel).
5. Reduce binge drinking among adults (2010 objective: 6.0%).
6. Reduce illicit drug use, past 30 days among adults (2010 objective: 2.0%).
- 7.-8. Reduce overweight, as measured by the Body Mass Index (BMI) (2000 objective: 15% or less among people under age 20, and 20% or less among people aged 20 or older).
9. Increase healthy weight as measured by BMI (2010 objective: 60% for persons aged 20 or older).
10. Increase 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 (2000 objective: 20% or more; 2010 objective: 30% or more).
11. Increase 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 (2000 objective: 90% or more; 2010 objective: 95% or more).
12. Increase the proportion of people with high blood pressure who are taking action to help control their blood pressure (2000 objective: 90% or more; 2010 objective: 95% or more).
13. Increase the proportion of adults who had their blood cholesterol checked within the preceding 5 years (2000 objective: 75% or more; 2010 objective: 80% or more).
14. Reduce nonfatal unintentional injuries that require hospitalization (2000 objective: no more than 754 per 100,000 people).
15. Increase the use of occupant protection systems, such as safety belts, inflatable safety restraints, and child safety seats (2000 objective: 85% or more of motor vehicle occupants; 2010 objective: 92% or more).

- 16.-17. Increase the use of helmets by motorcyclists and bicyclists (2000 objective: 80% or more for motorcyclists, 50% or more for bicyclists; 2010 objective: 79% or more for motorcyclists).
18. Increase the proportion of sexually active, unmarried people who used a condom at last sexual intercourse (2000 and 2010 objective: 50% or more).
- 19.-20. Increase the proportion of women aged 18 or older with an intact uterine cervix who have ever received a Pap test (2000 objective: 95% or more; 2010 objective: 97% or more) and the proportion of those who received a Pap test within the preceding 3 years (2000 objective: 85% or more; 2010 objective: 90% or more).
21. Increase abstinence from alcohol during pregnancy (2000 objective: 88%; 2010 objective: 94%).
22. Increase abstinence from tobacco use during pregnancy (2000 objective: 90% or more; 2010 objective: 99% or more).

In this section, we describe overall findings in the total DoD from 1995, 1998, and 2002 for the *Healthy People 2000* and *Healthy People 2010* objectives. In addition, we provide the civilian benchmarks from *Healthy People 2010* as a further comparison for military rates. Later chapters examine the objectives in more detail. We also provide findings for the 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 are based on the BMI but use different cutoff values.

3.2.1 Cigarette Use (Objective 1)

Table 3.3 presents the first six *Healthy People 2000/2010* objectives, which are all related to substance abuse. As shown, the prevalence of cigarette use in 2002 was 33.8%, which was a significant increase from the comparable rate in 1998. Despite clear progress in reducing the prevalence of cigarette smoking over the survey series (see Table 3.1), the 2002 rate remained nearly 14 percentage points higher than the *Healthy People 2000* objective of 20% adopted for the Military (Public Health Service [PHS], 1991) and nearly 22 percentage points higher than the *Healthy People 2010* objective of 12% prevalence (Department of Health and Human Services [DHHS], 2000). In addition, the rates appear higher than the civilian benchmark. However, as shown in Chapter 6, the military and civilian smoking rates are very similar when adjustments are made for sociodemographic differences in the two populations.

3.2.2 Cigar Use (Objective 2)

Table 3.3 shows objectives for cigar use and military data for cigar use in 2002, but data for cigar use or pipe use in 1995 and 1998, because that is the way the questions were asked in the earlier surveys. For 2002, the items were asked separately. Analyses of the 2002 data indicate that unique pipe use is relatively low and that cigar use accounts for the large majority of the combined use (i.e., cigar or pipe use in 2002 was 33.2%, compared with 32.6% for cigar use alone). Note that there was a large increase in cigar use between 1995 and 1998, but the 1998 rate remained stable in 2002. The rates are much higher

Table 3.3 Achievement of Selected *Healthy People 2010* Substance Use/Abuse Objectives, Total DoD, 1995-2002

Characteristic/Group	2000 Objective ^a	2010 Objective ^b	Civilian Estimate ^b	Year		
				1995	1998	2002
Cigarette Smoking,^c Past 30 Days	≤ 20%	12.0%	24.0%	31.9	29.9	33.8 ^d
Cigar Use, Past 12 Months	NA	1.2%	2.5%	18.7 ^e	32.6 ^e	32.6 ^e
Smokeless Tobacco Use, Past Year						
Males, aged 18–24	≤ 4%	NA	NA	21.9	19.0	17.1
All personnel	NA	0.4%	2.6%	13.2	11.7	12.2
Binge Drinking	NA	6.0%	16.6%	NA	NA	41.8
Any Illicit Drug Use, Past 30 Days	NA	2.0%	5.8%	3.0	2.7	3.4

Note: Table estimates are percentages.

^aPublic Health Service (1991). *Healthy people 2000: National health promotion and disease prevention objectives—full report, with commentary* (DHHS Publication No. PHS 91-50212). Washington, DC: U.S. Department of Health and Human Services.

^bDepartment of Health and Human Services (2000, November). *Healthy People 2010* (2nd ed). 2 vols. Washington, DC: U.S. Government Printing Office.

^cAged 18 and over.

^dComparisons between 1998 and 2002 are statistically significant at the 95% confidence level.

^eThe 1995 and 1998 data include both cigar and pipe smoking, past 12 months. The percentage given for 2002 (32.6%) is for cigar use only, compared with a 2002 figure of 33.2% for cigar and pipe smoking combined. Thus, we assume that pipe use in 1995 and 1998 was also very low.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1995 to 2002 (2002 Questions: Any Smoking, Q45, Q47; Cigar Use, Q56; Smokeless Tobacco Use, Q51, Q53; Binge Drank, Q24; Any Illicit Drug Use, Past 30 Days, Q60, Q62).

than the *Healthy People 2010* objective and considerably higher than the civilian benchmark. The 2002 cigar rate of use is similar to the cigarette rate of use for 2002.

3.2.3 Smokeless Tobacco Use (Objectives 3 and 4)

As shown in Table 3.3, for smokeless tobacco use in the past 30 days, military men aged 18 to 24 showed a prevalence of 17.1% for 2002, which was a nonsignificant change from 19.0% in 1998. However, the 2002 rate was over four times as high as the *Healthy People 2000* objective of 4%. Given the rather large disparity between the smokeless tobacco use 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 even by the year 2010. For all personnel, the past year smokeless use rate is 12.2%, but this is still much higher than the 2010 objective of 0.4% or the civilian benchmark of 2.6%.

3.2.4 Binge Drinking (Objective 5)

A new objective established for *Healthy People 2010* is binge drinking (now more commonly being referred to in the scientific literature as heavy episodic drinking) (Wechsler et al., 2002). The 2002 estimate of binge drinking, defined as five or more drinks of alcoholic beverages at the same time or

within 2 hours of each other at least once in the past 30 days, is 41.8% for the Military. This compares with the *Healthy People 2010* objective of 6.0% and the civilian benchmark of 16.6%. It should be noted, however, that rates of binge drinking among college populations (44.8% in 2001) are very similar to the military rate (Wechsler et al., 2002).

3.2.5 Illicit Drug Use (Objective 6)

The objective on any illicit drug use in the past 30 days is also new for *Healthy People 2010*. As shown in Table 3.3, the rates for the Military have been relatively stable at around 3% since 1995; these rates are lower than the civilian benchmark of 5.8% and very close to the *Healthy People 2010* objective of 2.0%. Chapter 5 provides more systematic comparisons of the military and civilian rates of drug use adjusting for demographics of the civilian population and shows the military rates to be substantially lower than the civilian rates.

3.2.6 Overweight (Objectives 7 and 8)

Table 3.4 presents objectives 7 through 18, plus the NHLBI guidelines for overweight and corresponding DoD data for 1995, 1998, and 2002. Estimates of the prevalence of overweight were based on the BMI, which is defined as the ratio of a person's weight in kilograms to the square of that person's height in meters. As shown, 23.8% of all military personnel in 2002 under the age of 20 were classified as overweight, and 24.0% 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 1998 for personnel under age 20 (22.9% vs. 23.8%), but showed a significant increase in overweight among personnel aged 20 or older (19.5% vs. 24.0%). The 1995 and 1998 prevalence of overweight fell below the *Healthy People 2000* objective for personnel aged 20 or older, but the rate of overweight for personnel in 2002 did not meet the objective. There is a clear pattern in the data for increasing overweight in both age groups over time, with 2002 rates being similar for both age groups. Taken together, personnel in the total DoD under the age of 20 exceeded the objective of no more than a 15% prevalence of overweight across all three survey years, whereas personnel aged 20 or older met the goal of no more than a 20% prevalence of overweight in 1995 and 1998 but were above the objective in 2002. The significant increase in overweight over the survey years suggests that overweight is an area in need of attention.

It is somewhat surprising that military personnel exceeded the *Healthy People 2000* objective 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. Nonetheless, the pattern shows a clear trend toward increasing rates of overweight among all ages, which is a cause for concern.

Table 3.4 Achievement of Selected Healthy People 2000 and 2010 Health Promotion Objectives, Total DoD, 1995-2002

Characteristic/Group	2000 Objective ^a	2010 Objective ^b	Civilian Estimates ^b	Year	
				1995	2002
Overweight—Healthy People 2000 Guidelines^c					
Under age 20	≤15%	NA	NA	19.0 (1.4)	22.9 (2.0)
Aged 20 or older	≤20%	NA	NA	16.7 (0.4)	19.5 (0.5)
Overweight—1998 NHLBI Guidelines^e					
Under age 20	≤15%	NA	NA	27.6 (1.7)	30.5 (2.1)
Aged 20 or older	≤20%	NA	NA	50.2 (0.6)	53.9 (0.5)
Healthy Weight—Healthy People 2010^f					
Aged 20 or older	NA	60%	42%	NA (NA)	NA (NA)
Strenuous Exercise, Past 30 Days^g					
All personnel	≥20%	≥30%	23%	65.4 (0.9) ^h	67.7 (0.9) ^h
Blood Pressure, Checked Past 2 Years and Know Result					
All personnel	≥90%	≥95%	90%	76.3 (0.9)	80.4 (0.5)
Taking Action to Control High Blood Pressureⁱ					
Personnel with history of high blood pressure	≥90%	≥95%	82%	49.3 (1.3)	46.5 (1.4)
Cholesterol Checked, Past 5 Years					
All personnel	≥75%	≥80%	67%	60.1 (1.5)	62.4 (1.1)
Hospitalization for Injuries, Past 12 Months					
All personnel	≤754 per 100,000	NA	NA	3,388 (235)	3,271 (237)
Seat Belt Use^j					
All personnel	≥85%	≥92%	69%	90.6 (0.7)	91.4 (0.7)
Helmet Use, Past 12 Months^j					
Motorcyclists	≥80%	≥79%	67%	71.0 (1.3)	75.9 (0.9)
Bicyclists	≥50%	NA	NA	22.8 (1.8)	44.2 (1.7)
Condom Use at Last Encounter					
Sexually active unmarried personnel ^k	≥50%	≥50%	23% ^l	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. NA = not applicable.

^aPublic Health Service (1991). *Healthy people 2000: National health promotion and disease prevention objectives—full report, with commentary* (DHHS Publication No. PHS 91-50212). Washington, DC: U.S. Department of Health and Human Services.

^bDepartment of Health and Human Services (2000, November). *Healthy People 2010* (2nd ed). 2 vols. Washington, DC: U.S. Government Printing Office.

^cDefinition 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 (Q101 and Q102) (PHS, 1991).

^dComparisons between 1998 and 2002 are statistically significant at the 95% confidence level.

^eDefinition 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 present analyses, these four levels were aggregated such that personnel were considered overweight if their BMI was ≥ 25.0 (Q101 and Q102).

^fDefined as a BMI equal to or greater than 18.5 and less than 25 (age adjusted to the year 2000 standard population).

^gAny of the following three or more times a week for 20 minutes or more: running, cycling, walking briskly, hiking, or other strenuous exercise (Q72).

^hMet or exceeded *Healthy People 2000* objective.

ⁱEstimate submitted to personnel who had ever been told they had high blood pressure (other than pregnancy-related high blood pressure). 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 (Q105-106, 107A-C, Q108A-C, and Q108F).

^jReported wearing seat belts or helmets “always” or “nearly always.” Objectives on helmet use were submitted to personnel who rode a motorcycle or bicycle in the past 12 months (Seat Belt Use, Q67; Motorcycle Helmet Use, Q68 and Q69; Bicycle Helmet Use, Q70 and Q71).

^kDefined as unmarried personnel who had one or more sexual partners in the past 12 months. For consistency with previous estimates, these estimates do not include personnel who are living as married (Q115 and Q116).

^lEstimate for females aged 18-44.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1995 to 2002 (2002 Questions: Overweight, Q101-102; Strenuous Exercise, Q72A-Q72B; Blood Pressure, Know Result, Q103-Q104; Taking Action to Control Blood Pressure, Q105-106, Q108A-C, Q108F; Cholesterol Checked, Past 5 Years, Q109; Hospitalization for Injuries, Past 12 Months, Q66; Seat Belt Use, Q67; Helmet Use, Q68-Q71; Condom Use Among Sexually Active Unmarried Personnel, Q115-116).

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 using the *Healthy People 2000* guidelines. For the 2002 survey, 36.5% of personnel under age 20 were defined as overweight, and 58.4% of those aged 20 or older were classified as overweight. For 1995, the corresponding percentages were 27.6% and 50.2%, respectively; the data for 1998 fall between the 1995 and 2002 estimates. The data under the NHLBI guidelines essentially show the same increasing pattern of overweight from 1995 to 2002 as are shown for the *Healthy People 2000* guidelines, but the rates of overweight are much higher under the NHLBI guidelines because of its lower threshold for classifying persons as overweight.

These data are useful when comparing active-duty populations with other populations and indicate that if the DoD were to use the NHLBI standard, a sizable group of personnel would be shifted from a category of meeting weight standards to a category of being overweight. This change would result from lowering the cutoff value in the scale, but it would not be due to any modification in behavior or appearance of the Military.

3.2.7 Healthy Weight (Objective 9)

Whereas for *Healthy People 2000* the focus was on reducing overweight in the Nation, for *Healthy People 2010* the emphasis has shifted to achieving healthy weight. Healthy weight is defined as having a BMI equal to or greater than 18.5 and less than 25.0 or, stated another way, having a BMI in the range from 18.5 to 25.0. As shown in Table 3.4, the Military had 40.7% of its personnel who met the healthy weight criterion, which is notably below the *Healthy People 2010* objective of 60%. This finding is consistent with the high rates of overweight described above using the NHLBI criteria and indicates that the Military faces a challenge to achieve this goal by the year 2010.

3.2.8 Exercise (Objective 10)

Objective 10 examines personnel who engaged in strenuous exercise (running/cycling/walking or other strenuous exercise, such as swimming laps) on 3 or more days per week for at least 20 minutes per occasion in the past 30 days. As shown in Table 3.4, 70.2% of personnel in the total DoD reported engaging in this behavior in 2002 and 65.4% in 1995. Data for all years far exceed the *Healthy People 2000* objective of 20% or more and the *Healthy People 2010* objective of 30% or more 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.

3.2.9 Blood Pressure (Objectives 11 and 12)

Table 3.4 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. According to the self-reports from the survey, in 2002, 77.9% of total DoD personnel had their blood pressure checked in the past 2 years and could state the result. Unfortunately, this is a significant decrease from the 80.4% who reported this behavior in 1998, and about the same level as was observed in 1995. The rate is below the *Healthy People 2000* and *2010* targets of 90% and 95%, respectively, and also below the civilian rate of 90%. These findings are somewhat surprising in view of the emphasis on fitness and health that prevails in the Military and the ease of access to health care.

We also gathered data about the group of people who had high blood pressure and 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 2002, 49.0% 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 2002 DoD survey. This was similar to the rates in 1995 and 1998. Although about half of military personnel were consciously taking steps to control their high blood pressure, this rate falls well below the *Healthy People 2000* objective of 90% and the *2010* objective of 95%. Clearly, those personnel who had a history of high blood pressure but were not taking any of these actions to control it are a group at increased risk for a recurrence of the problem.

3.2.10 Cholesterol (Objective 13)

As shown in Table 3.4, 56.3% of all personnel in the total DoD in 2002 had their cholesterol checked within the preceding 5 years. Unfortunately, this was a significant decrease from the rate of 62.4% in 1998 and the lowest prevalence since 1995. These rates were notably lower than the *Healthy People 2000* target of 75% and the *2010* objective of 80% for adults. It is also below the civilian benchmark of 67%. 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.

3.2.11 Injuries and Injury Prevention (Objective 14)

Table 3.4 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. As shown, for every 100,000 active-duty personnel, approximately 3,600 were hospitalized for treatment of an injury in the past 12 months, which did not differ significantly from the rates of 3,271 in 1998 and 3,388 in 1995. The 2002 rate was about five 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 did not distinguish between unintentional 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 examine the rate of hospitalization for intentional injuries in the 2002 survey, we inquired whether the respondent had any “overnight hospital stays for treatment of an unintentional injury in the past 12 months.”

3.2.12 Seat Belt Use (Objective 15)

Table 3.4 shows that, in 2002, 92.1% of DoD personnel wore seat belts “always” or “nearly always” when they drove or rode in an automobile. This commendably high rate was similar to the rates of 91.4% in 1998 and 90.6% in 1995 and exceeds the *Healthy People 2000* target of use of occupant protection systems by at least 85% of motor vehicle occupants. Similarly, it exceeds the *Healthy People 2010* rate of 92%. 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.

3.2.13 Helmet Use (Objectives 16 and 17)

Table 3.4 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 the subset of personnel who rode a motorcycle at least once in the past 12 months. 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. 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 2002 who rode a motorcycle at least once in the past 12 months, 82.1% wore helmets always or nearly always. This represents a significant increase from the 75.9% who reported this behavior in 1998 and from the 71.0% in 1995. As shown, there has been an increasing trend toward higher rates of helmet use since 1995, with the 2002 overall rate exceeding the *Healthy People 2000* and *2010* objectives of 80% and 79%, respectively.

Among personnel in 2002 who rode bicycles in the past 12 months, 51.9% used helmets always or nearly always. Like motorcycle helmet use, this rate is significantly higher than the rate of 44.2% in 1998 and the rate of 22.8% in 1995.

Helmet use represents the behavior with the greatest improvement among the *Healthy People 2000* and *2010* objectives studied here. Helmet use for motorcyclists exceeded the *Healthy People 2000* and *2010* objectives of 80% and 79%, respectively, and helmet use for bicyclists exceeded the *Healthy People 2000* rate of at least 50%. There is no objective regarding bicycle helmet use for *Healthy People 2010*.

3.2.14 Condom Use (Objective 18)

The proper use of condoms can reduce the risk of contracting sexually transmitted diseases (STDs) (including AIDS) among individuals who are sexually active but not in a monogamous relationship. The bottom row in Table 3.4 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 2002, some 42.1% 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 rates of 41.8% in 1998 and 40.4% 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.

3.2.15 Pap Tests (Objectives 19 and 20)

The major way that women can lessen the risk of cervical cancer is through regular Pap smear tests. As shown in Table 3.5, based on the 2002 survey, 98.4% of military women had ever received such tests and 97.2% had received the tests within the past 3 years. These high rates are similar to those observed in 1998 and 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.

3.2.16 Substance Use Reduction During Pregnancy (Objectives 21 and 22)

Avoidance of substance use during pregnancy is important in ensuring maternal and infant health and targets two behaviors, alcohol use and cigarette use. For alcohol, 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 a baseline rather than setting a specific percentage target. Because this objective was not examined until 1995 for the Military, the 1995 DoD survey rate of abstinence from alcohol during pregnancy (85.2%) served 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 have effectively required 100% of military women to abstain from alcohol during pregnancy. 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% (i.e., 100% minus the 1995 baseline of 85% prevalence) of military women in 1995 who were pregnant in the 5 years prior to that survey used alcohol during their most recent

Table 3.5 Achievement of Selected *Healthy People 2000* and 2010 Objectives for Military Women, Total DoD, 1995-2002

Characteristic	2000 Objective ^{a,b}	2010 Objective ^c	Civilian Estimate ^c	Year		
				1995	1998	2002
Pap Smear^d						
Ever received	≥95%	97%	92%	97.1 (0.6)	97.8 (0.2)	98.4 (0.4) ^e
Received in past 3 years	≥85%	90%	79%	95.2 (0.7)	95.9 (0.4)	97.2 (0.4) ^e
Substance Use During Last Pregnancy^f						
No alcohol use ^b	≥88%	94%	86%	85.2 (1.3)	85.8 (1.2)	89.9 (1.2) ^{e,g}
No cigarette use	≥90%	99%	87%	83.9 (1.4)	85.8 (1.3)	88.5 (1.3)

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

^aPublic Health Service. (1991). *Healthy people 2000: National health promotion and disease prevention objectives—full report, with commentary* (DHHS Publication No. PHS 91-50212). Washington, DC: U.S. Department of Health and Human Services.

^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.

^cDepartment of Health and Human Services. (2000, November). *Healthy People 2010* (2nd ed). 2 vols. Washington, DC: U.S. Government Printing Office.

^dEstimate made for women with an intact uterine cervix ($N = 3,079$ in 2002).

^eMet or exceeded *Healthy People 2000* objective.

^fEstimate made for women who were pregnant in the past 5 years ($N = 819$ in 2002). For women who were pregnant at the time of the survey, “last pregnancy” refers to the *current* pregnancy.

^gComparisons between 1998 and 2002 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1995, 1998, and 2002 (2002 Questions: Pap Smear, Q139 and Q140; Substance Use During Last Pregnancy: No Alcohol Use, Q142, Q146, and Q147; No Cigarette Use, Q142, Q144, and Q145).

pregnancies, then a prevalence of about 12% would represent a 20% reduction in the prevalence of alcohol use during pregnancy relative to the 1995 survey. For consistency in the way the data are presented in Table 3.5, we stated attainment of this objective in terms of 88% of women abstaining from alcohol (i.e., 100% minus 12%). The *Healthy People 2010* objectives, however, specified a target of 94% abstinence and a reported 1996–97 baseline of 86%, which was also the 1998 DoD rate.

As shown in Table 3.5 for 2002, 89.9% of military women who had been pregnant in the past 5 years reported that they did not consume any alcohol during their last pregnancy. This was a significant increase from the rates reported in 1998 (85.8%) and 1995 (85.2%) and reached the *Healthy People 2000* objective of 88% or higher. Although this is a notable achievement, the rate for the 2002 survey falls below the *Healthy People 2010* target of 94% and provides a useful baseline to track progress during the remainder of the decade.

Table 3.5 also shows that 88.5% of military women in 2002 who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy. This rate is about the same as that observed in 1998 (85.8%) and falls slightly below the *Healthy People 2000* objective of increasing abstinence from tobacco use during pregnancy to 90% or higher. Thus, although the large majority of women do not smoke cigarettes during pregnancy, greater preventive efforts are needed to achieve the *Healthy People 2000* and especially the *Healthy People 2010* objectives.

3.2.17 Status in Meeting *Healthy People 2000* and *2010* Objectives

This chapter has reported on findings of 22 *Healthy People 2000* and *2010* objectives to improve the health of military personnel classified into the three areas of substance use, health promotion, and women's health. The 2002 DoD survey provides important data for assessing progress toward the *Healthy People 2000* objectives since 1995 and a baseline for assessing the *Healthy People 2010* objectives.

Overall, in 2002 the Military met or exceeded 7 of the 22 *Healthy People 2000* objectives (strenuous exercise, seat belt use, helmet use for motorcycles, helmet use for bicycles, Pap smears ever received, Pap smears received in the past 3 years, and no alcohol use during pregnancy). Further, as discussed later in this report, other targets have been met by at least some sociodemographic subgroups in the Military, even if not by the entire force. In addition, military personnel were within 5 percentage points of reaching the *Healthy People 2000* targets for another 2 of the 22 behaviors (overweight for personnel over age 20, no cigarette use during pregnancy).

Thus, the Military met about a third of the selected 22 *Healthy People 2000* objectives examined here by the year 2002 and nearly met 2 additional objectives. It has also met 5 of the *Healthy People 2010* objectives (strenuous exercise, seat belt use, helmet use for motorcyclists, Pap smears ever received, Pap smears received in the past 3 years). Note that the objectives already met for *Healthy People 2010* are a subset of the objective met for 2000. It is noteworthy that the areas where objectives have been met are those where military regulations help ensure compliance with the desired behaviors (exercise, seat belt use, helmet 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 objectives in other areas, where individuals have to value the behaviors and take more initiative to achieve them.

3.3 Summary

In this chapter, we briefly review the prevalence of alcohol use, illicit drug use, and tobacco use from the 2002 DoD survey and examine trends in substance use and negative effects due to alcohol use from 1980 to 2002. For substance use trends, we provide raw estimates and estimates that have been adjusted for changes in sociodemographic characteristics over the time the surveys were conducted. We also provide data for selected *Healthy People 2000* and *2010* objectives for military personnel, many of which apply to all personnel and several that are specific to military women. Our focus in this chapter is on data for the entire DoD.

3.3.1 Unadjusted Trends in Substance Use

Comparisons of findings from eight DoD surveys of military personnel conducted periodically from 1980 to 2002 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 showed a nonsignificant change from 20.8% in 1980 to 18.1% in 2002, although there were some significant upward and downward shifts across the survey series;
- ! use of any illicit drugs declined sharply from 27.6% in 1980 to 3.4% in 2002; and
- ! cigarette smoking decreased significantly from 51.0% in 1980 to 33.8% in 2002.

Despite a rather constant rate of heavy alcohol use, the data showed a general shift toward lighter use of alcohol over time. The percentage of people who abstained from alcohol or who were infrequent/light drinkers increased significantly from 25.6% in 1980 to 41.3% in 2002.

Comparisons of findings between the 1998 and 2002 surveys show significant increases in the rates of heavy alcohol use (15.4% to 18.1%) and cigarette smoking (29.9% to 33.8%) but no significant change for illicit drug use (2.7% to 3.4%). The 2002 survey is the first time heavy alcohol use has increased significantly since 1988, which raises a number of concerns about readiness since heavy drinking rates can impact it directly. The increase for cigarettes is the first since 1980 and is also of concern in that it signals a change in a pattern of declines that has prevailed for the past two decades. The increases from 1998 to 2002 in heavy alcohol and cigarette use suggest that these are areas that need greater emphasis by the Military. The finding of no change from 1998 to 2002 for illicit drug use is in line with the low rates that have been found since 1992, suggesting that it may not be feasible to assume that the rate will drop much lower in the Military.

3.3.2 Trends in Substance Use Adjusted for Changes in Sociodemographic Composition

Members of the Armed Forces in 2002 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 sociodemographic 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 sociodemographic characteristics of the Military from 1980 to 2002 (Table 3.2):

- ! A key finding for heavy alcohol use is that the adjusted rates are nearly identical across the entire survey period (with the exception of the 1982 and 1985 surveys, which were even higher). This suggests that some of the decline in heavy alcohol use observed in the unadjusted rates can be explained by the changes in the demographics of the Military over the period from 1980 to 2002. The implication is that military programs and practices have had little effect on rates of heavy alcohol use during the 22-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 2002. 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 Trends in Alcohol-Related Negative Effects

There were significant declines 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), but there were alarming increases from 1998 to 2002:

- ! Serious consequences declined significantly from 17.3% in 1980 to 6.7% in 1998 and then increased significantly to 9.6% in 2002. Even though there is an overall decline from 1980 to 2002, the increase between 1998 and 2002 is of concern.
- ! Productivity loss declined significantly from 26.7% in 1980 to 13.6% in 1998 and then increased significantly to 17.3% in 2002. The increases in rates from 1988 to 2002 both for productivity loss and for serious consequences are the first in the past 20 years.
- ! Symptoms of dependence were assessed with two measures, the first from 1980 to 1998 and a second in 2002. The first measure appears somewhat conservative and likely underrepresents the level of dependence symptoms as indicated by *DSM-IV* criteria (APA, 1994). The first measure indicates that symptoms of dependence decreased significantly from 8.0% in 1980 to 4.8% in 1998. The new measure indicates that in 2002 over 12% of military personnel reported symptoms of dependence due to their alcohol use.

The relatively high rates of all three measures and the increases in rates for serious consequences and productivity loss signal the need for greater attention to be given to addressing alcohol problems in the Military.

3.3.4 Status in Meeting *Healthy People 2000* and *2010* Objectives

A major aim of the 2002 DoD survey was to provide the end-of-the-decade final measure on progress toward selected *Healthy People 2000* objectives for a variety of health behaviors and to provide baseline data for comparable *Healthy People 2010* objectives. The objectives that were measured were classified into three groups for presentation and discussion:

1. substance use objectives (cigarette smoking, cigar use, smokeless tobacco, binge drinking, and illicit drug use)
2. health promotion objectives (weight, exercise, blood pressure, cholesterol, injuries, seat belt use, helmet use, and condom use)
3. women's health objectives (Pap smears, substance use during pregnancy)

Some of the *Healthy People 2000* objectives have been continued for *Healthy People 2010*, a few have been modified, others have been discontinued, and new ones have been added. In total, the 2002 DoD

survey examined 22 *Healthy People 2000* and 2010 objectives to improve the health of military personnel:

- ! Overall, in 2002 the Military met or exceeded 7 of the 22 *Healthy People 2000* objectives (strenuous exercise, seat belt use, helmet use for motorcycles, helmet use for bicycles, Pap smears ever received, Pap smears received in the past 3 years, and no alcohol use during pregnancy).
- ! Other targets have been met by at least some sociodemographic subgroups in the Military, even if not by the entire force; for example, personnel aged 35 or older (but not those younger) exceeded the target of 75% having their cholesterol checked within the preceding 5 years.
- ! Military personnel were within 5 percentage points of reaching the *Healthy People 2000* targets for another 2 of the 22 behaviors (overweight for personnel over age 20, no cigarette use during pregnancy).

Thus, the Military met about a third of the 22 *Healthy People 2000* objectives examined here by the year 2002 and nearly met 2 additional objectives. It has also met 5 of the *Healthy People 2010* objectives (strenuous exercise, seat belt use, helmet use for motorcyclists, Pap smears ever received, Pap smears received in the past 3 years). Note that the areas where objectives have been met are those where military regulations help ensure compliance with the desired behaviors (exercise, seat belt use, helmet use, Pap tests). It is not clear whether the targets for these behaviors would be achieved without such requirements. It will likely be more challenging to reach the objectives in areas where individuals must take more initiative to achieve them.

3.3.5 Areas of Challenge

Overall, these findings indicate that the Military has made steady and notable progress during the past 22 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 the 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. Since 1998 there have been significant increases in cigarette use, heavy alcohol use, and two measures of negative effects due to alcohol (serious consequences and productivity loss). In addition, the measure of dependence symptoms is relatively high. Cigarette smoking remains common, used by one-third of military personnel, and heavy alcohol use—the consumption level most likely to result in alcohol-related problems—occurs among nearly one in five active-duty personnel. Indeed, the rate of heavy drinking in 2002 is not significantly different from the rate in 1980, suggesting that military efforts to reduce rates of heavy drinking have not been effective overall. Clearly, new and more effective initiatives 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* and *2010* objectives, but primarily in areas that are mandated by military regulations. Findings suggest that the largest gaps and greatest challenges will be to meet the objectives for smoking, cigar use, smokeless tobacco use, binge drinking, overweight, controlling high blood pressure, obtaining cholesterol checks, 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, binge drinking, 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. Binge drinking is defined as consuming five or more drinks on at least one occasion during the past 30 days. 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.5 to D.10).

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 and 2002 include both 32-ounce and 40-ounce 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 2002 based on the two slightly different procedures for calculating these measures (accounting for typical consumption of beer in 32- or 40-ounce containers). In general, including the 32-ounce response category in 1985 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 2002: the average daily ounces of alcohol (ethanol) and heavy alcohol use in the past 30 days. Average daily ounces of ethanol is calculated on the entire population and, thus, represents a per capita estimate of alcohol consumption. 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 1998 and increased in 2002. For the total DoD, the amount decreased from 1.48 ounces per day in 1980 to 0.79 ounce per day in 1998 and increased to 1.08 ounces per day in 2002. The decreases from 1985 to 1988 and from 1988 to 1992 were statistically significant. The most recent increase from 1998 to 2002 was statistically significant for the DoD as well as for the Navy. The Navy showed the most dramatic increase in the average amount of ethanol consumed between 1998 and 2002. The average amount of ethanol consumed per day in the Navy increased from 0.70 ounce per day in 1998 to 1.25 ounces in 2002, a substantial increase both statistically and substantively.

Over the 18-year period until 1998, 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). However, we observed increases between 1998 and 2002 of 18% for Army personnel, 80% for Navy personnel, 39% for Marine Corps personnel, and 24% for Air Force personnel. Even with the recent increase, consumption among Air Force personnel was by far the lowest of all the Services in each of the survey years.

The observed overall decreases through 1998 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., 1999). 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 2002 surveys to take into account sociodemographic changes since 1980. We standardized the sociodemographic distributions of the military population from the 1982 to 2002 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 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 2002 from 1.08 to 1.19 ounces. 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.

Table 4.1 Trends in Average Daily Ounces of Ethanol Consumed, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-2002

Service/Type of Estimate	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	1.11 (0.09) ^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)	1.26 (0.07) ^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	1.25 (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)	1.42 (0.06) ^a
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)	1.49 (0.20)
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)	1.65 (0.17)
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)	0.67 (0.06) ^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)	0.72 (0.06) ^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)	1.08 (0.05) ^{a,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)	1.19 (0.04) ^{a,c}

Note: Table entries are average 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 Appendix E.

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

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

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

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Average Daily Ounces of Ethanol, Past 30 Days, Q15-Q23 and Q28-Q30).

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 2002, except that adjusted estimates were higher. But even after the adjustment, they still showed a significant decline over time until the most recent survey year. 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.

The increase in average ounces consumed per day between 1998 and 2002, which was significant for the total DoD and the Navy, may reflect the increased responsibilities in the Military following the World Trade Center attacks in September 2001 and the pending (at the time of survey administration) war in Iraq.

4.1.2 Heavy Alcohol Use

As shown in the unadjusted portions of Table 4.2, heavy alcohol use shows a pattern toward lower rates of heavy drinking over the years, especially from 1982 to 1998, but only the Navy showed a significantly lower rate in 2002 compared with 1980 (also see Table 3.1 in Chapter 3 for DoD drinking levels and Tables D.1 to D.4 for Service drinking levels). The percentage of heavy drinkers among total DoD personnel showed a nonsignificant decrease of about 2 percentage points between 1980 and 2002, from 20.8% in 1980 to 18.1% in 2002. We also found statistically significant decreases over the 22-year period for the Navy (a 28% decrease), but not for any of the other Services. However, the Navy also showed a significant increase in heavy drinking from 13.5% in 1998 to 18.3% in 2002 (a 35% increase). All other Services demonstrated nonsignificant increases over the past 4-year period.

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 1985 to 1988, with rates stabilizing again between 1988 and 1998. In 2002, the percentage of heavy drinkers from lowest to highest was 12.3% among Air Force personnel, 18.3% among Navy personnel, 18.8% among Army personnel, and 27.7% 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 (10.4%). 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 significantly from 14.2% in 1992 to 19.1% in 1995. The percentage declined in 1998 back to 13.5%, a statistically significant decrease from the 1995 percentage and virtually equal to the percentage in 1992; however, the percentage increased significantly again in 2002 to 18.3%. The 2002 estimates of heavy drinkers for the other Services were not statistically significant from those in 1998, although all show a pattern toward an increase from 1998.

Table 4.2 Trends in Heavy Alcohol Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, 1980-2002

Service/Type of Estimate	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	18.8 (2.1)
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)	22.2 (1.4)
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	18.3 (1.2) ^{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	20.9 (1.0)
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)	27.7 (4.3)
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	30.8 (3.4)
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)	12.3 (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	13.5 (1.2)
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)	18.1 (1.1) ^a
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)	20.2 (0.7)

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. Heavy alcohol use is defined as consumption of five or more drinks on the same occasion at least once a week in the past 30 days. The algorithm for computing drinking levels (including heavy alcohol use) was altered in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced for each algorithm.

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

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

^cComparisons between 1980 and 2002 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Heavy Alcohol Use, Q15-Q18 and Q20-Q23).

In general, adjustments for sociodemographic differences for the total DoD and each of the Services increased the estimates of heavy alcohol use by about 2 to 3 percentage points. The adjustments by standardization did not alter the unadjusted patterns of significant differences between the surveys from 1980 to 2002. For adjusted rates, there was no significant decline in the rate of heavy alcohol use between 1980 and 2002 for the total DoD or for the Army, Marine Corps, or Air Force. The 2002 adjusted rates were nearly as high as those in 1980 for the total DoD and for the Air Force. The Army and the Marine Corps showed nonsignificantly higher rates of heavy alcohol use in 2002 than in 1980 and 1998. For the Navy, the rate increased significantly between 1998 and 2002 but still showed a significant overall decrease between 1980 and 2002.

To summarize, the average amount of alcohol consumed per day decreased or remained stable between 1980 and 2002 for the total DoD and for personnel from all of the individual Services. In addition, there were decreases over the years in rates of heavy drinking, although 2002 rates are not significantly lower than those in 1980. Most of the largest decreases in the percentages of heavy drinkers occurred between 1985 and 1988, with some reduction since 1988 in the Air Force. The total DoD and the Army, Navy, and Marine Corps have all shown increases from the lower rates noted in 1988. Taken together, these findings suggest that the Military has shown reductions in the average amount of alcohol actually being used and the prevalence of heavy alcohol use among its personnel from 1980 to 1998, although the increase to 2002 was not lower than 1980 rates. Adjusted estimates suggest that reductions in heavy alcohol use 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 the presence of more receptive personnel. But the leveling of heavy alcohol use rates over the past three or four DoD surveys and the current increase in heavy alcohol use rates may mean that sociodemographic forces and convincing easily persuaded heavy drinkers can no longer be relied upon; rather, more program effort and resources will be needed to further reduce heavy alcohol use in the Military.

4.2 Service Comparisons of Alcohol Use

In this section, we provide four sets of estimates for each of the Services, one set for per capita average daily ethanol use, one set for the prevalence of heavy alcohol use, one set for binge drinking (consuming five or more drinks per sitting one or more times in the past month), and one set for feeling drunk more than six times in the past year in 2002. We begin by presenting unadjusted estimates on these measures 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 average amount of alcohol consumed per day by all personnel in each Service and the prevalences of heavy alcohol use, binge drinking, and feeling drunk in 2002 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, heavy alcohol use, binge drinking, and feeling drunk, 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 2002. Unadjusted and adjusted estimates for average ounces of ethanol, heavy alcohol use, binge drinking, and feeling drunk more than six times in the past year 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 per capita estimates for 2002 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, Navy, or Marine Corps.

Unadjusted rates of heavy alcohol use (i.e., five or more drinks per typical drinking occasion at least once a week, on average) in 2002 were also significantly lower among Air Force personnel than among personnel in the Army, Navy, or Marine Corps.

The percentage of binge drinkers was significantly lower among Air Force personnel than among personnel in the Army, Navy, or Marine Corps. In 2002, 34.0% of Air Force personnel acknowledged at least one binge drinking episode in the past month, while rates for the Army (41.4%), Navy (44.2%), and Marines (54.2%) were significantly higher.

Likewise, rates of feeling drunk more than six times in the past year were lower in the Air Force (23.8%) than in the Army (32.4%), Navy (32.8%), and Marine Corps (43.8%). Again, the Marines face the greatest challenges in the prevalence of this measure of heavy drinking, with more than one in two Marines reporting frequent intoxication.

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. This task appears to be greatest for the Marine Corps, with an estimate of more than one in four Marines (27.7%) being heavy drinkers. The Air Force in 2002 had the smallest proportion of personnel being heavy drinkers, 12.3%, 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 (18.8%) and Navy (18.3%) fall between these two extremes.

4.2.2 Adjusted Estimates

Observed differences in per capita 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,

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

Measure/Type of Estimate	Service							
	Army	Navy	Marine Corps	Air Force	Total DoD			
Average Daily Ounces of Ethanol								
Unadjusted	1.11 (0.09) ^a	1.25 (0.07) ^a	1.49 (0.2) ^a	0.67 (0.06)	1.08 (0.05)			
Adjusted ^b	1.12 (0.06) ^a	1.19 (0.07) ^a	1.17 (0.07) ^a	0.76 (0.07)	1.06 (0.03)			
Heavy Alcohol Use								
Unadjusted	18.8 (2.1) ^a	18.3 (1.2) ^{a,c}	27.7 (4.3) ^a	12.3 (1.0)	18.1 (1.1)			
Adjusted ^b	19.3 (1.1) ^a	17.2 (1.4)	20.6 (1.6) ^a	14.0 (1.2)	17.8 (0.7)			
Alcohol Binge Episode^d								
Unadjusted	41.4 (2.0) ^{a,c}	44.2 (2.2) ^{a,c}	54.2 (4.4) ^a	34.0 (1.8)	41.8 (1.3)			
Adjusted ^b	42.4 (1.0) ^a	42.7 (1.3) ^a	46.1 (1.7) ^a	35.8 (1.8)	41.8 (0.7)			
Felt Drunk More Than 6 Times in Past Year								
Unadjusted	32.4 (2.9) ^{a,c}	32.8 (1.7) ^{a,c}	43.8 (4.9) ^a	23.8 (1.9)	31.7 (1.5)			
Adjusted ^b	33.7 (1.6) ^a	31.4 (0.5) ^a	34.8 (1.9) ^a	25.7 (1.8)	31.4 (0.8)			

Note: Table entries for average daily ounces of ethanol are average values, and entries for heavy alcohol use, alcohol binge episode, and felt drunk in past year 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.

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

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

^dDefined as having consumed five or more drinks on the same occasion at least once during the past 30 days.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Average Daily Ounces of Ethanol, Q15-Q23 and Q28-Q30; Heavy Alcohol Use, Q15-Q18 and Q20-Q23; Drunk More Than 6 Times in Past Year, Q31).

unmarried, and enlisted—groups who have been shown in previous DoD surveys to be more likely to be heavy drinkers (Bray et al., 1999). 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 with 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 as well as lower binge drinking rates, and the Air Force could have had a higher level of alcohol consumption, binge drinking, and 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, heavy alcohol use, binge drinking rates, and frequent intoxication in 2002. 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 average daily alcohol use, heavy alcohol use, binge drinking, and frequent intoxication.

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 0.67 ounce of ethanol per day to an average of 0.76 ounce. Standardization decreased the Navy estimate slightly from 1.25 ounces per day (unadjusted) and 1.19 ounces (adjusted). Standardization had an effect on the Marine Corps' estimate unlike the effects on the other Services' estimates, resulting in a decrease from 1.49 ounces per day on average (unadjusted) to 1.17 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 per capita alcohol consumption compared with 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 sociodemographic composition raised the prevalence estimates slightly for the Air Force (from 12.3% to 14.0%). Adjusting the estimates for sociodemographic differences increased the Army estimates slightly (18.8% unadjusted vs. 19.3% adjusted) and decreased the Navy estimates (18.3% unadjusted vs. 17.2% adjusted). Standardization reduced the estimated prevalence of heavy alcohol use for the Marine Corps, lowering it by more than 7 percentage points, from 27.7% (unadjusted) to 20.6% (adjusted). Following standardization, adjusted rates of heavy alcohol use for all of the Services still differed significantly from the adjusted rate for the Air Force.

Standardization of binge drinking rates resulted in the Air Force continuing to have a significantly lower rate of binge drinking than the other Services. Again, the adjusted rate for the Air Force remained relatively unchanged, moving from 34.0% to 35.8%, while slightly increasing the rate for the Army (41.4% to 42.4%), decreasing the rate for the Navy (44.2% to 42.7%), and showing a larger decrease in the rate for the Marine Corps (54.2% to 46.1%).

Adjusted rates for feeling drunk showed a similar pattern, revealing a slight increase in the Air Force and Army and a slight decrease in the Navy. The largest decrease was demonstrated in the Marines.

These results indicate that many of the differences in the unadjusted rates of heavy alcohol use in 2002 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 2002. 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 sociodemographic groups at increased risk for heavy alcohol use than the other Services, it 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 sociodemographic groups and the next 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 whites and Hispanics, those with less education, those aged 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 sociodemographic 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 Air Force personnel
- ! males compared with females
- ! non-Hispanic whites compared with non-Hispanic African Americans and those in the “other” racial/ethnic category
- ! those with a high school education or less compared with college graduates
- ! those aged 21 to 25 compared with those aged 35 or older

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

Sociodemographic Characteristic	Prevalence	Odds Ratio ^a		
		Adjusted	95% CI ^b	
Service				
Army	18.8 (2.1)	1.53 ^c	(1.13, 2.06)	
Navy	18.3 (1.2)	1.23	(0.92, 1.65)	
Marine Corps	27.7 (4.3)	1.71 ^c	(1.20, 2.43)	
Air Force	12.3 (1.0)	1.00		
Gender				
Male	20.3 (1.2)	3.59 ^c	(2.87, 4.49)	
Female	7.1 (0.8)	1.00		
Race/Ethnicity				
White, non-Hispanic	19.6 (1.2)	1.00		
African American, non-Hispanic	13.3 (1.4)	0.60 ^c	(0.47, 0.77)	
Hispanic	19.4 (1.8)	0.91	(0.70, 1.18)	
Other	16.0 (1.4)	0.74 ^c	(0.64, 0.85)	
Education				
High school or less	26.5 (1.5)	1.60 ^c	(1.12, 2.28)	
Some college	16.7 (0.8)	1.44	(0.97, 2.15)	
College graduate or higher	6.0 (0.7)	1.00		
Age				
20 or younger	26.1 (2.4)	1.37	(0.98, 1.93)	
21-25	28.4 (1.1)	2.17 ^c	(1.73, 2.73)	
26-34	11.7 (0.9)	1.13	(0.91, 1.39)	
35 or older	7.1 (0.5)	1.00		
Family Status				
Not married ^d	25.8 (1.4)	1.95 ^c	(1.73, 2.20)	
Married, spouse not present	20.6 (1.4)	1.70 ^c	(1.30, 2.21)	
Married, spouse present	11.1 (0.8)	1.00		
Pay Grade				
E1-E3	30.8 (1.9)	6.15 ^c	(3.16, 11.98)	
E4-E6	18.7 (0.8)	4.29 ^c	(2.24, 8.20)	
E7-E9	7.6 (0.5)	2.93 ^c	(1.48, 5.79)	
W1-W5	8.3 (1.4)	2.74 ^c	(1.36, 5.53)	
O1-O3	7.1 (1.0)	2.53 ^c	(1.49, 4.32)	
O4-O10	2.0 (0.5)	1.00		
Region				
CONUS ^e	16.9 (1.6)	0.89	(0.73, 1.09)	
OCONUS ^f	20.7 (0.8)	1.00		
Total	18.1 (1.1)			

Note: Prevalence estimates are percentages (with standard errors in parentheses). Heavy alcohol use is defined as consumption of five or more drinks on the same occasion at least once a week in the past 30 days.

^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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

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

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Heavy Alcohol Use, Past 30 Days, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

- ! those who were single or married with spouse absent compared with those who were married with spouse present
- ! 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 six times greater than senior officers in pay grades O4 to O10, and personnel in pay grades E4 to E9 had odds from three to four times greater. The odds of junior officers in pay grades O1 to O3 being heavy drinkers were over two and a half times that of senior officers. Male personnel had odds more than three 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 at or near 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 that are 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 the most productive.

4.4 Binge Drinking

In this section, we examine where and with whom binge drinking occasions (consuming five or more drinks on one occasion in the past month) occurred. First, we report the prevalence of selected sociodemographic characteristics by binge drinking companion. Next, sociodemographic characteristics are compared for binge drinking location.

4.4.1 Correlates of Binge Drinking Companion

Table 4.5 shows the prevalence of selected sociodemographic characteristics by binge drinking companion. Males had a higher prevalence of binge drinking (45.4%) than females (23.9%) and reported that most binge drinking occasions were with small groups (69.2%), followed by binge drinking with dates (13.7%) and large groups (10.3%). For females, most occasions of binge drinking also occurred with small groups of individuals (64.9%), followed by being with a date (18.9%) or large groups (11.5%). Personnel aged 18 to 25 had a higher prevalence of binge drinking occasions (53.8%) than personnel who were between 26 and 55 (31.4%). For all age groups and all Services, binge drinking with a small group had the highest prevalence, ranging from 60.3% to 74.6%. Army personnel had the highest rate of binge drinking alone (8.4%), compared with rates close to 5.5% for the other Services. Overall, the Air Force had the lowest rates of binge drinking (34.0%), followed by the Army (41.4%) and Navy (44.2%). The Marine Corps reported the highest prevalence of binge drinking (54.2%), which may be reflective of a younger age of personnel.

4.4.2 Correlates of Binge Drinking Location

Table 4.6 shows the prevalence of binge drinking location by selected sociodemographic characteristics. Binge drinking in a bar was reported by the majority of females (48.3%), while males also indicated high rates of binge drinking in bars (38.0%). The next most frequent locations for binge

Table 4.5 Selected Sociodemographic Characteristics, by Binge Drinking Companion

Sociodemographic Characteristics	Binge Drank in Last 30 Days	With Whom During Last Binge Episode ^a							
		No One/ Alone		Date/Spouse or Partner		Small Group		Large Group	
Gender									
Male	45.4 (1.4)	6.7 (0.5)	13.7 (1.0)	69.2 (1.3)	10.3 (0.8)				
Female	23.9 (1.1)	4.7 (1.1)	18.9 (2.0)	64.9 (2.0)	11.5 (1.4)				
Age									
18-25	53.8 (1.5)	5.2 (0.5)	9.2 (1.0)	74.6 (1.4)	11.0 (1.0)				
26-55	31.4 (1.0)	8.4 (0.8)	21.6 (1.5)	60.3 (1.3)	9.7 (0.9)				
Service									
Army	41.4 (2.0)	8.4 (1.2)	16.2 (1.2)	66.4 (1.9)	8.9 (1.1)				
Navy	44.2 (2.2)	5.7 (0.9)	12.3 (3.1)	70.3 (2.9)	11.7 (1.1)				
Marine Corps	54.2 (4.4)	5.6 (1.0)	13.4 (1.9)	70.4 (3.8)	10.6 (3.1)				
Air Force	34.0 (1.8)	5.2 (0.5)	14.2 (0.9)	69.4 (1.6)	11.3 (1.5)				
Total DoD	41.8 (1.3)	6.5 (0.5)	14.2 (1.0)	68.8 (1.3)	10.5 (0.8)				

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

^aDefined as having consumed five or more drinks on the same occasion at least once during the past 30 days.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Binge Drank, Q24, and With Whom Drank, Q25).

drinking among males were where they live (33.8%) or at someone else's home (18.6%). Female personnel also reported a high prevalence of binge drinking where they live (27.9%) or at someone else's home (16.3%). Personnel aged 18 to 25 most often binge drank at a bar (42.7%), whereas personnel aged 26 to 55 reported their most frequent location for binge drinking as at home (40.3%). Army personnel had the highest prevalence of binge drinking at home (41.4%), while Marine Corps and Air Force personnel listed a bar as the most typical location for binge drinking (37.1% and 38.5%, respectively).

4.5 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 2002 DoD surveys. Next, we examine the negative effects as a function of pay grade and the relationship between drinking levels and serious consequences.

4.5.1 Trends in Negative Effects

The Military showed dramatic overall reductions in alcohol-related negative effects during the 22-year period from 1980 to 2002. Alcohol-related negative effects have declined significantly since the survey series began. However, in 2002, increases were noted from the 1998 rates. For the total DoD, 9.6% of military personnel reported having experienced a serious consequence associated with alcohol use during the past year, 17.3% reported some productivity loss, and 12.3% reported at least four

Table 4.6 Selected Sociodemographic Characteristics, by Binge Drinking Location

Sociodemographic Characteristics	Binge Drank in Last 30 Days	Location During Last Binge Episode ^a								
		Where I Live		In a Bar, Club, Restaurant		At Someone Else's Place (Including a Party)		Other Place ^b		
Gender										
Male	45.4	(1.4)	33.8	(2.7)	38.0	(3.2)	18.6	(1.0)	9.6	(0.8)
Female	23.9	(1.1)	27.9	(2.4)	48.3	(2.7)	16.3	(1.2)	7.5	(1.1)
Age										
18-25	53.8	(1.5)	28.3	(2.4)	42.7	(3.0)	20.8	(1.6)	8.2	(1.2)
26-55	31.4	(1.0)	40.3	(3.1)	33.8	(3.3)	14.8	(0.8)	11.1	(0.7)
Service										
Army	41.4	(2.0)	41.4	(1.8)	32.0	(2.2)	19.4	(1.0)	7.3	(1.0)
Navy	44.2	(2.2)	+	(+)	+	(+)	14.1	(3.0)	10.5	(1.8)
Marine Corps	54.2	(4.4)	32.7	(1.5)	37.1	(1.8)	20.1	(0.6)	10.2	(2.3)
Air Force	34.0	(1.8)	30.1	(1.7)	38.5	(3.1)	20.6	(0.9)	10.8	(1.2)
Total DoD	41.8	(1.3)	33.2	(2.6)	39.0	(3.0)	18.4	(1.0)	9.4	(0.8)

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

+Low precision.

^aDefined as having consumed five or more drinks on the same occasion at least once during the past 30 days.

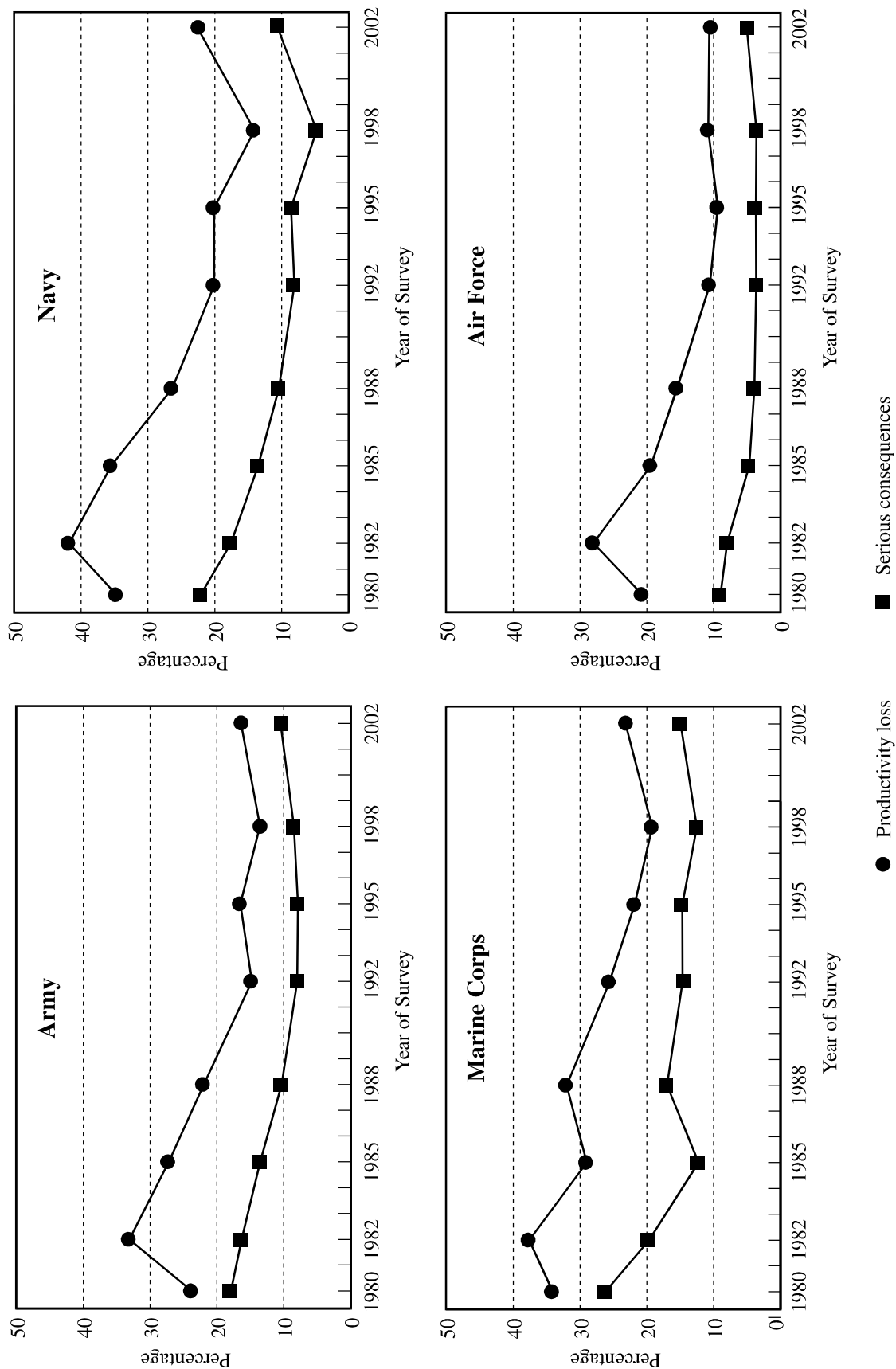
^b“Other” includes the following response categories for Q26: at work, sporting/rec events, ceremony/formal occasion, car, or other place.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Binge Drank, Q24, and Location Drank, Q26).

symptoms of dependence (see Table 3.1 in Chapter 3). The increase between 1998 and 2002 in the prevalence of productivity loss (from 13.6% in 1998 to 17.3% in 2002) was statistically significant. Similarly, the prevalence for serious consequences also increased significantly from the 1998 survey (i.e., from 6.7% to 9.6%). Our definition of dependence, as described in Section 2.5.3, does not reflect the strict definition used in the *DSM-IV* (American Psychiatric Association [APA], 1994). Rather, it includes having experienced four or more symptoms commonly associated with dependence at any time during the past year. New criteria for alcohol dependence were included in 2002 and, thus, comparisons to previous survey years on this dimension of negative effects cannot be made.

The same overall decreases in negative effects that we observed for the 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 2002 for selected 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 10.3% in 2002. Following an increase in productivity loss from 1980 to 1985, productivity loss for Army personnel returned to 1980 levels in 1988, declined further to 13.4% in 1998, and increased to 16.0% in 2002. 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 to 6.4% in 1995, and decreased

Figure 4.1 Trends in Alcohol-Related Negative Effects, by Service, 1980-2002



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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1980-2002 (2002 Questions: Serious Consequences, Q36 and 38; Productivity Loss, Q34; Dependence Symptoms, Q35).

slightly to 6.2% in 1998. As a result of the new dependence criteria, the rate for 2002 (13.0%) is not comparable to rates from previous years.

For Navy personnel, we found a steady decline in serious consequences from 22.1% in 1980 to 4.8% in 1998, but the rate more than doubled again in 2002 to 10.8%. 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, but showed a substantial increase in 2002 to 22.8%. 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 2002, 13.2% of Navy personnel reported dependence symptoms under the new measure.

Serious consequences among Marine Corps personnel declined from 26.2% in 1980 to 12.5% in 1998 and increased in 2002 to 15.2%. Following an increase in productivity loss from 1980 to 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, rising again in 2002 to 23.7%. Trends in reports of symptoms of alcohol dependence showed a decrease in dependence symptoms between 1980 and 1985; the prevalence of dependence symptoms returned in 1992 to the 1980 levels and then decreased to 8.2% by 1998. The rate in 2002 with the new measure of dependence symptoms was 20.4%.

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%) and increased in 2002 (4.9%). 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 10.6% in 2002. The Air Force showed the lowest prevalence of dependence symptoms, from 4.3% in 1980 down to 2.8% in 1998. In 2002, it was 6.9% with the new measure.

4.5.2 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 4.7 indicates, in 2002 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, 20.2% of junior enlisted personnel (E1s to E3s) but only 0.9% of senior officers (O4s to O10s) reported the occurrence of serious consequences due to alcohol consumption. For productivity loss, 27.2% of E1s to E3s reported a problem compared with 5.9% of O4s to O10s. The prevalence of dependence symptoms was 22.6% for E1s to E3s and 1.8% for O4s to O10s. This pattern in the total DoD also occurred for each of the Services.

Table 4.7 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	22.2	(1.2)	21.8	(2.5)	23.3	(3.8)	13.8	(1.3)	20.2	(1.4)
E4-E6	10.4	(1.2)	10.7	(1.2)	13.3	(2.9)	3.7	(0.5)	9.1	(0.7)
E7-E9	2.1	(0.4)	2.7	(0.5)	2.3	(0.5)	1.4	(0.5)	2.1	(0.3)
W1-W5	2.3	(0.6)	**	(**)	2.0	(1.2)	NA	(NA)	2.0	(0.5)
O1-O3	3.6	(1.2)	2.6	(0.7)	3.9	(1.7)	1.0	(0.6)	2.5	(0.5)
O4-O10	**	(**)	2.1	(1.0)	0.8	(0.8)	0.7	(0.6)	0.9	(0.4)
Total	10.3	(1.1)	10.8	(1.2)	15.2	(3.7)	4.9	(0.5)	9.6	(0.8)
Productivity Loss										
E1-E3	27.2	(3.5)	32.4	(2.5)	31.3	(2.3)	18.6	(2.5)	27.2	(1.7)
E4-E6	16.2	(1.4)	24.8	(1.5)	23.1	(3.3)	10.4	(1.0)	17.8	(0.9)
E7-E9	6.3	(1.2)	11.0	(1.4)	7.4	(0.4)	4.7	(0.9)	7.0	(0.6)
W1-W5	5.6	(1.2)	+	(+)	5.6	(2.9)	NA	(NA)	5.4	(1.1)
O1-O3	13.3	(2.0)	13.6	(1.5)	11.1	(1.3)	7.2	(2.6)	11.0	(1.3)
O4-O10	5.0	(1.8)	7.8	(1.4)	7.4	(2.2)	4.9	(1.7)	5.9	(0.9)
Total	16.0	(1.4)	22.8	(1.5)	23.7	(3.3)	10.6	(1.0)	17.3	(0.9)
Dependence Symptoms										
E1-E3	27.0	(2.4)	20.8	(0.9)	28.4	(3.0)	14.2	(0.5)	22.6	(1.4)
E4-E6	12.5	(1.5)	13.8	(1.0)	19.6	(3.0)	6.0	(0.6)	12.0	(0.8)
E7-E9	4.6	(1.2)	5.0	(0.4)	3.9	(1.0)	3.1	(1.1)	4.2	(0.5)
W1-W5	4.5	(1.1)	+	(+)	4.7	(2.5)	NA	(NA)	4.2	(0.9)
O1-O3	5.9	(1.3)	7.3	(1.1)	6.1	(1.7)	4.0	(1.3)	5.6	(0.7)
O4-O10	0.8	(0.5)	2.9	(0.8)	2.3	(0.5)	1.6	(0.6)	1.8	(0.4)
Total	13.0	(1.6)	13.0	(0.7)	20.3	(3.6)	6.8	(0.6)	12.3	(0.9)

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.

** Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Serious Consequences, Q36 and Q38; Productivity Loss, Q34; and Dependence Symptoms, Q35).

In view of the high rates of problems among E1s to E3s, Table 4.7 includes Service comparisons. Serious consequences among E1s to E3s were highest in the Marine Corps (23.3%), followed by the Army (22.2%), the Navy (21.8%), and the Air Force (13.8%). Serious consequences among E4s to E6s were found to be higher in the Marine Corps (13.3%) and about equally prevalent in the Navy (10.7%) and Army (10.4%) than in the Air Force (3.7%). Productivity loss among E1s to E3s was most prevalent in the Navy (32.4%), next highest in the Marine Corps (31.3%) and Army (27.2%), and least prevalent in the Air Force (18.6%). Productivity loss among E4s to E6s was also most prevalent in the Navy (24.8%) and the Marine Corps (23.1%) and least prevalent in the Army (16.2%) and Air Force (10.4%). Finally,

about 28% of E1s to E3s in the Marine Corps and 27% of E1s to E3s in the Army experienced dependence symptoms, along with 20.8% for the Navy and 14.2% for the Air Force.

The high prevalence of alcohol problems among junior enlisted personnel indicates 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.

4.5.3 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 4.8). Nearly one-third of heavy drinkers had one or more serious consequences (30.4%), a rate that was three and a half to eight times greater than for any other group of drinkers. We observed the next highest prevalence among those who were moderate/heavy drinkers, with 8.9% experiencing at least one serious consequence. Having experienced a serious consequence of alcohol use was reported by about equal percentages of moderate drinkers (3.9%) and infrequent/light drinkers (5.2%).

Productivity loss was most prevalent among the heaviest drinkers, with almost half of them reporting such a negative effect. Productivity loss was only half as prevalent among moderate/heavy drinkers, although still high at 22.4%. In comparison, the prevalence of productivity loss was lower among moderate drinkers (11.7%) and infrequent/light drinkers (8.2%), although still high enough to warrant concern.

Finally, dependence symptoms were reported by 40.3% of the heavy drinkers but by only 12.9% of the moderate drinkers. The prevalence of experiencing one or more dependence symptoms was lowest among light drinkers (5.9%).

We also examined the negative effects of alcohol use among personnel who acknowledged drinking at work in the past 30 days compared with those who did not drink at work. Serious consequences were reported among 40.3% of those who drank at work, while both productivity loss (46.6%) and dependence symptoms (43.9%) were even more prevalent.

4.6 Participation in Counseling and Treatment Programs

In Table 4.9, we can see that a number of military personnel reported receiving treatment for an alcohol problem since joining the Military. Rates varied from about 3% of current abstainers to almost 15% of heavy drinkers for the total DoD. For all Services, almost all of the personnel treated for an

Table 4.8 Negative Effects of Alcohol Use, Past 12 Months, by Drinking Level

Alcohol Measure	Serious Consequences		Productivity Loss		Dependence Symptoms	
Drinking Level						
Infrequent/light	5.2	(0.9) ^{a,b}	8.2	(0.9) ^{a,b}	5.9	(0.8) ^{a,b}
Moderate	3.9	(0.5) ^{a,b}	11.7	(1.2) ^{a,b}	5.9	(0.6) ^{a,b}
Moderate/heavy	8.9	(0.9) ^b	22.4	(1.4) ^b	12.9	(0.8) ^b
Heavy	30.4	(1.4)	45.1	(1.5)	40.3	(1.6)
Drank at Work in Past 30 Days						
Yes	40.3	(3.4)	46.6	(3.4)	43.9	(4.1)
No	8.1	(0.7)	16.1	(0.9)	10.5	(0.8)

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 lower than for moderate/heavy drinkers.

^bSignificantly lower than for heavy drinkers.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Serious Consequences, Q36 and Q38; Productivity Loss, Q34; Dependence Symptoms, Q35; Drinking Level, Q15-Q18 and Q20-Q23; Drank at Work, Q27).

alcohol-related problem received their treatment through a military treatment program or facility rather than through any kind of civilian medical facilities or treatment programs.

As shown in Table 4.9, 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 (14.9%) when compared with DoD personnel who drank at moderate (5.4%) or lower levels, or not at all (i.e., 3.6% of abstainers in Table 4.9 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 15% 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.

Table 4.9 Participation in Alcohol Treatment Since Joining the Military, by Drinking Level and Service

Service/Alcohol Treatment	Drinking Level		
	Abstainer	Infrequent/ Light	Moderate/ Heavy
Army			
No treatment	97.0 (0.6)	93.4 (1.3)	93.5 (1.6)
Any military alcohol treatment	2.7 (0.4)	6.5 (1.2)	6.1 (1.6)
Any civilian alcohol treatment	1.3 (0.4)	1.4 (0.5)	0.6 (0.4)
Military or civilian alcohol treatment	3.0 (0.6)	6.6 (1.3)	6.5 (1.6)
Navy			
No treatment	95.3 (0.6)	94.2 (1.0)	93.8 (0.8)
Any military alcohol treatment	4.6 (0.6)	5.5 (1.1)	5.4 (0.7)
Any civilian alcohol treatment	1.3 (0.4)	1.3 (0.7)	1.1 (0.2)
Military or civilian alcohol treatment	4.7 (0.6)	5.8 (1.0)	6.2 (0.8)
Marine Corps			
No treatment	96.0 (0.6)	93.2 (1.4)	95.2 (0.6)
Any military alcohol treatment	3.9 (0.6)	6.0 (1.7)	4.8 (0.6)
Any civilian alcohol treatment	1.1 (0.2)	1.4 (0.6)	0.5 (0.3)
Military or civilian alcohol treatment	4.0 (0.6)	6.8 (1.4)	4.8 (0.6)
Air Force			
No treatment	96.7 (1.0)	95.1 (1.2)	96.3 (0.8)
Any military alcohol treatment	3.1 (0.9)	4.5 (0.9)	3.7 (0.8)
Any civilian alcohol treatment	1.0 (0.5)	0.8 (0.4)	** (**)
Military or civilian alcohol treatment	3.3 (1.0)	4.9 (1.2)	3.7 (0.8)
Total DoD			
No treatment	96.4 (0.4)	94.1 (0.6)	94.6 (0.6)
Any military alcohol treatment	3.4 (0.3)	5.6 (0.6)	5.0 (0.6)
Any civilian alcohol treatment	1.2 (0.2)	1.2 (0.3)	0.5 (0.1)
Military or civilian alcohol treatment	3.6 (0.4)	5.9 (0.6)	5.4 (0.6)

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.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Alcohol Treatment Since Joining the Service, Q42; Drinking Level, Q15-Q18 and Q20-Q23).

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 with the other Services, persons using alcohol at this high level participated in treatment at a slightly higher rate than personnel in the other Services. Thus, the treatment rate for heavy drinkers in the Air Force of 18.5% differed slightly from the treatment rates for heavy drinkers in the other Services (13.3% for the Army, 14.3% for the Navy, and 15.1% for the Marine Corps). It is notable, however, that the Marine Corps, with the highest prevalence of heavy alcohol use, had one of the lowest rate of participation in treatment.

4.7 Reasons to Limit Drinking

Table 4.10 lists the importance of reasons for limiting drinking by drinking levels. Among light drinkers, 84.9% limited drinking because it is bad for one's health, compared with 71.7% of heavy drinkers. Holding strong beliefs or values was also an important reason for limiting drinking among light drinkers (63.1%), while being less important for moderate drinkers (53.6%) or heavy drinkers (38.1%). Avoiding problems associated with drinking and driving was a strong incentive for all levels of drinkers.

Endorsements for concern about damage to one's military career, being an alcoholic, the cost of alcohol, and regretting actions were equally found across all drinking levels. Fear of losing control over one's life was a strong reason for limiting drinking among 62.9% of light drinkers but only 52.5% of heavy drinkers.

4.8 Military and Civilian Comparisons

Results of standardized comparisons of heavy alcohol use among military personnel and civilians are presented in Table 4.11. Data for civilians are *standardized* estimates based on data from the 2001 NHSDA. Thus, the standardized civilian estimates presented here may differ from any published NHSDA estimates for 2001 (e.g., OAS, 2002). Data for military personnel are U.S.-based population estimates (including personnel stationed in Alaska and Hawaii) from the 2002 DoD survey. Because the military estimates for Table 4.11 have been subsetting 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 4.11 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 (16.9% vs. 11.2%, respectively), even after the civilian estimates had been adjusted to standardize sociodemographic 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 (19.4%) than among civilian males (12.8%). Military females for the total DoD (5.3%) showed rates that were also significantly higher than those among civilian females (3.8%).

Table 4.10 Level of Drinking, by Importance of Reasons to Limit Drinking

Importance of Reasons for Limiting Drinking ^a	Level of Drinking		
	Infrequent/ Light	Moderate	Moderate/ Heavy
Drinking bad for health	84.9 (0.9)	79.9 (0.9)	79.5 (1.4)
Costs too much	67.6 (1.2)	64.3 (0.8)	65.4 (1.1)
Family/friends get upset	59.0 (1.4)	53.7 (1.7)	53.4 (1.3)
Might interfere with military career	79.1 (0.9)	76.5 (1.0)	75.3 (1.0)
Goes against basic values or beliefs	63.1 (1.4)	53.6 (1.3)	46.3 (0.7)
Afraid of becoming an alcoholic	47.5 (1.3)	43.9 (1.2)	44.9 (0.8)
Makes me do things I'm sorry for later	51.4 (1.3)	47.0 (1.1)	46.4 (1.1)
Can make me feel sick	69.6 (1.3)	66.5 (1.4)	64.6 (0.9)
Drinking (without driving) can get me in trouble with police	60.7 (1.5)	56.5 (1.2)	54.5 (1.1)
Drinking and driving can get me in trouble with police	80.4 (0.8)	84.0 (1.0)	83.9 (0.7)
Leads to losing control over my life	62.9 (1.7)	56.0 (1.2)	52.6 (0.7)

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

^aEstimates are percentages (with standard error in parentheses) of respondents indicating reason for limiting drinking was somewhat or very important.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Receipt of Alcohol Treatment, Q42; Reasons for Limiting Drinking, Q33).

Table 4.11 Standardized Comparisons of the Prevalence of Heavy Alcohol Use^a Among Military Personnel and Civilians, Past 30 Days, by Gender and Age

Gender/Age Group	Comparison Population					
	Civilian	Total DoD	Army	Navy	Marine Corps	Air Force
Males	N=19,458	N=6,334	N=1,606	N=1,324	N=2,092	N=1,312
18-25	17.8 (0.5)	32.2 (2.3) ^b	32.8 (2.5) ^b	31.8 (3.5) ^b	38.6 (4.0) ^b	24.5 (3.2) ^b
26-55	9.1 (0.5)	10.0 (0.9)	11.1 (1.9)	10.2 (2.2)	14.2 (2.6)	7.5 (1.2)
All ages	12.8 (0.4)	19.4 (1.7) ^b	20.3 (3.0) ^b	16.0 (3.2)	30.0 (4.5) ^b	13.5 (1.5)
Females	N=21,909	N=2,339	N=764	N=700	N=376	N=499
18-25	5.5 (0.3)	8.1 (1.0) ^b	6.3 (1.7)	11.5 (2.7) ^b	12.9 (2.3) ^b	6.3 (1.4)
26-55	2.1 (0.3)	2.5 (0.6)	4.1 (1.3)	2.7 (1.0)	2.2 (1.3)	1.3 (0.8)
All ages	3.8 (0.2)	5.3 (0.6) ^b	5.3 (1.1)	6.5 (1.9)	9.9 (2.2) ^b	3.6 (0.7)
Total	N=41,367	N=8,673	N=2,370	N=2,024	N=2,468	N=1,811
18-25	15.3 (0.4)	27.3 (2.1) ^b	27.6 (2.4) ^b	26.0 (4.0) ^b	35.4 (4.8) ^b	19.8 (2.0) ^b
26-55	8.0 (0.4)	8.9 (0.8)	10.1 (1.8)	9.0 (2.1)	13.1 (2.5) ^b	6.3 (1.1)
All ages	11.2 (0.3)	16.9 (1.6) ^b	17.8 (2.7) ^b	14.1 (3.1)	27.8 (4.8) ^b	11.4 (1.3)

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 at least once a week in the past 30 days.

^bSignificantly different from civilian estimate at the 95% confidence.

Civilian data source: National Household Survey on Drug Abuse, 2001.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Heavy Alcohol Use, Past 30 Days, Q15-Q18 and Q20-Q23).

Most but not all of the patterns of military/civilian differences between the total DoD and civilian populations held for the individual Services. For males of all ages, Army (20.3%) and Marine Corps (30.0%) personnel had significantly higher rates of heavy alcohol use overall than their civilian counterparts (12.8%). Rates of heavy alcohol use among Air Force and Navy personnel were similar to the rates for civilians when controlling for differences in sociodemographic composition. A slightly different pattern emerged among females. Only Marine Corps female personnel (9.9%) had significantly higher rates of heavy alcohol use than civilian women (3.8%), whereas the Army, Navy, and Air Force female rates were similar to the standardized civilian female population rates.

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 (33.1% vs. 17.8%, respectively). For the individual Services, the largest discrepancies between military and standardized civilian estimates were for younger men aged 18 to 25 in the Marine Corps (39.7%), the Army (33.7%), the Navy (32.5%), and the Air Force (25.2%), as compared with civilian men aged 18 to 25 (17.8%). Among females aged 18 to 25, the Navy (11.5%) and the Marine Corps (12.9%) had significantly higher rates than civilian women (5.5%). For individuals aged 26 to 55, the prevalence rates for the individual Services were comparable to the civilian rates, with the exception of personnel in the Marine Corps (13.1% vs. 8.0%).

4.9 Summary

4.9.1 Trends in Alcohol Use

In 1998, the average amount of alcohol consumed daily and the proportion of military personnel who were heavy drinkers were close to the lowest since the survey series began. However, findings from the 2002 DoD survey indicate a pattern of increases in average alcohol consumption and the prevalence of heavy alcohol use relative to 1998, although not all of these increases were 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, but increased for 2002 to 1.08 ounces per day. Each individual Service also showed an increase, with the change being statistically significant compared with 1998 for the total DoD and for the Navy.
- ! Unadjusted rates of heavy alcohol use showed significant declines between 1980 and 1998, with a consistent pattern of increases in 2002 among total DoD personnel and personnel in each of the Services, although not all were statistically significant. For heavy alcohol use, changes from 1998 to 2002 were not significant for the Army, the Marine Corps, or the Air Force. In contrast, the Navy showed a significant increase from 13.5% to 18.3%, and the total DoD showed a significant increase from 15.4% to 18.1%.
- ! Adjusted estimates showed no significant decline in the rates of heavy alcohol use between 1980 and 2002 among total DoD personnel or for any Service. This suggests that sociodemographic changes in the Military between 1980 and 2002 have partially accounted for reductions observed in the unadjusted estimates and may indicate that the

Military's programmatic efforts have not had much effect in reducing heavy alcohol use among its members.

4.9.2 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 2002 was significantly lower among Air Force personnel than among members of the Army, the Marine Corps, and the Navy.
- ! Unadjusted rates of heavy alcohol use were significantly lower among Air Force personnel than among personnel from the Army, the Marine Corps, or the Navy. More than one in four Marines (27.7%) drank heavily in the 30 days before the 2002 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 and similar to rates for the Army and Navy. 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, and similar to the rates for the Army and Navy.

4.9.3 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 significantly greater among the following (Table 4.4):

- ! Army and Marine Corps personnel compared with Air Force personnel
- ! males compared with females
- ! non-Hispanic whites compared with non-Hispanic African Americans and those in the "other" racial/ethnic category
- ! those with a high school education or less compared with college graduates
- ! those aged 21 to 25 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
- ! those in pay grades E1 to E3 through O1 to O3 compared with those in pay grades O4 to O10

4.9.4 Binge Drinking

Binge drinking questions (consuming five or more drinks on the same occasion at least once during the past 30 days) were included in the 2002 survey. Responses indicated that binge drinking rates are high among military personnel (41.8%) and that, for most military personnel, binge drinking is a social occasion (Tables 4.5 and 4.6). The following specific findings were noted:

- ! Binge drinking was highest in the Marine Corps (54.2%), followed by the Navy (44.2%), Army (41.4%), and Air Force (34.0%).
- ! Males had a higher prevalence of binge drinking (45.4%) than females (23.9%).
- ! For males, most binge drinking occasions were with small groups (69.2%), followed by binge drinking with dates (13.7%) and large groups (10.3%).
- ! For females, most occasions of binge drinking also occurred with small groups of individuals (64.9%), followed by being with a date (18.9%) or large groups (11.5%).
- ! Personnel aged 18 to 25 had a higher prevalence of binge drinking occasions than personnel who were between 26 and 55 (53.8% vs. 31.4%).
- ! Binge drinking in a bar was the location reported most often by males (38.0%) and females (48.3%). The next most frequent locations for binge drinking among males and females were where they live (33.8%; 27.9%) or at someone else's home (18.6%; 16.3%).
- ! Although personnel aged 18 to 25 most often binge drank at a bar (42.7%), personnel aged 26 to 55 reported their most frequent location for binge drinking as at home (40.3%).
- ! At home or in a bar were the most typical locations for binge drinking for all Services.

4.9.5 Negative Effects of Alcohol Use

We measured alcohol use negative effects in terms of any serious consequences, productivity loss, and dependence symptoms (Table 3.1, Tables 4.7 and 4.8, Figure 4.1, and Tables D.1 to D.4):

- ! Alcohol-related negative effects declined significantly from 1980 to 1998 and rose again in 2002. In 2002, 9.6% of all military personnel experienced at least one alcohol-related serious consequence, 17.3% had some alcohol-related productivity loss, and 12.3% showed some 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 4.7).
- ! Negative effects of alcohol use were experienced by heavy drinkers at rates three times (productivity loss) to four times (dependence symptoms) higher than by military personnel who drank at only moderate or lighter levels (Table 4.8).

4.9.6 Participation in Counseling and Treatment Programs

We studied participation in alcohol counseling and treatment programs by military personnel across drinking levels (Table 4.9):

- ! Only 5.9% 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; however, 14.9% 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.

4.9.7 Reasons to Limit Drinking

Our research regarding military personnel's ratings of reasons to limit drinking revealed the following (Table 4.10):

- ! For all levels of drinking, the most important reasons for limiting drinking were that drinking is bad for one's health, that drinking can interfere with one's military career, and that drinking and driving can cause problems with the police (Table 4.10).
- ! A higher percentage of light drinkers listed losing control of one's life and holding strong values and beliefs as reasons for limiting drinking.
- ! Among heavy drinkers, the cost of alcohol was a strong incentive for limiting drinking.

4.9.8 Military and Civilian Comparisons

We standardized civilian data from the 2001 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 4.11):

- ! Military personnel overall were significantly more likely to drink heavily than were their civilian counterparts (16.9% vs. 11.2%). However, these differences varied by age group. Military personnel aged 18 to 25 showed significantly higher rates of heavy drinking (27.3%) than civilians (15.3%), whereas personnel aged 26 to 55 (8.9%) showed rates of heavy drinking similar to their civilian counterparts (8.0%).

- ! 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 two times higher than the rate for civilians (32.2% vs. 17.8%).
- ! The individual Services showed the same pattern as the total DoD, with rates of heavy alcohol use among 18 to 25 year olds being higher than those among civilians of the same age and rates of use among 26 to 55 year olds being similar. (Older Marines, however, also showed heavier use than civilians.)

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, predictability of last drug test, and the possible absence of testing. We also compare these findings to the civilian population. We have included supplemental tables on drug use, including trends and sociodemographic characteristics associated with illicit drug use, for each Service in Appendix D (Tables D.1 to D.4).

5.1 Trends in Illicit Drug Use

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 and increased slightly to 3.4% in 2002. The increase between 1998 and 2002 was not statistically significant. The decline between 1980 and 1998 represents a striking decrease of 90.2% over the 18-year period and an 87.7% decrease between 1980 and 2002. Figure 3.1 in Chapter 3 displays this trend as a steep initial decline during the first four surveys 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 prevalence of use in 2002 was the same as in 1992. The long-term decline in drug use reflects the effectiveness of military efforts to reduce drug use among personnel.

Similar to the trend for the total DoD, each Service also had a large and significant decline in 30-day drug use across the time period between 1980 and 2002, although not all changes between survey years were statistically significant. The Army and Air Force continued to have significant declines in illicit drug use through 1992 and then leveled off around 4.5% and 1.0%, respectively. Illicit drug use also decreased among Navy personnel through 1992, then stabilized around 4%. However, 30-day drug use increased significantly from a low of 1.8% in 1998 to 3.7% in 2002, bringing it back to 1995 levels. The Marine Corps saw the largest decline in 1985, although since then its rate declined gradually. As the rate for each of the Services has approached 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 change in past 30-day drug use between 1998 and 2002 (an increase from 1.8% to 3.7%). In 2002, rates of 4% to 5% were found among Army, Navy, and Marine Corps personnel and a 1% rate among Air Force personnel, who have consistently shown the lowest rates of drug use among the Services. 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.

Table 5.1 Trends in Any Illicit Drug Use, Past 30 Days and Past 12 Months, by Service, 1980-2002

Service/Period of Use	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	4.8 (0.9) ^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)	10.4 (1.7) ^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	3.7 (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	7.1 (0.3) ^{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)	3.8 (0.5) ^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)	7.9 (1.3) ^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)	1.0 (0.2) ^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)	1.8 (0.3) ^{a,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)	3.4 (0.4) ^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)	6.9 (0.7) ^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 2002 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62).

Rates in 2002 were similar to those in 1998 for all Services except the Navy, where there was a significant increase between 1998 and 2002.

In Chapter 2 (see Table 2.4), we noted that the sociodemographic characteristics 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 the Marine Corps' potential for higher use, it has been able to contain drug use to comparable levels with the Army and Navy generally and the Army in 1998. For most years, the highest rates of 30-day illicit drug use were found among Army personnel.

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. These estimates, which indicate observed past year prevalence rates in 2002, provide a perspective on the comparative magnitude of the challenge facing the Services in their efforts to eradicate drug use. As discussed in Section 2.6, one possible explanation for observed differences in drug use across the Services is variations 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 marijuana use, any illicit drug use except marijuana, and any illicit drug use.

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 (10.4%) and marijuana use (6.8%); these rates were significantly higher than those of the Air Force (1.8% and 0.8%, respectively), which had the lowest rates. The Army had similar rates of any illicit drug use and marijuana use to rates among Navy and Marine Corps personnel. Rates of any illicit drug use except marijuana were higher among Army personnel (6.6%) than Navy personnel (4.4%) or Air Force personnel (1.2%).

The Air Force had significantly lower unadjusted past 12-month rates compared with those for the Army, Navy, and Marine Corps on each measure of drug use. These findings show the relative challenges that the Services face in combating illicit drug use. The Army, Navy, and Marine Corps face the greatest challenges, whereas the Air Force faces the smallest challenge.

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

Drug/Type of Estimate	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Marijuana										
Unadjusted	6.8	(1.3) ^a	4.8	(0.3) ^a	5.5	(1.2) ^a	0.8	(0.2) ^{b,c}	4.5	(0.5)
Adjusted ^d	7.1	(0.9) ^{a,b,c}	4.3	(0.2) ^a	4.2	(0.6) ^a	0.8	(0.1) ^{b,c}	4.1	(0.3)
Any Illicit Drug Except Marijuana ^e										
Unadjusted	6.6	(1.1) ^{a,b}	4.4	(0.2) ^a	5.2	(0.8) ^a	1.2	(0.3) ^{b,c}	4.4	(0.5)
Adjusted ^d	6.8	(1.2) ^{a,b,c}	4.1	(0.3) ^a	4.2	(0.4) ^a	1.1	(0.3) ^{b,c}	4.1	(0.3)
Any Illicit Drug ^f										
Unadjusted	10.4	(1.7) ^a	7.1	(0.3) ^a	7.9	(1.3) ^a	1.8	(0.3) ^{b,c}	6.9	(0.7)
Adjusted ^d	10.9	(1.4) ^{a,b,c}	6.5	(0.4) ^a	6.3	(0.6) ^a	1.6	(0.1) ^{b,c}	6.3	(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.

^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.

^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, 2002 (Marijuana, Q60A, Q61A, and Q62A; Any Illicit Drug Use Except Marijuana, Q60B-M, Q61B-M, and Q62B-M; Any Illicit Drug Use, Q60A-M, Q61A-M, and Q62A-M).

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 Navy and Marine Corps. They slightly increased the rates for the Army, and unadjusted and adjusted rates were similar for Air Force personnel. The adjustments had the largest impact on the Marines, with the estimates for use of any illicit drug dropping from 7.9% to 6.3%. 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 sociodemographic composition of that Service. The Air Force still had

significantly lower adjusted rates of use compared with 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 others 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 sociodemographic 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. 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

As overall drug use has declined since 1980 and stabilized since the mid-1990s, so has use of most of the individual drugs or types of drugs considered in this survey. 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 1.7% of military personnel reporting use during the past month and 4.5% reporting use within the past year. Past 30-day use of each of the other individual drugs was 1.0% or less for the total DoD and of specific Services with several exceptions: cocaine use among Navy personnel (1.1%), amphetamine/stimulant use among Army (1.1%) and Navy (1.3%) personnel, tranquilizer use among Army personnel (1.1%), and analgesics use among Army (1.2%), Navy (1.5%), and Marine Corps (1.1%) personnel. Similarly, 12-month use of all individual drugs except marijuana was generally 2% or less among all Services; however, 2.5% of Army personnel used "designer drugs." Use of anabolic steroids in the past 30 days or past 12 months was rare for the total DoD and for each of the Services (1.2% or less).

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

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

Drug/Period of Use	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Marijuana										
Past 30 days	2.5	(0.6)	2.1	(0.2)	1.8	(0.2)	0.3	(0.1)	1.7	(0.2)
Past 12 months	6.8	(1.3)	4.8	(0.3)	5.5	(1.2)	0.8	(0.2)	4.5	(0.5)
Cocaine										
Past 30 days	0.9	(0.2)	1.1	(0.3)	0.5	(0.2)	0.1	(0.1)	0.7	(0.1)
Past 12 months	2.0	(0.5)	1.8	(0.2)	2.0	(0.7)	0.2	(0.1)	1.5	(0.2)
PCP										
Past 30 days	0.5	(0.1)	0.7	(0.1)	0.1	(0.1)	**	(**)	0.4	(0.1)
Past 12 months	0.7	(0.2)	0.9	(0.1)	0.3	(0.1)	**	(**)	0.5	(0.1)
LSD/Hallucinogens										
Past 30 days	0.7	(0.1)	0.7	(0.2)	0.5	(0.2)	0.2	(0.1)	0.5	(0.1)
Past 12 months	1.5	(0.3)	1.3	(0.1)	1.8	(0.3)	0.2	(0.1)	1.2	(0.1)
Amphetamines/Stimulants										
Past 30 days	1.1	(0.2)	1.3	(0.2)	0.3	(0.1)	0.1	(0.1)	0.8	(0.1)
Past 12 months	1.7	(0.3)	1.7	(0.3)	0.9	(0.3)	0.2	(0.1)	1.2	(0.1)
Tranquilizers										
Past 30 days	1.1	(0.2)	0.8	(0.1)	0.6	(0.2)	0.2	(0.1)	0.7	(0.1)
Past 12 months	1.7	(0.3)	1.0	(0.1)	1.2	(0.2)	0.3	(0.1)	1.1	(0.1)
Barbiturates/Sedatives										
Past 30 days	0.8	(0.2)	0.8	(0.3)	0.3	(0.2)	0.2	(0.1)	0.6	(0.1)
Past 12 months	1.1	(0.2)	1.0	(0.3)	0.7	(0.2)	0.2	(0.1)	0.7	(0.1)
Heroin/Other Opiates										
Past 30 days	0.5	(0.1)	0.8	(0.2)	0.2	(0.1)	**	(**)	0.4	(0.1)
Past 12 months	0.7	(0.2)	0.9	(0.2)	0.4	(0.1)	**	(**)	0.5	(0.1)
Analgesics										
Past 30 days	1.2	(0.2)	1.5	(0.1)	1.1	(0.3)	0.4	(0.1)	1.0	(0.1)
Past 12 months	2.0	(0.4)	1.9	(0.1)	1.4	(0.3)	0.5	(0.2)	1.5	(0.2)
Inhalants										
Past 30 days	0.8	(0.1)	0.9	(0.2)	0.6	(0.2)	0.2	(0.1)	0.6	(0.1)
Past 12 months	1.3	(0.3)	1.2	(0.1)	0.9	(0.2)	0.3	(0.1)	1.0	(0.1)
“Designer” Drugs										
Past 30 days	1.0	(0.2)	1.0	(0.2)	0.7	(0.3)	**	(**)	0.7	(0.1)
Past 12 months	2.5	(0.8)	1.6	(0.3)	2.0	(0.5)	0.1	(0.1)	1.6	(0.3)
Any Illicit Drug ^a										
Past 30 days	4.8	(0.9)	3.7	(0.3)	3.8	(0.5)	1.0	(0.2)	3.4	(0.4)
Past 12 months	10.4	(1.7)	7.1	(0.3)	7.9	(1.3)	1.8	(0.3)	6.9	(0.7)
Any Illicit Drug Except Marijuana ^b										
Past 30 days	3.3	(0.5)	2.8	(0.3)	2.7	(0.5)	0.8	(0.2)	2.4	(0.2)
Past 12 months	6.6	(1.1)	4.4	(0.2)	5.2	(0.8)	1.2	(0.3)	4.4	(0.5)
Anabolic Steroids										
Past 30 days	0.9	(0.1)	1.0	(0.1)	0.7	(0.2)	0.1	(0.1)	0.7	(0.1)
Past 12 months	1.1	(0.1)	1.1	(0.1)	1.2	(0.3)	0.2	(0.1)	0.9	(0.1)
Gamma Hydroxy Butyrate										
Past 30 days	0.5	(0.1)	0.7	(0.2)	0.2	(0.1)	**	(**)	0.4	(0.1)
Past 12 months	0.6	(0.1)	0.9	(0.1)	0.5	(0.1)	**	(**)	0.5	(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, excluding steroids.

^bNonmedical use one or more times of any of the above classes of drugs, excluding marijuana and steroids.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62).

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 (4.8% and 10.4%, respectively) and any illicit drug except marijuana (3.3% and 6.6%), followed by the Navy and Marine Corps, then the Air Force. Thirty-day use of any illicit drug was below 5.0%, and 12-month use was 10.4% or less across Services and the total DoD. Thirty-day use of any illicit drug except marijuana was 3.3% or less, and 12-month use was 6.6% or less across the Services and the total DoD.

5.4 Correlates of Illicit Drug Use

In addition to examining overall prevalence rates, we 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 for the sociodemographic groups, and column 3 shows the odds ratios from the logistic regression.

The prevalence data indicate substantial 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 the 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 (aged 25 or less) compared with older personnel (aged 26 or more)
- ! those who were not married and those who were married but did not have a spouse present compared with those who were married and had a spouse present
- ! those in pay grades E1 to E3 relative to senior enlisted personnel (E7 to E9) and to officers in grades O4 to O10

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

Sociodemographic Characteristic	Prevalence		Odds Ratio ^a	
			Adjusted	95% CI ^b
Service				
Army	10.4	(1.7)	6.35 ^c	(3.87, 10.43)
Navy	7.1	(0.3)	3.56 ^c	(2.45, 5.18)
Marine Corps	7.9	(1.3)	2.94 ^c	(1.96, 4.40)
Air Force	1.8	(0.3)	1.00	
Gender				
Male	7.2	(0.8)	1.41 ^c	(1.08, 1.85)
Female	5.5	(0.4)	1.00	
Race/Ethnicity				
White, non-Hispanic	6.7	(0.8)	1.00	
African American, non-Hispanic	6.7	(1.1)	0.86	(0.56, 1.31)
Hispanic	8.3	(1.3)	1.10	(0.82, 1.48)
Other	9.1	(1.4)	1.31	(0.96, 1.79)
Education				
High school or less	11.2	(1.1)	2.04 ^c	(1.15, 3.61)
Some college	5.8	(0.7)	1.93 ^c	(1.20, 3.10)
College graduate or higher	1.7	(0.3)	1.00	
Age				
20 or younger	14.1	(1.5)	1.66 ^c	(1.17, 2.36)
21-25	10.8	(1.0)	1.75 ^c	(1.36, 2.25)
26-34	3.1	(0.4)	0.69	(0.46, 1.03)
35 or older	2.2	(0.2)	1.00	
Family Status				
Not married ^d	10.1	(1.0)	1.50 ^c	(1.24, 1.82)
Married, spouse not present	8.6	(1.3)	1.51 ^c	(1.04, 2.20)
Married, spouse present	4.0	(0.5)	1.00	
Pay Grade				
E1-E3	13.9	(1.6)	2.66 ^c	(1.05, 6.70)
E4-E6	6.8	(0.7)	1.60	(0.65, 3.94)
E7-E9	0.9	(0.2)	0.34 ^c	(0.13, 0.85)
W1-W5	1.3	(0.5)	0.40	(0.12, 1.36)
O1-O3	1.8	(0.4)	1.08	(0.42, 2.80)
O4-O10	1.4	(0.4)	1.00	
Region				
CONUS ^e	6.4	(1.0)	1.03	(0.75, 1.40)
OCONUS ^f	8.0	(0.3)	1.00	
Total	6.9	(0.7)		

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

^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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

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

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Illicit Drug Use, Past 12 Months, Q60, Q61, and Q62; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Indeed, pay grade showed that drug use among warrant officers and pay grades E7 to E9 was especially low after adjusting for other variables in the model.

Service and pay grade showed the strongest effects in the model. Army personnel had the highest odds of using drugs; odds among Army personnel were more than six times those of Air Force personnel. Odds among Navy personnel were almost four times and odds among Marine Corps almost three times those of Air Force personnel. Odds of illicit drug use among E1 to E3 pay grades were 2.7 times those of O4 to O10 pay grades. This logistic regression analysis suggests that drug use prevention efforts should focus on lower pay grades in the Army, Navy, and Marine Corps.

The logistic regression findings differed slightly from the descriptive results in that the multivariate analysis showed lesser effects for age, whereas the descriptive analysis showed a more pronounced effect. Age may thus be correlated with other variables in the model (e.g., pay grade, family status, education), such that when all of the sociodemographic and Service variables were examined simultaneously in a single analysis, few additional effects were attributable to 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 2002 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, 33.6% of all DoD personnel reported being late for work compared with about 50% of those who reported using any illicit drug or any illicit drug except marijuana. A similar difference is apparent for each of the other measures, but differences were largest for leaving work early, being hurt in an on-the-job accident, and working below one's normal performance level.

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 (shown as all personnel in the table). Most notable of the productivity loss indicators, approximately 14% of the total DoD reported leaving work early on 4 or more days in the past year, compared with about 25% of those in both drug use categories. Approximately 35% of those in both drug use categories reported working below normal performance level on 4 or more days, compared with about 15% of the total DoD. For those who reported any illicit drug use, 17% reported being late for work on 4 or more days, compared with 8% of the total DoD. Conversely, the total DoD showed a higher percentage of those who reported productivity

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									
		No Days		1 Day		2 or 3 Days		4 or More Days		Any Number of Days	
All Personnel	12,458										
Late for work by 30 minutes or more		66.4	(1.3)	13.7	(0.4)	12.0	(0.8)	8.0	(0.6)	33.6	(1.3)
Left work early		65.2	(1.2)	7.7	(0.3)	13.4	(0.5)	13.7	(0.6)	34.8	(1.2)
Hurt in an on-the-job accident		89.7	(0.5)	6.2	(0.3)	2.6	(0.3)	1.5	(0.2)	10.3	(0.5)
Worked below normal performance level		67.6	(1.0)	6.2	(0.4)	11.0	(0.5)	15.2	(0.8)	32.4	(1.0)
Did not come into work because of illness or injury		79.9	(0.8)	7.0	(0.3)	7.6	(0.4)	5.4	(0.3)	20.1	(0.8)
Any Illicit Drug Use, Past 12 Months^a	688										
Late for work by 30 minutes or more		49.8	(2.6)	16.0	(1.7)	17.0	(2.5)	17.1	(2.3)	50.2	(2.6)
Left work early		50.7	(2.0)	9.8	(1.2)	14.9	(1.4)	24.6	(2.0)	49.3	(2.0)
Hurt in an on-the-job accident		79.8	(1.9)	8.8	(0.9)	4.5	(0.6)	6.9	(1.4)	20.2	(1.9)
Worked below normal performance level		45.9	(3.2)	6.9	(1.3)	12.8	(1.2)	34.4	(2.3)	54.1	(3.2)
Did not come into work because of illness or injury		72.1	(1.9)	6.6	(0.6)	8.7	(1.2)	12.5	(1.9)	27.9	(1.9)
Any Illicit Drug Use Except Marijuana, Past 12 Months^b	456										
Late for work by 30 minutes or more		48.3	(2.5)	18.6	(2.4)	15.2	(1.7)	17.9	(2.8)	51.7	(2.5)
Left work early		48.1	(3.1)	10.4	(1.3)	14.5	(1.8)	27.0	(3.1)	51.9	(3.1)
Hurt in an on-the-job accident		76.6	(1.4)	9.0	(1.2)	6.0	(0.8)	8.4	(1.8)	23.4	(1.4)
Worked below normal performance level		44.2	(3.9)	7.1	(1.4)	13.1	(1.2)	35.6	(3.3)	55.8	(3.9)
Did not come into work because of illness or injury		67.6	(2.6)	6.6	(1.2)	9.6	(1.4)	16.2	(2.6)	32.4	(2.6)

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, 2002 (Productivity Loss, Q73; Any Illicit Drug Use, Q60A-K, Q61A-K, and Q62A-K; Any Illicit Drug Use Except Marijuana, Q60B-K, Q61B-K, and Q62B-K).

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, and never.

As shown, virtually all military personnel (97.5%) had been tested for drugs at some point since joining the Service. Overall, 25.8% of personnel reported being tested within the past 30 days and 71.7% more than 30 days ago. Army personnel (98.6%) and Marine Corps personnel (98.2%) reported the highest rates of testing, followed by the Navy (97.9%) and the Air Force (95.3%). There were few differences among testing rates for drug users and nonusers.

Drug testing showed a clear association with drug use. Overall, drug users were significantly more likely to be tested in the past 30 days (34.4%) than nonusers (25.2%), and conversely less likely to be tested more than 30 days ago (62.7% vs. 72.3%). This pattern held for all of the Services, but most differences were not significant.

We also examined perceptions of the relative difficulty of predicting the last drug test by 12-month illicit drug use status. Personnel were asked to 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 4-point scale from “very easy” to “very hard.”

As shown in Table 5.7, a majority of military personnel (60.2%) reported that it was very hard to predict the time of their last drug test. Overall, the Air Force (74.8%) and Navy (71.3%) 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 Marine Corps (49.1%) and the Army (45.1%) reported that it was very hard to predict when they were last tested.

Personnel who did not use drugs were more likely to rate that it was very hard to predict testing (61.2%) compared with past 12-month drug users (47.9%). 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

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					
	Yes		No		Total	
Army						
Tested in past 30 days	35.2	(2.5)	29.6	(2.0)	30.2	(1.9)
Tested more than 30 days ago	62.6 ^a	(2.7)	69.1	(1.9)	68.4	(1.7)
Never tested	2.2	(1.2)	1.4	(0.2)	1.4	(0.2)
Navy						
Tested in past 30 days	+	(+)	28.5	(3.0)	28.8	(3.3)
Tested more than 30 days ago	63.0	(6.5)	69.6	(3.1)	69.1	(3.4)
Never tested	4.1	(2.0)	1.9	(0.2)	2.1	(0.2)
Marine Corps						
Tested in past 30 days	44.6	(7.2)	37.9	(7.0)	38.4	(7.1)
Tested more than 30 days ago	53.5	(7.4)	60.3	(7.0)	59.8	(7.0)
Never tested	1.9	(0.8)	1.8	(0.2)	1.8	(0.1)
Air Force						
Tested in past 30 days	12.1	(4.2)	11.2	(1.5)	11.2	(1.6)
Tested more than 30 days ago	81.9	(5.6)	84.1	(1.6)	84.1	(1.6)
Never tested	6.0	(2.3)	4.7	(0.6)	4.8	(0.5)
Total DoD						
Tested in past 30 days	34.4 ^a	(3.0)	25.2	(1.6)	25.8	(1.7)
Tested more than 30 days ago	62.7 ^a	(2.7)	72.3	(1.6)	71.7	(1.6)
Never tested	2.9	(0.9)	2.5	(0.2)	2.6	(0.2)

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.

+Low precision.

^aUser estimate is significantly different from nonuser estimate at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Illicit Drug Use, Q60, Q61, and Q62; Last Time Tested, Q63).

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 to rationalize their use.

We also examined self-assessments of the likelihood of illicit drug use if there were no drug testing in the Military. As shown in Table 5.8 for all DoD personnel, military personnel were many times more likely to believe that they would use illicit drugs if there were no drug testing than if there were drug testing. For example, 15.7% of military personnel stated they were likely to use any illicit drugs in the past 30 days if there were no drug testing, while 1.5% stated they were not likely to use illicit drugs if there were no testing. Similar findings were observed for the likelihood of using marijuana only or any illicit drug other than marijuana.

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

Service/Predictability	Illicit Drug Use, Past 12 Months					
	Yes		No		Total	
Army						
Not very hard	55.4	(1.4)	52.8	(2.8)	53.1	(2.0)
Very hard	43.1	(1.9)	45.3	(2.1)	45.1	(2.0)
Never tested	1.4	(0.8)	1.8	(0.2)	1.8	(0.2)
Navy						
Not very hard	34.9	(2.5) ^a	25.1	(0.7)	25.8	(0.7)
Very hard	60.9	(5.0) ^a	72.1	(0.7)	71.3	(0.8)
Never tested	2.5	(0.2)	2.7	(0.3)	2.8	(0.4)
Marine Corps						
Not very hard	61.9	(6.5)	47.7	(4.2)	48.8	(4.5)
Very hard	36.5	(6.1)	50.2	(4.3)	49.1	(4.6)
Never tested	1.5	(1.2)	2.1	(0.2)	2.0	(0.2)
Air Force						
Not very hard	+	(+)	19.9	(1.2)	20.0	(1.1)
Very hard	60.7	(4.3) ^a	75.1	(1.3)	74.8	(1.3)
Never tested	+	(+)	5.0	(0.4)	5.1	(0.4)
Total DoD						
Not very hard	49.2 ^a	(2.1)	35.8	(1.2)	36.8	(1.3)
Very hard	47.9 ^a	(2.2)	61.2	(1.2)	60.2	(1.2)
Never tested	2.9	(1.0)	3.0	(0.2)	3.0	(0.2)

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.

+Low precision.

^aUser estimate is significantly different from nonuser estimate at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Illicit Drug Use, Q60, Q61, and Q62; Predictability of Drug Testing, Q64).

5.7 Military and Civilian Comparisons

Compared with 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 5.9 contains standardized comparisons of drug use among military personnel and civilians during the 30 days prior to the survey, with the civilian data drawn from the 2001 National Household Survey on Drug Abuse (NHSDA) (Office of Applied Studies [OAS], 2002). 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

Table 5.8 Likelihood of Drug Use If No Drug Testing, by Type of Drug Use

Current Drug Use	Likely to Use Drugs If No Testing					
	Yes		No		Total	
Never						
Drug use	33.5	(1.9)	73.7	(0.7)	68.7	(1.0)
Marijuana Only						
Past 30 days	10.0	(1.3)	0.5	(0.1)	1.7	(0.2)
Past 12 months	22.6	(2.2)	1.8	(0.2)	4.5	(0.5)
Any Illicit Drug Except Marijuana^a						
Past 30 days	10.0	(1.1)	1.2	(0.2)	2.4	(0.2)
Past 12 months	18.2	(2.0)	2.3	(0.2)	4.4	(0.5)
Any Illicit Drug^b						
Past 30 days	15.7	(1.6)	1.5	(0.2)	3.3	(0.4)
Past 12 months	30.1	(2.7)	3.5	(0.3)	6.9	(0.7)

Note: Table entries are column 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 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 marijuana, 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, 2002 (Likelihood of Drug Use If No Drug Testing, Q65).

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 5.9, the prevalence of any illicit drug use among the total DoD in 2002 was less than one-third that of civilian personnel in 2001. We found that 3.3% of all military personnel aged 18 to 55 used illicit drugs in the previous month, which was significantly lower than the standardized estimate of 12.1% 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.

Differences between the military and civilian populations were more pronounced for males than for females, particularly with younger males aged 18 to 25. We estimated that 3.4% of U.S.-based males in the Military aged 18 to 55 used drugs in the past 30 days, compared with 12.9% of civilian males. For females, 2.8% of those aged 18 to 55 in the Military used drugs in the past month, compared with 8.3% of civilians.

Table 5.9 Standardized Comparisons of the Prevalence of Any Illicit Drug Use 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=19,458	N=6,192	N=1,585	N=1,286	N=2,060	N=1,261
18-25	20.8 (0.6)	5.8 (0.8) ^a	9.4 (1.4) ^a	5.0 (0.6) ^a	5.6 (0.6) ^a	1.1 (0.3) ^a
26-55	7.1 (0.5)	1.6 (0.3) ^a	2.6 (0.6) ^a	1.8 (0.6) ^a	1.2 (0.4) ^a	0.5 (0.2) ^a
All ages	12.9 (0.4)	3.4 (0.5) ^a	5.5 (1.2) ^a	2.6 (0.5) ^a	4.1 (0.5) ^a	0.7 (0.1) ^a
Females	N=21,909	N=2,305	N=754	N=692	N=375	N=484
18-25	11.7 (0.5)	3.3 (0.5) ^a	5.9 (1.2) ^a	1.2 (0.5) ^a	4.1 (0.3) ^a	1.2 (0.8) ^a
26-55	4.8 (0.4)	2.2 (0.3) ^a	1.7 (0.8) ^a	1.5 (0.9) ^a	2.5 (1.9)	2.8 (0.2) ^a
All ages	8.3 (0.3)	2.8 (0.3) ^a	3.9 (0.7) ^a	1.4 (0.7) ^a	3.6 (0.6) ^a	2.1 (0.4) ^a
Total	N=41,367	N=8,497	N=2,339	N=1,978	N=2,435	N=1,745
18-25	19.0 (0.5)	5.3 (0.7) ^a	8.7 (1.2) ^a	3.9 (0.3) ^a	5.4 (0.6) ^a	1.1 (0.3) ^a
26-55	6.7 (0.4)	1.7 (0.3) ^a	2.5 (0.6) ^a	1.7 (0.6) ^a	1.3 (0.4) ^a	0.9 (0.2) ^a
All ages	12.1 (0.3)	3.3 (0.5) ^a	5.2 (1.1) ^a	2.4 (0.5) ^a	4.0 (0.5) ^a	1.0 (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.

^aSignificantly different from civilian estimate at the 95% confidence level.

Civilian data source: National Household Survey on Drug Abuse, 2001.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Illicit Drug Use, Past 30 Days, Q60 and Q61).

Each Service had significantly lower rates of drug use compared with civilian estimates in each age category. These differences held across gender with one exception: rates for Marine Corps 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, with a slight increase between 1998 and 2002. Past 30-day drug use among military personnel in 2002 was 3.4%, a significant decrease from the high of 27.6% in 1980. 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 2002, showing a significant decrease in the prevalence of drug use of almost 90% in 22 years (Table 5.1):

- ! Use of any illicit drugs decreased from 27.6% in the past 30 days in 1980 to 3.4% in 2002.
- ! All Services showed the same pattern of decreases from 1980 to 2002 observed for the total DoD for illicit drug use in the past 30 days.
- ! The Navy increased its 30-day drug use significantly from 1.8% in 1998 to 3.7% in 2002; the other Services did not show a significant change between 1998 and 2002.

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 sociodemographic composition on drug use rates (Table 5.2):

- ! Comparisons of unadjusted 12-month estimates showed that the rate of any illicit drug use during the past year was highest among Army personnel (10.4%), similar among Navy (7.1%) and Marine Corps (7.9%) personnel, and lowest among Air Force personnel (1.8%). 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.
- ! After adjusting for sociodemographic differences among the Services, rates of use increased for the Army and decreased slightly for the Navy, Marine Corps, and Air Force. After the adjustments, rates of drug use for the Army (10.9%) were significantly higher than the other three Services, and adjusted rates in the Navy (6.5%) and Marine Corps (6.3%) were significantly higher than in the Air Force (1.6%).
- ! Differences between adjusted and unadjusted rates suggest that differences among the Services in sociodemographic composition are a partial explanation for differences in drug use among the Services.

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 2002, 1.7% of military personnel reported use of marijuana within the past month and 4.5% during the past year.
- ! Thirty-day use of all other individual drugs was 1% or less, 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 (aged 25 or less) compared with older personnel (aged 26 or more)
- ! those who were not married and those who were married but did not have a spouse present compared with those who were married and had a spouse present
- ! those in pay grades E1 to E3 relative to senior enlisted personnel (E7 to E9) and to officers in grades O4 to O10

Service and pay grade showed the strongest effects in the model. Army personnel and personnel in pay grades E1 to E3 had higher odds of drug use than other personnel. This logistic regression analysis suggests that drug use prevention efforts should focus on personnel in pay grades E1 to E3, 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 consistently more likely than all DoD personnel to report productivity loss from work on 1 or more days.

- ! 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, 5.7, and 5.8):

- ! Virtually all military personnel (97.5%) had been tested for drugs at some point since joining the Service. Overall, 25.8% of personnel reported being tested within the past 30 days and 71.7% more than 30 days ago. Army personnel (98.6%) and Marine Corps personnel (98.2%) reported the highest rates of testing in the past 30 days, followed by personnel in the Navy (97.9%) and the Air Force (95.3%). There were few differences among testing rates for drug users and nonusers.
- ! Drug testing showed a clear association with drug use. Overall, past 12-month drug users were significantly more likely to be tested in the past 30 days (34.4%) than nonusers (25.2%).
- ! A majority of military personnel (60.2%) reported that it was very hard to predict the time of their last drug test. This estimate varied, however, by Service. The Air Force (74.8%) and the Navy (71.3%) 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 Marine Corps (49.1%) and the Army (45.1%).
- ! 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 (61.2%) than those who did report drug use (47.9%).
- ! Military personnel were more likely to believe that they would use illicit drugs if there were no drug testing than if there were drug testing.

5.8.7 Military and Civilian Comparisons

We standardized civilian data from the 2001 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 5.9):

- ! Military personnel were notably and significantly less likely than civilians to use any illicit drug in the past 30 days (3.3% vs. 12.1%). 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 Marine Corps women aged 26 to 55 compared with civilian women in that age group.
- ! Overall, findings suggest that the military environment discourages illicit drug use quite successfully.

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 2002 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 individuals currently serving in the Armed Forces will eventually return to civilian life, and the DoD has an obligation to return veterans to the civilian sector in as healthy a condition 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 tobacco use among the Services, correlates of smoking, cigarette smoking initiation and perceived availability, cigarette use and productivity loss, attempts to stop smoking, and comparisons of the prevalence of smoking between the military and civilian populations. We have included additional information in Appendix D (Tables D.13, D.14, and D.16) 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 eight DoD surveys. In the total DoD population, the prevalence of any smoking declined significantly from 51.0% in 1980 to 33.8% in 2002. However, within this overall decline there was a recent upsurge. Between 1998 and 2002, the prevalence of any smoking increased from 29.9% to 33.8%.

Trends for each Service are also presented in Table 6.1 (see Tables D.1 to D.4 and D.12 to D.16 for further detail). For each Service, there was a significant decrease in the prevalence of smoking between 1980 and 2002. All Services showed an upswing in the trend line from 1998 to 2002, the first time since 1982 that the direction of the curve has not been declining. The Army, however, was the only Service for which the recent upswing was statistically significant, increasing from 31.1% to 35.6%.

Table 6.1 Trends in Cigarette Use, Past 30 Days, by Service, 1980-2002

Service/ Smoking Level	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	35.6 (1.9) ^{a,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	14.5 (0.7) ^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)	36.0 (2.4) ^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)	13.3 (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)	38.7 (4.1) ^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)	14.6 (2.4) ^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)	27.0 (2.7) ^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)	10.4 (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)	33.8 (1.3) ^{a,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)	13.1 (0.6) ^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 2002 are statistically significant at the 95% confidence level.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Any Smoking, Q45 and Q47; Heavy Smoking, Q46).

In the DoD population, the prevalence of heavy smoking also declined significantly, from 34.2% in 1980 to 13.1% in 2002. Unlike with any smoking, there was no recent upsurge in the prevalence between 1998 and 2002. This pattern persisted within each of the four Services. (In the Army and Marine Corps, there were 1998–2002 prevalence increases, but they were not statistically significant.)

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 2002, 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 among 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 differences 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 2002.

Unadjusted and adjusted estimates for both any smoking and heavy smoking in the past 30 days are shown in Table 6.2. When we look at the unadjusted prevalence rates of any smoking, we see that the unadjusted rate for any smoking was significantly higher among the Army, Navy, and Marine Corps (range = 35.6% to 38.7%) than the Air Force (27.0%). The unadjusted rate of heavy smoking was significantly higher in the Army than in the Air Force, but the rates in the Navy and the Marine Corps were not significantly different from that of the Air Force.

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 for the Navy and the Marine Corps and slightly higher estimates for the Army and the Air Force. When sociodemographic factors were taken into account, only the Army and the Navy continued to have significantly higher prevalences of any smoking than the Air Force. The adjusted smoking rate for the Marine Corps was similar to the adjusted Air Force rate.

Table 6.2 Estimates of Cigarette Use, Past 30 Days, Unadjusted and Adjusted for Sociodemographic Differences, by Service

Smoking Measure/Type of Estimate	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Any Smoking										
Unadjusted	35.6	(1.9) ^a	36.0	(2.4) ^a	38.7	(4.1) ^a	27.0	(2.7)	33.8	(1.3)
Adjusted ^c	37.0	(1.1) ^{a,b}	35.1	(1.2) ^a	31.6	(1.6)	30.1	(1.1)	33.4	(0.6)
Heavy Smoking										
Unadjusted	14.5	(0.7) ^a	13.3	(1.1)	14.6	(2.4)	10.4	(1.0)	13.1	(0.6)
Adjusted ^c	15.6	(0.5) ^{a,b}	12.6	(0.5)	11.9	(1.5)	11.3	(0.7)	12.9	(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 Marine Corps at the 95% confidence level.

^cAdjusted 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, 2002 (2002 Questions: Any Smoking, Q45 and Q47; Heavy Smoking, Q46).

With respect to heavy smoking, adjusting for sociodemographic differences again resulted in slightly lower estimates for the Navy and the Marine Corps and slightly higher estimates for the Army and the Air Force. When sociodemographic factors were taken into account, the adjusted rate of heavy smoking was significantly higher in the Army than in the Marine Corps or the Air Force; rates in the Navy and the Marine Corps were not significantly different from that of the Air Force.

In summary, the rates of any smoking and heavy smoking for the individual Services are influenced by differences in the Services' sociodemographic compositions. Prior to adjustments, the Marines show the highest rates of any smoking, followed by the Navy, Army, and Air Force. For heavy smoking, the Marine Corps and Army are highest, followed by the Navy and Air Force. Once sociodemographic differences are controlled by adjusting the estimates, Army and Navy personnel stand out as the most likely to engage in any smoking, and Army personnel stand out as the most likely to engage in heavy 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 logistic 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, Air Force personnel were the least likely of the Services to smoke (27.0%). Females were less likely than males to smoke (26.3% vs. 35.3%). Among personnel in different racial/ethnic groups, non-Hispanic African American personnel were the least likely to smoke (24.2%). In general, as education, age, and pay grade increased, smoking rates declined. Married personnel living with a spouse were less likely to smoke (27.7%) than were married personnel not living with a spouse (34.6%) or unmarried personnel (40.7%). Finally, there was a lower prevalence of smoking among personnel stationed within the 48 contiguous states in the continental United States than among those stationed overseas.

The picture, however, may not be as simple as it appears. 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 sociodemographic 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 sociodemographic variables, which were independent or predictor variables in the model. Reference groups (i.e., those to whom all other categories of each sociodemographic 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. 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 sociodemographic variables in the model were held constant:

- ! personnel in the Army and Navy compared with those in the Air Force
- ! males compared with females
- ! white non-Hispanics compared with African American non-Hispanics and Hispanics
- ! those who did not graduate from college compared with those who had at least a college degree
- ! unmarried personnel compared with those who were married with spouse present

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

Sociodemographic Characteristic	Prevalence		Odds Ratio ^a	
			Adjusted	95% CI ^b
Service				
Army	35.6	(1.9)	1.47 ^c	(1.24, 1.73)
Navy	36.0	(2.4)	1.28 ^c	(1.07, 1.53)
Marine Corps	38.7	(4.1)	1.18	(0.91, 1.52)
Air Force	27.0	(2.7)	1.00	
Gender				
Male	35.3	(1.3)	1.44 ^c	(1.25, 1.66)
Female	26.3	(1.5)	1.00	
Race/Ethnicity				
White, non-Hispanic	36.9	(1.3)	1.00	
African American, non-Hispanic	24.2	(1.5)	0.44 ^c	(0.38, 0.51)
Hispanic	30.8	(1.3)	0.65 ^c	(0.55, 0.75)
Other	36.1	(2.9)	0.86	(0.70, 1.06)
Education				
High school or less	46.4	(1.4)	2.33 ^c	(1.80, 3.02)
Some college	33.3	(1.2)	1.73 ^c	(1.33, 2.24)
College graduate or higher	11.8	(1.0)	1.00	
Age				
20 or younger	45.3	(1.6)	0.90	(0.73, 1.11)
21-25	43.0	(1.4)	1.17	(1.00, 1.37)
26-34	29.1	(1.3)	1.03	(0.87, 1.23)
35 or older	20.6	(1.4)	1.00	
Family Status				
Not married ^d	40.7	(1.3)	1.28 ^c	(1.14, 1.45)
Married, spouse not present	34.6	(2.9)	1.11	(0.89, 1.39)
Married, spouse present	27.7	(1.2)	1.00	
Pay Grade				
E1-E3	49.0	(1.6)	7.58 ^c	(4.96, 11.59)
E4-E6	36.9	(1.2)	4.93 ^c	(3.20, 7.59)
E7-E9	22.7	(1.2)	3.30 ^c	(2.17, 5.02)
W1-W5	17.6	(2.8)	2.17 ^c	(1.32, 3.58)
O1-O3	10.8	(1.3)	1.80 ^c	(1.16, 2.81)
O4-O10	5.7	(0.7)	1.00	
Region				
CONUS ^e	31.6	(1.7)	0.85 ^c	(0.75, 0.97)
OCONUS ^f	38.7	(1.6)	1.00	
Total	33.8	(1.3)		

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

^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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

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

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Cigarette Smoking, Past 30 Days, Q45 and Q47; refer to Section 2.5.1 for descriptions of sociodemographic variables).

- ! those in pay grades lower than the O4 to O10 range compared with those in pay grades O4 and above
- ! personnel stationed outside the continental United States or aboard afloat ships compared with personnel stationed within the 48 contiguous states in the continental United States

Age, the only variable that was not independently correlated with current smoking, is 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 aged 20 or younger had the same odds of smoking as those aged 35 or older. The reason for this seemingly inconsistent finding is likely due to the relations between age, education, family status, and pay grade in this population. Younger personnel tend to have less education, be unmarried, and be in lower pay grades. As previously noted, education, supportive family status, and pay grade were negatively associated with smoking. When the effects of education, family status, and pay grade were controlled as they were in the regression model, the independent effects of age can be determined. In this case, age was not significantly associated with current smoking when all other age-related factors were controlled.

One other noteworthy finding is that 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 eight times that of personnel in pay grades O4 to O10. The odds for smoking among those in pay grades O1 to O3, however, were approximately two 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 sociodemographic variables.

6.1.4 Cigarette Smoking Initiation and Perceived Cigarette Availability and Acceptability

Some previously published studies suggest that the military environment encourages smoking (Schei & Sogaard, 1994; Cronan & Conway, 1998). To examine this issue directly, the 2002 survey included a question about smoking initiation in the Military. Table 6.4 presents information on cigarette smoking initiation. Findings reveal that, overall, 30.2% of respondents starting smoking after joining the Military. This percentage stayed relatively fixed across strata defined by Service, age, and gender and age combined.

Table 6.5 presents information about the reasons military personnel start smoking. In the total DoD, there are three frequently cited reasons: to help relieve stress (22.8%), to help relax and calm down (24.1%), and to relieve boredom (17.2%). Only 2.6% reported that they started to smoke to fit in with the military unit. This pattern of responses persisted across the individual Services.

Table 6.5 also presents information on perceived cigarette availability and acceptability. Overall, 45.9% reported that the number of places to buy cigarettes at their installation makes it easy to smoke. Similar percentages reported that most of their friends in the Military smoke and that “my spouse, live-in partner, or the person I date disapproves of my smoking (or would disapprove if I did smoke).” However,

Table 6.4 Cigarette Smoking Initiation in the Military, by Demographics and Service

Gender/Age Group	Started Smoking in the Military	
	Yes	No
Males		
18-25	31.8 (0.9)	68.2 (0.9)
26-55	28.8 (0.7)	71.2 (0.7)
All ages	30.3 (0.7)	69.7 (0.7)
Females		
18-25	30.8 (1.9)	69.2 (1.9)
26-55	28.2 (1.6)	71.8 (1.6)
All ages	29.7 (1.3)	70.3 (1.3)
Total		
18-25	31.6 (0.8)	68.4 (0.8)
26-55	28.7 (0.6)	71.3 (0.6)
All ages	30.2 (0.6)	69.8 (0.6)
Service		
Army	31.9 (1.2)	68.1 (1.2)
Navy	30.3 (0.6)	69.7 (0.6)
Marine Corps	30.4 (2.1)	69.6 (2.1)
Air Force	27.7 (1.0)	72.3 (1.0)
Total DoD	30.2 (0.6)	69.8 (0.6)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Smoking Initiation in the Military, Q44).

only 15.1% of respondents reported that smoking is part of being in the Military. Again, this pattern of responses persisted across the Services.

6.1.5 Cigarette Use and Productivity Loss

Data presented earlier in this chapter showed that, in 2002, a third of all personnel continued to smoke. An important related issue is the possible effect of this behavior on productivity within the Military. Data addressing this question are presented in Table 6.6.

Table 6.6 presents information on productivity loss in the Armed Forces, by all personnel, current smokers, lifetime smokers, and nonsmokers. For purposes of comparison, the data for all personnel (regardless of cigarette use) are presented first. Overall, the prevalence of any productivity loss (any number of work days affected) ranged from 10.3% to 34.7%. The most frequent types of productivity loss were leaving work early (34.7%), being late for work by 30 minutes or more (33.6%), and working below normal performance level (32.3%). Being hurt in an on-the-job accident showed a much lower prevalence (10.3%).

Table 6.5 Perceived Cigarette Availability and Acceptability, by Service

Percent Agree/Strongly Agree	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Perceived Availability and Acceptability					
The number of places to buy cigarettes at this installation makes it easy to smoke	51.4 (3.6)	42.3 (1.8)	53.9 (3.6)	38.1 (0.8)	45.9 (1.5)
Most of my friends in the Military smoke	50.0 (2.9)	44.8 (2.0)	54.8 (4.4)	31.4 (4.3)	44.3 (1.7)
Smoking is part of being in the Military	18.9 (1.4)	14.9 (0.6)	13.3 (1.4)	11.3 (1.1)	15.1 (0.6)
My spouse, live-in partner, or the person I date disapproves of my smoking (or would disapprove if I did smoke)	39.1 (1.2)	41.1 (1.1)	40.2 (1.9)	42.3 (2.3)	40.6 (0.8)
Percent Very Important Why Started Smoking					
To fit in with my friends	8.3 (1.2)	9.9 (1.0)	9.4 (1.1)	11.1 (0.9)	9.5 (0.5)
To fit in with my military unit	2.4 (0.4)	2.9 (0.5)	2.0 (0.5)	2.9 (0.4)	2.6 (0.2)
To rebel against my parents or other in authority	4.5 (0.4)	4.9 (0.7)	4.9 (0.4)	5.6 (0.6)	4.9 (0.3)
To look “cool” or be “cool”	7.3 (1.1)	7.2 (0.3)	7.1 (0.6)	8.1 (0.8)	7.5 (0.4)
To help relieve stress	23.2 (1.7)	22.8 (0.8)	25.6 (1.5)	20.6 (1.4)	22.8 (0.8)
To help me relax or calm down	24.7 (1.6)	23.7 (1.0)	27.1 (1.5)	21.9 (1.8)	24.1 (0.8)
To relieve boredom	17.4 (1.9)	15.5 (0.9)	22.4 (0.5)	15.2 (0.8)	17.2 (0.8)
So I wouldn’t want to eat as much	7.5 (1.0)	5.4 (0.4)	6.1 (0.9)	7.8 (0.5)	6.8 (0.4)
To look or feel like an adult	5.2 (0.9)	4.6 (0.5)	5.1 (0.7)	5.1 (0.8)	5.0 (0.4)
To prove I could handle it	2.8 (0.5)	2.4 (0.3)	3.2 (0.3)	1.9 (0.2)	2.5 (0.2)
To be like someone I admired	2.6 (0.9)	2.8 (0.3)	3.4 (0.3)	2.0 (0.5)	2.6 (0.4)
To show I was tough	2.8 (0.5)	2.9 (0.4)	4.3 (0.2)	3.2 (0.6)	3.1 (0.2)
To avoid gaining weight	4.5 (0.8)	3.7 (0.5)	3.8 (0.8)	6.0 (0.3)	4.5 (0.3)

Note: Prevalence estimates 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 Behaviors Among Military Personnel, 2002 (Perceived Availability and Acceptability, Q58).

Table 6.6 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	12,366						
Late for work by 30 minutes or more		66.4 (1.3)	13.7 (0.4)	12.0 (0.9)	7.9 (0.6)	33.6 (1.3)	
Left work early		65.3 (1.2)	7.6 (0.3)	13.3 (0.5)	13.7 (0.6)	34.7 (1.2)	
Hurt in an on-the-job accident		89.7 (0.5)	6.2 (0.3)	2.6 (0.3)	1.5 (0.2)	10.3 (0.5)	
Worked below normal performance level		67.7 (0.9)	6.2 (0.4)	11.0 (0.5)	15.2 (0.8)	32.3 (0.9)	
Did not come into work because of illness or injury		80.0 (0.8)	7.0 (0.3)	7.6 (0.4)	5.4 (0.3)	20.0 (0.8)	
Current Smokers^a	3,747						
Late for work by 30 minutes or more		59.8 (2.3)	15.8 (0.6)	14.6 (1.4)	9.8 (0.9)	40.2 (2.3)	
Left work early		64.2 (1.6)	8.3 (0.6)	14.1 (0.7)	13.5 (0.8)	35.8 (1.6)	
Hurt in an on-the-job accident		86.8 (0.8)	7.3 (0.3)	3.5 (0.4)	2.4 (0.5)	13.2 (0.8)	
Worked below normal performance level		63.9 (1.5)	7.3 (0.5)	11.3 (0.7)	17.5 (1.5)	36.1 (1.5)	
Did not come into work because of illness or injury		79.1 (1.1)	7.0 (0.5)	7.5 (0.5)	6.4 (0.5)	20.9 (1.1)	
Lifetime Smokers^b	1,655						
Late for work by 30 minutes or more		70.6 (1.3)	13.3 (0.9)	9.9 (1.0)	6.1 (0.6)	29.4 (1.3)	
Left work early		67.6 (1.2)	6.5 (0.8)	12.8 (0.9)	13.1 (1.2)	32.4 (1.2)	
Hurt in an on-the-job accident		92.2 (1.2)	4.9 (0.7)	1.9 (0.7)	0.9 (0.3)	7.8 (1.2)	
Worked below normal performance level		69.4 (1.9)	6.7 (0.8)	10.8 (1.0)	13.1 (1.2)	30.6 (1.9)	
Did not come into work because of illness or injury		79.3 (1.6)	7.4 (0.8)	8.8 (0.9)	4.5 (0.6)	20.7 (1.6)	
Nonsmokers^c	6,964						
Late for work by 30 minutes or more		69.6 (1.3)	12.4 (0.6)	10.8 (1.0)	7.1 (0.7)	30.4 (1.3)	
Left work early		65.6 (1.3)	7.5 (0.4)	13.0 (0.6)	14.0 (0.7)	34.4 (1.3)	
Hurt in an on-the-job accident		91.0 (0.5)	5.7 (0.5)	2.3 (0.4)	1.0 (0.2)	9.0 (0.5)	
Worked below normal performance level		69.6 (0.9)	5.3 (0.4)	10.8 (0.6)	14.3 (0.7)	30.4 (0.9)	
Did not come into work because of illness or injury		80.6 (1.1)	6.8 (0.5)	7.5 (0.5)	5.1 (0.4)	19.4 (1.1)	

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 in lifetime and smoked in the past 30 days.

^bUnweighted number of respondents in the total DoD sample who smoked at least 100 cigarettes in 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 in lifetime.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Productivity Loss, Q73; Current Smoker, Lifetime Smoker, and Nonsmoker, Q45 and Q47).

Next, we examined the data for personnel who were current smokers at the time they completed the survey. Compared with nonsmokers, current smokers were more likely to have any productivity loss. For example, current smokers were 1.5 times more likely to be hurt in an on-the-job accident than nonsmokers. Ratios for other types of productivity loss ranged from 1.0 to 1.3. Individuals classified as “lifetime smokers” showed similar productivity losses to those of nonsmokers.

Although the findings from this survey reveal a tendency for current smokers to report greater productivity loss, it should be noted that the productivity loss ratios ranged from 1.0 to 1.5. Hence, any evidence to suggest that cigarette smoking is related to productivity loss in the Military is relatively weak.

6.1.6 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 6.7 presents our findings on respondents’ smoking cessation behaviors during the past year. As shown in the top panel, a large percentage (54.8%) of military personnel never smoked. In the total DoD, a considerable proportion of personnel (11.9%) stopped smoking successfully, including 8.0% who stopped smoking over a year ago and 3.9% who stopped smoking within the past year. Among all personnel, 18.1% were current smokers who tried to quit within the past 12 months, and 15.2% were smokers who did not try to stop smoking. This pattern generally persisted across all four Services.

Perhaps of most interest to the DoD are patterns of quit attempts and intentions to quit among past year smokers. The middle panel of Table 6.7 shows smokers’ attempts to stop smoking cigarettes during the past year. For the total DoD, 10.4% of smokers quit within the past year, 48.6% tried to quit but continued smoking, and 41.0% did not try to quit. Overall, then, over half (59.0%) of the military personnel who were smokers in the past year made an attempt to quit during the past year. This pattern of quit attempts among past year smokers in each Service is generally similar to that for the entire DoD.

A final consideration for those planning smoking cessation programs is the intent of current smokers to quit smoking. The bottom panel of Table 6.7 presents this information. 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 6.7 shows that approximately a third of current smokers (35.6%) were planning to quit soon, with an additional 26.4% reporting an intention to quit in the next 6 months. These patterns of intention to quit held true in each of the four Services.

In summary, there is considerable interest in cessation of smoking. On the other hand, roughly 4 out of 10 past year smokers did not try to quit in the past year, and the same proportion of current smokers reported no plans to quit in the near future.

Table 6.7 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	54.2 (1.3)	53.3 (2.7)	49.7 (3.0)	59.6 (2.2)	54.8 (1.1)
Former smoker, quit over a year ago	7.2 (0.8)	7.6 (0.4)	6.6 (0.9)	10.2 (0.7)	8.0 (0.4)
Former smoker, quit within past year	3.4 (0.2)	3.9 (0.3)	5.5 (0.5)	3.7 (0.2)	3.9 (0.1)
Current smoker, tried to quit	19.0 (0.9)	19.5 (0.8)	21.9 (2.1)	13.7 (1.4)	18.1 (0.6)
Current smoker, didn't try to quit	16.2 (1.2)	15.8 (2.4)	16.4 (2.0)	12.9 (1.6)	15.2 (0.9)
Among Smokers, Past Year					
Quit within past year	8.7 (0.8)	9.9 (0.6)	12.5 (2.0)	12.1 (0.9)	10.4 (0.5)
Tried to quit	49.3 (1.5)	49.7 (3.6)	50.0 (0.8)	45.2 (2.5)	48.6 (1.2)
Didn't try to quit	42.0 (1.5)	40.3 (3.8)	37.5 (1.6)	42.6 (2.6)	41.0 (1.3)
Among Current Smokers					
Planning to quit in next 30 days	35.9 (2.2)	35.8 (1.0)	35.3 (2.2)	34.9 (1.8)	35.6 (1.0)
Intending to quit in next 6 months	25.8 (2.2)	26.9 (0.6)	24.9 (1.4)	27.9 (2.8)	26.4 (1.1)

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. Current smokers are defined as those who smoked at least 100 cigarettes in their lifetime and who smoked in the past 30 days.

^aSmoked fewer than 100 cigarettes in their lifetime (Q45 and Q47).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Former Smoker, Quit Over a Year Ago or Within Past Year, Q45 and Q47; Current Smoker, Tried to Quit or Didn't Try to Quit, Q45, Q47, and Q48; Current Smoker, Planning to Quit in Next 30 Days, Q45, Q47, and Q50; Current Smoker, Planning to Quit in Next 6 Months, Q45, Q47, and Q49).

6.1.7 Military and Civilian Comparisons

In this section, we describe comparisons of the prevalence of current smoking made between civilian data taken from the 2001 NHSDA (OAS, 2002) and data from the 2002 DoD survey.

Comparison of the prevalence of current smoking for the civilian and U.S.-based (including Alaska and Hawaii) military populations are shown in Table 6.8. 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 the table. To further increase comparability of the two data sets, we standardized the civilian data to the sociodemographic distribution of the U.S.-based military population by gender, age, education, race/ethnicity, and marital status. Details about the standardization procedures are given in Appendix F.

Table 6.8 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 U.S.-based military populations. Based on the definition of current smoking used in the analyses, the overall DoD rate of 31.6% was not significantly different from the civilian rate of 31.1%. When the rates of cigarette smoking in the total DoD are examined by gender-age categories, we see that this pattern persisted, except for females 18 to 25 years of age. In this subgroup, the DoD population had a significantly lower prevalence (26.5%) than the civilian population (30.3%).

Several gender-age patterns emerged when cigarette smoking in each of the four Services was compared with that of the civilian population. First, the concept of 18- to 25-year-old military females' having lower smoking prevalence rates than their civilian counterparts persisted within the Army (25.0% vs. 30.3%) and the Marine Corps (25.7% vs. 30.3%). Second, in the Marine Corps, older females (26 to 55 years of age) as well as younger females had significantly lower smoking prevalences than their civilian counterparts (12.8% vs. 22.2%). Third, there was one instance where military smoking was *higher* than civilian smoking, among Army males aged 18 to 25 (47.6% vs. 42.2%).

6.2 Cigar, Pipe, and Smokeless Tobacco Use

Military personnel use 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 the use of smokeless tobacco as well as cigar and pipe smoking.

6.2.1 Prevalence of Smokeless Tobacco Use, Past 30 Days

Table 6.9 presents 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 in greater detail for males. In addition, we present the data from the 1995 and 1998 DoD surveys for comparison. It should be noted that these prevalence estimates have not been adjusted for sociodemographic differences, other than age.

Table 6.8 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=19,458	N=6,234	N=1,594	N=1,298	N=2,067	N=1,275
18-25	42.2 (0.7)	45.4 (1.8)	47.6 (2.3) ^a	42.6 (5.1)	49.3 (3.7)	38.9 (2.3)
26-55	24.6 (0.9)	24.2 (1.6)	28.2 (3.2)	23.5 (3.3)	26.0 (3.7)	19.9 (3.1)
All ages	32.1 (0.5)	33.2 (1.8)	36.3 (3.0)	28.6 (4.1)	41.1 (4.3) ^a	26.5 (3.3)
Females	N=21,909	N=2,307	N=752	N=695	N=375	N=485
18-25	30.3 (0.6)	26.5 (1.6) ^a	25.0 (2.6) ^a	31.2 (3.7)	25.7 (1.9) ^a	26.4 (3.5)
26-55	22.2 (0.9)	22.1 (2.4)	21.6 (2.4)	22.3 (4.0)	12.8 (3.1) ^a	23.8 (5.1)
All ages	26.3 (0.5)	24.3 (1.8)	23.4 (2.0)	26.2 (3.9)	22.1 (2.3)	25.0 (3.8)
Total	N=41,367	N=8,541	N=2,346	N=1,993	N=2,442	N=1,760
18-25	39.8 (0.6)	41.6 (1.7)	43.2 (1.9)	39.3 (5.0)	46.4 (4.3)	35.6 (1.8) ^a
26-55	24.3 (0.7)	23.9 (1.6)	27.2 (2.6)	23.3 (3.5)	24.7 (3.8)	20.6 (3.3)
All ages	31.1 (0.5)	31.6 (1.7)	34.2 (2.5)	28.2 (4.1)	39.0 (4.6)	26.2 (3.3)

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 estimate at the 95% confidence level.

Civilian data source: National Household Survey on Drug Abuse, 2001.

Military data source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Cigarette Smoking, Past 30 Days, Q45 and Q47).

Table 6.9 Comparison of Smokeless Tobacco Use in 1995, 1998, and 2002, Past 30 Days, for All Personnel and for Males

Service/Age Group	Year					
	1995		1998		2002	
Army						
All personnel	15.3	(1.1)	14.4	(1.3)	14.0	(1.0)
Males						
All ages	17.4	(1.1)	16.7	(1.3)	16.7	(1.0)
Ages 18-24	21.5	(1.4)	20.1	(1.2)	18.0	(1.8)
Ages 25-34	18.6	(1.5)	18.6	(1.8)	18.3	(1.8)
Ages 35+	7.3	(1.0)	8.3	(1.0)	11.9	(1.8)
Navy						
All personnel	12.0	(1.7)	9.2	(0.8)	9.0	(0.9)
Males						
All ages	13.4	(1.7)	10.4	(0.7)	10.4	(1.1)
Ages 18-24	21.2	(2.7)	18.1	(1.7)	12.6	(3.2)
Ages 25-34	12.2	(1.5)	11.7	(0.8)	10.1	(1.1)
Ages 35+	4.6	(0.9)	3.2	(0.6)	7.4	(1.3) ^a
Marine Corps						
All personnel	24.0	(1.4)	19.1	(1.6)	20.4	(3.3)
Males						
All ages	25.1	(1.3)	20.3	(1.5)	22.9	(2.9)
Ages 18-24	30.6	(1.0)	22.4	(2.0)	25.4	(3.1)
Ages 25-34	21.2	(2.2)	21.9	(1.3)	21.8	(2.8)
Ages 35+	11.6	(1.4)	10.2	(1.2)	14.2	(1.8)
Air Force						
All personnel	7.9	(1.0)	7.3	(0.7)	8.8	(1.7)
Males						
All ages	9.3	(1.1)	8.9	(0.8)	11.0	(1.9)
Ages 18-24	15.9	(1.6)	13.7	(1.0)	13.1	(2.7)
Ages 25-34	9.0	(1.1)	10.5	(0.9)	12.5	(1.4)
Ages 35+	3.3	(0.9)	3.4	(1.0)	7.8	(1.5) ^a
Total DoD						
All personnel	13.2	(0.7)	11.7	(0.7)	12.2	(0.8)
Males						
All ages	15.0	(0.7)	13.4	(0.6)	14.5	(0.9)
Ages 18-24	21.9	(1.0)	19.0	(0.8)	17.1	(1.5)
Ages 25-34	13.9	(0.7)	14.6	(0.7)	15.3	(0.9)
Ages 35+	5.5	(0.5)	5.3	(0.5)	9.5	(0.8) ^a

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 1998 and 2002 are statistically significant at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1998 and 2002 (2002 Questions: Smokeless Tobacco Use, Q51 and Q54; refer to Section 2.5.1 for descriptions of sociodemographic variables).

As shown in the bottom panel of Table 6.9, 12.2% of all military personnel in 2002 reported using smokeless tobacco in the past 30 days. Among males across all Services, the rate of smokeless tobacco use was 14.5%, and prevalence of use declined as the age of personnel increased. The prevalence rate in the youngest age group of men (18 to 24 years) was 17.1%, but only 9.5% of those aged 35 or older reported smokeless tobacco use.

Comparisons across the four Services show large differences in past month smokeless tobacco use in 2002. Personnel in the Marine Corps had the highest prevalence of use (20.4%), and those in the Air Force had the lowest (8.8%). For the Army (14.0%) and the Navy (9.0%), the estimates were intermediate. Within each Service, however, the pattern of greater use among younger personnel applied.

With respect to trends, we see in Table 6.9 that, for all personnel, the prevalence of smokeless tobacco use did not change significantly between 1995 and 2002. However, among males aged 35 years or older, smokeless tobacco use increased significantly from 5.3% in 1998 to 9.5% in 2002. With respect to individual Services, this increase was also seen in the Navy and the Air Force.

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 smokeless tobacco, cigars, and pipes. The bottom panel of Table 6.10 presents the unadjusted prevalence of past year use of smokeless tobacco for the total DoD and for each of the Services. Overall, the prevalence of past year use was 19.4%. Estimates of past year use were highest in the Marine Corps (32.4%), followed by the Army (21.5%), the Navy (15.3%), and the Air Force (14.1%). An examination of the frequency information reveals that, regardless of Service, most personnel who used smokeless tobacco did so 1 or more days a week.

The top panel of Table 6.10 shows the frequency of cigar smoking. In the total DoD population, the prevalence of past year cigar use was 32.6%. The highest prevalence was reported by the Marine Corps (42.5%), and the lowest prevalence was reported by the Air Force (27.6%). The Army and Navy had intermediate values (32.1%, and 33.6%, respectively).

The middle panel of Table 6.10 shows the frequency of pipe smoking. In the total DoD population, the prevalence of past year pipe use was 4.2%. As with cigar smoking, the highest prevalence was reported by the Marine Corps (5.8%), and the lowest prevalence was reported by the Air Force (3.5%). The Army and Navy had intermediate values (3.8% and 4.7%, respectively).

In Figure 6.1, we present trends from 1995 to 2002 in past year use of both smokeless tobacco and cigarettes. As shown (and noted previously in Table 6.9), the Services showed no significant changes in past year smokeless tobacco use between 1995 and 2002. This is in comparison to past year smoking, which showed more variation over the period. Specifically, rates for the Navy and Marine Corps showed declines from 1995 to 1998 and then increased from 1998 to 2002 to the 1995 levels or higher. Note that rates of cigarette use were consistently higher than rates of smokeless tobacco use.

Table 6.10 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										
Didn't smoke	67.9	(1.2)	66.4	(1.1)	57.5	(1.7)	72.4	(1.4)	67.4	(0.7)
Less than once/week	28.7	(1.1)	30.5	(1.0)	39.2	(1.6)	25.9	(1.2)	29.8	(0.7)
1 or more days/week	3.5	(0.5)	3.1	(0.2)	3.3	(0.2)	1.7	(0.5)	2.9	(0.2)
Any cigar use	32.1	(1.2)	33.6	(1.1)	42.5	(1.7)	27.6	(1.4)	32.6	(0.7)
Pipes										
Didn't smoke	96.2	(0.7)	95.3	(0.6)	94.2	(0.7)	96.5	(0.3)	95.8	(0.3)
Less than once/week	3.0	(0.5)	3.9	(0.4)	4.9	(0.6)	3.2	(0.4)	3.5	(0.2)
1 or more days/week	0.8	(0.2)	0.7	(0.2)	0.8	(0.2)	0.3	(0.1)	0.7	(0.1)
Any pipe use	3.8	(0.7)	4.7	(0.6)	5.8	(0.7)	3.5	(0.3)	4.2	(0.3)
Smokeless Tobacco										
Didn't use	78.5	(1.3)	84.7	(1.0)	67.6	(4.9)	85.9	(2.3)	80.6	(1.2)
Less than once/week	10.4	(0.5)	6.6	(0.4)	14.6	(2.6)	6.1	(1.1)	8.8	(0.5)
1 or more days/week	11.2	(1.0)	8.7	(0.8)	17.8	(2.7)	8.0	(1.4)	10.6	(0.7)
Any smokeless tobacco use	21.5	(1.3)	15.3	(1.0)	32.4	(4.9)	14.1	(2.3)	19.4	(1.2)

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, 2002 (Cigar Use, Q56; Pipe Use, Q57; Smokeless Tobacco Use, Q51 and Q53).

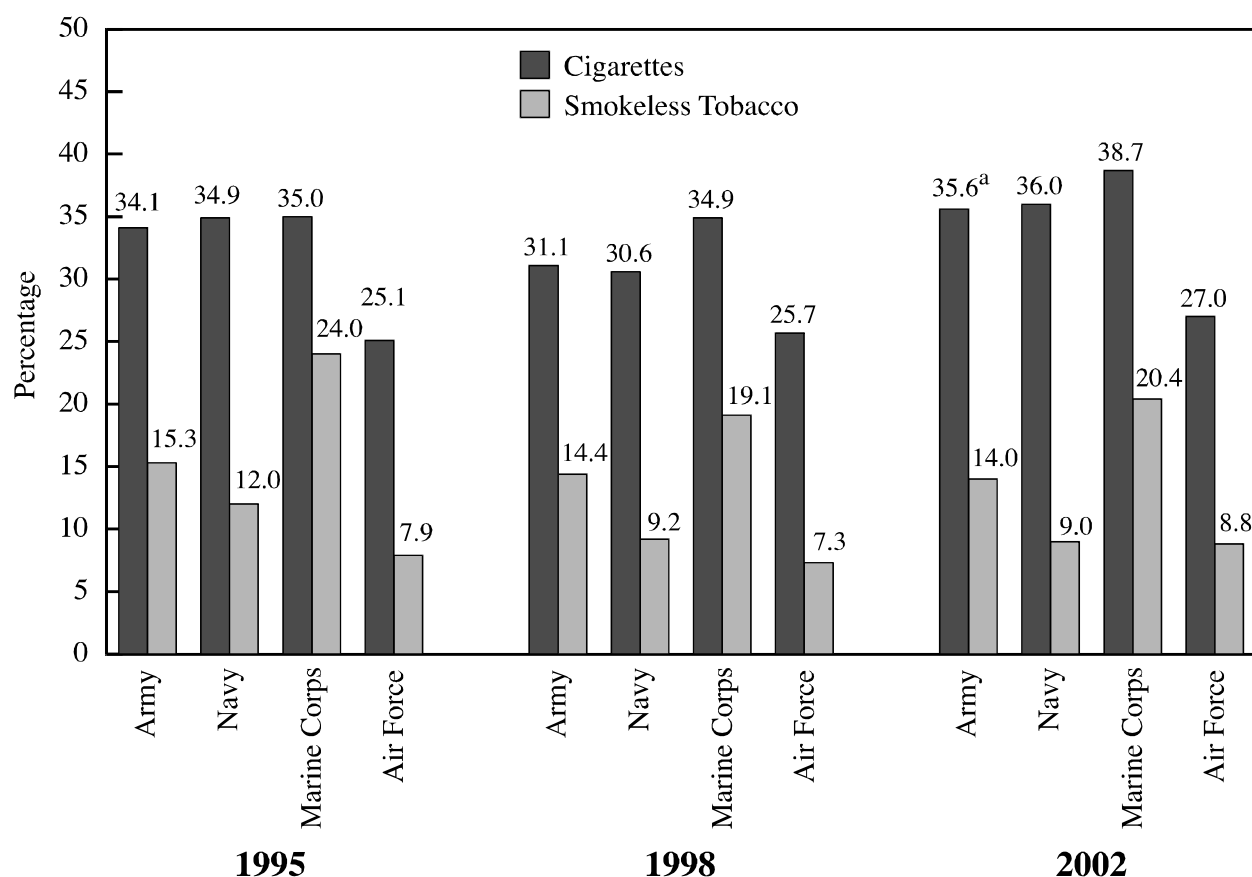
6.3 Summary

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 23 years were described, sociodemographic correlates and relationships to productivity were identified, information about smoking initiation and 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 also presented.

6.3.1 Trends in Cigarette Use and Service Comparisons

Findings of the 1980–2002 DoD surveys show that in the total DoD population, the prevalence of any smoking declined significantly from 51.0% in 1980 to 33.8% in 2002. However, within this overall decline there was a recent upsurge. Between 1998 and 2002, the prevalence of any smoking increased from 29.9% to 33.8% (see Tables 6.1 and 6.2). Furthermore:

Figure 6.1 Service Comparisons in the Prevalence of Any Cigarette and Smokeless Tobacco Use, Past 12 Months, 1995, 1998, and 2002



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.

^a2002 estimate is significantly different from 1998 estimate at .05 significance level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Cigar Use, Q56).

- ! For each Service, there was a significant decrease in the prevalence of smoking between 1980 and 2002. All Services showed an upswing in the trend line from 1998 to 2002, the first time since 1982 that the direction of the curve has not been declining. The Army, however, was the only Service for which the upswing was significant, increasing from 31.1% to 35.6%.
- ! In the DoD population, the prevalence of heavy smoking also declined significantly, from 34.2% in 1980 to 13.1% in 2002. Unlike with any smoking, there was no significant change in the prevalence between 1998 and 2002. This pattern persisted within each of the four Services.
- ! 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 and had the greatest impact on the Marine Corps. Adjusted Marine Corps rates were notably lower than unadjusted rates.

6.3.2 Correlates of Cigarette Use

Results of logistic regression analysis (Table 6.3) show that the following groups were significantly more likely to be current smokers when the effects of all other sociodemographic variables in the model were held constant: personnel in the Army and Navy, males, white non-Hispanics, those who did not graduate from college, unmarried personnel, those in pay grades lower than O4s to O10s, and personnel stationed outside the continental United States or aboard afloat ships.

6.3.3 Cigarette Smoking Initiation and Perceived Cigarette Availability and Acceptability

Some previously published studies suggest that the military environment encourages smoking. This was confirmed with our data, which showed that in the total DoD, 30.2% of respondents started smoking after joining the Military (Table 6.4). Findings from Table 6.5 reveal that, in the total DoD, there are three frequently cited reasons for starting to smoke: to help relieve stress (22.8%), to help relax and calm down (24.1%), and to relieve boredom (17.2%). This pattern of responses persisted across the four Services.

6.3.4 Cigarette Use, Productivity Loss, and Attempts to Stop Smoking Cigarettes

Overall, the prevalence of any productivity loss (any number of work days affected) ranged from 10.3% to 34.7% (Table 6.6). The most frequent types of productivity loss were leaving work early (34.7%), being late for work by 30 minutes or more (33.6%), and working below normal performance level (32.3%). Being hurt in an on-the-job accident was a relatively rare event among military personnel (10.3%). Compared with nonsmokers, current smokers were more likely to have any productivity loss, although the association is weak.

Among past year smokers, 59% tried to quit or quit successfully (Table 6.7). Some 35.6% of smokers indicated that they planned to quit within the next 30 days, and an additional 26.4% reported an intention to quit within the next 6 months.

6.3.5 Military and Civilian Comparisons

Based on the definition of current smoking used in the analyses, the overall DoD rate of 31.6% was not significantly different from the civilian rate of 31.1% (Table 6.8). This equivalence persisted within gender-age subgroups, except for females 18 to 25 years of age, where smoking rates were significantly lower in the military populations. This overall pattern was observed within each of the Services, as well, with one exception: Army males 18 to 25 years old were *more* likely to smoke than their civilian counterparts.

6.3.6 Other Tobacco Use

Comparisons across the four Services show large differences in past month smokeless tobacco use in 2002 (Table 6.9). Personnel in the Marine Corps had the highest prevalence of use (20.4%), and those in the Air Force had the lowest (8.8%). For the Army (14.0%) and the Navy (9.0%), the estimates were intermediate. Overall, the prevalence of past month smokeless tobacco use did not change significantly between 1995 and 2002. However, among males aged 35 years or older, smokeless tobacco use increased significantly from 5.3% in 1998 to 9.5% in 2002. With respect to individual Services, this increase was seen in the Navy and the Air Force.

In the total DoD population, the prevalence of past year cigar use was 32.6%; the prevalence of past year pipe use was 4.2% (Table 6.10). For each Service, there were no significant changes in past year smokeless tobacco use between 1995 and 2002. This is in comparison to past year smoking, which showed more variation over the period. Specifically the Navy and Marine Corps showed declines from 1995 to 1998 and then increased in 2002 back to the 1995 levels or higher. Rates of cigarette use were consistently higher than rates of smokeless tobacco use.

6.3.7 Conclusion

Taken together, findings from the 2002 DoD survey are generally encouraging. First, the prevalence of any smoking declined significantly from 51.0% in 1980 to 33.8% in 2002. However, for the first time since 1980, the rates showed a significant increase from 1998 to 2002. Second, smoking rates among military personnel were equal to and sometimes lower than those of the civilian population. Third, over half (59.0%) of the military personnel who were smokers in the past year made an attempt to quit during the past year.

On the other hand, a number of areas should receive attention. First, to counteract the recent increase in smoking, population subgroups found to be at higher risk for smoking could be targeted for intervention, such as unmarried personnel and those who did not graduate from college. Second, almost a third of respondents reported that they started smoking after they joined the Military, suggesting that more effective smoking *prevention* programs are needed. In these programs, military personnel could be exposed to alternative ways to relieve stress and boredom. Third, although over half of the military personnel who were smokers in the past year made an attempt to quit during that time, roughly 4 out of 10 past year smokers did not try to quit in the past year, and the same proportion of current smokers reported no plans to quit in the near future. These smokers may represent a more formidable target for military policies and programs designed to encourage cessation. Lastly, reasons for the increase of smokeless tobacco use by males aged 35 years or older should be explored and strategically targeted intervention efforts should be implemented.

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 and condom use. Finally, there are discussions on poor physical health and risk-taking behavior. Where appropriate, knowledge and behavior among military personnel are compared with relevant *Healthy People 2000* objectives (Public Health Service [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 (Anderson, 2002). 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 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 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 2002 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. In 1998, 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 as well as those more 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 2002 survey findings to examine results from 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
- ! 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

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).

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

Gender/Age Group	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Males ^a										
Under 20	20.6	(3.1)	39.1	(4.6)	23.1	(5.4)	25.3	(4.7)	25.4	(2.2)
20-25	18.4	(2.3)	21.7	(1.3)	14.0	(1.3)	19.5	(0.6)	18.6	(0.9)
26-34	30.8	(2.9)	33.2	(2.7)	20.9	(1.9)	26.4	(2.0)	29.1	(1.5)
35 or older	32.6	(1.7)	37.9	(1.0)	26.7	(2.5)	33.1	(2.3)	33.7	(1.0)
Females ^b										
Under 20	13.8	(4.9)	33.1	(3.5)	+	(+)	15.5	(4.3)	17.9	(2.7)
20-25	11.9	(1.9)	20.3	(2.4)	5.4	(2.2)	6.8	(1.6)	11.6	(1.0)
26-34	21.1	(2.9)	22.9	(2.6)	3.8	(1.1)	10.8	(3.4)	16.5	(1.8)
35 or older	25.8	(2.9)	23.1	(3.3)	0.7	(0.4)	7.9	(3.2)	16.2	(2.4)
Total										
Under 20	19.0	(2.6)	37.5	(4.3)	21.4	(6.0)	22.8	(3.6)	23.8	(1.8)
20-25	17.1	(1.9)	21.4	(1.3)	12.9	(0.9)	16.3	(0.8)	17.2	(0.8)
26-34	29.3	(2.5)	31.7	(2.4)	18.9	(1.3)	23.3	(1.5)	27.1	(1.2)
35 or older	31.7	(1.7)	36.3	(1.2)	25.3	(2.3)	28.8	(2.7)	31.4	(1.2)

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. Revised 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 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, 2002 (Overweight, Q101-Q102).

For individuals under age 20, the estimates for the total DoD (and especially all men) were considerably above the target of 15%. Among this age group, 23.8% of all personnel (25.4% of males and 17.9% of females) would be classified as overweight according to the BMI. Thus, neither males nor females 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%. The prevalence of overweight women under age 20 in the Army and Air Force was 13.8% and 15.5%, respectively, and thus women in these Services either met or nearly met the *Healthy People 2000* objective. In contrast, the prevalence of overweight women under age 20 in the Navy was 33.1%. Among personnel under age 20, the prevalence of overweight among males in all four Services was above the objective. Males in this age group in the Navy had an especially high prevalence of overweight (39.1%).

As shown in Table 3.4, the *Healthy People 2000* objective for overweight among people aged 20 or older (prevalence of no more than 20%) was not met for personnel in this age group in the total DoD (24.0%). Examining this goal separately for those aged 20 to 25 and 26 to 34, however, reveals a slightly different picture. The prevalence rate for overweight for personnel aged 20 to 25 in the total DoD (17.2%) was below the *Healthy People 2000* objective of 20%, and this held true for each individual Service with the exception of the Navy (21.4%), although the Navy rate was also very close. Both men (18.6%) and women (11.6%) in this age group were below the *Healthy People 2000* objective. In contrast, 27.1% of all personnel aged 26 to 34 were considered overweight, and rates for this age group were higher than 20% for all Services with the exception of the Marine Corps (18.9%). Women in this age group were below the *Healthy People 2000* goal (16.5%), and men were significantly above the goal (29.1%). At the Service level, men aged 26 to 34 in all four Services, as well as women in this age group from the Army and Navy, exceeded the *Healthy People 2000* objective.

In general, attainment of the *Healthy People 2000* goal of 20% overweight among personnel aged 35 or older was mixed. Among this age group, women in the total DoD were below the objective (16.2%), whereas men were significantly above the objective (33.7%). Women aged 35 or older in the Marine Corps and Air Force were far below the objective (0.7% and 7.9%, respectively), whereas women in the Army and Navy were above the objective (25.8% and 23.1%, respectively). Among this age group, men in all four Services were above the objective.

Comparing the 2002 findings to those of 1998 reveals a marked increase in the prevalence of overweight for the *Healthy People 2000* guidelines. As Table 3.4 indicates, for personnel under age 20, the percentage considered overweight was very similar in 1998 (22.9%) and 2002 (23.8%). Notably, the percentage of females under the age of 20 who were classified as overweight nearly doubled between 1998 (9.2%) and 2002 (17.9%). Among males in the total DoD, the percentage overweight was consistent between 1998 (25.9%) and 2002 (25.4%). There were differences among males in this age group at the Service level; for example, the percentage overweight decreased among males under age 20 in the Army (26.9% in 1998 to 20.6% in 2002), whereas this percentage increased among males in the Navy (28.8% in 1998 to 39.1% in 2002). For those aged 20 or older, the percentage considered overweight increased by about 4.5% during that period. This increase is evident for most of the groups and subgroups in the Military when comparing data in Table 7.1 to those of 1998. For example, in 1998, 12.9% of Marine Corps men over the age of 35 were considered overweight, compared with 26.7% in 2002. Among Army women aged 26 to 34, the percentage of those overweight increased from 9.7% in 1998 to 21.1% in 2002. Among personnel aged 20 or older, the prevalence of overweight increased for all subgroups with the exception of males aged 20 to 25 in the Navy and females aged 35 or older in the Marine Corps and Air Force. Given this increase since 1998, 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 that can result from being overweight.

Readers should use caution, however, in interpreting these estimates, particularly those for younger personnel, because the BMI may somewhat overestimate the percentages of military personnel who are overweight. BMI 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. Indeed, current military policy dictates that the decisive factor for being considered overweight is percentage body fat (maximum 26% for males and maximum 36% for females) (DoD, 2002).

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, 10.5% of all military personnel under 20 were considered underweight compared with 6.5% of those aged 20 to 25, 3.1% of those aged 26 to 34, and only 2.1% of those aged 35 or older. For males, personnel aged under 20 had the highest prevalence of underweight in each of the four Services. For females, this pattern was found only in the Army; in the Navy and Air Force, women aged under 20 had lower prevalence of underweight than women aged 20 to 25. Notably, young male personnel showed higher rates of being underweight than young female personnel. Approximately 12% 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 6.6% 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, the percentage of personnel who were underweight ranged from 13.6% in the Army to 7.6% in the Air Force. Among women under age 20, the percentage of personnel who were underweight ranged from 8.3% in the Army to 3.9% in the Navy.

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 DoD (and for both men and women separately), the prevalence of underweight decreased as age increased. This same general pattern held for males in each of the Services. For females, the pattern varied by Service. For example, among women in the Marine Corps, the prevalence of underweight *increased* as age increased. Among women in both the Navy and the Air Force, the prevalence of overweight was higher for those aged 20 to 25 than for those aged under 20. The general 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).

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

Gender/Age Group	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Males ^a										
Under 20	13.6	(3.0)	10.5	(2.3)	12.1	(1.6)	7.6	(3.5)	11.5	(1.5)
20-25	5.7	(0.6)	8.0	(0.3)	5.7	(0.8)	7.2	(1.5)	6.6	(0.4)
26-34	2.8	(0.8)	3.4	(0.5)	1.6	(0.6)	2.4	(0.8)	2.7	(0.4)
35 or older	2.8	(0.9)	1.2	(0.2)	0.8	(0.2)	2.5	(1.1)	2.1	(0.5)
Females ^b										
Under 20	8.3	(2.3)	3.9	(1.8)	+	(+)	6.4	(3.5)	6.6	(1.4)
20-25	3.8	(1.2)	5.2	(0.5)	3.8	(0.7)	9.2	(1.4)	5.8	(0.6)
26-34	5.0	(1.2)	3.6	(2.0)	5.6	(2.9)	5.9	(1.6)	5.1	(0.9)
35 or older	+	(+)	2.6	(1.2)	8.4	(4.4)	1.8	(1.4)	2.1	(0.9)
Total										
Under 20	12.4	(2.1)	8.7	(1.3)	11.5	(1.2)	7.3	(2.5)	10.5	(1.1)
20-25	5.3	(0.6)	7.5	(0.3)	5.5	(0.8)	7.7	(1.0)	6.5	(0.3)
26-34	3.1	(0.6)	3.4	(0.4)	2.1	(0.5)	3.1	(0.6)	3.1	(0.3)
35 or older	2.7	(0.8)	1.4	(0.3)	1.2	(0.4)	2.4	(0.8)	2.1	(0.4)

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. Revised 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, 2002 (Underweight, Q101-Q102).

There was more variation between Services in the prevalence of underweight for those under age 20 than for other age groups, with the percentage underweight in this age group ranging from 12.4% in the Army to 7.3% in the Air Force. Differences were also found for those aged 35 or older, with a higher percentage being underweight in the Army (2.7%) and Air Force (2.4%) than in the Navy (1.4%) or Marine Corps (1.2%). Among those aged 35 or older, men in the Marine Corps had the lowest prevalence of overweight (0.8%) in the four Services, whereas women in the Marine Corps had the highest prevalence of overweight (8.4%) in the four Services.

Comparing the 2002 findings to those of 1998 reveals that the prevalence of underweight for the total DoD changed little during this time. There was a decrease between 1998 and 2002 in the percentage of personnel aged under 20 who were underweight (12.4% in 1998 and 10.5% in 2002), but the percentages overweight were consistent for the other age groups. This decrease in percentage overweight

for personnel aged under 20 was found for both males (13.1% in 1998 compared with 11.5% in 2002) and females (9.1% in 1998 compared with 6.6% in 2002). However, this pattern varied across the Services, especially for males. For example, the percentage of male personnel aged under 20 who were underweight decreased markedly in the Air Force from 1998 (17.4%) to 2002 (7.6%), but increased in the Marine Corps from 7.9% in 1998 to 12.1% in 2002. Overall, the percentage of Air Force personnel under age 20 who were underweight decreased from 15.6% in 1998 to 7.3% in 2002.

Rates of overweight and underweight presented thus far have been based upon *Healthy People 2000* and Brownell and Fairburn (1995) guidelines for overweight and underweight, respectively. 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 must be recognized, 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 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 underweight and overweight for the total DoD by gender for 1995, 1998, and 2002 using the *Healthy People 2000* guidelines and the new NHLBI guidelines. As shown, the prevalence of underweight in the total DoD, as measured by *Healthy People 2000* guidelines, was similar in all 3 years (5.0% in 1995, 4.3% in 1998, and 4.6% in 2002). Similarly, for all 3 years, rates for men and women were close to those of the total DoD, although slightly more women were underweight than men. Measuring underweight using the new NHLBI guidelines revealed similar patterns. In all 3 years, the prevalence of underweight in the total DoD was comparable (0.9% in 1995, 0.8% in 1998, and 1.1% in 2002). In addition, rates for being underweight were higher for women, although under these new guidelines a much higher percentage of women than men were considered underweight. For example, using previous guidelines, 4.9% of women and 4.5% of men were underweight in 2002. Using NHLBI guidelines, 2.9% of women and 0.7% 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. This is a function of the difference in the cutpoint for defining underweight for the guidelines. Based on the NHLBI guidelines, the rate of underweight was about 1% for the total DoD in 1995, 1998, and 2002. This same pattern held for both males and females in both years, although 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).

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 from 1995 to 2002. This finding

Table 7.3 Comparison of the Prevalence of Underweight and Overweight Active-Duty Personnel, 1995, 1998, and 2002, by Gender, Using *Healthy People 2000* Guidelines and 1998 NHLBI Guidelines

	1995			1998			2002		
	HP 2000 Guidelines	NHLBI Guidelines	HP 2000 Guidelines	NHLBI Guidelines	HP 2000 Guidelines	NHLBI Guidelines	HP 2000 Guidelines	NHLBI Guidelines	
Underweight^a									
Male	5.0 (0.3)	0.7 (0.1)	4.2 (0.3)	0.4 (0.1)	4.5 (0.3)	0.7 (0.1)			
Female	5.2 (0.4)	2.7 (0.3)	4.9 (0.4)	2.8 (0.3)	4.9 (0.5)	2.9 (0.4)			
Total DoD	5.0 (0.2)	0.9 (0.1)	4.3 (0.2)	0.8 (0.1)	4.6 (0.3)	1.1 (0.1)			
Overweight^b									
Male	17.6 (0.4)	53.0 (0.6)	20.7 (0.5)	57.2 (0.5)	26.0 (0.7)	62.3 (0.9)			
Female	8.1 (0.7)	21.0 (0.9)	9.4 (0.6)	25.4 (1.0)	14.3 (0.8)	32.4 (1.5)			
Total DoD	16.4 (0.4)	49.0 (0.6)	19.1 (0.5)	52.9 (0.5)	24.0 (0.6)	57.2 (0.8)			

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 Surveys of Health Related Behaviors Among Military Personnel, 1995, 1998, and 2002 (2002 Questions: Q101-102).

is consistent with data presented in Table 3.4. About 16% of personnel in 1995 would be considered overweight, compared with about 19% of personnel in 1998 and 24% in 2002. For all 3 years, a much higher percentage of men than women were overweight (17.6% vs. 8.1% in 1995, 20.7% vs. 9.4% in 1998, and 26.0% vs. 14.3% in 2002). Basing overweight prevalence on the new NHLBI standards revealed a marked increase in the percentage of personnel considered overweight. For the total DoD, 49.0% in 1995, 52.9% in 1998, and 57.2% in 2002 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 in all 3 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 data that will be useful to the Military in considering the utility of the new guidelines for military purposes.

Dietary Supplements. Table 7.4 displays the percentages of male and female DoD personnel who reported taking different types of dietary supplements once a week or more in the past 12 months. In the total DoD, females were more likely than males to have taken vitamins/antioxidants once a week or more (55.8% vs. 41.1%). This pattern was consistent for each of the four Services. Both female and male personnel in the Air Force had higher rates of taking vitamins/antioxidants than male and female personnel in the other Services. Regarding dietary supplements related to body-building, nearly one in four males in the total DoD (about 23%) had taken a body-building supplement at least once in the past week. Men in the Marine Corps were more likely to have taken body-building supplements in the past week (29.8%) than men in the other Services. Only 7.8% of women in the total DoD had taken a body-building supplement in the past week. However, female personnel were more likely than male personnel in the total DoD to have taken a weight loss supplement in the past week (29.9% vs. 20.5%). The rate of taking weight loss supplements was especially high among women in the Marine Corps (33.4%). Regarding herbal dietary supplements, past week use was similar between men and women in the total DoD (18.1% and 17.2%, respectively), and this was generally true for each of the Services.

Exercise. Table 7.5 presents the percentages of DoD 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, walking, or hiking, or other strenuous exercise, such as swimming), slightly more than two-thirds (70.2%) 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 87% in the Army engaged in regular strenuous exercise compared with approximately 58% and 56% 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, cycling, walking, or hiking. 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 Prevalence of Taking Dietary Supplements, by Service and Gender

Supplements Taken	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Vitamins/Antioxidants										
Males	38.3	(1.1)	41.8	(1.2)	39.2	(0.9)	45.4	(3.5)	41.1	(1.0)
Females	50.6	(2.3)	54.9	(2.9)	51.7	(1.6)	62.5	(2.3)	55.8	(1.3)
Body-Building										
Males	22.5	(1.4)	21.1	(0.6)	29.8	(1.1)	19.6	(1.1)	22.5	(0.6)
Females	9.3	(2.2)	7.2	(0.5)	9.2	(1.8)	6.3	(1.1)	7.8	(0.9)
Herbal										
Males	19.5	(0.7)	16.9	(0.8)	19.5	(0.5)	16.7	(1.5)	18.1	(0.5)
Females	16.6	(0.8)	19.3	(1.3)	17.3	(2.3)	16.5	(1.4)	17.2	(0.7)
Weight Loss										
Males	22.0	(1.0)	19.5	(0.8)	24.0	(0.6)	17.7	(1.9)	20.5	(0.7)
Females	30.1	(1.4)	30.6	(1.5)	33.4	(1.8)	28.2	(1.9)	29.9	(0.9)
Other										
Males	11.1	(0.5)	11.4	(0.4)	15.5	(1.8)	8.6	(1.1)	11.2	(0.5)
Females	11.5	(1.2)	12.1	(1.5)	14.7	(2.4)	8.5	(1.7)	10.9	(0.8)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported using each type of dietary supplement once a week or more in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Dietary Supplements, Q96).

Table 7.5 Prevalence of Involvement in Strenuous Exercise, by Service

	Service								Total DoD		
	Army		Navy		Marine Corps		Air Force				
Strenuous Activity, Past 30 Days											
Run, cycle, walk briskly, or hike for 20 minutes or more	82.8	(2.0)	49.5	(1.4)	73.6	(3.3)	52.3	(2.5)	64.9	(1.3)	
Other strenuous exercise for 20 minutes or more (e.g., swimming laps)	56.1	(1.3)	36.3	(2.4)	54.3	(2.0)	35.1	(2.2)	45.2	(0.9)	
Any type of strenuous exercise for 20 minutes or more	86.6	(1.6)	56.0	(1.7)	79.0	(2.5)	58.3	(2.1)	70.2	(1.1)	

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, 2002 (Run, Cycle, Walk Briskly, or Hike, Q72A; Other Strenuous Exercise, Q72B).

7.1.2 Blood Pressure

Blood Pressure Screening and Awareness. Table 7.6 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 7.6 may be somewhat conservative.

Healthy People 2000 includes an objective stating that 90% or more of 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, approximately 78% of personnel in the total DoD met these two criteria, which is 12 percentage points below 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 (84.4%), followed by the Army (77.5%), the Navy (74.2%), and the Marine Corps (73.0%).

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 7.6). Females were slightly more likely than males to meet these criteria in both the total DoD (80.7% vs. 77.4%) and within each Service. In the total DoD, non-Hispanic whites (79.7%) were the most likely racial/ethnic group to meet these criteria, and personnel in the "other" category (72.0%) 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, 89.0% of college graduates met these criteria, compared with 81.2% of those with some college education and 67.5% 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. Increased age also was associated with a greater likelihood of blood pressure screening in the total DoD and within each Service. In the total DoD, 90.0% of those aged 35 or older had their blood pressure checked in the past 2 years and remembered the result, compared with 81.1% of those aged 26 to 34, 71.4% of those aged 21 to 25, and 64.5% of those aged 20 or younger. Personnel aged 35 or older were the only sociodemographic subgroup of the DoD to meet the *Healthy People 2000* objective for blood pressure checks, although personnel who were college graduates approached this objective.

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.

Table 7.6 Prevalence of Blood Pressure Screening and Awareness, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Gender										
Male	77.0	(1.1)	73.8	(0.9)	72.5	(2.3)	84.1	(1.4)	77.4	(0.7)
Female	80.0	(1.8)	76.4	(3.1)	76.7	(2.1)	85.3	(1.1)	80.7	(1.1)
Race/Ethnicity										
White, non-Hispanic	79.5	(1.3)	76.3	(0.9)	74.4	(1.9)	85.2	(1.2)	79.7	(0.7)
African American, non-Hispanic	74.6	(1.9)	69.7	(2.5)	69.3	(5.0)	83.6	(2.2)	74.8	(1.2)
Hispanic	74.1	(4.1)	73.0	(2.2)	70.1	(3.1)	79.3	(4.6)	74.2	(1.8)
Other	73.5	(3.0)	67.9	(4.2)	67.9	(4.4)	79.5	(4.9)	72.0	(2.3)
Education										
High school or less	66.0	(1.3)	64.5	(1.9)	67.5	(1.7)	76.3	(2.2)	67.5	(0.9)
Some college	81.6	(0.8)	77.7	(0.7)	77.6	(2.4)	84.4	(1.8)	81.2	(0.8)
College graduate or higher	90.1	(0.9)	87.0	(1.2)	83.8	(2.6)	90.5	(1.1)	89.0	(0.5)
Age										
20 or younger	61.1	(2.5)	62.0	(1.9)	65.9	(2.1)	72.0	(3.0)	64.5	(1.4)
21-25	73.1	(1.5)	66.2	(1.5)	69.5	(2.3)	76.3	(3.3)	71.4	(1.1)
26-34	79.4	(1.1)	77.2	(2.4)	78.4	(2.8)	87.4	(1.5)	81.1	(0.9)
35 or older	90.4	(1.1)	87.9	(0.8)	86.8	(1.2)	91.8	(0.6)	90.0	(0.5)
Total	77.5	(1.2)	74.2	(1.1)	73.0	(2.3)	84.4	(1.4)	77.9	(0.7)

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, 2002 (Blood Pressure Screening and Awareness, Q103-Q104; refer to Section 2.5 for descriptions of sociodemographic variables).

High Blood Pressure Advice or Interventions. Table 7.7 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 15.4%, or approximately one in seven, of all active-duty military personnel in 2002 had ever been diagnosed as having hypertension. The overall lifetime rates of high blood pressure in the Army (16.5%) and Air Force (15.8%) were somewhat higher than the rate for the total DoD, whereas the overall rates in the Navy (14.6%) and Marine Corps (13.1%) were somewhat lower.

Table 7.7 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

Table 7.7 Prevalence of Advice Given and Actions Taken to Control High Blood Pressure

Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Lifetime History of High Blood Pressure ^a	16.5	(1.1)	14.6	(0.6)	13.1	(0.4)	15.8	(0.6)	15.4	(0.5)
Advice Given to Lifetime Hypertensives ^b										
Medication prescribed	22.4	(3.3)	30.0	(2.8)	13.5	(1.6)	23.1	(1.3)	23.3	(1.5)
Diet to reduce weight	22.4	(1.0)	36.0	(3.8)	13.9	(1.3)	29.5	(3.2)	26.7	(1.4)
Decrease salt intake	43.1	(2.0)	49.9	(3.3)	37.8	(4.1)	45.6	(1.7)	44.8	(1.3)
Exercise	36.6	(2.4)	61.5	(3.0)	34.0	(2.6)	59.1	(3.5)	48.7	(1.5)
Any of the above	59.0	(3.2)	72.2	(2.0)	53.2	(4.5)	68.4	(2.3)	64.1	(1.5)
Action Being Taken by Lifetime Hypertensives ^c										
Take prescribed medication	13.2	(2.8)	20.8	(2.5)	7.2	(1.8)	18.5	(1.7)	15.8	(1.4)
Diet to reduce weight	14.3	(2.2)	22.9	(2.6)	8.7	(1.5)	15.9	(4.6)	16.2	(1.7)
Decrease salt intake	25.1	(2.7)	35.8	(4.0)	19.6	(3.4)	28.9	(2.3)	28.1	(1.6)
Exercise	28.3	(2.0)	45.5	(4.2)	26.3	(2.7)	42.9	(5.5)	36.3	(2.0)
Any of the above	44.0	(3.2)	58.6	(4.7)	35.6	(3.2)	52.7	(3.6)	49.0	(2.0)
Action Being Taken by Probable Current Hypertensives ^d										
Take prescribed medication	19.9	(5.8)	27.5	(2.8)	11.0	(2.9)	25.4	(3.3)	22.1	(2.6)
Diet to reduce weight	19.9	(3.9)	31.1	(3.6)	10.3	(2.4)	22.6	(5.8)	22.2	(2.5)
Decrease salt intake	35.6	(5.0)	42.9	(4.5)	24.0	(6.1)	40.6	(3.5)	37.4	(2.6)
Exercise	37.1	(2.5)	55.4	(6.0)	30.3	(4.2)	53.7	(4.7)	45.2	(2.5)
Any of the above	52.9	(4.6)	70.3	(5.2)	42.2	(5.9)	61.9	(3.0)	58.3	(2.6)

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

^aRespondents in the total DoD sample who had ever been told they had high blood pressure.

^bAdvice given by a health care provider, such as a doctor or other health professional.

^cEstimates 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.

^dDefined as personnel (a) who had ever been told they had high blood pressure; (b) who 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, 2002 (Lifetime History of High Blood Pressure, Q105; Advice, Q107A-C; Medication Prescribed, Q106; Action Taken, Q108A-C and F; Probable Current, Q103-105).

- ! advising reductions in sodium intake
- ! recommending exercise

About two-thirds of military personnel (64.1%) 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. Navy personnel (72.2%) were the most likely among the Services to have been advised to take one or more of these actions; Marine Corps personnel were the least likely (53.2%) to have been so advised.

Recommendations to exercise and reduce salt intake were the most common forms of medical advice given to lifetime hypertensives in the total DoD (48.7% and 44.8%, respectively). About 27% of personnel with a history of high blood pressure in the total DoD were advised to diet to reduce their weight, and about 23% 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 by recommending behavioral changes before prescribing medication. Another possibility is that some of these personnel may have had borderline hypertension, which 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.

Actions to Control High Blood Pressure. Table 7.7 also presents the 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, about half of personnel who had a lifetime history of high blood pressure (49.0%) 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, 58.6% of those in the Navy and 52.7% of those in the Air Force were currently following one or more of these four recommendations, compared with 44.0% of those in the Army and 35.6% of those in the Marine Corps. Of those advised to

reduce salt intake, about 28% of DoD personnel were taking action to follow this advice. Among those in the total DoD advised to exercise, about 36% were acting on that advice.

Relatively few DoD personnel with a lifetime history of high blood pressure were currently dieting or taking blood pressure medication (16.2% and 15.8%, 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 (49.0%). 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 decreased from 53.5% to 51.0% between 1998 and 2002.

Table 7.7 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, 58.3% were taking one or more of the actions shown in Table 7.7. 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, although it was above the 1998 rate of 54.0%. Probable current hypertensives in the Navy (70.3%) were the most likely to report taking one or more actions to control high blood pressure, followed by personnel in the Air Force (61.9%), Army (52.9%), and Marine Corps (42.2%).

Considering these probable current hypertensives, the most common actions taken to control blood pressure were exercise (45.2%) and dietary changes to decrease salt intake (37.4%). About 22% of personnel were dieting to lose weight, and 22% were taking prescribed blood pressure medication. For each of the four actions we studied, personnel in the Marine Corps were the least likely among the Services to report taking the action. For example, although about 20% to 31% 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 10% of probable current hypertensives in the Marine Corps reported doing so.

7.1.3 Cholesterol

Table 7.8 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. Approximately 56% of personnel in the total DoD had

Table 7.8 Prevalence of Receipt of Cholesterol Screening, by Age

Age Group/Recency	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Under 25										
Within past 2 years	27.7	(3.4)	27.9	(0.9)	22.1	(0.9)	41.7	(4.2)	29.7	(1.7)
Within past 5 years	30.9	(3.5)	31.3	(1.0)	23.8	(1.0)	44.5	(4.8)	32.5	(1.7)
More than 5 years ago	0.8	(0.2)	1.6	(0.2)	1.3	(0.4)	0.3	(0.1)	1.0	(0.1)
Never	37.9	(2.5)	33.8	(0.4)	37.7	(1.0)	26.9	(4.0)	34.4	(1.3)
Don't know	30.4	(2.2)	33.2	(1.1)	37.3	(1.7)	28.3	(1.9)	32.1	(1.0)
Ages 25 to 34										
Within past 2 years	48.3	(2.5)	47.2	(1.3)	41.6	(3.7)	64.8	(4.1)	52.0	(1.8)
Within past 5 years	58.6	(3.2)	61.2	(2.9)	50.1	(2.6)	93.7	(3.4)	62.6	(1.9)
More than 5 years ago	3.5	(0.7)	2.0	(0.4)	2.7	(0.5)	2.8	(1.1)	2.9	(0.4)
Never	17.8	(2.4)	21.6	(2.0)	20.2	(2.6)	8.4	(1.4)	16.2	(1.2)
Don't know	20.0	(1.2)	15.3	(1.0)	27.0	(2.1)	15.1	(2.1)	18.4	(0.8)
Ages 35 or Older										
Within past 2 years	69.3	(1.8)	67.4	(0.8)	64.8	(3.1)	80.9	(3.6)	72.6	(1.4)
Within past 5 years	83.3	(2.1)	84.4	(1.4)	76.4	(2.3)	90.3	(1.8)	85.6	(0.9)
More than 5 years ago	5.5	(1.5)	3.0	(0.3)	5.1	(1.2)	2.9	(0.8)	3.9	(0.6)
Never	4.2	(0.8)	3.6	(0.5)	8.9	(1.3)	1.3	(0.4)	3.3	(0.3)
Don't know	7.1	(0.7)	9.1	(1.1)	9.5	(1.2)	5.5	(1.4)	7.2	(0.6)
Total										
Within past 2 years	45.1	(2.9)	44.2	(1.0)	33.1	(3.5)	62.7	(3.1)	48.1	(1.6)
Within past 5 years	53.5	(3.3)	54.4	(2.0)	38.0	(3.6)	69.9	(3.1)	56.1	(1.7)
More than 5 years ago	2.9	(0.5)	2.1	(0.2)	2.2	(0.2)	2.0	(0.7)	2.4	(0.3)
Never	22.5	(2.3)	22.1	(0.9)	29.1	(2.0)	12.0	(2.0)	20.4	(1.0)
Don't know	21.1	(1.2)	21.4	(1.2)	30.8	(2.0)	16.1	(1.4)	21.1	(0.7)

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.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Cholesterol Screening, Q109).

their cholesterol checked within the preceding 5 years. Approximately 70% of Air Force personnel, 54% of Army and Navy personnel, and 38% of Marine Corps personnel had their cholesterol checked within the past 5 years. These overall rates for the total DoD, and for each Service, 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%, whereas the overall rate for the Air Force approached the target. 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 fact, the *Healthy People 2000* target of 75% was reached in 2002 among personnel aged 35 or older, both in the total DoD

as well as in each Service. In addition, nearly 81% of Air Force personnel aged 35 or older and approximately 73% of personnel aged 35 or older in the total DoD had their cholesterol checked within the past 2 years. As noted in the previous paragraph, 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.

About one in five personnel (21.1%) 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 (32.1% of personnel under the age of 25 vs. 18.4% of personnel aged 25 to 34 and 7.2% of personnel aged 35 or older). 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 7.8 may be somewhat conservative.

Table 7.9 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. Lifetime estimates were based on reports from personnel of having ever been told by a health professional that their cholesterol level was high.

As shown, in the total DoD population, 17.7% of all personnel had been told by a health care provider that they had elevated cholesterol at some point in their lives. Only 10% of Marine Corps personnel reported that they had a lifetime history of high cholesterol, a lower number 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.

Of those who had been told they had high cholesterol, 18.2% reported that they had been prescribed medication to help lower cholesterol, whereas 83.1% had been told by a health professional to reduce their dietary fat intake. In terms of actions taken to lower cholesterol, 13.1% were following a health care provider's advice to take medication. Approximately 57% of those who had been told they had high cholesterol 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.

7.2 Injuries and Injury Prevention

A major effort in injury prevention is to reduce injuries and fatalities resulting from motor vehicle accidents. In 2002, an estimated 43,000 people were killed and 2.9 million people were injured in motor vehicle crashes (National Highway Traffic Safety Administration [NHTSA], 2003a). Research demonstrates, however, that seat belts are very effective in preventing injury and reducing the likelihood

Table 7.9 Prevalence of Advice Given and Actions Taken to Control High Cholesterol

Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Lifetime History of High Cholesterol	16.5	(2.1)	19.5	(0.6)	10.0	(1.1)	21.2	(1.3)	17.7	(0.8)
Advice Given^a										
Cut down on fat	83.3	(1.8)	80.6	(1.3)	78.1	(1.8)	86.0	(2.2)	83.1	(1.0)
Medication prescribed	16.5	(3.7)	23.3	(5.3)	12.1	(1.9)	17.1	(1.6)	18.2	(1.9)
Action Taken^b										
Cut down on fat	55.0	(3.7)	54.0	(3.1)	54.3	(4.4)	62.2	(3.4)	57.2	(2.0)
Taking medication	11.5	(3.1)	15.1	(3.0)	6.9	(1.8)	14.2	(2.8)	13.1	(1.6)

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 other health professional.

^bEstimates 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, 2002 (Lifetime History of High Cholesterol, Q110; Cut Down on Fat, Q111; Advice: Medication Prescribed, Q112; Cut Down on Fat, Q113A; Action Taken: Taking Medication, Q113B).

of death in motor vehicle crashes (NHTSA, 1996). Most States now have laws requiring motor vehicle occupants to use seat belts. As of July 2003, 49 States and the District of Columbia (DC) had mandatory seat belt use laws (Insurance Institute for Highway Safety [IIHS], 2003a).

Injuries to motorcyclists and bicyclists also are of concern. For example, in 2002, motorcycle and bicycle fatalities accounted for 8% and 2%, respectively, of all traffic fatalities (NHTSA, 2003a). 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). Motorcycle helmets have been shown to be 67% effective in preventing brain injuries (NHTSA, 1996). As of July 2003, 47 States and DC had laws requiring some motorcyclists (usually riders younger than age 20) or all motorcyclists to use helmets (IIHS, 2003b). Fewer States (only 17) had laws regarding bicycle helmet use, and these applied only to young riders (aged 16 or younger) (IIHS, 2003b).

In this section, we present findings from the 2002 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 2002 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
- ! increase use of helmets to at least 80% of motorcyclists and at least 50% of bicyclists

7.2.1 Prevalence of Injuries

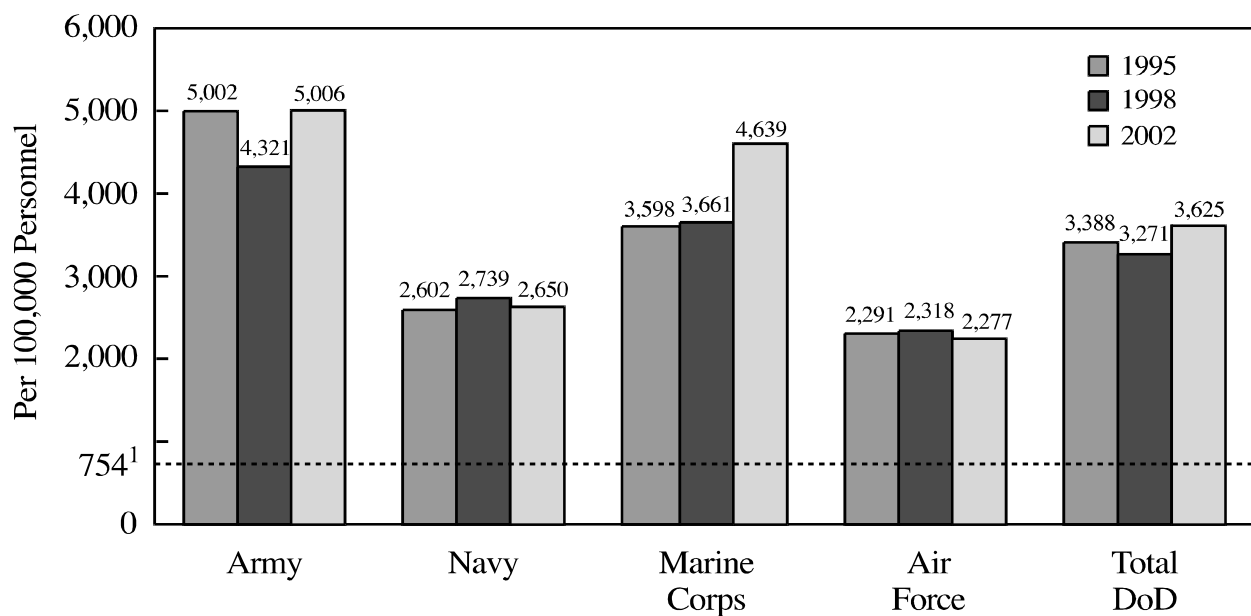
Figure 7.1 compares prevalence estimates from the 1995, 1998, and 2002 DoD surveys of hospitalization for treatment of injuries in the 12 months prior to each survey. To obtain these estimates, we asked respondents whether they had any overnight hospital stays in the past 12 months for treatment of an 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 2002, 3,625 per 100,000 personnel were hospitalized for injuries. Among the Services, personnel in the Army and Marine Corps (5,006 per 100,000 and 4,639 per 100,000, respectively) were most likely to have been hospitalized; rates for the Navy and the Air Force were roughly comparable (2,650 per 100,000 and 2,277 per 100,000, respectively). Comparing 2002 rates with those of 1995 and 1998, Figure 7.1 indicates that rates in hospitalizations for injuries did not change dramatically over the 7-year period. The only exception was exhibited by personnel in the Marine Corps, who increased the rate of injuries from 3,598 per 100,000 in 1995 and 3,661 per 100,000 in 1998 to 4,639 per 100,000 in 2002. 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 substantial effort would 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 may reflect the intense physical nature of the Military and/or potential differences in military and civilian hospital admission practices. This suggests the need for further research on injuries among military 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, but the 2002 survey asked specifically about unintentional 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. Because the number of hospitalizations due to intentional injuries is likely to be small, the high rate of hospitalizations for injuries for 1995 and 1998 cannot be explained by *intentional* injuries. Because of the nature of military training and physical activities, it is probably not realistic to expect the Military to meet the *Healthy People 2000* objective.

Notably, efforts to address high rates of injury in the Military are under way. The Injury Prevention and Control Work Group of the Armed Forces Epidemiological Board was formed in 1996 to investigate the impact that injuries have on the health and readiness of the U.S. Armed Forces (Jones &

Figure 7.1 Comparison of Prevalence of Hospitalization for Unintentional Injuries, by Service, 1995, 1998, and 2002



Note: The *Healthy People 2000* goal is 754 injuries per 100,000 personnel.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1995, 1998, and 2002 (2002 Question: Hospitalization for Injuries, Q66; 1995, Q67; 1998, Q71).

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. Furthermore, military discharge databases were identified as very useful sources of surveillance information and were recommended to be used routinely (Smith, Dannenberg, & Runyan, 1996). In addition to surveillance, it has been recently suggested that the success of injury prevention will depend on partnerships among the medical, surveillance, and safety agencies of the Military, as well as the military commanders, other decision makers, and Service members whose direct actions can prevent injuries and disease (Jones, Perrotta, Canham-Chervak, Nee, & Brundate, 2000). Data presented in this report can aid the Military in evaluating the underlying causes of hospitalization due to injury and working toward the *Healthy People 2000* goal or an alternate goal that may be adopted.

7.2.2 Seat Belt Use

Table 7.10 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 personnel reported higher rates of seat belt use (96.4%) compared

Table 7.10 Prevalence of Seat Belt Use, by Gender and Age

Gender/Age Group	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Male										
20 or younger	77.3	(3.4)	81.0	(5.1)	84.8	(2.1)	91.4	(1.5)	82.6	(1.9)
21-25	82.7	(1.7)	84.3	(5.8)	89.7	(1.1)	91.0	(0.9)	86.3	(1.6)
26-34	93.6	(1.0)	95.0	(1.1)	94.1	(1.2)	97.4	(0.7)	95.0	(0.5)
35 or older	95.4	(1.1)	96.0	(0.7)	96.9	(0.8)	99.3	(0.3)	97.0	(0.4)
Total	88.7	(1.2)	89.8	(3.1)	90.7	(1.4)	95.9	(0.6)	91.1	(0.9)
Female										
20 or younger	90.8	(2.3)	90.9	(3.0)	95.3	(2.4)	95.3	(1.5)	92.5	(1.2)
21-25	96.8	(0.8)	94.4	(3.1)	96.5	(1.0)	97.3	(1.6)	96.3	(0.9)
26-34	97.3	(0.9)	97.4	(0.8)	100.0	(NA)	99.6	(0.4)	98.4	(0.4)
35 or older	99.2	(0.5)	98.3	(1.3)	99.6	(0.4)	99.6	(0.4)	99.2	(0.3)
Total	96.2	(0.4)	95.1	(1.4)	97.3	(0.7)	98.3	(0.4)	96.8	(0.3)
Total										
20 or younger	80.5	(2.4)	83.0	(5.3)	85.8	(2.5)	92.6	(1.4)	84.6	(1.8)
21-25	85.3	(1.4)	86.1	(5.3)	90.6	(1.2)	92.6	(1.0)	88.2	(1.4)
26-34	94.1	(0.9)	95.3	(0.9)	94.8	(1.1)	97.9	(0.6)	95.5	(0.5)
35 or older	95.9	(0.9)	96.2	(0.6)	97.0	(0.8)	99.4	(0.3)	97.3	(0.4)
Total	90.0	(1.0)	90.7	(2.8)	91.4	(1.5)	96.4	(0.5)	92.1	(0.8)

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.

NA = Not applicable.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Seat Belt Use, Q67).

with the Marine Corps, the Navy, and the Army (91.4%, 90.7%, and 90.0%, respectively). In the total DoD, about 92% 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 (96.8% vs. 91.1%). 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, Frazier, Mariolis, Brackbill, & Smith, 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 75% of passengers (in all vehicles) wore seat belts (NHTSA, 2003b), a rate much lower than that of the total DoD (92.1%). To the extent that 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 7.10 also indicate that age had an impact on regular seat belt use, with younger groups less likely to report wearing a seat belt always or nearly always than older groups. Overall, in the total DoD, about 83% of men aged 20 or younger reported regular seat belt use. The rate of seat belt use for men aged 20 or younger in the Army was particularly low (77.3%). The rates of regular seat belt use among men aged 20 or younger in the Air Force and the Marine Corps (about 91% and 85%, respectively) met the *Healthy People 2000* goal of 85%.

In contrast to the self-reported seat belt behavior of these groups of young men, rates among men in older age groups met or exceeded the 85% goal in the total DoD and in nearly all age and Service groups. The only exceptions to this were men aged 21 to 25 in the Army (82.7%) and the Navy (84.3%). In addition, the *Healthy People 2000* objective was met or exceeded for all women in all age and Service subgroups.

Findings for males aged 21 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 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 Table 4.4), and that alcohol is commonly involved in motor vehicle fatalities (NHSTA, 2003c), 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 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 7.11 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 $N = 2,165$). 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 $N = 5,663$). Personnel who reported that they never rode a motorcycle or bicycle in the past 12 months were excluded from these estimates.

Among personnel in the total DoD who rode a motorcycle at least once in the past 12 months, 82.1% wore helmets always or nearly always; females had a higher rate (89.8%) than men (80.7%). These overall rates for the Military exceeded the *Healthy People 2000* objective of increasing helmet use to at least 80% of motorcyclists. Each of the Services exceeded the *Healthy People 2000* goal, with the exception of the Army (78.1%). Among men, the Air Force and Marine Corps met the goal of 80%

Table 7.11 Prevalence of Helmet Use Among Motorcyclists and Bicyclists, Past 12 Months, by Gender

Gender	N	Service								Total DoD	
		Army		Navy		Marine Corps		Air Force			
Male											
Motorcyclists	1,661	76.5	(4.4)	78.4	(2.4)	79.8	(4.3)	89.1	(2.4)	80.7	(1.9)
Bicyclists	4,613	52.7	(3.1)	39.0	(7.0)	41.5	(4.7)	63.8	(3.5)	51.0	(2.2)
Female											
Motorcyclists	504	87.2	(3.2)	91.3	(2.1)	95.5	(3.8)	89.4	(4.0)	89.8	(1.9)
Bicyclists	1,050	58.2	(3.9)	48.6	(4.7)	49.8	(5.7)	64.8	(3.2)	58.1	(2.1)
Total											
Motorcyclists	2,165	78.1	(4.1)	80.4	(2.3)	81.4	(4.3)	89.1	(2.2)	82.1	(1.8)
Bicyclists	5,663	53.4	(3.1)	40.0	(6.7)	42.2	(4.8)	63.9	(3.0)	51.9	(2.1)

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, 2002 (Helmet Use for Motorcyclists, Q69; for Bicyclists, Q71).

(approximately 89% and 80%, respectively); rates were below the objective for men in the Army (76.5%) and Navy (78.4%). Women in all Services met the objective of 80%, with rates ranging from 87.2% in the Army to 95.5% in the Marine Corps.

Progress in motorcycle helmet use also can be measured by comparing results to those of the Military in 1995 (Bray et al., 1995b) and 1998 (Bray et al., 1999). As shown in Table 3.4, the prevalence of helmet use in the total DoD in 2002 discussed above represents a significant increase from previous years (71.0% in 1995, 75.9% in 1998, and 82.1% in 2002). Furthermore, self-reported rates of motorcycle helmet use for each gender group in each Service were higher than those reported in 1998. These results suggest that injury prevention efforts in the Military are yielding results. Given that some groups were still below the goal of 80% helmet use (e.g., males in the Army and Navy), 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 2002 are encouraging. Of DoD personnel who reported riding a bicycle at least once in the past 12 months, about 52% indicated that they always or nearly always wore a helmet. Rates for men were lower than for women (51.0% and 58.1%, respectively). These rates represent an increase in regular bicycle helmet use since 1998 (44.2% for the total DoD) and a marked increase since 1995 (22.8% for the total DoD). Moreover, the 2002 rates exceeded the *Healthy People 2000* goal of increasing helmet use to 50% of bicyclists.

The pattern of bicycle helmet use varied by Service. Both the Air Force and Army had rates of regular bicycle helmet use (63.9% and 53.4%, respectively) that exceeded the *Healthy People 2000* goal.

Rates were below the goal of 50% in both the Navy and the Marine Corps (40.0% and 42.2%, respectively). This pattern was consistent for both men and women; in the Air Force and Army, rates exceeded the goal for both men and women, whereas in the Navy and Marine Corps, rates were below the goal for both men and women (women in the Marine Corps were within rounding error of the 50% objective). With the exception of the Air Force, females in all Services had higher rates of regular bicycle helmet use than their male counterparts.

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 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 (Centers for Disease Control and Prevention [CDC], 1988b).

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 7.12 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 lifetime. 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, and 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 7.12, approximately 18% of personnel in the total DoD had an STD at least once in their lifetime. Among military men, the lifetime prevalence of STDs was approximately 16% in the total DoD; rates in the different Services ranged from 13.4% in the Marine Corps to 17.2% in the Army. Among military women, the lifetime prevalence of STDs was approximately 27% for the total DoD; rates in the different Services ranged from 22.8% in the Navy to 32.6% in the Army. A similar difference in lifetime prevalence rates between men and women 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).

Table 7.12 Prevalence of Sexually Transmitted Disease, by Gender

Gender/Time Period	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Male										
Lifetime	17.2	(0.7)	17.1	(0.7)	13.4	(1.3)	14.2	(1.8)	15.8	(0.6)
Past 12 months	3.1	(0.3)	3.2	(0.2)	3.4	(0.4)	3.1	(0.6)	3.1	(0.2)
Female										
Lifetime	32.6	(2.8)	22.8	(1.1)	25.7	(2.6)	24.6	(1.7)	27.1	(1.3)
Past 12 months	7.5	(1.1)	4.9	(1.0)	6.8	(0.6)	7.1	(1.2)	6.7	(0.6)
Total										
Lifetime	19.8	(0.7)	18.0	(0.7)	14.8	(1.5)	16.4	(1.5)	17.7	(0.5)
Past 12 months	3.8	(0.4)	3.5	(0.2)	3.8	(0.3)	3.9	(0.4)	3.8	(0.2)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who had had a sexually transmitted disease (STD) in their lifetime or in the past 12 months. Estimates have not been adjusted for sociodemographic differences among Services.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Sexually Transmitted Disease: Lifetime, Q122, Past 12 Months, Q121).

Nearly 4% of all personnel in the total DoD reported having had an STD in the past 12 months. As was the case with lifetime prevalence of STDs, female personnel were more likely to have reported an STD in the past year than male personnel (6.7% vs. 3.1%). Levels of past year STDs were generally consistent across the Services.

When compared with the 1998 findings (Bray et al., 1999), the lifetime prevalence of STDs in the total DoD decreased slightly in 2002 (18.8% in 1998 and 17.7% in 2002), whereas the past year prevalence increased (2.6% in 1998¹ and 3.8% in 2002). Past year prevalence of STDs increased from 1998 to 2002 for all four Services and for both genders. This general increase in past year STDs suggests that additional resources are needed for education and prevention of STDs in the Military.

7.3.2 Condom Use

Table 7.13 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 previous estimates, the 2002 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 2002 survey used a condom the last time they had intercourse. This rate, as well as the rates for each Service individually, was lower than the *Healthy People 2000* objective

¹ Estimates of past year prevalence of STD in 1998 differ from previously reported estimates.

Table 7.13 Prevalence of Condom Use at Last Encounter Among Sexually Active Unmarried Personnel, by Selected Sociodemographic Characteristics

Characteristic/Group	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
All Sexually Active Unmarried Personnel	39.6	(1.4)	46.4	(2.4)	43.3	(1.4)	40.2	(1.9)	42.1	(0.9)
Gender										
Male	40.9	(2.3)	49.1	(2.3)	45.1	(1.5)	44.2	(1.7)	44.6	(1.0)
Female	35.3	(3.6)	36.1	(4.0)	29.8	(2.4)	29.3	(3.1)	33.2	(2.0)
Age										
20 or younger	39.6	(4.0)	54.3	(1.4)	45.8	(2.4)	56.1	(2.7)	47.9	(1.8)
21-25	43.9	(1.8)	48.5	(5.7)	43.1	(1.3)	42.9	(3.1)	44.8	(1.9)
26-34	35.2	(2.6)	38.2	(2.3)	40.7	(6.3)	30.7	(3.9)	35.3	(1.7)
35 or older	31.6	(5.7)	31.0	(5.4)	35.4	(5.4)	25.0	(2.9)	29.4	(2.5)
Education										
High school or less	41.7	(1.5)	48.1	(3.3)	45.3	(1.4)	48.0	(4.0)	45.2	(1.3)
Some college	38.6	(3.1)	45.8	(2.7)	39.4	(2.3)	38.0	(2.1)	40.3	(1.4)
College graduate or higher	32.9	(5.2)	39.4	(3.2)	45.9	(3.9)	33.2	(4.3)	35.7	(2.4)
Pay Grade										
Enlisted	40.2	(1.5)	46.8	(2.9)	43.6	(1.4)	41.0	(2.3)	42.7	(1.1)
Officer	32.7	(5.3)	40.2	(5.3)	38.9	(4.1)	33.8	(6.5)	35.4	(2.9)
Number of Partners, Past 12 Months										
1 partner	35.5	(3.0)	40.9	(1.2)	37.9	(4.4)	38.2	(2.4)	38.0	(1.4)
2-4 partners	39.1	(1.8)	50.3	(1.6)	44.6	(1.7)	41.0	(2.9)	43.2	(1.1)
5 or more partners	45.4	(4.6)	47.5	(7.1)	47.6	(2.6)	42.7	(2.6)	45.9	(2.6)

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 ($N = 3,989$). For consistency with previous estimates, these estimates do not include personnel who are living as married.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Condom Use, Q116 and Q117; refer to Section 2.5.1 for descriptions of sociodemographic variables).

of condom use at the last episode of sexual intercourse by at least 50% of sexually active unmarried individuals, with the Navy somewhat closer to the objective than the other Services.

Additional key findings about correlates of condom use among sexually active unmarried personnel in 2002 include the following:

- ! Unmarried male personnel were generally more likely to indicate that they or their partner used a condom the last time they had sex than unmarried female personnel (44.6% vs. 33.2%, respectively).
- ! Younger unmarried personnel were more likely than older unmarried personnel to have used a condom the last time they had sex. With the exception of sexually active

unmarried Army 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 25% to 35% 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 1998 findings (Bray et al., 1999) but consistent with the 1995 findings (Bray et al., 1995b), sexually active unmarried enlisted personnel appeared to have somewhat higher rates of condom use the last time they had sex than did officers, although the estimates for this group were less precise than the estimates for sexually active unmarried enlisted personnel (35.4% officers vs. 42.7% enlisted in 2002; 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 lower in 2002 when compared with 1998 rates. In 2002, almost 46% of total DoD personnel who had five or more partners in the past 12 months used a condom at last encounter, as compared with 49% in 1998 (Bray et al., 1999). However, some rather large standard errors 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 compared with older unmarried personnel are encouraging because they suggest that younger personnel have been heeding the messages about the importance of using condoms if they are sexually active. Conversely, the finding that sexually active unmarried personnel aged 35 or older were generally less likely to have used a condom the last time they had sex may 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. The finding that the prevalence of condom use among unmarried personnel remained largely unchanged between 1998 and 2002 is an additional cause for concern.

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 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 at risk for infection with other STDs, such as gonorrhea, syphilis, chlamydia, and genital herpes.

The 2002 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 7.14 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 contrast to the data in Table 7.13, 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.

Table 7.14 Prevalence 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 ^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	66.3	(1.2)	33.7	(1.2)
2-4 total partners	70.2	(2.0)	29.8	(2.0)
1 partner	61.5	(1.9)	38.5	(1.9)
Any Casual Partner, Past 12 Months^d				
2 or more total partners	45.1	(2.5)	54.9	(2.5)
1 partner	22.5	(1.9)	77.5	(1.9)
Only Ongoing Relationships, Past 12 Months^e				
2 or more total partners	23.6	(4.2)	76.4	(4.2)
1 partner	12.0	(0.5)	88.0	(0.5)

Note: Table entries are percentages (with standard errors in parentheses) of all sexually active personnel in the past 12 months, married and unmarried ($N = 11,251$).

^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 might include people who had sex with casual partners or with someone on an ongoing basis.

^dDefined as “someone you know and have sex with occasionally.” This group might 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, 2002 (Total Number of Partners, Q117; Type of Encounter: Any One Time, Q120, Any Casual Partner, Q119, On-Going Relationships, Q118).

One-time encounters were defined as “someone you had sex with once and don’t plan to have sex with again.” 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 two to four total partners in one-time encounters. As might be expected, sexually active personnel who had only one sexual partner in the past 12 months used condoms less often. To the extent that personnel who reported only one sexual partner are in monogamous relationships, however, the risk of STD infection for these personnel is virtually nonexistent.

A casual partner was defined as “someone you know and have sex with occasionally.” Among personnel who had sex with any casual partner in the past 12 months, 77.5% of those who had one casual partner used condoms only half of the time or less, as did 54.9% of those with two or more casual partners. 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.

For 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 (12%), as would be expected. Roughly one-fourth (23.6%) of those with two or more partners in ongoing relationships used condoms every time or most of the time. This means that roughly three-fourths (76.4%) of those with two 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.

7.4 Poor Physical Health

In the 2002 survey, DoD personnel were asked how often poor physical health kept them from doing their usual activities, such as work or recreation, in the past 30 days. Table 7.15 displays the percentages of personnel who reported that this had never happened in the past month, those who had limited their usual activities less than once a week (1 to 3 days in the past month), and those who had limited their usual activities once a week or more (4 or more days in the past month).

In the total DoD, 79.5% of personnel had not limited their usual activities in the past month because of poor physical health, 13.3% had limited their usual activities less than once a week, and 7.2% had limited their usual activities once a week or more. Among the individual Services, Air Force personnel were the least likely to have been kept from their regular activities by physical health, followed by the Navy, Marine Corps, and Army; for example, 4.8% of Air Force personnel had been kept from their usual activities once a week or more in the past month, compared with 6.7% of the Navy, 8.6% of the Marine Corps, and 9.0% of the Army. Female personnel were more likely to have limited their usual activities because of poor physical health at least once in the past month (29.3%) than male personnel (18.8%). Among the total DoD, younger personnel were somewhat more likely to have limited their usual activities because of poor physical health than were older personnel, although this pattern was mainly evident among males.

Table 7.16 displays the percentages of total DoD personnel who limited their usual activity because of poor physical health in the past month by selected health behaviors. Approximately 6% of personnel who regularly engaged in strenuous exercise had limited their usual activities once a week or more in the past month because of poor physical health, compared with 10% of personnel who had not regularly engaged in strenuous exercise. The associations between substance use and limiting usual activities because of poor physical health varied by substance. This association was not strong for alcohol use; for example, personnel who were heavy alcohol users limited their usual activities because of poor physical health at similar levels as infrequent/light alcohol users. Illicit drug use and cigarette use, however, were more closely associated with physical health. For example, personnel who had used marijuana in the past year were more likely to have limited their usual activities because of poor physical health at least once in the past month compared with personnel who had not used an illicit drug (35.7% vs. 19.3%). Heavy smokers were somewhat more likely to have limited their usual activities because of

Table 7.15 Prevalence of Limited Usual Activities Because of Poor Physical Health, Past Month, by Gender/Age and Service

	Poor Physical Health Limited Usual Activities					
Gender/Age Group	Never		Less Than Once a Week (1-3 Days)		Once a Week or More (4 or More Days)	
Male						
20 or younger	79.7	(2.0)	12.7	(1.6)	7.7	(0.7)
21-25	78.0	(1.1)	13.5	(0.6)	8.4	(0.9)
26-34	84.1	(1.0)	10.4	(0.7)	5.5	(0.5)
35 or older	82.9	(0.9)	11.4	(0.6)	5.6	(0.4)
Total	81.3	(0.6)	12.0	(0.3)	6.8	(0.4)
Female						
20 or younger	70.7	(3.0)	17.4	(2.3)	11.9	(1.3)
21-25	69.6	(1.4)	20.4	(1.1)	10.1	(1.0)
26-34	71.1	(2.7)	21.1	(1.9)	7.9	(1.3)
35 or older	72.4	(2.2)	18.4	(1.6)	9.2	(1.2)
Total	70.7	(1.1)	19.7	(0.9)	9.6	(0.4)
Total						
20 or younger	77.8	(1.6)	13.7	(1.4)	8.5	(0.5)
21-25	76.4	(0.9)	14.8	(0.5)	8.8	(0.7)
26-34	82.0	(1.2)	12.1	(0.8)	5.9	(0.6)
35 or older	81.5	(0.9)	12.4	(0.6)	6.1	(0.4)
Service						
Army	75.7	(0.9)	15.3	(0.5)	9.0	(0.6)
Navy	80.0	(1.2)	13.2	(0.7)	6.7	(0.5)
Marine Corps	77.9	(0.6)	13.5	(0.4)	8.6	(0.6)
Air Force	84.6	(0.9)	10.6	(0.5)	4.8	(0.4)
Total	79.5	(0.6)	13.3	(0.3)	7.2	(0.3)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Poor Physical Health Past Month, Q83).

poor health once a week or more in the past month (about 11%) compared with those who had never smoked (about 6%), former smokers (about 7%), or current nonheavy smokers (about 8%).

Table 7.17 displays the percentages of total DoD personnel who limited their usual activity because of poor physical health by perceived levels of stress and poor mental health. Personnel who perceived high levels of stress at work or in their family life were more likely to have limited activities due to poor physical health. Compared with personnel who perceived no stress at work, personnel who perceived a lot of stress at work were markedly more likely to have limited their usual activities because of poor physical health less than once a week (18.5% vs. 4.5%) or once a week or more (12.0% vs. 3.7%). Similarly, personnel who perceived a lot of stress in their family life were more likely to have limited their usual activity because of poor physical health less than once a week (18.3% vs. 8.1%) or once a week or more (12.8% vs. 4.6%) than were personnel who perceived no stress in their family life.

Table 7.16 Prevalence of Limited Regular Activities Because of Poor Physical Health, Past Month, by Health Behaviors

Health Behaviors	Poor Physical Health Limited Usual Activities					
	Never		Less Than Once a Week (1-3 Days)		Once a Week or More (4 or More Days)	
Engaged in Strenuous Exercise 20 Minutes or More at Least 3 Days a Week						
Yes	80.4	(0.5)	13.5	(0.3)	6.1	(0.3)
No	77.8	(1.1)	12.4	(0.8)	9.8	(0.7)
Alcohol Drinking Level						
Abstainer	80.6	(0.7)	11.5	(0.6)	7.9	(0.4)
Infrequent/light	77.7	(1.1)	14.2	(0.7)	8.1	(0.7)
Moderate	81.7	(1.1)	12.6	(1.0)	5.7	(0.5)
Moderate/heavy	80.4	(0.7)	13.6	(0.7)	6.0	(0.5)
Heavy	76.6	(1.2)	14.7	(1.0)	8.7	(0.8)
Past Year Illicit Drug Use						
No drug use	80.7	(0.4)	12.8	(0.3)	6.5	(0.2)
Marijuana	64.3	(3.2)	19.2	(2.3)	16.6	(2.0)
Any illicit drug use except marijuana	62.8	(3.5)	21.6	(2.8)	15.6	(1.9)
Smoking Status						
Never smoked	82.1	(0.6)	11.6	(0.4)	6.3	(0.2)
Former smoker	81.5	(1.1)	11.5	(1.0)	7.0	(0.7)
Current smoker, not heavy	75.2	(1.4)	17.3	(0.9)	7.5	(0.8)
Heavy smoker	74.1	(1.5)	15.4	(0.8)	10.5	(1.5)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Poor Physical Health Past Month, Q83).

Poor physical health was also associated with poor mental health. Among personnel who had not limited their usual activities because of poor mental health in the past month, only about 15% had limited their activities because of poor physical health. In contrast, almost 60% of personnel who had limited their usual activities because of poor mental health once a week or more in the past month had also limited their activities because of poor physical health.

7.5 Risk Taking

In the 2002 survey, DoD personnel were asked a series of nine questions about their tendency to take risks (e.g., “I often act on the spur of the moment without stopping to think,” “I like to test myself every now and then by doing something a little chancy,” and “I go for the thrills in life when I get a chance”). Based on their responses to these questions, personnel were classified as either low risk takers (16% of personnel), moderate risk takers (66% of personnel), or high risk takers (18% of personnel). The

Table 7.17 Prevalence of Limited Regular Activities Because of Poor Physical Health, by Perceived Level of Stress and Poor Mental Health

Perceived Level of Stress	Poor Physical Health Limited Usual Activities		
	Never	Less Than Once a Week (1-3 Days)	Once a Week or More (4 or More Days)
Perceived Stress at Work			
A lot	69.6 (1.0)	18.5 (0.8)	12.0 (0.5)
Some	80.2 (0.7)	13.3 (0.5)	6.4 (0.5)
A little	85.3 (0.9)	11.0 (0.8)	3.6 (0.4)
None at all	91.7 (0.7)	4.5 (0.5)	3.7 (0.7)
Perceived Stress in Family Life			
A lot	68.9 (1.4)	18.3 (0.8)	12.8 (0.9)
Some	76.9 (0.9)	14.8 (0.7)	8.3 (0.4)
A little	81.9 (0.7)	12.9 (0.5)	5.2 (0.4)
None at all	87.4 (1.0)	8.1 (0.6)	4.6 (0.5)
Poor Mental Health Limited Usual Activities			
Never	85.2 (0.4)	9.9 (0.3)	4.9 (0.3)
Less than once a week	54.2 (1.9)	35.8 (1.7)	10.1 (1.0)
Once a week or more	40.9 (2.5)	23.8 (1.5)	35.3 (1.9)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Perceived Stress at Work, Q75; Perceived Stress in Family Life, Q76; Poor Mental Health Limited Usual Activities, Q74; Poor Physical Health Limited Usual Activities, Q83).

percentages of personnel at different risk-taking levels who displayed selected health behaviors are shown in Table 7.18.

DoD personnel who were high risk takers were significantly more likely to engage in substance use than those who were low or moderate risk takers (Table 7.18). Regarding alcohol, only 13.9% of high risk takers were abstainers, compared with 36.0% of low risk takers. In addition, 37.7% of high risk takers reported heavy drinking, compared with 7.6% of low risk takers. High risk takers were also twice as likely to report drinking and driving (47.8%) compared with low risk takers (23.3%). Regarding past year illicit drug use, high risk takers were 10 times more likely to have used marijuana in the past year (11.0%) compared with low risk takers (1.1%). High risk takers were also more likely to have used illicit drugs other than marijuana in the past year (5.1%) compared with low risk takers (1.1%). Regarding cigarette smoking, 27.6% of high risk takers were current smokers, compared with 13.7% of low risk takers.

Table 7.18 Prevalence of Selected Behaviors by Risk-Taking Level

Behavior	Risk-Taking Level ^a					
	Low		Moderate		High	
Alcohol Drinking Level						
Abstainer	36.0	(1.0)	20.9	(0.7)	13.9	(1.1)
Infrequent/light	21.0	(1.2)	19.4	(0.6)	12.1	(1.2)
Moderate	18.8	(1.1)	19.6	(0.6)	13.1	(0.7)
Moderate/heavy	16.5	(1.0)	24.7	(0.4)	23.2	(0.9)
Heavy	7.6	(0.9)	15.5	(0.9)	37.7	(2.0)
Past Year Illicit Drug Use						
No drug use	97.7	(0.5)	94.5	(0.5)	84.0	(1.7)
Marijuana	1.1	(0.3)	3.4	(0.4)	11.0	(1.3)
Any illicit drug use except marijuana	1.1	(0.3)	2.0	(0.2)	5.1	(0.7)
Smoking Status						
Never smoked	65.8	(1.7)	55.5	(1.1)	40.5	(2.0)
Former smoker	12.6	(0.9)	12.2	(0.4)	10.2	(0.8)
Current smoker	13.7	(1.4)	20.5	(0.9)	27.6	(1.4)
Risk Behaviors						
Drinking and driving	23.3	(1.7)	37.8	(1.1)	47.8	(1.9)
Total	15.8	(0.8)	65.8	(0.8)	18.4	(0.8)

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

^aRisk-taking level is based on an item and scoring algorithm from the National Alcohol Research Center's 1995 National Alcohol Survey. Respondents were categorized as Low (0-12), Moderate (13-24), or High (25-36) risk-taking level based on nine summed scores on a 0-4 scale.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Risk Taking Level or Scale, Q14).

7.6 Summary

7.6.1 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 and using new guidelines released by NHLBI in 1998:

- ! Among DoD personnel under age 20, 23.8% were overweight according to their BMI (Table 7.1). This exceeds the *Healthy People 2000* objective of having a prevalence of no more than 15% overweight. In this age group, neither women (17.9%) nor men (25.4%) met the objective.
- ! Overall, members of the total DoD aged 20 or older (24.0%, Table 3.4) did not meet 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 (17.2%) met

the objective, whereas those aged 26 to 34 (27.1%) and those aged 35 or older (31.4%) did not. Women in all three age groups met the objective, but only men aged 20 to 25 did so (18.6%) (Table 7.1).

- ! Comparing the prevalence of overweight in 1995, 1998, and 2002 using *Healthy People 2000* guidelines and NHLBI guidelines reveals that the latter greatly increase the percentage of personnel considered overweight (Table 7.3). This is due to the different BMI criteria for defining overweight for the two guidelines.

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 NHLBI guidelines:

- ! The prevalence of underweight was highest among younger DoD personnel (Table 7.2). In the total DoD, 10.5% of personnel under age 20 were underweight, including about 12% of males and about 7% of females.
- ! For both men and women in the total DoD, the prevalence of underweight decreased as age increased. Only 2.1% of all DoD personnel aged 35 or older were underweight.
- ! Compared with the *Healthy People 2000* guidelines, the NHLBI guidelines classified considerably fewer personnel as underweight.

Dietary Supplements. We asked DoD personnel how often they took various types of dietary supplements:

- ! In the total DoD, about 22.5% of males and 7.8% of females reported taking body-building supplements at least once a week (Table 7.4). Rates were highest for men in the Marine Corps (29.8%).
- ! In the total DoD, nearly one in three women (about 30%) and one in five men (about 21%) reported using weight loss supplements at least once a week.
- ! Female personnel in the total DoD were more likely than males to report taking vitamins/antioxidants once a week or more (55.8% vs. 41.1%). Personnel in the Air Force had higher rates of taking vitamins/antioxidants than male and female personnel in the other Services.

Exercise. The total DoD and each Service greatly exceeded the *Healthy People 2000* objective for participating in strenuous exercise (Table 7.5). Strenuous exercise included two types of activities: (a) running, cycling, walking, and hiking, and (b) other strenuous exercise, such as swimming:

- ! More than two-thirds of DoD personnel (70.2%) 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 (86.6%) and Marine Corps (79.0%) personnel were more likely to exercise than were Navy (56.0%) or Air Force (58.3%) personnel.

Blood Pressure Screening and Awareness. The total DoD was about 12 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 7.6):

- ! Less than four-fifths (77.9%) 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 whites, college graduates, those aged 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 2002 DoD survey showed the following (Table 7.7):

- ! Less than one in six DoD personnel (15.4%) reported ever being diagnosed as having high blood pressure.
- ! About 64% 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 (44.8%) and to exercise (48.7%) were most common.
- ! About 49% of DoD personnel who had ever been diagnosed with hypertension reported currently taking action toward one or more of the recommendations mentioned above.
- ! Among probable current hypertensives, 58.3% 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 (45.2%) and reducing salt (37.4%) 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 7.8). 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 56% of personnel had their cholesterol checked within the 5 years preceding the 2002 survey. This is below the *Healthy People 2000* goal of 75% of adults having had their cholesterol measured in that time period. However, personnel aged 35 or older in the total DoD (85.6%) met this objective.
- ! Personnel in the Air Force were more likely to have had their cholesterol checked within the past 5 years (about 70%) than personnel in the other Services. Air Force personnel aged 25 to 34 and 35 or older met the *Healthy People 2000* goal.

- ! Approximately 18% of the total DoD had ever been told by a health care provider that they had high cholesterol (Table 7.9).

7.6.2 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 2002, 3,625 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 2002, those in the Army (5,006 per 100,000) and Marine Corps (4,639 per 100,000) were more likely to be injured than those in other Services. Injury rates in those Services increased significantly from 1998 to 2002, whereas injury rates did not change greatly during this time for the Navy or Air Force.

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 7.10):

- ! Some 92% of military personnel reported that they wore seat belts always or nearly always when driving or riding in a motor vehicle. This exceeded the *Healthy People 2000* objective of 85% or more motor vehicle occupants using occupant protection systems.
- ! Males aged 20 or younger in the total DoD (and in the Army and Navy separately) did not meet the *Healthy People 2000* objective for seat belt use.
- ! In the total DoD, females (96.8%) were more likely than males (91.1%) 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 were attained in 2002 within the total military population (Table 7.11):

- ! Among DoD personnel who rode a motorcycle in the past 12 months, 82.1% wore helmets always or nearly always. This rate was above the *Healthy People 2000* objective of 80% or greater use of helmets among motorcyclists. All groups of personnel with the exceptions of men in the Army and Navy met or exceeded this objective.
- ! About 52% of DoD personnel who rode a bicycle in the past 12 months always or nearly always wore a helmet. This rate exceeded the *Healthy People 2000* goal of 50% or greater use of helmets among bicyclists. This finding in 2002 represents an increase in helmet use from approximately 44% in 1998 and approximately 23% in 1995.

7.6.3 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 more than 1 in 6 personnel, whereas prevalence in the past year was much lower at 1 in 26 personnel (Table 7.12):

- ! About 18% 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 27% of military women reporting ever having had an STD. Among women, lifetime prevalence rates were approximately 33% in the Army, 26% in the Marine Corps, 25% in the Air Force, and 23% in the Navy.
- ! About 4% of personnel in the total DoD (3% of males and 7% of females) reported having an STD in the preceding year. Rates of past year STD use were consistent across Services.

Condom Use. Condom use was assessed among sexually active unmarried personnel (Table 7.13) and among *all* sexually active personnel (Table 7.14). We asked questions about condom use in a variety of situations, including one-time 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 (Table 7.13). The rate of reported condom use by themselves or their partner was higher among males, younger personnel, those with a high school education or less, enlisted personnel, and those who had more than one sexual partner in the past 12 months.
- ! The type of sexual relationship reported by sexually active personnel affected condom use behavior (Table 7.14). 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 personnel who had sex with any casual partner in the past 12 months, 55% to 78% used condoms half the time or less. As might be expected, those personnel reporting an ongoing relationship with one partner used condoms least frequently, with only about 12% reporting condom use every time or most of the time.

7.6.4 Poor Physical Health

DoD personnel were asked how often poor physical health kept them from doing their usual activities, such as work or recreation, in the past 30 days:

- ! In the total DoD, 79.5% of personnel had not limited their usual activities in the past month because of poor physical health, 13.3% had limited their usual activities less than once a week, and 7.2% had limited their usual activities once a week or more (Table 7.15).
- ! Among the individual Services, Air Force personnel were the least likely to have been kept from their regular activities by physical health (15.4%), followed by the Navy (20.0%), Marine Corps (22.1%), and Army (24.3%).

- ! Female personnel were more likely to have limited their usual activities because of poor physical health at least once in the past month (29.3%) than male personnel (18.8%).

Poor physical health was assessed by asking personnel how often they had limited their usual activities because of poor physical health in the past month:

- ! Personnel who had used illicit drugs in the past year or who were current or heavy cigarette smokers were more likely to have limited their usual activities because of poor physical health in the past month than personnel who had not used illicit drugs (37.2% vs. 19.3%) or were not smokers (25.9% vs. 17.9%) (Table 7.16).
- ! Compared with personnel who perceived no stress at work, personnel who perceived a lot of stress at work were more likely to have limited their usual activities because of poor physical health less than once a week (18.5% vs. 4.5%) or once a week or more (12.0% vs. 3.7%) in the past month (Table 7.17). The results were similar for perceived stress in family life.
- ! Poor physical health was also associated with poor mental health. Personnel who had limited their usual activities because of poor mental health once a week or more in the past month were four times as likely to have limited their activities due to poor physical health as personnel who had not limited their activities due to poor mental health (60% vs. 15%).

7.6.5 Risk Taking

On the basis of their answers to nine questions regarding their tendency to take risks, DoD personnel were classified as either low (16%), moderate (66%), or high risk takers (18%):

- ! DoD personnel who were high risk takers were more likely to engage in substance use than those who were low or moderate risk takers (Table 7.18). Compared with low risk takers, high risk takers were more likely to report heavy alcohol use (37.7% vs. 7.6%), drinking and driving (47.8% vs. 23.3%), past year marijuana use (11.0% vs. 1.1%), and current smoking (27.6% vs. 13.7%).

8. STRESS AND MENTAL HEALTH

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, 1995b, 1999), the 2002 survey asked respondents to appraise their levels of stress at work and in their intimate and family relationships. As they had since 1995, respondents also provided information on specific sources of stress and on the perceived impact of work-related and personal or family-related 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. New to the 2002 survey are data to support the 1999 DoD initiatives to control combat stress among service members and to expand DoD's suicide prevention program (OASD, 1999). To obtain baseline prevalence information, items were added on anxiety symptoms and suicidal ideation. 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 and Impact on Military Job

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 (see Foa, Steketee, & Olasov Rothbaum, 1989).

Personnel were asked to separately appraise their levels of work and family stress, as well as the degree to which stress interfered with the performance of their military jobs. Table 8.1 shows that personnel reported higher levels of stress at work than in their personal lives. Almost one-third of the total DoD reported "a lot" of stress at work, compared with the less than 20% who reported "a lot" of stress in their personal lives. Navy and Marine Corps personnel reported the most stress at work and Air Force personnel the least. Air Force personnel also reported less stress in their family than members of the other Services.

Of the 32.3% of personnel reporting "a lot" of stress at work and the 18.7% reporting "a lot" of stress in the family, 28% reported that these stressors interfered "a lot" with the performance of their military job (data not tabled).

Table 8.1 Levels of Perceived Stress at Work and in Family Life, Past 12 Months, by Service

Type and Level of Stress	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Stress at Work										
A lot	33.5	(3.0)	35.8	(1.0)	35.0	(3.4)	26.3	(2.1)	32.3	(1.3)
Some	29.0	(1.1)	29.7	(1.2)	31.8	(1.0)	31.8	(0.8)	30.3	(0.6)
A little	25.1	(2.2)	21.7	(0.5)	22.5	(1.8)	26.8	(0.9)	24.4	(0.8)
None at all	12.4	(0.8)	12.8	(1.6)	10.6	(0.9)	15.1	(2.2)	13.0	(0.8)
Stress in Family										
A lot	19.4	(0.9)	19.1	(0.5)	20.5	(0.9)	16.6	(1.2)	18.7	(0.5)
Some	25.8	(0.8)	25.6	(0.4)	25.1	(0.5)	23.1	(0.8)	24.9	(0.4)
A little	32.3	(1.7)	30.7	(2.1)	31.9	(0.9)	34.6	(0.7)	32.5	(0.8)
None at all	22.5	(0.9)	24.6	(2.4)	22.6	(0.9)	25.7	(1.7)	23.9	(0.8)

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, 2002 (Stress at Work, Q75; Stress in Family, Q76).

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
- ! behavior problems in some of your children

As shown in Table 8.2, the most frequently reported sources of stress were being away from family (19.1%) and deployment (19.0%). Increases in work load was the next most frequently acknowledged source of stress (15.0%), followed by changes in personal life (14.5%). These sources of stress varied somewhat by gender. Women experienced significantly more stress than men due to changes in personal life (21.4% vs. 13.1%), problems with coworkers (14.9% vs. 10.1%) and supervisors (13.9% vs. 10.8%), conflicts between military and family responsibilities (14.8% vs. 11.6%), having a PCS (13.7% vs. 9.5%), personal health problems (9.0% vs. 4.1%), and family health problems (8.3% vs. 6.3%), including behavior problems in their children (6.0% vs. 3.1%). Interestingly, there were no differences between men and women in the percentage reporting high levels of stress due to deployment or being away from family.

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.
- ! 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 experienced 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 in a high stress group (i.e., those who experienced a “great deal” or a “fairly large amount” of stress at work or in personal relationships within the past 12 months) and for a moderate/low stress group (i.e., personnel who reported “some,” “a little,” or no stress both at work and in the family in the past 12 months). Note that personnel who experienced a high level of stress in *either* the family or work environment were categorized into the high stress group.

Table 8.2 Specific Sources of Stress, Past 12 Months, by Gender, Total DoD

Stressor	Gender				Total DoD	
	Men		Women			
Deployment	18.9	(1.4)	19.6	(3.0)	19.0	(1.5)
Having a PCS ^a	9.5 ^b	(0.5)	13.7	(1.0)	10.1	(0.5)
Problems with coworkers	10.1 ^b	(0.6)	14.9	(1.2)	10.9	(0.6)
Problems with supervisor	10.8 ^b	(0.7)	13.9	(0.8)	11.3	(0.6)
Concern about performance rating	6.1	(0.5)	6.3	(0.4)	6.1	(0.4)
Increases in work load	14.7	(0.8)	17.0	(0.9)	15.0	(0.7)
Decreases in work load	2.2 ^b	(0.2)	3.6	(0.5)	2.4	(0.2)
Being away from family	18.7	(1.0)	21.2	(1.5)	19.1	(1.0)
Changes in personal life	13.1 ^b	(0.5)	21.4	(1.1)	14.5	(0.5)
Conflicts between military and family responsibilities	11.6 ^b	(0.6)	14.8	(0.9)	12.1	(0.6)
Problems with money	10.3	(0.7)	12.0	(0.8)	10.6	(0.7)
Problems with housing	6.0	(0.3)	6.9	(0.7)	6.1	(0.3)
Personal health problems	4.1 ^b	(0.3)	9.0	(0.6)	4.9	(0.3)
Family health problems	6.3 ^b	(0.3)	8.3	(0.8)	6.6	(0.3)
Behavior problems in children	3.1 ^b	(0.3)	6.0	(0.5)	3.5	(0.2)

Note: Table entries are percentages (with standard errors in parentheses) of personnel who reported “a lot” of stress in the past 12 months.

^aPCS = Permanent change of station.

^bDifference between men and women significant at 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Specific Sources of Stress, Q84).

The productivity loss most frequently reported by all personnel, for any number of days, was leaving work early (34.8%), closely followed by being late for work by at least 30 minutes (33.6%) and working below normal performance level (32.4%). Not coming to work because of injury or illness was reported by about 20% of respondents and being hurt in an on-the-job accident was reported by about 10% of respondents.

When we examined the relationship between stress and productivity loss, a consistent pattern emerged. As shown in the middle and lowest panels of Table 8.3, compared with military personnel who perceived low to moderate levels of stress, those who experienced high levels of job-related or personal stress were more likely to experience a corresponding productivity loss. Overall productivity loss was greater for the group that experienced more stress. For example, working below normal performance level was reported by 43.8% of the high stress group, compared with 25.0% of the moderate/low stress group. The high stress group was also much more likely to report more days affected in the past 12 months in all domains of productivity loss. Personnel in the high stress group were over twice as likely

Table 8.3 Perceived Stress and Productivity Loss, Past 12 Months, Total DoD

Group/Problem	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										
Late for work by 30 minutes or more	66.4	(1.3)	13.7	(0.4)	12.0	(0.8)	8.0	(0.6)	33.6	(1.3)
Left work early	65.2	(1.2)	7.7	(0.3)	13.4	(0.5)	13.7	(0.6)	34.8	(1.2)
Hurt in an on-the-job accident	89.7	(0.5)	6.2	(0.3)	2.6	(0.3)	1.5	(0.2)	10.3	(0.5)
Worked below normal performance level	67.6	(1.0)	6.2	(0.4)	11.0	(0.5)	15.2	(0.8)	32.4	(1.0)
Did not come into work because of illness or injury	79.9	(0.8)	7.0	(0.3)	7.6	(0.4)	5.4	(0.3)	20.1	(0.8)
Moderate or Low Level of Stress, Past 12 Months ^a										
Late for work by 30 minutes or more	70.8	(1.1)	12.6	(0.4)	11.1	(0.8)	5.5	(0.4)	29.2	(1.1)
Left work early	69.1	(1.3)	7.3	(0.4)	12.2	(0.8)	11.3	(0.5)	30.9	(1.3)
Hurt in an on-the-job accident	92.7	(0.4)	5.0	(0.4)	1.5	(0.3)	0.8	(0.1)	7.3	(0.4)
Worked below normal performance level	75.0	(0.8)	5.5	(0.3)	9.5	(0.6)	10.1	(0.6)	25.0	(0.8)
Did not come into work because of illness or injury	83.4	(0.7)	6.7	(0.4)	6.2	(0.4)	3.8	(0.3)	16.6	(0.7)
High Level of Stress, Past 12 Months ^b										
Late for work by 30 minutes or more	59.7	(1.6)	15.2	(0.7)	13.5	(1.1)	11.6	(1.1)	40.3	(1.6)
Left work early	59.3	(1.2)	8.2	(0.5)	15.0	(0.8)	17.5	(0.9)	40.7	(1.2)
Hurt in an on-the-job accident	85.2	(0.8)	8.0	(0.4)	4.2	(0.5)	2.6	(0.4)	14.8	(0.8)
Worked below normal performance level	56.2	(1.0)	7.3	(0.8)	13.4	(0.8)	23.1	(1.2)	43.8	(1.0)
Did not come into work because of illness or injury	74.4	(1.3)	7.6	(0.3)	9.8	(0.8)	8.1	(0.4)	25.6	(1.3)

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

^aPersonnel who experienced “some,” “a little,” or no stress both at work and in the family in the past 12 months.

^bPersonnel who experienced “a lot” of stress either at work or in the family in the past 12 months.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Stress at Work, Q75; Stress in Family, Q76; Productivity Loss, Q73).

as those in the moderate/low stress group to report 4 or more days working below their normal performance level (23.1% vs. 10.1%), being late for work by 30 minutes or more (11.6% vs. 5.5%), not coming into work because of illness or injury (8.1% vs. 3.8%), and being hurt in an on-the job-accident (2.6% vs. 0.8%).

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 Psychological Distress

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 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 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 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-

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	74.8	(0.8) ^{a,b}	75.1	(1.5)	71.5	(1.1) ^a	77.2	(0.7) ^{b,d}	75.1	(0.5)
Light up a cigarette	29.2	(1.5) ^a	29.2	(2.0) ^a	31.6	(3.1) ^a	21.7	(2.1) ^{b,c,d}	27.5	(1.0)
Have a drink	25.8	(2.3) ^a	26.8	(1.2) ^a	31.8	(3.9) ^a	19.2	(1.5) ^{b,c,d}	25.1	(1.1)
Say a prayer	53.3	(1.8) ^b	52.6	(2.6)	48.7	(1.3) ^{a,d}	55.8	(2.9) ^b	53.2	(1.2)
Exercise or play sports	58.8	(2.0) ^a	59.0	(1.1) ^a	63.2	(2.0)	63.8	(1.2) ^{c,d}	60.8	(0.8)
Engage in a hobby	59.8	(1.2) ^a	57.0	(1.3) ^a	58.8	(1.2) ^a	63.1	(1.1) ^{b,c,d}	59.9	(0.6)
Get something to eat	41.8	(1.2)	43.1	(1.6)	40.3	(0.6)	41.4	(0.7)	41.8	(0.6)
Smoke marijuana/use other illegal drugs	2.7	(0.4) ^a	2.3	(0.5) ^a	2.0	(0.5) ^a	0.6	(0.2) ^{b,c,d}	1.9	(0.2)
Think of plan to solve problem	83.4	(0.8)	82.1	(1.2) ^a	81.1	(2.2)	84.4	(1.9)	83.1	(0.7)
Consider hurting or killing myself	5.3	(0.7) ^{a,c}	7.1	(0.4) ^{a,d}	6.1	(1.1) ^a	2.6	(0.4) ^{b,c,d}	5.1	(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.

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

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

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

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Coping Behavior, Q85).

oriented options. “Think of plan to solve problem” was overwhelmingly indicated by military personnel as a “frequently” or “sometimes” implemented coping strategy (83.1%), followed by “talk to friend or family member” (75.1%), “exercise or play sports” (60.8%), and “engage in a hobby” (59.9%). 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. Slightly over half (53.2%) of personnel reported saying a prayer to cope with stress. With respect to generally less effective avoidant coping strategies, 41.8% indicated that they “get something to eat” when confronted with stress, 27.5% “light up a cigarette,” 25.1% “have a drink,” 5.1% considered hurting or killing themselves, and 1.9% used illegal substances as a coping option for stress and/or depressive symptoms.

Table 8.5 shows significant gender differences in coping strategies. More women than men reported using social support (87.6% vs. 72.5%, respectively), prayer (71.0% vs. 49.5%), and food (51.1% vs. 39.9%). In contrast, men were more likely than women to engage in hobbies (60.5% vs. 57.0%) and use cigarettes (28.2% vs. 24.0%) and alcohol (25.9% vs. 20.8%) as methods of coping.

Table 8.5 Behaviors for Coping With Stress, by Gender, Total DoD

Coping Behavior	Gender				Total DoD	
	Men		Women			
Talk to friend/family member	72.5	(0.6) ^a	87.6	(0.7)	75.1	(0.5)
Light up a cigarette	28.2	(1.0) ^a	24.0	(1.5)	27.5	(1.0)
Have a drink	25.9	(1.3) ^a	20.8	(0.8)	25.1	(1.1)
Say a prayer	49.5	(1.2) ^a	71.0	(1.6)	53.2	(1.2)
Exercise or play sports	61.0	(0.9)	60.1	(1.2)	60.8	(0.8)
Engage in a hobby	60.5	(0.7) ^a	57.0	(0.9)	59.9	(0.6)
Get something to eat	39.9	(0.7) ^a	51.1	(1.1)	41.8	(0.6)
Smoke marijuana/use other illegal drugs	2.1	(0.2) ^a	1.2	(0.2)	1.9	(0.2)
Think of plan to solve problem	82.3	(0.7) ^a	86.7	(0.9)	83.1	(0.7)
Consider hurting or killing myself	5.1	(0.4)	5.0	(0.4)	5.1	(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.

^aDifference between men and women is significant at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Coping Behavior, Q85).

8.5 Screening for Anxiety

We included six items from the Patient Health Questionnaire (PHQ) that have been used widely to screen for generalized anxiety symptoms (Spitzer, Kroenke, & Williams, 1999). If respondents had been bothered by feeling nervous, anxious, on edge, or worrying a lot about different things for several days in the past month and had at least two other symptoms for more than half the days, they were scored as needing further anxiety evaluation. Table 8.6 shows, by selected sociodemographic characteristics, the percentages of military personnel who met this screening criterion. The sociodemographic characteristics were gender, race/ethnicity, education, age, marital status, pay grade, and geographic region where the respondent was stationed. Overall, 16.6% of the survey respondents met screening criteria suggesting a need for further anxiety evaluation. This is consistent with other screening studies using the PHQ, where somewhat lower rates were found in older samples (e.g., 4% to 16%; Spitzer et al., 1999). Rates of needing further anxiety evaluation decreased with age across all Services. Indeed, respondents aged 25 or younger had almost twice the rates as those 35 years of age or older. Also consistent with the literature, women, respondents with a high school education or less, and those in the lowest ranks had the highest rates. Married personnel whose spouse was not present at their duty location had similar rates as unmarried personnel. A potentially important exception was among Navy personnel, where rates for married but spouse not present (27.7%) exceeded those for unmarried personnel (20.5%) and rates for those stationed outside the continental United States (OCONUS) (21.6%) exceeded those for personnel stationed within the continental United States (CONUS) (13.0%).

Table 8.6 Need for Further Anxiety Evaluation, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	16.4	(1.5)	16.5	(1.3)	18.0	(2.4)	10.8	(1.1)	15.2	(0.8)
Female	23.5	(1.6)	27.3	(1.0)	25.4	(2.7)	19.9	(2.5)	23.3	(1.1)
Race/Ethnicity										
White, non-Hispanic	18.3	(1.7)	18.1	(1.1)	19.6	(2.1)	12.9	(1.4)	16.8	(0.8)
African American, non-Hispanic	16.1	(1.0)	17.8	(1.6)	14.3	(2.3)	14.1	(1.7)	15.9	(0.7)
Hispanic	16.3	(2.6)	+	(+)	18.8	(3.2)	11.5	(2.6)	17.1	(2.4)
Other	19.1	(3.3)	16.0	(1.2)	+	(+)	6.7	(2.5)	15.8	(1.7)
Education										
High school or less	20.7	(1.4)	19.2	(1.1)	21.6	(2.4)	14.4	(3.0)	19.5	(1.0)
Some college	17.2	(1.2)	19.4	(1.6)	18.4	(1.7)	13.8	(0.7)	16.7	(0.6)
College graduate or higher	12.2	(1.0)	13.1	(1.7)	7.1	(0.4)	9.4	(1.4)	11.0	(0.8)
Age										
20 or younger	23.2	(2.8)	20.9	(1.2)	26.3	(4.3)	15.6	(3.6)	21.7	(1.7)
21-25	22.4	(1.1)	22.1	(2.3)	21.2	(1.0)	16.1	(2.1)	20.7	(0.9)
26-34	15.5	(2.1)	17.2	(1.4)	13.1	(1.3)	11.6	(2.1)	14.6	(1.1)
35 or older	10.6	(0.9)	12.4	(1.6)	8.3	(1.1)	10.1	(1.3)	10.7	(0.7)
Family Status ^a										
Not married	20.7	(1.6)	20.5	(1.1)	21.5	(3.4)	14.2	(2.5)	19.2	(1.1)
Married, spouse not present	18.2	(3.1)	27.7	(2.7)	21.6	(5.0)	15.9	(6.0)	21.6	(1.8)
Married, spouse present	15.1	(1.2)	14.1	(1.3)	15.2	(1.0)	11.6	(0.8)	13.8	(0.6)
Pay Grade										
E1-E3	27.1	(2.2)	18.1	(0.5)	24.8	(3.0)	17.0	(2.2)	21.9	(1.3)
E4-E6	18.0	(1.4)	21.1	(1.6)	18.0	(1.2)	12.7	(1.3)	17.5	(0.8)
E7-E9	11.6	(1.1)	11.9	(1.3)	8.6	(1.1)	9.9	(0.7)	10.9	(0.6)
W1-W5	7.9	(1.3)	+	(+)	12.8	(2.9)	NA	(NA)	9.2	(1.3)
O1-O3	9.5	(1.7)	13.1	(2.3)	7.3	(0.7)	10.9	(3.0)	10.7	(1.3)
O4-O10	10.0	(3.0)	10.7	(2.1)	5.8	(2.2)	9.5	(1.9)	9.7	(1.2)
Region										
CONUS ^b	18.3	(1.8)	13.0	(0.7)	19.5	(2.2)	13.0	(1.5)	16.1	(0.9)
OCONUS ^c	15.4	(0.1)	21.6	(1.8)	14.0	(0.2)	11.7	(2.2)	17.7	(0.9)
Total	17.6	(1.3)	18.1	(1.0)	18.8	(2.0)	12.7	(1.3)	16.6	(0.7)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. The definition of need of further anxiety evaluation is given in Section 2.5.5.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel who were stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel who were stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Need for Further Anxiety Evaluation, Q86; refer to Section 2.5.1 for descriptions of these sociodemographic variables).

The fact that a considerable proportion of military personnel were in need of further evaluation for anxiety is not surprising. Anxiety disorder is among the most common mental health problems in the general population; it also is one of the most serious and may have serious consequences for mission readiness. To better understand the consequences of personnel experiencing depressive symptoms, we examined the perceived levels of stress associated with work and family among those in need of anxiety evaluation, by Service (see Table 8.7).

Overall, work was perceived as somewhat more stressful than family life among those in need of further anxiety evaluation. The most notable difference between work- and family-related stress was at the highest levels of stress. Among personnel in need of further anxiety evaluation, these high levels of stress were associated with work by 65.1% and with family by 38.6%. The most frequently endorsed stress level for both work and family was “a lot.” These data show a pattern that differs distinctly from that of personnel who did *not* meet the criterion for needing further anxiety evaluation (data not shown in a table). The percentages for levels of work-related stress among those who did *not* need further anxiety evaluation (total DoD) were

- ! a lot, 25.7%;
- ! some, 32.6%; and
- ! a little/none, 41.7%.

For family-related stress, the percentages were

- ! a lot, 14.7%;
- ! some, 24.4%; and
- ! a little/none, 60.9%.

When these percentages are compared with those in Table 8.7, clear distinctions are evident. Individuals in need of further anxiety evaluation reported much higher levels of stress associated with both work and family than those who did not need such evaluation.

8.6 Screening for Depression

We also included eight items similar to those frequently used in psychiatric epidemiologic surveys to screen for the presence of possible depressive symptoms and syndromes from the brief scale developed by Burnam and Wells (1990). The screener was scored by solving for the probability of being depressed and assigning this value as a scale score for each individual using the equation provided by Burnam and Wells (1990). (See Section 2.5.5 and Appendix H for details.) Personnel were defined as needing further evaluation or assessment for depression using the cutpoint of 0.060, or to account for missing data, if at least two of five items from the Center for Epidemiologic Studies Depression Scale (CES-D) or both of the dysthymia items were answered positively. Table 8.8 shows, by selected sociodemographic characteristics, the percentages of military personnel who met this composite screening criterion.

Table 8.7 Levels of Perceived Stress at Work and in Family Life for Past 12 Months Among Personnel in Need of Further Anxiety Evaluation, by Service

Type and Level of Stress	Service							
	Army	Navy	Marine Corps	Air Force	Total DoD			
Stress at Work								
A lot	64.5 (2.8)	67.5 (5.6)	71.3 (4.4)	58.8 (3.4)	65.1 (2.2)			
Some	20.1 (1.5)	17.6 (1.5)	17.2 (2.0)	22.1 (3.4)	19.4 (1.0)			
A little/none at all	15.5 (1.7)	14.9 (5.6)	11.6 (3.0)	19.1 (1.9)	15.5 (1.8)			
Stress in Family								
A lot	43.4 (2.0)	33.0 (1.4)	39.9 (2.3)	36.7 (2.0)	38.6 (1.1)			
Some	25.3 (2.0)	30.4 (2.6)	24.1 (2.4)	27.8 (2.8)	27.0 (1.2)			
A little	17.5 (1.6)	21.0 (1.3)	21.1 (3.5)	21.1 (1.5)	19.8 (0.9)			
None at all	13.8 (1.4)	15.6 (4.8)	14.9 (1.1)	14.4 (0.8)	14.6 (1.4)			

Note: Table entries are column percentages (with standard errors in parentheses) of personnel who are considered in need for further anxiety evaluation ($N=1,981$). Estimates have not been adjusted for sociodemographic differences among Services. Estimates may not sum to 100 due to rounding. The definition of need for further anxiety evaluation is given in Section 2.5.5.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Need for Further Anxiety Evaluation, Q86; Stress at Work, Q75; Stress in Family, Q76).

Overall, 18.8% 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 also found evidence 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 27.2% for the DoD and ranged from 20.8% of Air Force women to 33.3% of Marine Corps women. For men in the total DoD, 17.1% needed further assessment for depression, with percentages in specific Services ranging from 11.5% (Air Force) to 20.3% (Navy). 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 depression evaluation by race/ethnicity shows a larger percentage of Marines of “other” ethnicity (35.7%) relative to “other” ethnic groups in the Army, Navy, and Air Force. 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.

Table 8.8 Need for Further Depression Evaluation, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	18.1	(1.9)	20.3	(0.6)	19.4	(2.8)	11.5	(1.0)	17.1	(0.8)
Female	29.4	(1.6)	31.7	(2.7)	33.3	(1.4)	20.8	(1.9)	27.2	(1.0)
Race/Ethnicity										
White, non-Hispanic	18.6	(2.1)	23.0	(1.0)	21.0	(2.2)	12.9	(0.9)	18.2	(0.8)
African American, non-Hispanic	23.3	(2.0)	18.8	(2.3)	19.2	(1.2)	16.6	(2.5)	20.4	(1.3)
Hispanic	20.2	(2.5)	21.8	(2.3)	17.2	(2.9)	13.9	(1.4)	18.6	(1.2)
Other	19.7	(4.1)	20.9	(2.5)	35.7	(6.6)	11.4	(3.7)	20.5	(2.1)
Education										
High school or less	27.5	(1.4)	25.6	(1.3)	24.9	(2.2)	14.5	(2.2)	24.5	(1.0)
Some college	18.3	(1.6)	22.5	(1.6)	19.3	(1.3)	15.7	(1.0)	18.5	(0.8)
College graduate or higher	9.3	(1.0)	13.5	(1.3)	8.8	(0.9)	8.3	(1.5)	9.9	(0.7)
Age										
20 or younger	27.9	(1.9)	29.0	(2.4)	30.3	(2.7)	20.0	(2.2)	27.1	(1.3)
21-25	26.3	(1.4)	29.4	(0.7)	24.0	(2.0)	15.0	(1.9)	24.0	(0.9)
26-34	18.3	(2.4)	17.6	(1.1)	15.5	(1.0)	12.0	(2.3)	16.1	(1.2)
35 or older	9.4	(1.0)	13.4	(1.2)	5.9	(0.6)	11.6	(1.2)	10.9	(0.7)
Family Status ^a										
Not married	25.1	(1.1)	27.7	(0.8)	27.6	(1.8)	17.8	(1.8)	24.4	(0.7)
Married, spouse not present	28.9	(3.9)	30.4	(1.7)	21.3	(3.9)	21.3	(3.3)	27.3	(1.8)
Married, spouse present	15.4	(1.7)	14.8	(1.2)	12.9	(1.8)	10.3	(0.9)	13.4	(0.8)
Pay Grade										
E1-E3	31.1	(2.1)	29.8	(0.7)	29.1	(2.4)	19.7	(1.2)	27.4	(1.1)
E4-E6	22.2	(1.7)	24.0	(0.6)	20.0	(1.0)	14.0	(1.3)	20.3	(0.8)
E7-E9	10.4	(1.4)	12.6	(0.8)	6.5	(1.2)	10.9	(1.5)	10.7	(0.7)
W1-W5	7.0	(2.2)	9.1	(1.4)	8.7	(3.5)	NA	(NA)	7.5	(1.7)
O1-O3	10.4	(0.8)	12.1	(1.5)	8.4	(1.6)	8.7	(1.7)	10.1	(0.7)
O4-O10	2.1	(0.8)	12.3	(1.8)	3.6	(1.3)	6.5	(1.2)	6.6	(0.8)
Region										
CONUS ^b	20.2	(2.0)	16.2	(2.0)	21.2	(2.3)	13.5	(1.2)	17.6	(1.0)
OCONUS ^c	19.6	(1.1)	26.0	(**)	19.2	(2.1)	13.1	(2.5)	21.5	(0.6)
Total	20.0	(1.5)	22.0	(0.7)	21.0	(2.1)	13.5	(1.1)	18.8	(0.7)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services. The definition of need for further depression evaluation is given in Section 2.5.5.

**Estimate rounds to zero.

NA = Not applicable.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel who were stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel who were stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Need for Further Depression Evaluation, Q87-Q89; refer to Section 2.5.1 for descriptions of these sociodemographic variables).

Family status also was related to the need for further depression evaluation. As with the need for further anxiety evaluation, the presence of a spouse appeared to be a strong buffer; unmarried personnel (24.4%) and married personnel not living with their spouse (27.3%) scored considerably higher on need for further depression evaluation than did married personnel living with their spouse (13.4%). This pattern was consistent across all Services but particularly pronounced among Navy personnel and those stationed OCONUS.

Finally, 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.

Depression is the most common mental health problem in the general population and, like anxiety, 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 examined the perceived levels of stress associated with work and family among those in need of depression evaluation, by Service (see Table 8.9). Among personnel in need of further depression evaluation, high levels of stress were associated with work by 63.8% and with family by 43.9%. The pattern of perceived stress among those in need of further evaluation is opposite 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 lot, 24.4%;
- ! some, 32.6%; and
- ! a little/none, 43.0%.

For family-related stress, the percentages were

- ! a lot, 12.5%;
- ! some, 24.5%; and
- ! a little/none, 63.0%.

When these percentages are compared with those in Table 8.9, individuals in need of further depression evaluation reported much higher levels of stress associated with both work and family than those who did not need such evaluation.

8.7 Screening for Suicidality

We also asked respondents if they had seriously considered suicide within the past year. Table 8.10 shows the prevalence of suicidal ideation reported by sociodemographic characteristics. Overall, 5.1% of DoD personnel reported seriously considering suicide within the past year. Rates were highest among the E1-E3, 20 years old or younger, high school or less educated, and “other”

Table 8.9 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 and Level of Stress	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Stress at Work										
A lot	64.1	(2.4)	65.5	(2.0)	63.3	(4.1)	61.0	(4.1)	63.8	(1.5)
Some	22.0	(2.0)	20.1	(0.9)	22.5	(2.0)	23.7	(4.4)	21.9	(1.2)
A little/none at all	13.9	(2.1)	14.3	(1.9)	14.2	(2.9)	15.3	(2.3)	14.3	(1.1)
Stress in Family										
A lot	49.3	(1.0)	39.5	(2.1)	44.2	(2.4)	40.1	(3.8)	43.9	(1.2)
Some	22.5	(1.3)	25.3	(1.7)	25.2	(0.8)	26.3	(3.0)	24.4	(1.0)
A little	16.1	(1.4)	19.0	(0.5)	19.8	(2.1)	22.0	(3.3)	18.6	(0.9)
None at all	12.1	(1.3)	16.2	(0.7)	10.9	(0.7)	11.6	(1.8)	13.0	(0.6)

Note: Table entries are column percentages (with standard errors in parentheses) of personnel who are considered in need for further depression evaluation ($N=1,994$). Estimates have not been adjusted for sociodemographic differences among Services. Estimates may not sum to 100 due to rounding. 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, 2002 (Need for Further Depression Evaluation, Q87-Q89; Stress at Work, Q75; Stress in Family, Q76).

race/ethnicity groups. The lower rates for the Air Force relative to the other Services are consistent with its overall lower population proportion in these high-risk groups.

8.8 Mental Health and Productivity Loss

We next examined the relationship between mental health indices and productivity loss. Table 8.11 presents the types of productivity loss reported by all personnel, by those who reported suicidal ideation in the past year, by those needing further depression evaluation, and by those needing further anxiety 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. As shown, personnel experiencing suicidal ideation and need for further depression or anxiety evaluation were much more likely to experience productivity loss than personnel without these symptoms on all of the measures. For example, those who had suicidal ideation were more than twice as likely (22.7%) to be hurt on the job than were those who did not need further evaluation (10.3%). Similarly, approximately half of those with suicidal ideation (54.7%), depressive symptoms (50.0%), and/or anxiety symptoms (49.0%) worked below their normal performance level, compared with slightly less than a third of personnel (32.4%) without these symptoms. In addition, personnel reporting suicidal ideation reported more losses than those needing further depression or anxiety evaluation, which varied very little. For example, 20.1% of those experiencing suicidal ideation reported being late for work by 30 minutes or more on 4 or more days in the past year, compared with 12.5% of those needing further depression evaluation and 12.7% of those needing further anxiety evaluation.

Table 8.10 Suicidal Ideation Within Past Year, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Gender					
Male	5.5 (0.8)	6.2 (0.4)	6.3 (1.2)	2.2 (0.3)	4.9 (0.4)
Female	5.2 (0.5)	7.5 (0.9)	8.4 (0.4)	4.9 (0.9)	5.9 (0.4)
Race/Ethnicity					
White, non-Hispanic	5.2 (0.9)	6.5 (0.8)	6.3 (1.1)	2.7 (0.2)	4.9 (0.4)
African American, non-Hispanic	6.0 (0.7)	5.4 (0.6)	7.0 (1.2)	3.2 (1.0)	5.4 (0.4)
Hispanic	5.3 (2.2)	4.0 (0.5)	6.7 (0.7)	1.6 (1.0)	4.4 (0.9)
Other	5.6 (1.7)	10.3 (2.6)	9.4 (3.6)	3.5 (1.2)	7.3 (1.4)
Education					
High school or less	7.7 (1.0)	7.7 (0.3)	8.2 (1.0)	4.8 (1.1)	7.4 (0.5)
Some college	4.8 (1.0)	6.8 (0.4)	5.7 (0.9)	2.6 (0.4)	4.6 (0.4)
College graduate or higher	2.6 (0.5)	2.8 (1.6)	1.8 (0.7)	1.7 (0.4)	2.3 (0.4)
Age					
20 or younger	7.5 (0.9)	11.9 (1.2)	11.4 (1.9)	5.8 (1.2)	9.1 (0.7)
21-25	7.8 (1.3)	9.1 (0.7)	7.0 (0.5)	4.3 (1.1)	7.1 (0.5)
26-34	4.9 (0.9)	3.8 (1.7)	4.3 (0.9)	2.2 (0.4)	3.8 (0.6)
35 or older	1.8 (0.6)	2.5 (1.0)	1.7 (0.4)	1.1 (0.2)	1.7 (0.3)
Family Status^a					
Not married	7.2 (0.7)	9.0 (0.5)	9.0 (1.3)	4.2 (0.6)	7.2 (0.4)
Married, spouse not present	9.1 (2.8)	6.5 (0.8)	7.0 (4.2)	+ (+)	7.2 (1.4)
Married, spouse present	3.8 (0.7)	3.5 (0.6)	3.6 (0.8)	1.8 (0.2)	3.1 (0.3)
Pay Grade					
E1-E3	8.6 (1.4)	12.6 (3.0)	10.9 (1.0)	5.9 (1.2)	9.4 (1.0)
E4-E6	5.9 (0.9)	6.4 (1.4)	5.0 (0.5)	2.1 (0.2)	4.9 (0.5)
E7-E9	2.0 (0.5)	2.5 (0.4)	1.1 (0.3)	1.6 (0.6)	1.9 (0.3)
W1-W5	1.2 (0.7)	** (**)	1.1 (1.0)	NA (NA)	1.0 (0.6)
O1-O3	3.8 (0.7)	1.6 (1.4)	1.9 (0.7)	2.1 (0.9)	2.5 (0.5)
O4-O10	2.1 (1.7)	+ (+)	0.6 (0.7)	1.7 (0.6)	1.5 (0.6)
Region					
CONUS ^b	5.4 (0.9)	3.4 (0.7)	6.8 (1.1)	2.8 (0.4)	4.5 (0.4)
OCONUS ^c	5.7 (1.1)	8.4 (0.6)	4.8 (1.4)	2.7 (0.6)	6.4 (0.4)
Total	5.4 (0.7)	6.4 (0.4)	6.6 (1.0)	2.8 (0.3)	5.1 (0.3)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

**Estimate rounds to zero.

NA = Not applicable.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel who were stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel who were stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Q90A-B).

Table 8.11 Productivity Loss in Past 12 Months Among Personnel in Need of Further Mental Health Evaluation

Group/Type of Loss	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										
Late for work by 30 minutes or more	66.4	(1.3)	13.7	(0.4)	12.0	(0.8)	8.0	(0.6)	33.6	(1.3)
Left work early	65.2	(1.2)	7.7	(0.3)	13.4	(0.5)	13.7	(0.6)	34.8	(1.2)
Hurt in an on-the-job accident	89.7	(0.5)	6.2	(0.3)	2.6	(0.3)	1.5	(0.2)	10.3	(0.5)
Worked below normal performance level	67.6	(1.0)	6.2	(0.4)	11.0	(0.5)	15.2	(0.8)	32.4	(1.0)
Did not come into work because of illness or injury	79.9	(0.8)	7.0	(0.3)	7.6	(0.4)	5.4	(0.3)	20.1	(0.8)
Suicidal Ideation in Past Year										
Late for work by 30 minutes or more	50.1	(3.7)	14.6	(2.0)	15.3	(2.3)	20.1	(2.8)	49.9	(3.7)
Left work early	53.3	(2.8)	8.0	(1.5)	12.9	(1.7)	25.8	(1.7)	46.7	(2.8)
Hurt in an on-the-job accident	77.3	(2.0)	7.4	(1.2)	7.4	(1.3)	7.9	(1.6)	22.7	(2.0)
Worked below normal performance level	45.3	(3.3)	6.4	(0.9)	13.0	(1.4)	35.3	(2.9)	54.7	(3.3)
Did not come into work because of illness or injury	70.1	(2.6)	5.8	(1.1)	9.9	(1.1)	14.2	(1.9)	29.9	(2.6)
Need for Further Depression Evaluation										
Late for work by 30 minutes or more	57.4	(1.8)	14.6	(0.9)	15.6	(1.3)	12.5	(1.4)	42.6	(1.8)
Left work early	55.6	(1.3)	9.8	(0.8)	15.1	(0.9)	19.4	(1.1)	44.4	(1.3)
Hurt in an on-the-job accident	81.9	(1.8)	8.6	(0.9)	5.7	(0.7)	3.7	(0.8)	18.1	(1.8)
Worked below normal performance level	50.0	(1.9)	8.9	(1.0)	14.9	(1.1)	26.2	(1.9)	50.0	(1.9)
Did not come into work because of illness or injury	73.1	(1.5)	7.5	(0.7)	10.0	(0.6)	9.5	(0.9)	26.9	(1.5)
Need for Further Anxiety Evaluation										
Late for work by 30 minutes or more	58.1	(2.4)	14.3	(1.0)	14.9	(1.1)	12.7	(1.5)	41.9	(2.4)
Left work early	56.6	(1.7)	8.5	(0.6)	15.5	(0.9)	19.3	(1.4)	43.4	(1.7)
Hurt in an on-the-job accident	81.2	(1.4)	8.5	(0.5)	5.2	(0.6)	5.0	(1.1)	18.8	(1.4)
Worked below normal performance level	51.0	(2.4)	8.0	(0.8)	13.4	(1.4)	27.6	(2.0)	49.0	(2.4)
Did not come into work because of illness or injury	73.0	(1.7)	7.2	(0.8)	8.7	(0.7)	11.1	(1.0)	27.0	(1.7)

Note: Table entries are percentages (with standard errors in parentheses). The definitions of need for further depression and anxiety evaluation are given in Section 2.5.5.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Need for Further Depression Evaluation, Q87-Q89; Productivity Loss, Q73A-E; Suicidal Ideation, Q90A-B; Need for Further Anxiety Evaluation, Q86).

It is clear from these findings that psychological symptoms are fairly common among military personnel and that these symptoms are associated with high levels of perceived stress and decreased productivity. The analyses previously conducted on the 1998 data represented the first attempt in the series of DoD surveys to understand the outcomes associated with the need for further depression evaluation. The present analyses expand those observations to include anxiety symptoms and suicidal ideation. Additional research is needed to fully understand the causes, outcomes, and treatment success of psychological disorder among military personnel. Depressive and anxiety disorders are complex illnesses and include different subtypes that respond best to 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). Such treatments have the potential to significantly improve the functioning of those suffering from psychological disorder and potentially decrease the risk of suicide among military personnel.

8.9 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 and to mental health. Table 8.12 reports findings for military personnel 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 8.12, there was a strong relation between heavy alcohol use, stress, and mental health measures. In particular, relative to abstainers, heavy alcohol users were more likely to

- ! perceive “a lot” of stress at work (40.1% vs. 29.6%) or in their family life (22.3% vs. 16.1%),
- ! experience 11 or more days during the month when their mental health interfered with their usual activities (5.9% vs. 3.1%),
- ! meet the criteria for needing further anxiety evaluation (21.3% vs. 16.6%) and depression evaluation (26.4% vs. 18.0%), and
- ! report suicidal ideation in the past 2 months (4.8% vs. 1.9%), past year (3.9% vs. 2.4%), and past 2 years (4.2% vs. 2.5%).

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 8.12 Alcohol Use, Stress, and Mental Health Problems, Total DoD

Problem/Level	Alcohol Use, Past 30 Days						Total ^a	
	None		Any		Heavy			
Stress at Work, Past 12 Months								
A lot	29.6	(1.5)	33.1	(1.4)	40.1	(2.4)	32.3	(1.3)
Some/a little	53.5	(1.5)	55.1	(0.9)	47.7	(1.6)	54.7	(1.0)
None at all	16.9	(1.2)	11.9	(0.8)	12.2	(1.2)	13.0	(0.8)
Stress in Family, Past 12 Months								
A lot	16.1	(0.7)	19.4	(0.6)	22.3	(0.9)	18.7	(0.5)
Some/a little	56.6	(1.1)	57.6	(0.8)	52.2	(1.6)	57.4	(0.8)
None at all	27.2	(0.9)	23.0	(1.0)	25.4	(1.7)	23.9	(0.8)
Days in Past Month Limited Usual Activities Due to Poor Mental Health ^b								
11 or more days	3.1	(0.4)	3.4	(0.3)	5.9	(0.8)	3.3	(0.2)
4-10 days	2.4	(0.4)	2.9	(0.2)	4.5	(0.4)	2.8	(0.2)
1-3 days	7.3	(0.5)	10.4	(0.5)	12.2	(0.7)	9.7	(0.4)
None	87.2	(0.5)	83.4	(0.6)	77.3	(1.1)	84.2	(0.5)
Need for Further Anxiety Evaluation, Past 30 Days								
Yes	16.6	(0.9)	16.6	(0.8)	21.3	(1.5)	16.6	(0.7)
No	83.4	(0.9)	83.4	(0.8)	78.7	(1.5)	83.4	(0.7)
Need for Further Depression Evaluation								
Yes	18.0	(0.9)	19.0	(0.8)	26.4	(1.2)	18.8	(0.7)
No	82.0	(0.9)	81.0	(0.8)	73.6	(1.2)	81.2	(0.7)
Suicidal Ideation								
Past 2 months	1.9	(0.4)	2.8	(0.3)	4.8	(0.4)	2.6	(0.2)
Past year (but not past 2 months)	2.4	(0.3)	2.5	(0.3)	3.9	(0.5)	2.5	(0.2)
Past 2 years (but not past year)	2.5	(0.3)	2.8	(0.2)	4.2	(0.5)	2.8	(0.2)
Not within past 2 years	93.2	(0.5)	91.8	(0.5)	87.1	(0.8)	92.1	(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.

^aRepresents prevalence of problem shown in Column 1 without regard to alcohol use.

^bBased on respondents' perception of number of days when mental health limited usual activities.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Stress at Work, Q75; Stress in Family, Q76; Mental Health, Past 30 Days, Q74; Need for Further Depression Evaluation, Q87-Q89; Alcohol Use, Past 30 Days, Q15-18 and Q20-Q23; Further Anxiety Evaluation, Q86; Suicidal Ideation, Q90A-B).

8.10 Selected Mental Health Issues

Finally, 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 have a detrimental impact on their career. Table 8.13 presents distributions across response categories, displayed separately for each Service. As shown, the perceived need for mental health counseling was similar across the four Services. Roughly 17% to 20% of personnel in each Service indicated that they had perceived a personal need for counseling in the past 12 months. Approximately two-thirds of those who felt a need actually received care (i.e., 12.5% of the 18.7%). Most individuals received counseling from a military mental health professional (6.1%), a military chaplain (5.4%), or a physician at a military facility (4.4%).

The impact of mental health counseling on a military career appears about evenly divided between those who perceive it “definitely or probably would” (48.8%) and those who perceive it “definitely or probably would not” (51.2%) damage a military career. This pattern was fairly similar across the four Services. Some potentially significant differences did emerge, however. Members of the Navy felt more optimistic about the impact of counseling (46.9% for “definitely or probably would” damage career vs. 53.1% for “definitely or probably would not”) than were personnel in the Marine Corps (52.2% “definitely or probably would” vs. 47.7% “definitely or probably would not”).

To determine whether the perception of negative repercussions is deterring some personnel from receiving mental health counseling, we examined the opinions of those who perceived or indicated a need for this type of treatment. 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 8.14 includes data only for those who (a) perceived a need for mental health services, (b) revealed a need for further anxiety or depression evaluation, (c) reported suicidal ideation in the past 12 months, or (d) reported limited activities due to poor mental health. Thus, this is a small subset of active-duty personnel. Within each group, respondents were divided into those who had received mental health care in the past 12 months and those who had not. As shown, among those who felt they needed counseling, those who had *not* received mental health services (66.9%) were more likely than those who had received them (50.4%) to respond that such services “definitely or probably would” damage a person’s military career. In contrast, those who had received mental health care (49.6%) were more likely to respond that such services “probably or definitely would not” be detrimental to their career than those who had not received such services (33.1%). This pattern held among those needing further anxiety and depression evaluation. There were no differences in perceived damage to career between those who received mental health services and those who did not among personnel reporting suicidal ideation or limited activities due to poor mental health.

Table 8.13 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					
Receipt of Mental Health Counseling					
Any counseling professional	20.4 (1.3)	19.4 (0.5)	16.8 (0.5)	16.8 (1.4)	18.7 (0.6)
From a military mental health professional	13.2 (0.9)	11.9 (0.4)	9.6 (0.4)	13.5 (1.1)	12.5 (0.5)
From a general physician at a military facility	6.2 (0.6)	5.2 (0.3)	3.7 (0.2)	7.7 (0.9)	6.1 (0.4)
From a military chaplain	4.1 (0.8)	3.9 (0.2)	3.8 (0.3)	5.5 (0.5)	4.4 (0.3)
From a civilian mental health professional	6.9 (0.7)	5.2 (0.5)	4.8 (0.4)	4.0 (0.4)	5.4 (0.3)
From a general physician at a civilian facility	1.8 (0.4)	2.5 (0.3)	1.7 (0.2)	2.3 (0.3)	2.1 (0.2)
From a civilian pastoral counselor	1.3 (0.2)	1.1 (0.1)	0.7 (0.1)	1.1 (0.3)	1.1 (0.1)
	2.5 (0.4)	2.6 (0.2)	2.1 (0.3)	1.6 (0.2)	2.2 (0.1)
Perceived Damage to Career					
Definitely would	18.0 (1.3)	18.6 (0.7)	21.0 (1.5)	17.0 (1.2)	18.3 (0.6)
Probably would	30.0 (0.7)	28.3 (0.9)	31.2 (1.8)	32.8 (1.2)	30.5 (0.5)
Probably would not	35.5 (1.7)	35.7 (0.8)	32.2 (0.9)	37.4 (1.6)	35.6 (0.8)
Definitely would not	16.5 (0.9)	17.4 (1.0)	15.5 (1.0)	12.8 (0.6)	15.6 (0.4)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Perceived Need for Counseling Services, Q93; Receipt of Counseling, Q91A-F; Perceived Damage to Career, Q92).

Table 8.14 Perceived Damage to Military Career for Seeking Mental Health Services, by Selected Mental Health Measures

Mental Health Measure	N	Perceived Damage to Career			
		Definitely Would	Probably Would	Probably Would Not	Definitely Would Not
Perceived Need for Mental Health Counseling, Past 12 Months					
Received mental health services ^a	978	25.0 (1.5)	25.4 (1.2)	33.2 (1.8)	16.4 (1.4)
Did not receive services ^b	1,292	32.9 (1.5)	34.0 (1.5)	22.1 (1.5)	11.0 (0.7)
Need for Anxiety Evaluation, Past 1 Month					
Received mental health services ^c	508	28.9 (2.6)	26.1 (1.3)	29.4 (2.6)	15.7 (1.8)
Did not receive services ^d	1,412	31.9 (1.7)	33.0 (1.5)	21.9 (0.9)	13.2 (1.1)
Need for Depression Evaluation, Past 12 Months					
Received mental health services ^c	618	28.3 (2.0)	27.2 (1.7)	30.0 (2.2)	14.5 (1.1)
Did not receive services ^d	1,329	32.4 (1.8)	34.0 (1.8)	22.7 (1.5)	11.0 (1.1)
Suicidal Ideation, Past 12 Months					
Received mental health services ^c	270	39.1 (2.9)	27.9 (3.2)	21.4 (2.6)	+ (+)
Did not receive services ^d	276	40.8 (2.8)	28.7 (3.4)	20.3 (2.6)	10.1 (1.7)
Activities Limited by Poor Mental Health, Past Month					
Received mental health services ^e	165	39.9 (3.1)	27.0 (2.6)	16.8 (3.3)	+ (+)
Did not receive services ^f	170	35.7 (5.4)	28.5 (4.5)	+ (+)	17.6 (2.3)

Note: Table entries are percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding. The definitions of need for further anxiety and depression evaluation are given in Section 2.5.5.

+Low precision.

^aUnweighted number of respondents who perceived the need for mental health counseling in the past 12 months and received mental health services.

^bUnweighted number of respondents who perceived the need for mental health counseling in the past 12 months and did not receive services.

^cUnweighted number of respondents who revealed a need for depression/anxiety or reported suicidal ideation evaluation in the past 12 months and received mental health services.

^dUnweighted number of respondents who revealed a need for depression/anxiety or reported suicidal ideation evaluation in the past 12 months and did not receive services.

^eUnweighted number of respondents who reported their mental health limited usual activities for 11 or more days in the past 30 days and received mental health services.

^fUnweighted number of respondents who reported their mental health limited usual activities 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, 2002 (Perceived Damage to Career, Q92; Receipt of Mental Health Counseling Services, Q91A-F; Perceived Need for Counseling, Q93; Need for Further Depression Evaluation, Q87-Q89; Limited Usual Activities, Q74; Need for Anxiety Evaluation, Q86; Suicidal Ideation, Q90A and B).

Thus, those who received services were generally more likely to believe that having done so would not have a negative impact on their career than those who did not receive such services. However, among those who did receive services, only half or fewer perceived that this would not damage their career (e.g., 49.6% mental health counseling, 45.1% anxiety evaluation, 44.5% depression evaluation). In other words, there was still strong concern even among those who received services that it would damage their career.

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). Despite these efforts, it appears that more assurance may be needed to combat the widely held concerns that seeking help will damage a career.

Personnel who are in need of mental health services that they are reluctant to seek likely are not performing at their optimal level on the job. Therefore, the resolution of this conflict (perhaps through education and assurance of anonymity) could increase the readiness of the U.S. military forces.

8.11 Summary

This chapter examined a variety of mental health issues among military personnel, including stress, coping mechanisms, symptoms of anxiety and depression, suicidal ideation, relations between alcohol use and mental health problems, and perceptions and receipt of mental health counseling.

8.11.1 Levels and Sources of Stress

Higher percentages of military personnel rated their jobs (32.3%) as more stressful than their personal lives (18.7%) (Table 8.1). When asked about the specific sources of stress, military personnel reported the following (Table 8.2):

- ! The most frequently indicated stressors for both men and women were separation from family (19.1%) and deployment (19.0%).
- ! More women than men reported stress related to personal and family problems and to relationships at work. For example, women were more likely than men to report high stress related to changes in their personal life (21.4% vs. 13.1%), problems with

coworkers (14.9% vs. 10.1%), and conflicts between military and family responsibilities (14.8% vs. 11.6%).

8.11.2 Stress and Productivity Loss

Compared with 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 (Table 8.3):

- ! Working below normal performance level was reported by 43.8% of the high stress group, compared with 25.0% 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).
- ! Illness, injuries, and accidents in the workplace on 4 or more days in the past year were twice as common in the high stress group (10.7%) as in the moderate/low stress group (4.6%).

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.

8.11.3 Coping With Stress and Psychological Distress

The most commonly used strategies for coping with stress were using a problem-solving approach (83.1%), seeking social support (75.1%), and engaging in physical activity (60.8%). These encouraging findings are tempered somewhat by the finding that a quarter of military personnel commonly used alcohol or tobacco to cope with stress, daily pressures, and feelings of depression (Tables 8.4 and 8.5):

- ! More men than women reported using alcohol (25.9% vs. 20.8%) and cigarettes (28.2% vs. 24.0%) as coping behaviors. Women were more likely than men to talk to a friend or family member (87.6% vs. 72.5%), or to use prayer (71.0% vs. 49.5%) as a coping strategy. Women also were more likely than men to get something to eat as a coping strategy (51.1% vs. 39.9%).
- ! An estimated 5.1% of military personnel had considered suicide as an option for dealing with stress and depression.

8.11.4 Anxiety, Depression, and Suicidal Ideation

Consistent with findings from psychiatric epidemiologic studies, the prevalence of anxiety and depression symptoms is substantial (16.6% and 18.8%, respectively) (Tables 8.6 and 8.8). Also consistent with the literature, a greater percentage of women scored above the thresholds on the anxiety and depression screeners than did men. 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 anxiety and depression. These differences should be interpreted with some

caution, recognizing that screening procedures may cast a wide net and that comprehensive assessment procedures are required to identify cases of specific psychiatric disorders.

Because psychological distress can affect military readiness, we further analyzed the data of personnel who met the criterion for need for further anxiety and depression evaluation (Tables 8.7 and 8.9) and those who reported suicidal ideation in the past year (Table 8.10). These analyses revealed some potentially important findings:

- ! Substantial percentages of personnel in need of further evaluation for anxiety experienced “a lot” of stress associated with work (65.1%) and with family (38.6%). Similarly, personnel in need of further depression evaluation also indicated a lot of stress associated with work (65.1%) and with family (43.9%).
- ! Productivity loss was higher among personnel reporting suicidal ideation or in need of further evaluation for anxiety or depression than it was among those who did not need this evaluation (Table 8.11). Those who had suicidal ideation were more than twice as likely (22.7%) to be hurt on the job as those who did not need further evaluation (10.3%). Similarly, approximately half of those with suicidal ideation (54.7%), depressive symptoms (50.0%), and/or anxiety symptoms (49.0%) worked below their normal performance level, compared with personnel (32.4%) without these symptoms.

8.11.5 Alcohol, Stress, and Mental Health

Compared with their counterparts who did not drink, heavy users of alcohol had more problems with stress at work (40.1% vs. 29.6%) or in their family (22.3% vs. 16.1%), were more likely to exhibit anxiety symptoms (21.3% vs. 16.6%) and depressive symptoms (26.4% vs. 18.0%), and reported more limitations in activities due to poor mental health (5.9% vs. 3.1%) (Table 8.12). This finding suggests that there is a strong comorbid relation 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.

8.11.6 Selected Mental Health Issues

Roughly 19% of personnel had perceived a need for mental health care in the 12 months prior to the survey and about two-thirds of them received this care (Table 8.13). The absence of care may be due to personnel who perceived probable or definite damage of receiving mental health counseling on a Service member’s military career (Table 8.14). Although those who received care were less likely (50.4%) than those who did not receive services (66.9%) to believe that counseling would damage a military career, clearly a large portion in both groups believed it would be detrimental to one’s career.

9. OTHER HEALTH-RELATED ISSUES IN THE MILITARY

In Chapter 9, we present findings on other health-related issues from the 2002 DoD survey. The areas of special interest include gender-specific health issues, oral health, gambling in the Military, job satisfaction, and religiosity/spirituality. 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. In the discussion of job satisfaction, we examine sociodemographic correlates, as well as rank, occupation, and service.

Religiosity/spirituality is a new topic covered by the DoD survey series. In its discussion, we explore the relationship between degree of spirituality and selected measures such as need for mental health evaluation and stress.

9.1 Gender-Specific Health Issues

9.1.1 Stress Serving as a Military Woman

Over 40% 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, 41.2% of military women reported these relatively high levels of stress. Women in the Navy were most likely to report high stress (49.4%), followed closely by women in the Army (45.9%) and Marine Corps (43.9%). Women in the Air Force (30.6%) reported 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 2002, women comprised 16.9% of the Military overall (Table 2.4). Among Navy personnel, whose women indicated the highest levels of stress, the proportion of women was second to lowest of all Services. Only 15.0% of Navy personnel were women (Table 2.4).

In the total DoD, stress associated with being a woman in the Military differed only slightly among racial/ethnic groups (Table 9.1). "Other" ethnicities most frequently reported experiencing high levels of stress (52.8%), whereas non-Hispanic whites did so least frequently (39.3%). Over 40% of Hispanic and non-Hispanic African American women reported high stress levels. Ethnic patterns in reported stress were similar among Services. For example, Army women reporting high stress did not vary much across ethnic groups (range of 44.5% to 49.4%); the same was the case for women in the Air Force, who reported stress levels ranging from 27.7% (Hispanic) to 30.8% (African American non-Hispanic).

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 32% of those with a college education reported high stress, compared with nearly 47% of those with a high school education or less. Women under age 25 were most likely to report high stress, while women aged

Table 9.1 Stress Associated With Being a Woman in the Military, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Race/Ethnicity										
White, non-Hispanic	46.3	(1.7)	46.6	(4.9)	44.1	(1.9)	29.6	(3.0)	39.3	(1.8)
African American, non-Hispanic	44.5	(3.5)	51.7	(3.7)	46.6	(2.9)	30.8	(1.6)	42.3	(1.9)
Hispanic	49.2	(5.7)	49.1	(7.0)	+	(+)	27.7	(4.1)	42.4	(3.3)
Other	49.4	(6.4)	63.3	(4.5)	+	(+)	+	(+)	52.8	(3.2)
Education										
High school or less	49.3	(1.8)	53.4	(2.7)	44.1	(2.8)	35.5	(5.9)	46.5	(2.0)
Some college	44.7	(3.0)	52.6	(2.7)	44.6	(2.2)	33.8	(2.9)	42.2	(1.7)
College graduate or higher	42.9	(4.4)	35.2	(4.7)	+	(+)	20.5	(3.7)	31.5	(2.8)
Age										
20 or younger	47.2	(3.1)	58.5	(6.5)	56.6	(3.6)	28.6	(5.3)	45.7	(3.5)
21-25	52.4	(2.0)	53.9	(2.5)	45.1	(1.7)	38.4	(5.1)	47.6	(1.8)
26-34	44.0	(4.0)	42.3	(2.1)	38.3	(5.0)	27.8	(3.2)	37.5	(2.1)
35 or older	34.7	(2.9)	39.0	(4.5)	17.9	(4.1)	25.0	(5.7)	30.6	(3.3)
Family Status										
Not married ^a	46.8	(1.8)	49.8	(3.6)	42.3	(1.2)	29.1	(4.2)	41.7	(2.0)
Married, spouse not present	47.0	(3.9)	63.9	(8.0)	+	(+)	+	(+)	45.4	(3.2)
Married, spouse present	44.3	(3.9)	45.5	(3.0)	46.1	(4.7)	32.6	(4.1)	40.0	(2.3)
Pay Grade										
Enlisted	47.5	(2.3)	52.0	(2.8)	45.6	(2.0)	32.0	(2.5)	43.1	(1.4)
Officer	35.6	(2.2)	35.8	(6.2)	23.8	(4.3)	23.5	(3.9)	30.4	(2.2)
Region										
CONUS ^b	43.0	(2.8)	37.4	(4.4)	42.3	(2.4)	29.3	(2.1)	36.7	(1.5)
OCONUS ^c	53.1	(3.4)	62.5	(1.3)	59.3	(6.5)	+	(+)	52.8	(3.1)
Total	45.9	(2.1)	49.4	(3.3)	43.9	(2.0)	30.6	(2.4)	41.2	(1.4)

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.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bRefers to personnel who were stationed within the 48 contiguous States in the continental United States.

^cRefers to personnel who were stationed outside the continental United States or aboard afloat ships.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Stress Associated With Being a Woman in the Military, Q141; refer to Section 2.5.1 for descriptions of sociodemographic variables).

35 or older were least likely to report high stress. Married women with their spouse not present were more likely to report high levels of stress than those not married and those married with their spouse present. Enlisted women (43.1%) were more likely to report high stress than officers (30.4%). This disparity was largest in the Marine Corps, where 45.6% of enlisted women reported high stress compared with 23.8% of officers. Air Force officers and enlisted women differed least among Services in this gender-related stress, with 32.0% of enlisted women and 23.5% of officers reporting high stress levels. Women stationed outside the continental United States (OCONUS) were more likely to report high stress than those stationed within the continental United States (CONUS) (52.8% vs. 36.7%, 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 "changes in personal life" (21.4%), "being away from family" (21.2%), and "deployment" (19.6%). In 1998, however, the most frequently reported work-related causes of stress for women were "increases in work load" (17.1%), "work relationships" (15.4%), and "problems with supervisor" (13.3%). This change in primary sources of work-related stress for military women is likely due in large part to the deployment of U.S. troops to Afghanistan beginning in September 2001 for Operation Enduring Freedom.

In addition to these sources of stress, military women indicated that "increases in work load" (17.0%), "problems with coworkers" (14.9%), "conflicts between military and family responsibilities" (14.8%), and "problems with supervisor" (13.9%) were major sources of stress. Among the least stressful were "problems with housing" (6.9%), "concern about performance rating" (6.3%), and "behavior problems in children" (6.0%). As these results indicate, 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 Table 3.5, receipt of Pap smears was nearly universal among military women. A commendable 98.4% of military women received a Pap smear in their lifetime, and 97.2% had the test within the past 3 years. These results are very similar to those from the 1998 survey, in which 97.8% of women had received a Pap smear in their lifetime and 95.9% had the test in the previous 3 years, and 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. There was little variation in receipt of Pap smears across Services. As noted in Chapter 3, military women overall exceeded the *Healthy People 2000* objective of 95% and the *Healthy People 2010* objective of 97% having ever had a Pap smear, as well as the 85% (*Healthy People 2000*) and 90% (*Healthy People 2010*) objectives for having had one in the past 3 years (Table 3.5). Military rates of obtaining Pap smears appear to be 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, Calle, Wingo, & Heath, 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 (Centers for Disease Control and Prevention [CDC], 1996). These data show that 2002 military lifetime Pap smear rates among women were about 4 percentage points higher than 1996 civilian rates, and that past 3-year rates were about 11 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; National Institute on Drug Abuse [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.

Pregnancy. As shown in Table 9.2, about 17% of military women reported that they had been pregnant within the past year or they were currently pregnant, and another 1.3% 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 live birth, those whose pregnancy was terminated, and those who were currently pregnant at the time of the survey. Across all the Services, about 37% 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 highest in the Marine Corps (22.1%) and Army (20.6%). The Navy had the highest percentage of women who had never been pregnant (51.0%). These differences in pregnancy by Service may be related to differences in age and other sociodemographic characteristics among women across the Services.

Use of Prenatal Care Services. Sociodemographic characteristics appear to be somewhat related to receipt of prenatal care (Table 9.3). Overall, nearly 90% of women received prenatal care during their first trimester. Women from the different Services were similarly likely to receive prenatal care in their first trimester. Education appears to be associated with receiving prenatal care; college graduates had a somewhat higher likelihood than those with less education to receive prenatal care early in pregnancy. Higher age also was linked to increased early prenatal care. For example, only 85.2% of those aged 21 to 25 used prenatal services in the first trimester, while 93.7% of those 35 or older did. Officers were more likely to get prenatal care in the first trimester than enlisted personnel (97.5% vs. 88.4%).

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 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. A 94% abstinence prevalence results from the same

Table 9.2 Pregnancy History Among Military Women

Recency	Service				
	Army	Navy	Marine Corps	Air Force	Total DoD
Never been pregnant	36.3 (1.8)	51.0 (3.7)	42.7 (3.0)	44.7 (1.3)	43.1 (1.3)
May currently be pregnant ^a	1.5 (0.5)	1.6 (0.2)	1.5 (0.5)	+ (+)	1.3 (0.2)
Currently pregnant ^b	7.4 (1.3)	4.3 (0.8)	9.9 (2.1)	5.2 (0.7)	6.1 (0.6)
Past year but not now	13.2 (1.4)	8.1 (0.6)	12.2 (2.0)	9.6 (1.6)	10.7 (0.8)
1 to 2 years ago	7.8 (1.3)	6.4 (0.7)	12.7 (1.7)	6.0 (1.1)	7.3 (0.6)
2 to 5 years ago	13.2 (1.1)	11.5 (0.8)	11.3 (1.9)	12.7 (0.8)	12.5 (0.5)
More than 5 years ago	20.6 (1.3)	17.0 (1.7)	9.7 (2.3)	21.1 (2.7)	19.0 (1.2)

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, 2002 (Pregnancy History, Q142).

objective set forth by *Healthy People 2010*. Responses from the 1995 DoD survey provided a baseline from which to measure change within the military population (Table 3.4). Data collected in 2002 inform us regarding final progress toward these goals (see Chapter 3 for discussion). As shown in Table 9.4, 89.9% of all military women who were pregnant in the past 5 years abstained from alcohol use during their most recent pregnancy. This percentage is slightly higher than those reported in 1995 (85.2%) and 1998 (85.8%). This percentage was slightly lower among older women and those with a college degree. Some 86.5% of those aged 35 or older abstained from alcohol during their last pregnancy and 79.6% of those with at least a college degree abstained. Overall, the *Healthy People 2000* objective of increasing abstinence to 88% was met between 1998 and 2002, although the objective of 94% from *Healthy People 2010* was not reached.

Table 9.4 indicates both abstinence and alcohol use by women during their most recent pregnancy resulting in a live birth (during the past 5 years). As shown, 10.1% of pregnant military women drank at least once a month during their most recent pregnancy. Interestingly, education appears to have a negative relationship with the likelihood of drinking during one's last pregnancy: 20.4% of women with a college degree or higher reported drinking, compared to 10.1% of women with some college experience and 5.8% of women with a high school education or less.

Pay grade and trimester of first prenatal care visit also appear to be positively related with drinking during pregnancy. Among military women, nearly 9% of enlisted personnel drank during their

Table 9.3 Receipt of Prenatal Care During Most Recent Pregnancy Resulting in a Live Birth, Past 5 Years, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Trimester of First Prenatal Care Visit ^a			
	First		Second, Third, or None	
Service				
Army	89.0	(1.9)	11.0	(1.9)
Navy	91.6	(0.8)	8.4	(0.8)
Marine Corps	90.5	(2.4)	9.5	(2.4)
Air Force	88.1	(2.4)	11.9	(2.4)
Race/Ethnicity				
White, non-Hispanic	88.6	(1.6)	11.4	(1.6)
African American, non-Hispanic	90.6	(1.7)	9.4	(1.7)
Hispanic	89.6	(4.1)	10.4	(4.1)
Other	89.0	(5.1)	11.0	(5.1)
Education				
High school or less	87.4	(2.1)	12.6	(2.1)
Some college	88.8	(2.0)	11.2	(2.0)
College graduate or higher	95.7	(1.8)	4.3	(1.8)
Age				
20 or younger	87.2	(4.3)	12.8	(4.3)
21-25	85.2	(2.4)	14.8	(2.4)
26-34	93.4	(1.3)	6.6	(1.3)
35 or older	93.7	(2.6)	6.3	(2.6)
Family Status^b				
Not married	88.3	(1.5)	11.7	(1.5)
Married, spouse not present	85.2	(5.0)	14.8	(5.0)
Married, spouse present	90.5	(1.5)	9.5	(1.5)
Pay Grade				
Enlisted	88.4	(1.2)	11.6	(1.2)
Officer	97.5	(1.5)	2.5	(1.5)
Total	89.4	(1.1)	10.6	(1.1)

Note: Table entries are percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years ($N=810$). Excludes currently pregnant women who have not had a first prenatal care visit. 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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Receipt of Prenatal Care During Most Recent Pregnancy, Past 5 Years, Q142 and Q143; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table 9.4 Alcohol Use During Most Recent Pregnancy Resulting in a Live Birth, Past 5 Years, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Alcohol Use			
	No		Yes	
Service				
Army	92.2	(1.4)	7.8	(1.4)
Navy	89.0	(2.1)	11.0	(2.1)
Marine Corps	89.5	(2.0)	10.5	(2.0)
Air Force	87.8	(2.9)	12.2	(2.9)
Race/Ethnicity				
White, non-Hispanic	87.8	(1.5)	12.2	(1.5)
African American, non-Hispanic	93.2	(1.4)	6.8	(1.4)
Hispanic	94.4	(2.8)	5.6	(2.8)
Other	84.2	(5.5)	15.8	(5.5)
Education				
High school or less	94.9	(1.2)	5.1	(1.2)
Some college	89.9	(1.7)	10.1	(1.7)
College graduate or higher	79.6	(3.5)	20.4	(3.5)
Age				
20 or younger	95.6	(2.1)	4.4	(2.1)
21-25	89.8	(2.0)	10.2	(2.0)
26-34	89.6	(2.1)	10.4	(2.1)
35 or older	86.5	(3.7)	13.5	(3.7)
Family Status^a				
Not married	91.2	(2.2)	8.8	(2.2)
Married, spouse not present	82.2	(4.2)	17.8	(4.2)
Married, spouse present	90.0	(1.0)	10.0	(1.0)
Pay Grade				
Enlisted	91.3	(1.2)	8.7	(1.2)
Officer	78.4	(2.5)	21.6	(2.5)
Prenatal Care^b				
Any in first or second trimester	91.0	(1.2)	9.0	(1.2)
Third trimester or none	+	(+)	+	(+)
Total	89.9	(1.2)	10.1	(1.2)

Note: Table entries are row percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years (N=819). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bFirst 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, 2002 (Alcohol Use During Most Recent Pregnancy, Past 5 Years, Q142 and Q146; refer to Section 2.5.1 for descriptions of sociodemographic variables).

most recent pregnancy, but nearly 22% of officers did so. 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 are close to but have not quite yet reached this objective. About 89% of military women who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy.

Although the *Healthy People 2000* objective was not reached, abstaining from cigarette use during the most recent pregnancy did increase slightly since 1995, when 83.9% reported no use, and since 1998, when 85.8% reported no use. Despite the *Healthy People 2000* objective not being met overall, the following subgroups of military women had obtained the 90% objective of not smoking at all during pregnancy: Air Force women, non-Hispanic African Americans, Hispanics, those of other race/ethnicity, college graduates, women aged 35 or older, and officers.

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.

9.1.4 Testicular Self-Examinations

For the second 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, about 40% 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 were very similar, from a low of 38.1% in the Air Force to a high of 41.1% in the Navy. Although these percentages are less than half of active-duty personnel, they are notably higher than those reported in the 1998 survey (a low of 24% in the Air Force to a high of 38% in the Army).

Approximately 18% of all military men examined their testicles for lumps once or twice in the past 12 months. Roughly one-fourth (25.5%) of all military men never examined their testicles for lumps in the past 12 months, with the Navy (26.9%) and Marine Corps (28.0%) showing the highest percentages. It is encouraging that the majority of military men across all the Services (approximately 75%) examined their testicles one or more times in the past 12 months for the early detection of testicular

Table 9.5 Cigarette Use During Most Recent Pregnancy, Past 5 Years, by Selected Sociodemographic Characteristics

Sociodemographic Characteristic	Cigarette Use			
	No		Yes	
Service				
Army	89.1	(1.3)	10.9	(1.3)
Navy	83.7	(3.2)	16.3	(3.2)
Marine Corps	88.1	(3.0)	11.9	(3.0)
Air Force	90.7	(3.1)	9.3	(3.1)
Race/Ethnicity				
White, non-Hispanic	82.8	(1.9)	17.2	(1.9)
African American, non-Hispanic	95.5	(0.9)	4.5	(0.9)
Hispanic	92.7	(2.9)	7.3	(2.9)
Other	91.9	(2.8)	8.1	(2.8)
Education				
High school or less	87.6	(2.4)	12.4	(2.4)
Some college	87.0	(1.7)	13.0	(1.7)
College graduate or higher	96.1	(1.7)	3.9	(1.7)
Age				
20 or younger	87.6	(3.7)	12.4	(3.7)
21-25	87.8	(2.3)	12.2	(2.3)
26-34	87.4	(1.9)	12.6	(1.9)
35 or older	95.7	(2.7)	4.3	(2.7)
Family Status ^a				
Not married	87.0	(2.3)	13.0	(2.3)
Married, spouse not present	86.3	(3.9)	13.7	(3.9)
Married, spouse present	89.7	(1.9)	10.3	(1.9)
Pay Grade				
Enlisted	87.5	(1.4)	12.5	(1.4)
Officer	96.5	(1.8)	3.5	(1.8)
Prenatal Care ^b				
Any in first or second trimester	89.6	(1.2)	10.4	(1.2)
Third trimester or none	+	(+)	+	(+)
Total	88.5	(1.3)	11.5	(1.3)

Note: Table entries are row percentages (with standard errors in parentheses) of military women who were pregnant in the past 5 years (N=819). Estimates have not been adjusted for sociodemographic differences among Services.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, the marital status question did not distinguish between personnel who were married and those who were living as married.

^bFirst 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, 2002 (Cigarette Use During Most Recent Pregnancy, Past 5 Years, Q142 and Q145; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table 9.6 Testicular Self-Examination Among Military Men, by Service

Testicular Self-Examination Measure	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Frequency of Examining Testicles, Past 12 Months										
Once a month or more often	41.0	(1.1)	41.1	(1.5)	40.2	(0.8)	38.1	(2.2)	40.2	(0.7)
Every other month	10.8	(0.4)	10.2	(0.4)	9.4	(0.3)	12.2	(0.7)	10.8	(0.3)
3-5 days	5.9	(0.5)	4.9	(0.3)	5.4	(0.1)	7.0	(0.7)	5.8	(0.3)
Once or twice	17.0	(0.9)	17.0	(0.7)	17.1	(0.9)	19.9	(0.7)	17.8	(0.4)
Never	25.3	(1.3)	26.9	(2.3)	28.0	(0.6)	22.9	(2.1)	25.5	(0.9)
Ever Received Education on Testicular Self-Examination	57.9	(3.5)	60.2	(3.0)	55.9	(1.7)	73.1	(4.7)	62.1	(2.1)

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

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Testicular Self-Exam, Frequency, Q137; Education on Testicular Self-Exam, Q138).

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.

More than 60% 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 Marine Corps of 55.9% to a high in the Air Force of 73.1% of males who had ever received education on testicular self-examination.

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 second time in the DoD survey series, respondents were asked a set of four questions pertaining to oral health issues. Table 9.7 presents 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 minor differences among the Services. About 87% of Navy personnel and 93% of Air Force personnel had a dental check-up in the previous year. Of all military personnel across the total DoD, 34% were required to get dental work done in the past 12 months before they could be deployed at sea or in the field. This percentage is noticeably higher than the 16% in 1998 who needed

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	89.6	(1.6)	86.5	(1.9)	88.7	(1.3)	93.2	(1.3)	89.7	(0.8)
Required to Get Dental Work Before Deployment, Past 12 Months	38.4	(2.1)	26.7	(2.9)	45.7	(3.1)	28.1	(1.3)	34.0	(1.6)
Tooth Loss Since Joining Military										
Due to any problem	20.1	(1.3)	15.0	(0.7)	12.6	(1.1)	13.0	(1.2)	15.9	(0.6)
Due to gum disease	2.7	(0.4)	2.2	(0.1)	1.3	(0.3)	1.2	(0.3)	2.0	(0.2)
Due to dental cavities	12.7	(1.1)	8.9	(1.1)	6.5	(0.6)	7.1	(1.4)	9.4	(0.6)
Due to injury	3.7	(0.4)	2.6	(0.6)	3.1	(0.6)	2.0	(0.3)	2.9	(0.2)
Due to some other problem	5.8	(0.6)	5.5	(0.5)	4.4	(0.6)	4.6	(0.5)	5.2	(0.3)
Reasons for Not Having Dental Check-Up^a										
Couldn't get time off from work	38.1	(3.8)	25.9	(2.3)	28.3	(3.6)	+	(+)	28.3	(1.7)
Couldn't get an appointment with a military dentist	36.0	(4.0)	25.1	(4.2)	28.1	(1.7)	27.2	(2.9)	30.0	(2.0)
Would have had to wait too long at military dental clinic before being seen	35.8	(1.8)	32.9	(1.4)	32.8	(2.5)	20.5	(2.0)	32.0	(0.9)
Couldn't afford to go to a civilian dentist	35.3	(3.4)	25.9	(1.5)	32.5	(3.2)	+	(+)	28.6	(1.7)
Didn't think I needed a check-up	26.7	(3.1)	24.2	(2.4)	29.6	(1.1)	16.5	(4.9)	24.7	(1.6)
Don't like going to the dentist at this installation	31.0	(2.3)	27.9	(1.2)	25.8	(3.1)	+	(+)	27.1	(1.2)
Don't like going to any dentists	30.5	(2.1)	31.5	(0.7)	28.2	(4.3)	22.7	(2.4)	29.3	(1.1)

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

+Low precision.

^aBased on a sample size of 1,191 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, 2002 (Dental Check-Up Past 12 Months, Q79; Required Dental Work Prior to Deployment, Q81; Tooth Loss, Q82; Reasons for Not Having Checkup, Q80).

dental work before deploying. The highest percentages were seen in the Marine Corps (45.7%) and the Army (38.4%); the Navy had the lowest rate of needing predeployment dental work (26.7%).

Approximately 16% of all personnel had lost a permanent tooth since joining the Military 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 (20.1%) had suffered a tooth loss due to one or more of those problems since they joined the Military. More than 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, 2.0%; cavities, 9.4%; mouth injury, 2.9%; some other problem, 5.2%).

Reasons for *not* having a dental check-up in the 12 months before the survey were plentiful. Table 9.7 shows that, of those 10.3% of personnel who did not have a dental check-up in the past 12 months, 32% did not do so because they would have had to wait too long at a military dental clinic before being seen. This was the most commonly reported reason for not having a dental check-up during the past year. An estimated 30% failed to do so because they could not get an appointment with a military dentist. This reason was more likely to be cited in the Army (36%) 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 (28.3%).
- ! They could not afford to go to a civilian dentist (28.6%).
- ! They did not think they needed a check-up (24.7%).
- ! They did not like going to the dentist at their installation (27.1%).
- ! They did not like going to any dentists (29.3%).

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 12-step self-help program for pathological gamblers that has been patterned after Alcoholics Anonymous (AA). The Brecksville Unit 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
10. relying on others to provide money to relieve a desperate financial situation caused by gambling

A fairly limited number of studies have been conducted on the prevalence of pathological gambling in the general U.S. population. A 1994 survey study published in the *American Journal of Public Health* reported that the point prevalence of pathological gambling in the general population has been estimated to be as high as 1.4% (Volberg, 1994). 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, nonwhite, 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, sociodemographic 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 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 2002 DoD 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. Sociodemographic 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. A more recent review conducted by the National Research Council (1999) based on a meta-analysis of State surveys conducted by Shaffer, Hall, and Bilt (1997) suggests the national prevalence of pathological gambling to be 1.5%.

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 2002 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. Based on the sociodemographic 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 sociodemographic 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 2002 DoD survey were asked a series of 10 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* (APA, 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

¹For both of these studies (Volberg, 1992; Volberg & Silver, 1993), 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.

- ! needing to gamble with increased amounts of money to achieve the desired level of excitement
- ! unsuccessful, repeated attempts to control, cut back, or stop gambling
- ! 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
- ! breaking the law to pay for gambling losses
- ! having jeopardized or lost important relationships, a job, or career opportunities because of gambling
- ! borrowing money to relieve financial problems caused by gambling

An affirmative answer to at least one of these 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 five or more items was considered to indicate probable pathological gambling in the lifetime. As noted in Chapter 2 (Section 2.5.6), the definition of pathological gambling has changed over the years. Earlier definitions considered three or more items to be indicative of pathological gambling, whereas the most current *DSM-IV* criteria define a threshold of five or more problems. We adopted the latter definition for this report but also report on three or more problems for comparison with findings from earlier DoD surveys.

Percentages of affirmative responses to each of the individual gambling items are shown in Table 9.8. For the total DoD and within each Service, personnel were more likely to indicate that they had experienced preoccupation with gambling (3.7%) or had gone back to win money that was lost (i.e., they "chased" their money; 4.3%). Similar overall percentages were observed for the Army, Navy, and Air Force, with rates slightly higher for the Marine Corps. An estimated 2.2% 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 each of the Services were fairly similar. Less than 1% of all personnel had ever jeopardized or lost an important relationship or their job because of gambling, or broke the law to pay for their gambling.

Overall, the occurrence of several individual gambling-related problems was somewhat more likely among Marine Corps personnel than among the other three Services and in the total DoD. This finding is similar to that from the 1998 survey, where the Marine Corps appeared to have higher percentages of specific gambling-related problems. Rates reported in 1992, however, reflected fairly consistent numbers across the Services (Bray et al., 1992).

Table 9.8 Lifetime Prevalence of Gambling Problems

Problem	Service				Total DoD
	Army	Navy	Marine Corps	Air Force	
Increased preoccupation with gambling	3.4 (0.6)	4.1 (0.4)	4.7 (0.5)	3.0 (0.5)	3.7 (0.3)
Needed to gamble with increased amounts of money to achieve desired level of excitement	2.2 (0.3)	2.3 (0.5)	2.8 (0.7)	1.9 (0.3)	2.2 (0.2)
Tried to control, cut back, or stop gambling, but unable	1.4 (0.2)	1.8 (0.4)	1.3 (0.6)	0.7 (0.3)	1.3 (0.2)
Restless or irritable when unable to gamble	1.1 (0.3)	1.4 (0.5)	1.7 (0.5)	0.6 (0.2)	1.1 (0.2)
Gambled to escape from problems	1.0 (0.3)	1.7 (0.8)	1.2 (0.3)	0.5 (0.1)	1.1 (0.2)
Went back to try to win back money lost	3.8 (0.4)	4.9 (0.5)	5.3 (0.8)	4.1 (0.3)	4.3 (0.2)
Lied to others about extent of gambling	1.5 (0.4)	1.9 (0.5)	2.0 (0.4)	1.0 (0.3)	1.5 (0.2)
Broke the law to pay for gambling	0.7 (0.2)	1.0 (0.5)	0.8 (0.3)	0.1 (0.1)	0.6 (0.1)
Jeopardized or lost important relationships, job, or career opportunities because of gambling	1.1 (0.3)	1.1 (0.5)	1.1 (0.3)	0.3 (0.2)	0.9 (0.2)
Someone provided money to relieve financial problems caused by gambling	1.3 (0.4)	1.3 (0.4)	1.0 (0.3)	0.5 (0.2)	1.1 (0.2)
1 or more problems	5.6 (0.5)	6.6 (0.4)	7.9 (0.9)	6.0 (0.6)	6.3 (0.3)
3 or more problems^a	2.2 (0.5)	2.8 (0.8)	2.9 (0.7)	1.7 (0.3)	2.3 (0.3)
5 or more problems^b	1.4 (0.4)	1.5 (0.5)	1.4 (0.5)	0.7 (0.3)	1.2 (0.2)

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 per Lesieur, 1991.

^bIndication of five or more problems was interpreted to suggest probable pathological gambling per *DSM-IV* (APA, 1994).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Gambling Problems, Q123).

Table 9.8 also presents information on the total number of gambling-related problems experienced by military personnel. For the total DoD, 6.3% of personnel had experienced one or more of the gambling-related problems in their lifetime, 2.3% had experienced three or more of these problems, and 1.2% of military personnel indicated having five or more gambling-related problems, indicative of probable pathological gambling according to the *DSM-IV*. For one or more problems and three or more problems, the Army, Navy, and Air Force all had rates that were similar to those for the total DoD. The Marine Corps had the highest percentages of personnel having had one or more (or three or more) gambling-related problems. Notably, almost 8% of Marine Corps personnel reported at least one gambling problem. For five or more problems, however, the Air Force appeared to have a lower

percentage than the other Services and the total DoD: 0.7% of Air Force personnel indicated having five or more gambling-related problems, and 1.4% to 1.5% of Army, Navy, and Marine Corps personnel indicated having five or more gambling-related problems. There were no significant differences in number of gambling problems between CONUS and OCONUS personnel (data not shown).

Table 9.9 compares the prevalence of individual gambling problems and the number of gambling problems for the total DoD for 1992, 1998, and 2002. As the data indicate, the prevalence of most of the individual gambling problems showed little change since 1992. Although 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 all 3 survey years. The prevalence of personnel reporting three or more problems remained relatively unchanged (about 2%) across survey years. The rate for those who reported at least one gambling problem was slightly lower in 2002 (6.3%) than in 1992 and 1998 (7.1% and 8.1%, respectively). The prevalence of personnel having five or more problems in 2002 was 1.2%; these data were not reported in the 1992 or 1998 surveys.

Although these data provide important information about gambling behaviors in the Military, they do have limitations. One limitation is that the data 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.

Furthermore, because no additional items on a person's involvement with gambling were included as part of the 2002 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 1992, 1998, and 2002 DoD surveys 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 1.2% of all active-duty personnel who had experienced five or more problems with gambling during their lifetime, only a subset may currently (i.e., in the past year) have been showing such signs. 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. 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, these findings indicate that the lifetime prevalence of probable pathological gambling (1.2%) in the Military was relatively low and similar to rates that

Table 9.9 Trends in Lifetime Prevalence of Gambling Problems, Total DoD, 1992, 1998, and 2002

Problem	1992	1998	2002
Increased preoccupation with gambling	4.1 (0.4)	3.9 (0.2)	3.7 (0.3)
Needed to gamble with increased amounts of money to achieve desired level of excitement	2.1 (0.2)	2.0 (0.1)	2.2 (0.2)
Tried to control, cut back, or stop gambling but unable	NA (NA)	NA (NA)	1.3 (0.2)
Restless or irritable when unable to gamble	1.4 (0.1)	1.3 (0.1)	1.1 (0.2)
Gambled to escape from problems	1.2 (0.2)	1.1 (0.1)	1.1 (0.2)
Went back to try to win back money lost	5.3 (0.3)	6.1 (0.3)	4.3 (0.2)
Lied to others about extent of gambling	1.1 (0.1)	1.4 (0.1)	1.5 (0.2)
Broke the law to pay for gambling	NA (NA)	NA (NA)	0.6 (0.1)
Jeopardized or lost important relationships, job, or career opportunities because of gambling	0.4 (0.1)	0.6 (0.1)	0.9 (0.2)
Someone provided money to relieve financial problems caused by gambling	0.7 (0.1)	0.8 (0.1)	1.1 (0.2)
1 or more problems	7.1 (0.4)	8.1 (0.3)	6.3 (0.3)
3 or more problems^a	2.0 (0.2)	2.2 (0.1)	2.1 (0.3)
5 or more problems^b	NA (NA)	NA (NA)	1.2 (0.2)

Note: Table entries are percentages (with standard errors in parentheses). Estimates have not been adjusted for sociodemographic differences among Services.

NA = Not applicable.

^aThe 1992 and 1998 surveys addressed respondents' gambling behaviors based on 8 items addressing 10 symptoms of problem gambling identified in *DSM-IV* (APA, 1994); the 2002 survey gambling measure consisted of 10 items, representing all 10 *DSM-IV* criteria. No significant differences in 3 or more gambling problems were seen when 2002 data were analyzed using the 8 items from the 1992 and 1998 surveys (10 items: 2.3, SE 0.3; 8 items: 2.1, SE 0.3).

^bIndication of five or more problems was interpreted to suggest probable pathological gambling per *DSM-IV* (APA, 1994).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 1992, 1998, 2002 (2002 Questions: Gambling Problems, Q123).

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 similar to 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. It would probably be most accurate, however, to consider these 2002 DoD survey findings as representing only an initial exploration of the issue of pathological gambling in the Military.

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 (Sellman, Adamsom, Robertson, Sullivan, & Coverdale, 2002). Studies have been restricted, however, to

civilian or military veteran populations. A 2002 study of mild to moderate alcohol-dependent outpatients found that nearly 80% had gambled at some time during the previous 6 months; nearly 30% gambled on a weekly basis. An estimated 4.0% of study participants were categorized as pathological gamblers by the SOGS; diagnoses were confirmed by *DSM-IV* criteria.

A study of adults in St. Louis found that problem gamblers were more likely than nongamblers to use alcohol and to 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 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 patients identified as pathological gamblers used alcohol at a significantly higher rate than did patients who were not pathological gamblers. Lesieur et al. (1986) reported that 5% of patients in an alcohol and drug abuse treatment center who only abused alcohol were pathological gamblers.

Table 9.10 presents findings on the percentage of military personnel at each drinking level who also had problems with gambling, the percentage who experienced negative effects due to alcohol use and who had gambling-related problems, and the percentage who received alcohol treatment since joining the Military and who had problems with gambling. Data on drinking levels indicate an increased likelihood of a person in the Military being a problem gambler with higher drinking levels, although the vast majority (89.2%) of heavy drinkers had never experienced any gambling-related problems. An estimated 5.7% of heavy drinkers had between one and four problems associated with gambling in their lifetime, compared with 1.9% of abstainers. This pattern also was observed in 1992 and 1998, although the number of heavy drinkers in 1992 with at least one gambling problem increased slightly; 12.9% of heavy drinkers reported one or more problems in 1992 (Bray et al., 1992). An estimated 5.1% of heavy drinkers reported at least five gambling-related symptoms in 2002, which suggests pathological gambling according to the *DSM-IV*.

In addition, Table 9.10 suggests a possible relationship between gambling and alcohol-related negative effects. For example, from 6.4% to 7.3% of personnel who showed negative effects (serious consequences, productivity loss, or symptoms of alcohol dependence) also had between one and four gambling-related problems, and 5.8% to 8.5% could be classified as probable pathological gamblers. An estimated 1.9% of the persons who had been treated for alcohol problems since joining the Military had between one and four gambling-related problems during their lifetime, and 1.8% of the personnel who had been treated for alcohol problems could be classified as probable pathological gamblers. These same patterns were observed in 1992 and 1998.

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

Table 9.10 Alcohol Use and Gambling Problems, Total DoD

Alcohol Measure	Number of Gambling Problems					
	0		1-4		5 or More ^a	
Drinking Level						
Abstainer	96.8	(0.3)	1.9	(0.3)	1.2	(0.2)
Infrequent/light or moderate	94.8	(0.3)	3.1	(0.3)	2.1	(0.3)
Moderate/heavy	92.5	(0.7)	5.9	(0.6)	1.7	(0.4)
Heavy	89.2	(0.7)	5.7	(0.6)	5.1	(0.8)
Negative Effects						
Serious consequences	84.5	(1.4)	7.0	(0.8)	8.5	(1.6)
Productivity loss	86.9	(0.8)	7.3	(0.6)	5.8	(0.7)
Dependence symptoms	86.2	(1.1)	6.4	(0.5)	7.4	(1.1)
Alcohol Treatment Since Entering Service						
Yes	96.3	(0.5)	1.9	(0.3)	1.8	(0.4)
No	93.2	(0.4)	4.4	(0.3)	2.4	(0.3)

Note: Table entries are row percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding.

^aIndication of five or more problems was interpreted to suggest probable pathological gambling per *DSM-IV* (APA, 1994).

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Gambling Problems, Q123; Drinking Level, Q15-Q18 and Q20-Q23; Negative Effects: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35; Alcohol Treatment, Q42).

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. Finally, 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 Job Satisfaction in the Military

Job satisfaction may play a critical role in determining military readiness. While a few studies investigate job satisfaction within specific military subpopulations, such as nurses (Robinson, Rodriguez, Sammons, & Keim, 1993; Kocher & Thomas, 1994; Allgood, O'Rourke, VanDerslice, & Hardy, 2000; Prevosto, 2001), training instructors (Carbone & Cigrang, 2001), and prevention personnel (Whorley, 1989, 1992), fewer have examined job satisfaction among the general military population. Those that have done so suggest that first-term personnel are less satisfied than mid-career personnel (General Accounting Office [GAO], 2001), that greater satisfaction is predictive of intention to remain in the Military (Lakhani, 1991), and that personnel are less satisfied if they perceive job pressures to be high and identify job-related issues to be a major problem (Sanchez, Bray, Vincus, & Bann, in press).

For the first time in the DoD survey series, respondents were asked a set of three questions geared toward identifying overall job satisfaction, as well as the likelihood that the respondent would continue to stay on active duty if given the choice. Table 9.11 presents survey findings on the relationship between overall job satisfaction and sex, age, rank, and occupation. Table 9.12 presents findings concerning

likelihood to stay on active duty if given the choice, likelihood of serving at least an additional 20 years, and overall satisfaction with work assignment.

9.4.1 Overall Job Satisfaction

Table 9.11 presents findings of job satisfaction by age group, gender, and job classification. As shown, an estimated 65.3% of all personnel were satisfied or very satisfied overall with their work assignment. There were no differences in rates of satisfaction by males (65.5%) and females (64.7%). Older age groups had greater satisfaction with their jobs than younger age groups: personnel under age 20 were less satisfied overall than personnel aged 35 or older, with a fairly linear increase in satisfaction with age.

Overall, it appears that officers may experience more job satisfaction than enlisted personnel. The enlisted job classification (other than nonoccupational) with the lowest percentage of satisfied or very satisfied personnel was “infantry, gun crew, or seamanship specialist” (58.1%), whereas the officer job classification (other than nonoccupational) with the lowest percentage of satisfied or very satisfied personnel was “administrator” (73.0%). Enlisted job categories ranged from 58.1% to 70.5% (“functional support and administrative”) satisfied/very satisfied; officer job categories ranged from 73.0% to 87.3% (“scientist or professional [not involved with health care]”) satisfied/very satisfied.

9.4.2 Measures of Job Satisfaction

Table 9.12 illustrates three job satisfaction measures: likelihood of choosing to stay on active duty, likelihood of choosing to serve in the Military at least 20 years, and overall satisfaction with work assignment, by Service and for the total DoD. Overall, 53.9% indicated that they would be “likely or very likely” to choose to stay on active duty. Among the Services, the Air Force had the highest percentage of personnel indicating that they would either “likely” or “very likely” choose to remain on active duty if given the choice (65.0%), and the Marine Corps had the lowest percentage for this measure (43.7%). The distribution for this measure was similar to that for the indicator addressing the likelihood of serving in the Military for at least 20 years. The Air Force had the highest percentage reporting likely/very likely (66.2%), followed by the Army (51.2%), the Navy (48.8%), and the Marine Corps (40.2%).

Note that percentages of personnel indicating they would likely choose to stay on active duty were similar to percentages reporting they would likely choose to serve in the Military for at least 20 years, suggesting that these items may be measuring somewhat similar constructs. As shown for the third measure of overall satisfaction, about two-thirds (65.3%) of personnel indicated that they were satisfied or very satisfied with their work assignment. Satisfaction was highest in the Air Force (72.0%) and lowest in the Army (60.9%).

9.5 Religiosity/Spirituality in the Military

A substantial body of literature exists regarding the positive relationship between spirituality or religion and physical/mental health. For instance, one study (Pardini, Plante, Sherman, & Stump, 2000)

Table 9.11 Overall Job Satisfaction, by Age, Gender, Rank, and Occupation

	Overall Satisfaction With Work Assignment			
	Satisfied/ Very Satisfied		Dissatisfied/ Very Dissatisfied	
Gender and Age				
Males	65.5	(1.7)	34.5	(1.7)
<20	53.4	(3.9)	46.6	(3.9)
20-24	53.3	(1.7)	46.7	(1.7)
25-29	62.6	(1.9)	37.4	(1.9)
30-34	73.2	(2.4)	26.8	(2.4)
35+	81.7	(1.4)	18.3	(1.4)
Females	64.7	(1.6)	35.3	(1.6)
<20	53.8	(4.3)	46.2	(4.3)
20-24	55.1	(1.6)	44.9	(1.6)
25-29	66.1	(2.8)	33.9	(2.8)
30-34	70.9	(4.1)	29.1	(4.1)
35+	83.0	(2.5)	17.0	(2.5)
Rank and Occupation				
Enlisted				
Infantry, gun crew, or seamanship specialist	58.1	(3.5)	41.9	(3.5)
Electronic equipment repairman	63.9	(2.5)	36.1	(2.5)
Communications or intelligence specialist	64.9	(3.7)	35.1	(3.7)
Health care specialist	68.1	(3.2)	31.9	(3.2)
Other technical or allied specialist	67.7	(2.7)	32.3	(2.7)
Functional support and administrative	70.5	(1.7)	29.5	(1.7)
Electrical/mechanical	61.0	(2.4)	39.0	(2.4)
Craftsman	60.8	(3.3)	39.2	(3.3)
Service and supply handler	59.0	(2.5)	41.0	(2.5)
Nonoccupational	52.3	(4.8)	47.7	(4.8)
Officer				
General officer or executive	82.7	(4.7)	17.3	(4.7)
Tactical operations officer	77.7	(3.6)	22.3	(3.6)
Intelligence officer	79.1	(4.1)	20.9	(4.1)
Engineering or maintenance officer	78.6	(2.2)	21.4	(2.2)
Scientist or professional (not involved with health care)	87.3	(3.5)	12.7	(3.5)
Health care officer	80.2	(3.8)	19.8	(3.8)
Administrator	73.0	(4.5)	27.0	(4.5)
Supply, procurement, or allied officer	73.4	(3.6)	26.6	(3.6)
Nonoccupational	88.2	(3.5)	11.8	(3.5)
Total	65.3	(1.6)	34.7	(1.6)

Note: Table entries are row percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Satisfaction, Q131; Rank and Occupation, Q132).

Table 9.12 Job Satisfaction, by Service

Job Satisfaction Measure	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Would Choose to Stay on Active Duty										
Likely/very likely	51.6	(2.7)	50.5	(1.5)	43.7	(3.2)	65.0	(2.4)	53.9	(1.3)
Neither likely nor unlikely	12.2	(0.6)	12.8	(1.1)	11.6	(0.8)	11.1	(0.6)	12.0	(0.4)
Unlikely/very unlikely	36.2	(2.7)	36.6	(0.8)	44.8	(2.4)	23.9	(2.1)	34.1	(1.2)
Would Choose to Serve in Military at Least 20 Years										
Likely/very likely	51.2	(2.8)	48.8	(1.0)	40.2	(3.4)	66.2	(3.3)	53.0	(1.4)
Neither likely nor unlikely	10.9	(0.5)	11.8	(0.8)	12.0	(0.4)	10.2	(1.2)	11.1	(0.4)
Unlikely/very unlikely	37.9	(2.9)	39.5	(0.7)	47.7	(3.1)	23.6	(2.2)	35.9	(1.3)
Overall Satisfaction With Work Assignment										
Satisfied/very satisfied	60.9	(3.8)	63.6	(2.0)	66.3	(4.1)	72.0	(1.5)	65.3	(1.6)
Dissatisfied/very dissatisfied	39.1	(3.8)	36.4	(2.0)	33.7	(4.1)	28.0	(1.5)	34.7	(1.6)

Note: Table entries are row percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Job Satisfaction, Q129-Q131).

found a positive association between religious faith/spirituality and positive mental health attributes such as increased coping, resilience to stress, lower anxiety, and greater perceived social support among persons recovering from substance abuse disorders. These associations persisted even after controlling for social desirability of religion. Other studies have reported a relationship between religious faith and adaptive coping and increased resilience to stress (Hughes, McMollum, Sheftel, & Sanchez, 1994, as cited in Pardini et al., 2000; Kendler, Gardner, & Prescott, 1997; Park, Cohen, & Herb, 1990).

Despite the body of literature regarding spirituality among the general population, there is a paucity of this literature geared specifically toward the military population. A 2001 article by Parker et al. (2001b) examined the role of spirituality among soldiers and their families in terms of a developmental model. They noted more than three decades of research regarding “health and faith,” as well as the relationship established during that time between regular religious practices and reduced disease morbidity. The authors observed that rarely is spirituality linked with health promotion initiatives within the military population and that including spirituality could potentially increase the effectiveness of current health promotion efforts. A second part to the article was published in July 2001 (Parker et al., 2001a) and followed up on these issues. The article presented a model of military health promotion and wellness that integrates successful aging, targeted efforts, and spirituality guided by life course development constructs. Spirituality was not addressed independently.

Similar to the lack of literature regarding spirituality of active-duty military personnel, little literature exists regarding the spirituality of military veterans. A Medline search using the terms “veteran,” “religiosity,” “spirituality,” and other forms of these words yielded a single article, which described a chaplain’s experiences with patients at a Veteran’s Administration Medical Center in

Vermont (LaPierre, 1994). Based on a set of structured questions asked of all interviewees, the author found the following:

- ! A large majority of patients believed in a “higher power.”
- ! Between 5% and 15% of patients attended Sunday workshop services in the hospital’s chapel.
- ! Between 80% and 90% of patients welcomed prayer by the chaplain.
- ! Many patients seemed to have been more involved in their local church before or during their military service; they seemed to become less involved after completing their service.

These findings are consistent with both previous findings of the DoD survey (Bray et al., 1999) and those reported from the present survey (see Chapter 8) in which over half the respondents reported saying a prayer as a means of coping with stress. To further examine the association between religiosity and mental health, the 2002 DoD survey included items regarding religiosity and spirituality of military personnel. Specifically, the items asked about the number of times the respondent attended religious services (other than special occasions), the importance of religious/spiritual beliefs in one’s life, and the degree to which religious/spiritual beliefs influence decision making.

As presented in Table 9.13, nearly 20% of military personnel were categorized as having high religiosity/spirituality. More than half were categorized as having a medium level, and almost one-fourth were categorized as having low religiosity/spirituality. We noted some statistically significant differences between spirituality levels when considering selected health and stress measures. For instance, persons categorized as being highly religious/spiritual (15.7%) were slightly but significantly less likely than those categorized as medium (18.2%) or low (21.8%) to perceive “a lot” of stress in their family. This difference was also noted between those with a medium level of religiosity/spirituality and those with a low level.

We also observed that personnel categorized as having high religiosity/spirituality (4.6%) were significantly less likely to indicate they had seriously considered suicide in the year prior to the survey than those categorized as having a low level (6.6%). This may be because highly spiritual individuals view suicide as being against their religious beliefs.

9.6 Summary

This chapter investigated several other issues that may affect the health and readiness of the Active 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; (d) gambling in the Military; (e) job satisfaction; and (f) religiosity/spirituality. This section provides a brief summary of findings regarding these issues.

Table 9.13 Religiosity/Spirituality Index, by Selected Health and Stress Measures

Health/Stress Measure	Religiosity/Spirituality Index					
	High		Medium		Low	
Need of Further Anxiety Evaluation						
Yes	16.4	(1.1)	16.1	(0.7)	17.1	(1.2)
No	83.6	(1.1)	83.9	(0.7)	82.9	(1.2)
Need of Further Depression Evaluation						
Yes	18.2	(1.0)	18.5	(0.9)	20.1	(1.1)
No	81.8	(1.0)	81.5	(0.9)	79.9	(1.1)
Seriously Considered Suicide in Past Year						
Yes	4.6	(0.6) ^a	4.6	(0.4)	6.6	(0.6)
No	95.4	(0.6) ^a	95.4	(0.4)	93.4	(0.6)
Perceived Stress at Work						
A lot	32.2	(1.7)	31.6	(1.5)	33.7	(1.7)
Some	52.6	(1.8)	55.5	(1.1)	55.2	(1.1)
A little/none at all	15.2	(1.5) ^a	12.8	(0.8)	11.1	(0.9)
Perceived Stress in Family						
A lot	15.7	(1.0) ^{a,b}	18.2	(0.7) ^c	21.8	(0.9)
Some	56.4	(1.8)	59.1	(0.8) ^c	55.4	(0.9)
A little/none at all	28.0	(1.7) ^{a,b}	22.8	(0.8)	22.8	(1.3)
Total	19.5	(0.7) ^{a,b}	56.3	(0.5) ^c	24.2	(0.5)

Note: Table entries are percentages (with standard errors in parentheses). Estimates may not sum to 100 due to rounding. Respondents were asked to what extent they agreed with two questions regarding importance of religious/spiritual beliefs (question 135) and the degree to which religious/spiritual beliefs influence their decision-making (question 136). Respondents were categorized as High if they reported “Strongly agree” to both items; Medium if they reported either “Strongly agree” or “Agree” to at least one of the questions; and Low if they reported either “Disagree” or “Strongly disagree” to both questions.

^aComparisons between High and Low are statistically significant at the 95% confidence level.

^bComparisons between High and Medium are statistically significant at the 95% confidence level.

^cComparisons between Medium and Low are statistically significant at the 95% confidence level.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Religiosity/Spirituality, Q134-Q136).

9.6.1 Gender-Specific Health Issues

Stress Serving as a Military Woman

- ! Some 41.2% 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). Women in the Navy had the highest rate (49.4%), followed by women in the Army (45.9%), Marine Corps (43.9%), and Air Force (30.6%).
- ! In the total DoD, stress associated with being a woman in the Military was higher among women who were younger, of “other” ethnicities, less well-educated, married without a spouse present, enlisted, and serving in OCONUS assignments.

Cervical Cancer Risk Reduction

- ! Receipt of Pap smears was nearly universal among military women. Some 98.4% of military women received a Pap smear in their lifetime, and 97.2% had the test within the past 3 years (Table 3.5).
- ! Military women overall exceeded the *Healthy People 2000* and *2010* objectives of having ever had a Pap smear (95% and 97%, respectively) and having had one in the past 3 years (85% and 90%, respectively).

Maternal and Infant Health

- ! Nearly 17% of military women reported that they had been pregnant within the past year, and another 1.3% 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, about 37% of military women had been pregnant within the past 5 years, although some of these pregnancies may have occurred prior to military service.
- ! Nearly 90% of military women reported receiving their first prenatal care during their first trimester.
- ! Sociodemographic characteristics appear to be 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, and women who were enlisted (Table 9.3).
- ! Some 89.9% of all military women who were pregnant in the past 5 years abstained from alcohol during their most recent pregnancy. Drinking during pregnancy appears to be more common among women with a college degree (20.4%) and officers (21.6%) (Table 9.4).
- ! About 89% of military women who were pregnant during the past 5 years reported no cigarette use during their most recent pregnancy (Table 9.5). Women who smoked were more likely to be white, non-Hispanic (17.2%), to be age 34 or younger (12% to 13%), to have less than a college degree (12% to 13%), and to be enlisted (12.5%).

Testicular Self-Examinations

- ! About 40% of all military men examined their testicles for lumps once a month or more often during the 12 months prior to the survey. An estimated 25.5% of all military men had never examined their testicles for lumps in the past 12 months. Rates across Services were somewhat similar. About 62% of all military men had ever received information or instruction on how to examine their testicles for lumps (Table 9.6).

9.6.2 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, 34% 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). This is notably higher than the approximately 16% required to have dental work before deployment reported in the 1998 survey.
- ! 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 (9.4%).
- ! Of those personnel who did not have a dental check-up in the past 12 months, almost one-third (32.0%) did not do so because they would have had to wait too long at a military dental clinic before being seen. Nearly 30% of all personnel who did not have a dental check-up in the past 12 months failed to do so because they did not like going to any dentists (Table 9.7).
- ! 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 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.

9.6.3 Gambling in the Military

- ! For the total DoD, 6.3% of personnel had experienced at least 1 of the 10 gambling-related problems in their lifetime, 2.3% experienced at least 3 of these gambling-related problems, and 1.2% experienced 5 or more problems—the level constituting probable pathological gambling. The Marine Corps (7.9%) showed the highest rate of at least one gambling problem (Table 9.8).
- ! The prevalence of individual gambling problems for the total DoD has not changed greatly since 1992. Increased preoccupation with gambling and going back to win money lost were behaviors most frequently reported in the 1992, 1998, and 2002 surveys (Table 9.9).
- ! Gambling problems appeared to be related to alcohol use. An estimated 11% of heavy drinkers had at least one problem associated with gambling in their lifetime, compared with 6.3% of military personnel overall, regardless of drinking level. Some 5.1% of heavy drinkers had five or more gambling problems (Table 9.10).
- ! Probable pathological gambling (five or more gambling problems in the lifetime) was also associated with negative effects of alcohol use. Of those who experienced serious consequences of alcohol use, 8.5% had five or more gambling problems; of those who experienced alcohol dependence symptoms, 7.4% had five or more gambling problems; and of those who experienced

productivity loss due to alcohol use, 5.8% had five or more gambling problems (Table 9.10).

9.6.4 Job Satisfaction in the Military

- ! An estimated 65.3% of military personnel indicated they were either “satisfied” or “very satisfied” overall with their current work assignment. Satisfaction was highest in the Air Force (72.0%) and lowest in the Army (60.9%). Males and females indicated similar job satisfaction. Older personnel and officers were more satisfied with their current work assignments than their counterparts (Table 9.11).
- ! Air Force personnel were most likely to indicate that they would be “likely” or “very likely” to choose to remain on active duty if given the choice (65.0%), followed by the Army (51.6%), Navy (50.5%), and Marine Corps (43.7%) (Table 9.12).

9.6.5 Religiosity/Spirituality in the Military

- ! The 2002 DoD survey is the first in the series to address religiosity/spirituality of personnel. An estimated 20% of military personnel were categorized as being highly religious or spiritual. More than half (56%) were categorized as having a medium level of religiosity/spirituality, and nearly one-fourth of personnel were categorized as having low religiosity/spirituality (Table 9.13).
- ! Highly religious/spiritual personnel were significantly less likely than those categorized as medium or low to perceive “a lot” of stress in their family.
- ! Personnel with high religiosity/spirituality were significantly less likely to indicate that they had seriously considered suicide in the year prior to the survey than personnel categorized with low levels of religiosity/spirituality.

Taken together, these findings on health issues of special interest from the 2002 DoD survey suggest areas that will require further attention in coming years, particularly 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. Additionally, the relationship between heavy alcohol use and gambling problems suggests that those undergoing care for alcohol problems also should be screened for gambling problems. Efforts to increase overall job satisfaction across the DoD and perhaps specifically within the Marine Corps may be warranted. Finally, additional investigation into the relationship between physical and mental health of military personnel and religiosity/spirituality should be undertaken.

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APPENDIX A

SAMPLING DESIGN

APPENDIX A

SAMPLING DESIGN

In this appendix, we describe the methodology used to develop and implement the sampling design for the 2002 Department of Defense (DoD) Survey of Health Related Behaviors Among Military Personnel. 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 approach 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 January 2002 version of the Active Duty Master File (ADMF) maintained by the Defense Manpower Data Center (DMDC). The data file contained 24,362 unique duty ZIP-UIC combinations that accounted for 1,293,441 persons. We identified and discarded 306 records (6,638 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 99.0% 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 1,000 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).

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 240 installations where 1,000 or more active-duty persons were stationed. These installations accounted for more than 1.10 million persons, or 85.2% of the active-duty population in 2002.

Many of the large installations (historically defined as those with a population exceeding 15,000 or containing 250 UICs or more) housed hundreds of operational units, making the coordination and notification of sample members within all the various UICs both 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. Within each large installation, we sorted the list by UIC identifier and sequentially combined the units to form the clusters. Subsequently, we treated the UIC clusters 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. 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.

Unlike previous surveys in this series, the 2002 DoD survey included the on-site group session sample and excluded the mail-only portion of the design. Data collection for this survey was initially implemented in September 2001; the survey was shut down after the terrorist attacks on September 11, 2001. In early 2002, it was decided to exclude the mail-only sample and focus the remaining project funds on the on-site component, which historically accounts for the largest portion of the analysis cases. Analysis of the 1998 data concluded that excluding the mail-only sample did not significantly impact the study estimates on most of the analyses issues.

To compensate for lost expenditures resulting from the shutdown of data collection due to the September 11 attacks and still obtain an adequate sample size, the research team in consultation with DoD decided to reduce the number of installations by half and select more personnel at each installation.

A.1.2 Person-Level Sampling Frame

We selected a sample of 30 installations for the on-site group administrations from the installation-level frame based on the January 2002 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 available (May 2002) 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 the 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	296,194		36,621		332,815	
OCONUS	86,274		28,294		114,568	
	382,468	85.5%	64,915	14.5%	447,383	100.0%
Navy						
CONUS	129,069		46,566		175,635	
OCONUS	44,743		17,771		62,514	
Afloat ^b	111,578		1,472		113,050	
	285,390	81.3%	65,809	18.7%	351,199	100.0%
Marine Corps						
CONUS	111,238		21,138		132,376	
OCONUS	18,752		3,547		22,299	
	129,990	84.0%	24,685	16.0%	154,675	100.0%
Air Force						
CONUS	250,156		16,436		266,592	
OCONUS	54,793		10,414		65,207	
	304,949	91.9%	26,850	8.1%	331,799	100.0%
Total DoD	1,102,797	85.8%	182,259	14.2%	1,285,056	100.0%

Note: CONUS = in the continental United States; OCONUS = outside the continental United States.

^aOn-site administrations were done at duty locations with 1,000 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, May 2002 Active Duty Master File.

The sample design of the 2002 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 2002 DoD survey, the variance of the estimated proportion from domain d can be expressed as follows:

$$\begin{aligned} Var(\bar{y}_d) &= \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{n_h} \left\{ \sum_{i=1}^{N_h} z_{hi} \left(\frac{Y_{dhi}}{z_{hi}} - Y_{dh} \right)^2 + \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{Var(\hat{y}_{hij})}{z_{hi}} \right\} \\ &= \frac{1}{M_d^2} \sum_{h=1}^8 \left\{ \sum_{i=1}^{N_h} z_{hi} \left(\frac{Y_{dhi}}{z_{hi}} - Y_{dh} \right)^2 \right\} + \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{n_h} \left\{ \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{Var(\hat{y}_{hij})}{z_{hi}} \right\} \quad (4) \\ &= Var_{PSU}(\bar{y}_d) + Var_{SSU}(\bar{y}_d) . \end{aligned}$$

If the SSUs are drawn by stratified simple random sampling, then

$$\begin{aligned} Var_{SSU}(\bar{y}_d) &= \frac{1}{M_d^2} \sum_{h=1}^8 \frac{1}{N_h} \left\{ \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{M_{hij}^2 (1 - f_{hij})}{z_{hi}} \frac{S_{hij}^2}{m_{hij}} \right\} \\ &= \frac{1}{M_d^2} \sum_{h=1}^8 \sum_{j \in D_d} \sum_{i=1}^{N_h} \frac{M_{hij}^2 (1 - f_{hij}) S_{hij}^2}{\pi_{hi} m_{hij}}. \end{aligned}$$

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

$$Var_{SSU}(\bar{y}_d) = \frac{1}{M_d^2} \sum_{h=1}^H \sum_{j \in D_d} \sum_{i=1}^N \frac{M_{hij} M_{hj} (1 - f_{hij}) S_{hij}^2}{m_{hj}}. \quad (5)$$

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_{hi} , 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_{2hj} 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 1998 DoD survey and successfully implemented in the 2002 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 variance constraints and the domains on which constraints were imposed are given in Table A.3.

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 sample allocation from the constrained optimization is given in Table A.5.

Initially, the study was designed to have 60 installations and to be fielded in the fall of 2001, beginning in September. The events of September 11, 2001, resulted in the data collection being terminated and postponed for a year. We did a redesign for 2002 because of limited funding to conduct the study. Given the need to focus the remaining project funds on the data collection methodology that maximized the number of completed questionnaires, we decided to cut the optimal number of installations (60) in half and to increase the optimal sample size on average within the selected installations. We calculated that the revised design would double or triple the 95% confidence interval widths for the estimates compared with the 1998 results and determined this to be an acceptable risk.

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:

$$S_{hi} = \sum_{j=1}^{12} f_{hj} N_{hij}, \quad \text{for } i = 1, 2, \dots, n_h, \quad h = 1, 2, \dots, 8, \quad (9)$$

Table A.2 Outcome Groups Used in Calculation of Variance Constraints for 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: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

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.

Table A.3 Variance Constraints Used in Sample Allocation

	Alcohol	Drug	Smoking
Service			
Army	6.77	8.76	6.63
Navy	9.98	6.50	11.40
Marine Corps	9.13	10.02	8.27
Air Force	7.59	4.65	7.73
Rank			
E2-E3	4.85		4.65
E4-E6	4.69		4.99
E7-E9	5.33		6.22
W1-W5	21.15		9.15
O1-O3	9.46	5.03	8.77
O4-O10	13.80	5.63	8.74
Service x Gender			
DoD, male	4.28		4.19
Army, male	8.14		10.77
Navy, female	11.93		27.37
Marine, female	12.04		17.47
Air Force, female	16.13		14.16

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

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, 30 FSUs were selected from the January 2002 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 May 2002 version of the ADMF file in combination with 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 1998 DoD survey. We inflated the sample sizes by an additional factor to account for a higher PCS rate due to a fall data collection period.

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

Table A.4 Design Constraints Used in Sample Allocation

Design Constraints	Target	Achieved
Constraints on the Number of FSUs		
Minimum number of FSUs per stratum ($\geq$)	2	2.0
Total number of FSUs ($\leq$)	65	58.5
Maximum number of FSUs per Service ($\leq$)	18	15.8
Maximum number of FSUs for Army OCONUS ($<$)	6	6.0
Maximum number of FSUs for Navy OCONUS ($\leq$)	6	6.0
Maximum number of FSUs for Marine OCONUS ($\leq$)	2	2.0
Maximum number of FSUs for Air Force OCONUS ($\leq$)	4	4.0
Minimum number of FSUs per Service ($\geq$)	12	13.5
Constraints on the Number of SSUs		
Maximum total SSUs ($\leq$)	18,000	18,000.0
Minimum SSUs per cell ($\geq$)		
Male	2	12.5
Female	1	1.7
Maximum SSUs per cell ($\geq$)		
Male	1,300	1,017.8
Female	300	300.0
Minimum number of DoD female SSUs ($\geq$)	4,000	4,000.0
Minimum number of SSUs per FSU ($\geq$)	250	275.0
Maximum number of SSUs per FSU ($\leq$)		
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: FSU = first-stage sampling unit; OCONUS = outside the continental United States; CONUS = in the continental United States; SSU = second-stage sampling unit.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

Table A.5 Rounded Sample Allocation From the Constrained Optimization for the First- and Second-Stage Sample Sizes

	Army			Navy			Marine Corps			Air Force		
	CONUS	OCONUS		CONUS	OCONUS ^a		CONUS	OCONUS		CONUS	OCONUS	DoD
	6	2		6	2		5	2		5	2	30
FSUs per Cost Stratum												
Males												
E2-E3	335	260		395	260		745	175		215	165	2,550
E4-E6	760	645		795	645		850	175		795	475	5,140
E7-E9	355	330		485	360		625	105		625	225	3,110
W1-W5	225	115		45	45		100	18				548
O1-O3	240	120		230	140		240	60		270	110	1,410
O4-O10	175	105		195	135		195	50		245	100	1,200
Females												
E2-E3	175	85		130	155		195	40		195	75	1,050
E4-E6	275	155		255	215		195	35		295	125	1,550
E7-E9	145	65		105	35		35	8		80	40	513
W1-W5	30	10		8	8		8	5				69
O1-O3	135	30		115	20		30	8		125	20	483
O4-O10	85	12		150	15		8	5		70	20	365
Summary												
FSUs/SSUs per Service	16	4,867		16	4,941		14	3,910		14	4,270	60 17,988
Total SSUs per stratum	2,935	1,932		2,908	2,033		3,226	684		2,915	1,355	17,988
Average SSUs per FSU	294	322		291	339		269	342		292	339	300
Total females per stratum	845	357		763	448		471	101		765	280	4,030
Total males per stratum	2,090	1,575		2,145	1,585		2,755	583		2,150	1,075	13,958
Females/males per Service	1,202	3,665		1,211	3,730		572	3,338		1,045	3,225	4,030 13,958
Percent of females/males	24.7%	75.3%		24.5%	75.5%		14.6%	85.4%		24.5%	75.5%	22.4% 77.6%
Total officers/enlisted	1,282	3,585		1,106	3,835		727	3,183		960	3,310	4,075 13,913
Percent of officers/enlisted	26.3%	73.7%		22.4%	77.6%		18.6%	81.4%		22.5%	77.5%	22.7% 77.3%

Note: CONUS = in the continental United States; OCONUS = outside the continental United States; FSU = first-stage sampling unit; SSU = second-stage sampling unit.
^aOCONUS and afloat personnel.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002.

independent stratified random samples of active-duty members within each FSU. Overall, we selected a total of 29,787 active-duty members for the on-site administration of the survey.

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APPENDIX B

SAMPLE WEIGHTING AND ESTIMATION PROCEDURES

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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

$$\pi_{hi} = n_h \cdot S_{hi} / S_{h+} , \quad (1)$$

where

- n_h = number of FSUs selected from the h^{th} stratum,
- S_{hi} = 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

$$\pi_{k | hij} = \text{Min}[1, m_{hij} / M_{hij}] , \quad (2)$$

where

- M_{hij} = 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_{hij} = 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

$$w_{hijk} = [\pi_{hi} \cdot \pi_{k|hij}]^{-1} . \quad (3)$$

We assigned the initial sampling weight to each of the 29,787 personnel selected for the sample.

B.1.2 Adjustments for Survey Eligibility

As in previous surveys in this series, the 2002 DoD survey population comprised all military personnel on active duty in January 2003 and who were still on active duty when we conducted the survey (**September 2002 through mid-February 2003**). 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 January 2003 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 25 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:

$$e_{hijk} = \begin{cases} 1 & \text{if he/she was eligible for the survey, and} \\ 0 & \text{otherwise.} \end{cases}$$

We set this indicator to 1 for the sampled members of 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

$$\hat{N}_{ec} = \frac{\sum_{h \in c} \sum_{i \in h} \sum_{k \in j} w_{hijk} \cdot e_{hijk}}{\sum_{h \in c} \sum_{i \in h} \sum_{k \in j} w_{hijk}} \cdot N_c, \quad (4)$$

where

N_c = January 2003 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 (i.e., a questionnaire that contained enough information for weighting and analysis purposes). 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:

$$r_{hijk} = \begin{cases} 1 & \text{if he/she provided a usable questionnaire, and} \\ 0 & \text{otherwise.} \end{cases}$$

We set this indicator to 1 for the 12,756 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 :

$$A_c = \frac{\hat{N}_{ec}}{\sum_{h \in c} \sum_{i \in h} \sum_{k \in j} w_{hijk} \cdot r_{hijk}}. \quad (5)$$

Table B.1 Comparison of Total Personnel and Eligible Personnel

		Army			Navy			Marine Corps			Air Force			Total DoD		
		Total Personnel	Estimated Eligible Personnel		Total Personnel	Estimated Eligible Personnel		Total Personnel	Estimated Eligible Personnel		Total Personnel	Estimated Eligible Personnel		Total Personnel	Estimated Eligible Personnel	
E2-E3	Male	78,881	55,172 (8,150)		62,690	47,244 (4,965)		56,207	53,124 (17,189)		51,811	48,106 (14,124)		249,589	203,647 (24,208)	
	Female	16,095	12,847 (1,653)		14,736	11,224 (3,206)		3,716	4,374 (880)		16,616	15,627 (3,673)		51,163	44,072 (5,222)	
E4-E6	Male	203,651	176,524 (13,581)		170,606	132,111 (13,874)		62,181	56,702 (8,476)		134,971	116,428 (21,436)		571,409	481,765 (30,137)	
	Female	38,056	36,583 (4,270)		27,515	22,555 (3,173)		4,255	10,925 (2,683)		33,889	31,697 (3,842)		103,715	101,761 (7,089)	
E7-E9	Male	45,285	37,924 (4,575)		31,741	26,836 (2,052)		12,670	10,942 (1,309)		34,675	30,324 (3,884)		124,371	106,027 (6,476)	
	Female	5,608	6,069 (1,112)		2,474	2,476 (622)		660	170 (79)		4,202	7,265 (2,416)		12,944	15,980 (2,732)	
W1-W5	Male	10,871	9,292 (1,684)		1,682	1,312 (257)		1,727	1,362 (226)		NA	NA		14,280	11,966 (1,719)	
	Female	825	903 (348)		90	87 (23)		104	397 (153)		NA	NA		1,019	1,387 (380)	
O1-O3	Male	32,298	21,564 (2,292)		26,666	20,040 (2,470)		9,546	7,898 (1,615)		32,328	25,992 (4,361)		100,838	75,494 (5,743)	
	Female	7,203	5,447 (843)		5,127	4,093 (1,555)		746	861 (287)		8,691	7,215 (712)		21,767	17,615 (1,928)	
O4-O10	Male	23,337	15,066 (3,853)		18,142	15,033 (4,232)		5,757	4,578 (2,239)		25,975	21,789 (7,108)		73,211	56,466 (9,396)	
	Female	3,484	2,440 (906)		2,913	2,463 (1,153)		141	11 (133)		4,124	3,989 (1,199)		10,662	8,904 (1,898)	
Total		465,594	379,831 (26,481)		364,382	285,475 (25,946)		157,710	151,344 (23,731)		347,282	308,433 (38,009)		1,334,968	1,125,083 (58,157)	

Note: Total personnel is the number of personnel, excluding cadets, midshipmen, and basic trainees, who were on active duty as of January 2003. 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, 2002.

Then we applied the adjustment factor to the initial sampling weight of each respondent to obtain the following adjusted weight:

$$w_{hijk}^* = A_c \cdot w_{hijk} \cdot r_{hijk} . \quad (6)$$

Nonzero values of this weight were assigned to the 12,756 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 2002 survey. We produced estimates for different reporting domains, such as sociodemographic 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 1998 and 2002. 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 Research Triangle Institute for the specific purpose of analyzing data from complex surveys (Research Triangle Institute, 2002). 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).

References for Appendix B

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APPENDIX C

ESTIMATED SAMPLING ERRORS

APPENDIX C

ESTIMATED SAMPLING ERRORS

The procedures and methodology used for the 2002 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 2002 survey, over 1.2 million officers and enlisted personnel in the four Services were on active duty worldwide. Samples of 12,756 such military personnel generally clustered at a sample of 240 central installations with 1,000 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 33.8%, with a standard error of 1.3%, of the military personnel in the 2002 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 31.3% and 36.3%. 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 1998 and 2002 in the percentages of all military personnel whom we classified as smokers as 3.9% (Table 3.1), and we have computed the 95% confidence limits for that difference as $\pm 3.0\%$ of that estimate. In other words, we can be 95% certain that the true difference between the 2 years’ populations is somewhere between 3.0% below the estimated difference and 3.0% above it. Because that range does not include zero difference between the 2 survey years, at the 95% level the estimated difference is significantly different from zero, or just “significant.” If the interval had been larger (i.e., included 0.0), the difference would have been “not 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 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

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APPENDIX D

SUPPLEMENTAL TABLES

Table D.1 Substance Use Summary for the Army, 1980-2002

Measure	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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)	23.9 (1.0) ^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)	18.3 (0.9) ^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)	16.8 (1.0) ^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)	22.3 (0.6) ^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)	18.8 (2.1)
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)	4.8 (0.9) ^c
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)	10.4 (1.7) ^c
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)	35.6 (1.9) ^{b,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	14.5 (0.7) ^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)	10.3 (1.1) ^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	16.0 (1.4) ^c
Dependence symptoms ^e	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)	
Dependence symptoms ^f								13.0 (1.6)

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced by each algorithm.

^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, 1998, and 2002.

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

^cComparisons between 1980 and 2002 are statistically significant at the 95% confidence level.

^dThis estimate was incorrectly reported as 8.3 (1.2) in the 1995 report.

^eHaving experienced alcohol dependence symptoms on at least 48 days during the past year.

^fHaving experienced four or more alcohol dependence symptoms at any time during the past year.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Alcohol Drinking Levels, Q15-Q18 and Q20-Q23; Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62; Cigarette Use, Past 30 Days: Any Smoking, Q45 and Q47, Heavy Smoking, Q46; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35).

Table D.2 Substance Use Summary for the Navy, 1980-2002

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	2002
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)	22.4 (0.8) ^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)	18.4 (1.1) ^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)	18.0 (1.1)
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)	22.9 (0.8) ^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	18.3 (1.2) ^{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)	3.7 (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)	7.1 (0.3) ^{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)	36.0 (2.4) ^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	13.3 (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)	10.8 (1.2) ^{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)	22.8 (1.5) ^{b,c}
Dependence symptoms ^e	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}
Dependence symptoms ^f							13.0 (0.7)

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced by each algorithm.

^aAny nonmedical use of marijuana, PCP, LSD/hallucinogens, cocaine, amphetamines/stimulants, tranquilizers, barbiturates/sedatives, heroin/other opiates, analgesics, or inhalants.

^b“Designer” drugs also are included for 1988, 1992, 1995, 1998, and 2002.

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

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

^eThis estimate was incorrectly reported as 9.1 (3.9) in the 1995 report.

^fHaving experienced alcohol dependence symptoms on at least 48 days during the past year.

^gHaving experienced four or more alcohol dependence symptoms at any time during the past year.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Alcohol Drinking Levels, Q15-Q18 and Q20-Q23; Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62; Cigarette Use, Past 30 Days: Any Smoking, Q45 and Q47, Heavy Smoking, Q46; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35).

Table D.3 Substance Use Summary for the Marine Corps, 1980-2002

Measure	Year of Survey							
	1980	1982	1985	1988	1992	1995	1998	2002
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}	18.8 (1.1) ^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}	15.5 (1.6) ^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)	16.0 (1.1)
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	22.1 (1.4) ^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)	27.7 (4.3)
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	3.8 (0.5) ^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	7.9 (1.3) ^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	38.7 (4.1) ^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	14.6 (2.4) ^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	15.2 (3.7) ^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	23.7 (3.3) ^c
Dependence symptoms ^e	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)	
Dependence symptoms ^f								20.3 (3.6)

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced by each algorithm.

^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, 1998, and 2002.

^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.

^eHaving experienced alcohol dependence symptoms on at least 48 days during the past year.

^fHaving experienced four or more alcohol dependence symptoms at any time during the past year.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Alcohol Drinking Levels, Q15-Q18 and Q20-Q23; Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62; Cigarette Use, Past 30 Days: Any Smoking, Q45 and Q47, Heavy Smoking, Q46; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35).

Table D.4 Substance Use Summary for the Air Force, 1980-2002

Measure	Year of Survey						
	1980	1982	1985	1988	1992	1995	2002
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	24.4 (1.9) ^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)	19.5 (0.7) ^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)	20.3 (0.8) ^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)	23.5 (1.0) ^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)	12.3 (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)	1.0 (0.2) ^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)	1.8 (0.3) ^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	27.0 (2.7) ^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	10.4 (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)	4.9 (0.5) ^{b,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)	10.6 (1.0) ^c
Dependence symptoms ^e	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)
Dependence symptoms ^f							6.8 (0.6)

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 2002. 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 in 1998. Heavy alcohol use estimates made after 1995 take into account 32- and 40-ounce containers. Estimates for heavy alcohol use prior to 1998 did not take into account 40-ounce containers. Therefore, the 1998 and 2002 estimates differ slightly from those reported in previous DoD survey reports. To compare the effects of changing the algorithm, Tables D.17 through D.21 show estimates produced by each algorithm.

^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, 1998, and 2002.

^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.

^eHaving experienced alcohol dependence symptoms on at least 48 days during the past year.

^fHaving experienced four or more alcohol dependence symptoms at any time during the past year.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1980 to 2002 (2002 Questions: Alcohol Drinking Levels, Q15-Q18 and Q20-Q23; Any Illicit Drug Use: Past 30 Days, Q60 and Q62, Past 12 Months, Q60, Q61, and Q62; Cigarette Use, Past 30 Days: Any Smoking, Q45 and Q47, Heavy Smoking, Q46; Alcohol Use Negative Effects, Past 12 Months: Serious Consequences, Q36 and Q38, Productivity Loss, Q34, Dependence Symptoms, Q35).

Table D.5 Drinking Level, Total DoD, by Sociodemographic Characteristics

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy	
Gender										
Male	21.2	(0.8)	16.6	(0.5)	17.6	(0.6)	24.2	(0.5)	20.3	(1.2)
Female	31.4	(1.2)	26.5	(1.0)	19.5	(0.6)	15.5	(0.6)	7.1	(0.8)
Race/Ethnicity										
White, non-Hispanic	19.6	(1.0)	17.7	(0.6)	19.0	(0.6)	24.1	(0.6)	19.6	(1.2)
African American, non-Hispanic	32.4	(1.3)	18.5	(0.9)	15.1	(1.0)	20.7	(0.8)	13.3	(1.4)
Other	25.2	(1.0)	21.0	(0.8)	17.1	(1.4)	18.7	(1.3)	18.0	(1.3)
Education										
High school or less	22.4	(0.9)	16.7	(0.9)	14.9	(0.5)	19.6	(0.7)	26.5	(1.5)
Some college	23.7	(1.0)	19.0	(0.8)	17.4	(0.7)	23.2	(0.8)	16.7	(0.8)
College graduate or higher	22.3	(1.2)	19.6	(1.1)	24.7	(1.1)	27.4	(1.0)	6.0	(0.7)
Age										
20 or younger	33.3	(2.3)	15.7	(1.0)	10.4	(1.4)	14.4	(1.4)	26.1	(2.4)
21-25	17.1	(1.0)	16.2	(0.8)	15.7	(0.6)	22.7	(0.7)	28.4	(1.1)
26-34	21.4	(0.9)	20.6	(1.0)	21.5	(0.8)	24.8	(0.7)	11.7	(0.9)
35 or older	26.8	(1.2)	19.8	(0.5)	21.2	(1.0)	25.1	(0.8)	7.1	(0.5)
Family Status										
Not married ^a	20.6	(1.2)	15.5	(0.8)	15.1	(0.6)	23.0	(0.6)	25.8	(1.4)
Married, spouse not present	22.2	(1.5)	18.7	(1.7)	17.3	(1.2)	21.2	(1.9)	20.6	(1.4)
Married, spouse present	25.1	(0.7)	20.6	(0.6)	20.5	(0.7)	22.7	(0.6)	11.1	(0.8)
Pay Grade										
E1-E3	25.2	(1.6)	14.0	(1.1)	12.7	(1.1)	17.4	(0.9)	30.8	(1.9)
E4-E6	22.2	(0.7)	19.7	(0.7)	17.2	(0.5)	22.3	(0.6)	18.7	(0.8)
E7-E9	27.1	(1.3)	19.3	(0.7)	20.0	(1.1)	26.0	(1.0)	7.6	(0.5)
W1-W5	20.7	(1.7)	14.6	(1.2)	24.5	(3.4)	31.9	(1.5)	8.3	(1.4)
O1-O3	18.1	(1.3)	18.4	(1.5)	26.1	(1.6)	30.4	(2.0)	7.1	(1.0)
O4-O10	21.4	(1.9)	20.3	(1.7)	28.0	(2.0)	28.3	(2.0)	2.0	(0.5)
Region										
CONUS ^b	24.2	(1.0)	18.6	(0.6)	17.9	(0.6)	22.5	(0.5)	16.9	(1.6)
OCONUS ^c	20.2	(0.6)	17.6	(1.0)	18.1	(0.9)	23.4	(0.7)	20.7	(0.8)
Total	23.0	(0.7)	18.3	(0.5)	17.9	(0.5)	22.7	(0.4)	18.1	(1.1)

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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Drinking Level, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.6 Drinking Level for the Army, by Sociodemographic Characteristics

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy	
Gender										
Male	21.6	(1.2)	16.8	(1.0)	16.8	(1.3)	23.8	(0.8)	21.1	(2.3)
Female	35.5	(1.4)	25.7	(1.8)	16.9	(1.0)	14.6	(0.6)	7.3	(1.8)
Race/Ethnicity										
White, non-Hispanic	19.2	(1.4)	18.0	(1.4)	17.7	(1.3)	24.0	(0.5)	21.1	(2.2)
African American, non-Hispanic	34.2	(2.4)	17.0	(1.1)	14.2	(1.9)	20.0	(1.0)	14.7	(3.0)
Other	24.0	(1.0)	22.8	(1.2)	18.2	(3.2)	18.7	(3.1)	16.4	(1.2)
Education										
High school or less	22.0	(1.3)	18.1	(1.4)	14.8	(1.0)	17.0	(0.9)	28.0	(1.9)
Some college	25.4	(1.7)	18.5	(1.5)	15.7	(1.3)	24.6	(1.6)	15.7	(1.8)
College graduate or higher	24.1	(2.5)	17.9	(2.6)	23.3	(2.5)	27.1	(1.6)	7.6	(1.5)
Age										
20 or younger	27.5	(2.6)	15.1	(1.6)	13.4	(2.4)	13.0	(2.3)	31.0	(2.1)
21-25	19.0	(1.8)	17.4	(1.5)	14.9	(1.3)	20.8	(1.4)	28.0	(1.6)
26-34	23.0	(1.6)	21.6	(1.4)	18.0	(1.3)	24.3	(1.2)	13.1	(1.9)
35 or older	30.1	(2.5)	16.5	(1.2)	19.7	(1.6)	26.8	(1.8)	6.9	(1.2)
Family Status										
Not married ^a	20.1	(0.8)	15.9	(1.1)	14.8	(1.3)	22.8	(1.1)	26.4	(2.2)
Married, spouse not present	25.2	(2.5)	16.0	(3.0)	17.3	(1.2)	20.9	(2.9)	20.6	(2.2)
Married, spouse present	26.7	(1.3)	20.4	(1.2)	18.2	(1.3)	22.0	(0.9)	12.7	(1.8)
Pay Grade										
E1-E3	23.1	(2.4)	13.8	(2.5)	13.9	(1.7)	15.2	(1.9)	33.9	(2.1)
E4-E6	23.8	(1.3)	20.1	(1.3)	15.4	(1.0)	21.1	(0.8)	19.6	(1.6)
E7-E9	30.4	(3.0)	16.7	(1.4)	19.2	(2.0)	27.3	(1.7)	6.4	(0.9)
W1-W5	20.3	(2.0)	14.4	(1.3)	23.5	(4.2)	33.1	(1.7)	8.7	(1.7)
O1-O3	15.3	(1.3)	19.6	(2.7)	21.9	(2.0)	33.6	(2.8)	9.5	(2.5)
O4-O10	27.0	(4.2)	17.1	(5.3)	27.0	(4.1)	27.8	(4.9)	+	(+)
Region										
CONUS ^b	25.6	(1.3)	18.6	(1.0)	16.0	(1.3)	22.0	(0.8)	17.7	(2.7)
OCONUS ^c	19.1	(0.8)	17.3	(2.1)	18.8	(1.1)	23.1	(0.2)	21.7	(2.2)
Total	23.9	(1.0)	18.3	(0.9)	16.8	(1.0)	22.3	(0.6)	18.8	(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.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Drinking Level, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.7 Drinking Level for the Navy, by Sociodemographic Characteristics

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy	
Gender										
Male	21.5	(0.8)	17.1	(1.0)	17.4	(1.3)	24.1	(0.8)	20.0	(1.2)
Female	27.3	(1.3)	26.2	(1.1)	21.4	(1.1)	16.3	(1.2)	8.8	(1.5)
Race/Ethnicity										
White, non-Hispanic	19.4	(0.8)	17.4	(0.9)	19.6	(1.3)	24.1	(0.7)	19.5	(1.8)
African American, non-Hispanic	29.7	(1.7)	19.0	(2.5)	14.0	(0.6)	23.1	(1.3)	14.2	(0.6)
Other	25.5	(1.7)	22.1	(1.3)	16.1	(1.0)	17.5	(2.1)	18.7	(1.7)
Education										
High school or less	22.5	(0.8)	17.0	(1.6)	14.5	(0.7)	21.4	(1.5)	24.7	(0.3)
Some college	22.7	(1.1)	18.5	(0.9)	18.0	(1.7)	23.1	(1.0)	17.7	(1.7)
College graduate or higher	21.2	(1.5)	21.7	(2.3)	26.0	(1.5)	25.9	(1.4)	5.2	(1.4)
Age										
20 or younger	35.5	(0.5)	18.5	(1.2)	8.7	(3.7)	14.9	(3.9)	22.5	(0.7)
21-25	14.4	(0.6)	16.1	(1.1)	16.4	(0.6)	24.0	(1.1)	29.0	(1.8)
26-34	22.2	(1.1)	19.4	(2.9)	21.1	(0.8)	26.4	(1.7)	10.9	(1.4)
35 or older	25.2	(1.7)	20.6	(1.2)	22.6	(1.4)	22.7	(1.5)	9.0	(0.9)
Family Status										
Not married ^a	21.1	(1.6)	17.6	(1.6)	14.9	(0.5)	21.7	(0.7)	24.8	(1.2)
Married, spouse not present	24.1	(1.0)	17.6	(0.7)	17.3	(2.4)	21.7	(3.4)	19.3	(1.7)
Married, spouse present	23.5	(0.4)	19.5	(1.2)	21.5	(1.7)	24.4	(1.5)	10.9	(1.4)
Pay Grade										
E1-E3	25.9	(1.0)	16.0	(1.7)	12.1	(3.5)	18.2	(1.9)	27.9	(2.8)
E4-E6	22.1	(0.6)	18.6	(1.3)	16.8	(0.6)	22.8	(1.5)	19.7	(0.9)
E7-E9	22.0	(2.5)	21.3	(0.9)	21.9	(1.6)	22.6	(1.3)	12.2	(1.0)
W1-W5	14.0	(4.5)	13.4	(4.7)	+	(+)	36.7	(5.1)	+	(+)
O1-O3	20.3	(1.6)	17.8	(2.8)	25.9	(1.8)	29.5	(4.8)	6.4	(1.9)
O4-O10	17.0	(2.6)	22.0	(2.5)	29.6	(2.8)	29.9	(2.2)	1.5	(0.8)
Region										
CONUS ^b	24.3	(0.6)	20.2	(1.8)	19.0	(1.4)	22.4	(1.1)	14.1	(3.1)
OCONUS ^c	21.1	(1.1)	17.3	(1.5)	17.4	(1.7)	23.2	(1.1)	21.0	(1.0)
Total	22.4	(0.8)	18.4	(1.1)	18.0	(1.1)	22.9	(0.8)	18.3	(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.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Drinking Level, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.8 Drinking Level for the Marine Corps, by Sociodemographic Characteristics

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy	
Gender										
Male	17.3	(0.9)	14.3	(1.2)	16.0	(1.2)	22.7	(1.7)	29.7	(4.1)
Female	30.4	(1.0)	24.8	(3.6)	15.8	(1.5)	17.7	(1.7)	11.3	(2.1)
Race/Ethnicity										
White, non-Hispanic	15.2	(1.3)	14.9	(1.5)	16.1	(1.2)	23.3	(1.8)	30.5	(4.6)
African American, non-Hispanic	31.9	(1.8)	17.7	(3.1)	16.6	(1.7)	19.6	(2.7)	14.3	(1.6)
Other	23.6	(2.8)	15.8	(1.2)	14.1	(2.8)	19.0	(1.6)	27.5	(5.9)
Education										
High school or less	18.3	(0.6)	13.2	(1.6)	13.2	(0.5)	21.1	(1.9)	34.2	(3.9)
Some college	19.3	(1.7)	18.4	(2.0)	18.1	(1.9)	20.7	(2.1)	23.5	(2.8)
College graduate or higher	19.3	(2.5)	16.9	(1.4)	22.2	(2.6)	31.9	(1.2)	9.7	(3.3)
Age										
20 or younger	23.8	(3.7)	12.8	(2.4)	10.7	(0.9)	17.3	(2.5)	35.4	(7.2)
21-25	14.2	(1.0)	13.8	(1.9)	14.9	(1.0)	22.1	(1.9)	35.0	(3.4)
26-34	21.0	(2.4)	18.9	(2.0)	19.9	(2.0)	23.5	(1.4)	16.8	(2.6)
35 or older	23.3	(2.4)	19.6	(1.6)	21.6	(2.9)	27.6	(1.9)	7.8	(1.7)
Family Status										
Not married ^a	16.9	(1.2)	10.8	(1.7)	12.6	(1.0)	22.4	(1.9)	37.4	(4.9)
Married, spouse not present	10.7	(2.6)	20.7	(3.3)	14.5	(2.8)	20.6	(3.5)	33.6	(2.6)
Married, spouse present	22.1	(1.6)	20.6	(1.5)	20.2	(2.0)	22.0	(1.0)	15.0	(2.3)
Pay Grade										
E1-E3	17.5	(0.5)	12.2	(2.2)	12.2	(0.8)	19.1	(2.2)	38.9	(4.0)
E4-E6	18.9	(1.8)	17.7	(1.5)	16.6	(1.4)	21.1	(1.7)	25.8	(3.0)
E7-E9	26.6	(1.9)	18.2	(1.5)	20.5	(2.9)	26.1	(1.0)	8.6	(2.1)
W1-W5	27.9	(3.5)	17.1	(3.7)	24.1	(3.9)	21.4	(2.8)	9.5	(2.8)
O1-O3	15.1	(2.9)	15.1	(1.8)	25.3	(3.1)	35.4	(3.8)	9.1	(2.6)
O4-O10	18.3	(2.5)	16.7	(3.5)	21.5	(1.6)	40.2	(3.1)	3.4	(1.4)
Region										
CONUS ^b	18.3	(1.2)	15.2	(1.8)	16.4	(1.3)	22.4	(1.5)	27.8	(4.8)
OCONUS ^c	22.3	(0.9)	17.7	(2.2)	12.7	(1.0)	20.5	(4.6)	26.8	(0.5)
Total	18.8	(1.1)	15.5	(1.6)	16.0	(1.1)	22.1	(1.4)	27.7	(4.3)

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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Drinking Level, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.9 Drinking Level for the Air Force, by Sociodemographic Characteristics

Sociodemographic Characteristic	Drinking Level									
	Abstainer		Infrequent/ Light		Moderate		Moderate/ Heavy		Heavy	
Gender										
Male	22.8	(2.0)	17.2	(0.8)	19.9	(0.8)	25.7	(1.1)	14.4	(1.2)
Female	30.2	(2.7)	28.0	(2.0)	21.7	(1.3)	15.3	(1.5)	4.8	(0.6)
Race/Ethnicity										
White, non-Hispanic	22.3	(2.5)	19.0	(0.9)	21.1	(1.1)	24.5	(1.4)	13.0	(1.3)
African American, non-Hispanic	31.9	(2.7)	21.5	(2.0)	17.5	(2.7)	20.1	(1.6)	9.0	(1.8)
Other	27.9	(3.0)	19.8	(1.9)	18.7	(2.8)	20.5	(1.4)	13.1	(1.9)
Education										
High school or less	28.0	(2.5)	17.2	(2.0)	18.0	(1.1)	20.2	(2.0)	16.6	(2.5)
Some college	24.0	(2.1)	20.1	(1.6)	18.6	(0.7)	22.6	(1.3)	14.6	(0.9)
College graduate or higher	22.2	(2.4)	20.2	(1.6)	25.5	(1.8)	27.7	(2.2)	4.4	(0.9)
Age										
20 or younger	49.3	(4.4)	15.9	(2.0)	7.6	(1.6)	13.2	(1.6)	14.0	(3.1)
21-25	19.7	(2.9)	16.4	(1.4)	16.5	(1.1)	24.2	(1.4)	23.1	(1.7)
26-34	18.9	(1.7)	20.7	(1.9)	27.0	(2.0)	24.6	(0.7)	8.8	(0.9)
35 or older	25.7	(2.1)	22.2	(0.5)	21.3	(2.0)	25.0	(0.9)	5.8	(0.8)
Family Status										
Not married ^a	23.0	(3.9)	15.9	(1.8)	17.2	(1.4)	25.2	(1.6)	18.8	(1.0)
Married, spouse not present	+	(+)	+	(+)	20.0	(5.2)	21.6	(6.9)	9.6	(4.0)
Married, spouse present	25.5	(1.5)	21.7	(0.8)	22.5	(0.9)	22.3	(1.2)	8.0	(0.8)
Pay Grade										
E1-E3	33.6	(3.4)	13.8	(1.8)	12.4	(2.3)	17.4	(1.6)	22.7	(1.4)
E4-E6	21.4	(1.5)	21.3	(1.0)	20.4	(0.9)	24.0	(0.8)	13.0	(0.6)
E7-E9	27.1	(1.0)	21.2	(1.6)	19.4	(2.0)	27.2	(2.3)	5.0	(0.7)
W1-W5	NA	(NA)	NA	(NA)	NA	(NA)	NA	(NA)	NA	(NA)
O1-O3	19.4	(3.2)	18.7	(2.8)	29.7	(3.4)	27.2	(3.4)	5.0	(1.0)
O4-O10	21.1	(3.3)	22.1	(1.9)	28.8	(3.6)	25.3	(2.8)	2.7	(0.6)
Region										
CONUS ^b	25.7	(2.3)	19.6	(0.9)	20.2	(1.0)	23.1	(1.1)	11.4	(1.3)
OCONUS ^c	18.9	(1.2)	19.0	(0.1)	20.6	(0.6)	25.2	(1.4)	16.3	(0.5)
Total	24.4	(1.9)	19.5	(0.7)	20.3	(0.8)	23.5	(1.0)	12.3	(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.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Drinking Level, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.10 Heavy Alcohol Use, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service									
	Army		Navy		Marine Corps		Air Force		Total DoD	
Gender										
Male	21.1	(2.3)	20.0	(1.2)	29.7	(4.1)	14.4	(1.2)	20.3	(1.2)
Female	7.3	(1.8)	8.8	(1.5)	11.3	(2.1)	4.8	(0.6)	7.1	(0.8)
Race/Ethnicity										
White, non-Hispanic	21.1	(2.2)	19.5	(1.8)	30.5	(4.6)	13.0	(1.3)	19.6	(1.2)
African American, non-Hispanic	14.7	(3.0)	14.2	(0.6)	14.3	(1.6)	9.0	(1.8)	13.3	(1.4)
Other	16.4	(1.2)	18.7	(1.7)	27.5	(5.9)	13.1	(1.9)	18.0	(1.3)
Education										
High school or less	28.0	(1.9)	24.7	(0.3)	34.2	(3.9)	16.6	(2.5)	26.5	(1.5)
Some college	15.7	(1.8)	17.7	(1.7)	23.5	(2.8)	14.6	(0.9)	16.7	(0.8)
College graduate or higher	7.6	(1.5)	5.2	(1.4)	9.7	(3.3)	4.4	(0.9)	6.0	(0.7)
Age										
20 or younger	31.0	(2.1)	22.5	(0.7)	35.4	(7.2)	14.0	(3.1)	26.1	(2.4)
21-25	28.0	(1.6)	29.0	(1.8)	35.0	(3.4)	23.1	(1.7)	28.4	(1.1)
26-34	13.1	(1.9)	10.9	(1.4)	16.8	(2.6)	8.8	(0.9)	11.7	(0.9)
35 or older	6.9	(1.2)	9.0	(0.9)	7.8	(1.7)	5.8	(0.8)	7.1	(0.5)
Family Status										
Not married ^a	26.4	(2.2)	24.8	(1.2)	37.4	(4.9)	18.8	(1.0)	25.8	(1.4)
Married, spouse not present	20.6	(2.2)	19.3	(1.7)	33.6	(2.6)	9.6	(4.0)	20.6	(1.4)
Married, spouse present	12.7	(1.8)	10.9	(1.4)	15.0	(2.3)	8.0	(0.8)	11.1	(0.8)
Pay Grade										
E1-E3	33.9	(2.1)	27.9	(2.8)	38.9	(4.0)	22.7	(1.4)	30.8	(1.9)
E4-E6	19.6	(1.6)	19.7	(0.9)	25.8	(3.0)	13.0	(0.6)	18.7	(0.8)
E7-E9	6.4	(0.9)	12.2	(1.0)	8.6	(2.1)	5.0	(0.7)	7.6	(0.5)
W1-W5	8.7	(1.7)	+	(+)	9.5	(2.8)	NA	(NA)	8.3	(1.4)
O1-O3	9.5	(2.5)	6.4	(1.9)	9.1	(2.6)	5.0	(1.0)	7.1	(1.0)
O4-O10	+	(+)	1.5	(0.8)	3.4	(1.4)	2.7	(0.6)	2.0	(0.5)
Region										
CONUS ^b	17.7	(2.7)	14.1	(3.1)	27.8	(4.8)	11.4	(1.3)	16.9	(1.6)
OCONUS ^c	21.7	(2.2)	21.0	(1.0)	26.8	(0.5)	16.3	(0.5)	20.7	(0.8)
Total	18.8	(2.1)	18.3	(1.2)	27.7	(4.3)	12.3	(1.0)	18.1	(1.1)

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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Heavy Alcohol Use, Q15-Q18 and Q20-Q23; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.11 Any Illicit Drug Use, Past 12 Months, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	11.1	(1.9)	7.3	(0.3)	8.0	(1.4)	1.4	(0.3)	7.2	(0.8)
Female	7.1	(0.9)	5.7	(0.7)	7.1	(0.2)	3.3	(0.7)	5.5	(0.4)
Race/Ethnicity										
White, non-Hispanic	10.6	(2.2)	7.1	(0.7)	7.7	(1.4)	1.7	(0.4)	6.7	(0.8)
African American, non-Hispanic	8.9	(2.2)	5.8	(0.9)	8.0	(1.2)	2.3	(0.6)	6.7	(1.1)
Other	12.8	(2.2)	8.6	(2.0)	9.2	(1.7)	1.5	(0.8)	8.6	(1.2)
Education										
High school or less	17.2	(2.0)	10.2	(0.4)	9.5	(1.2)	1.6	(0.8)	11.2	(1.1)
Some college	8.3	(1.8)	6.1	(0.5)	7.4	(1.5)	2.4	(0.5)	5.8	(0.7)
College graduate or higher	2.1	(0.6)	2.3	(0.7)	2.0	(0.9)	0.8	(0.2)	1.7	(0.3)
Age										
20 or younger	22.1	(3.0)	14.2	(0.9)	11.4	(1.1)	3.3	(1.6)	14.1	(1.5)
21-25	16.2	(2.2)	11.1	(0.5)	10.9	(1.6)	2.4	(0.5)	10.8	(1.0)
26-34	5.2	(0.9)	2.0	(0.7)	2.8	(0.7)	1.3	(0.5)	3.1	(0.4)
35 or older	3.1	(0.6)	2.7	(0.4)	0.8	(0.4)	1.3	(0.2)	2.2	(0.2)
Family Status										
Not married ^a	15.5	(2.5)	10.2	(0.3)	10.8	(2.0)	2.4	(0.4)	10.1	(1.0)
Married, spouse not present	12.3	(2.6)	6.4	(1.2)	8.9	(3.5)	3.3	(1.4)	8.6	(1.3)
Married, spouse present	6.3	(1.1)	3.8	(0.2)	4.3	(0.9)	1.3	(0.2)	4.0	(0.5)
Pay Grade										
E1-E3	23.2	(3.7)	14.3	(0.7)	14.1	(1.4)	3.0	(1.0)	13.9	(1.6)
E4-E6	10.4	(1.5)	7.0	(0.4)	5.4	(0.6)	2.0	(0.1)	6.8	(0.7)
E7-E9	1.5	(0.6)	0.9	(0.3)	0.7	(0.3)	0.3	(0.2)	0.9	(0.2)
W1-W5	1.5	(0.7)	**	(**)	+	(+)	NA	(NA)	1.3	(0.5)
O1-O3	2.9	(1.2)	2.0	(0.8)	1.1	(0.6)	0.8	(0.5)	1.8	(0.4)
O4-O10	0.8	(0.5)	2.2	(0.7)	+	(+)	1.4	(0.6)	1.4	(0.4)
Region										
CONUS ^b	10.4	(2.3)	4.1	(0.7)	8.3	(1.4)	1.8	(0.3)	6.4	(1.0)
OCONUS ^c	10.5	(0.9)	9.0	(**)	5.2	(0.8)	1.7	(0.4)	8.0	(0.3)
Total	10.4	(1.7)	7.1	(0.3)	7.9	(1.3)	1.8	(0.3)	6.9	(0.7)

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.

**Estimate rounds to zero.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Any Illicit Drug Use, Past 12 Months, Q60- Q62; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.12 Patterns of Cigarette Smoking, Past 30 Days, by Smoking Level

Smoking Level	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Didn't smoke	62.1	(2.2)	61.2	(2.3)	58.5	(4.5)	71.5	(2.9)	64.0	(1.4)
½ pack or less/day (1-15 cigarettes)	23.4	(1.9)	25.5	(1.4)	26.8	(2.4)	18.1	(1.9)	22.9	(1.0)
About 1 pack/day (16-25 cigarettes)	11.1	(0.5)	10.2	(1.0)	10.4	(1.6)	7.8	(0.9)	9.9	(0.5)
About 1½ packs/day (26-35 cigarettes)	2.0	(0.3)	1.9	(0.3)	2.9	(0.3)	1.7	(0.4)	2.0	(0.2)
About 2 or more packs/day (>36 cigarettes)	1.4	(0.2)	1.2	(0.2)	1.5	(0.6)	0.9	(0.1)	1.2	(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 Behaviors Among Military Personnel, 2002 (Smoking Level, Q46).

Table D.13 Any Cigarette Smoking, Past 30 Days, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	37.8	(2.2)	36.8	(2.4)	40.7	(3.9)	27.4	(2.7)	35.3	(1.3)
Female	24.9	(2.1)	31.2	(3.0)	22.8	(2.1)	25.4	(3.1)	26.3	(1.5)
Race/Ethnicity										
White, non-Hispanic	39.6	(2.4)	39.4	(1.9)	42.6	(4.4)	29.3	(2.7)	36.9	(1.3)
African American, non-Hispanic	25.9	(2.5)	25.0	(1.9)	24.1	(2.4)	19.6	(3.9)	24.2	(1.5)
Other	38.1	(1.4)	35.3	(3.3)	34.3	(4.9)	20.6	(1.4)	33.0	(1.5)
Education										
High school or less	48.8	(1.1)	46.4	(3.2)	46.6	(3.2)	40.8	(3.0)	46.4	(1.4)
Some college	34.1	(1.7)	36.7	(1.6)	35.9	(4.0)	29.4	(2.7)	33.3	(1.2)
College graduate or higher	12.8	(1.9)	11.5	(1.7)	10.5	(3.4)	11.3	(1.7)	11.8	(1.0)
Age										
20 or younger	47.3	(1.5)	46.1	(3.3)	48.5	(4.0)	37.6	(3.2)	45.3	(1.6)
21-25	44.6	(1.8)	45.7	(3.1)	45.1	(3.8)	35.8	(2.0)	43.0	(1.4)
26-34	32.2	(2.7)	28.2	(2.2)	29.4	(4.4)	25.5	(1.7)	29.1	(1.3)
35 or older	21.2	(1.4)	25.1	(2.0)	16.4	(1.5)	17.6	(3.3)	20.6	(1.4)
Family Status										
Not married ^a	41.1	(1.7)	42.2	(2.2)	45.5	(4.6)	35.4	(2.5)	40.7	(1.3)
Married, spouse not present	37.7	(4.1)	30.7	(4.9)	+	(+)	24.2	(7.1)	34.6	(2.9)
Married, spouse present	31.2	(2.4)	29.9	(2.3)	29.7	(3.2)	21.3	(2.3)	27.7	(1.2)
Pay Grade										
E1-E3	53.8	(2.7)	49.1	(3.0)	51.8	(2.9)	41.2	(2.3)	49.0	(1.6)
E4-E6	39.2	(2.0)	39.1	(2.6)	38.0	(3.2)	30.7	(2.2)	36.9	(1.2)
E7-E9	21.5	(0.7)	31.0	(0.8)	17.8	(1.9)	19.2	(3.5)	22.7	(1.2)
W1-W5	18.0	(3.5)	21.6	(7.2)	12.3	(3.0)	NA	(NA)	17.6	(2.8)
O1-O3	12.7	(3.1)	14.3	(2.4)	7.7	(2.8)	7.6	(1.9)	10.8	(1.3)
O4-O10	3.4	(1.2)	6.1	(1.5)	6.4	(1.3)	7.0	(0.9)	5.7	(0.7)
Region										
CONUS ^b	34.1	(2.6)	28.0	(4.1)	39.0	(4.6)	26.2	(3.3)	31.6	(1.7)
OCONUS ^c	39.8	(0.8)	41.1	(2.8)	36.9	(2.2)	30.3	(3.8)	38.7	(1.6)
Total	35.6	(1.9)	36.0	(2.4)	38.7	(4.1)	27.0	(2.7)	33.8	(1.3)

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 after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Any Cigarette Smoking, Past 30 Days, Q45 and Q47; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.14 Heavy Cigarette Smoking, Past 30 Days, by Sociodemographic Characteristics

Sociodemographic Characteristic	Service								Total DoD	
	Army		Navy		Marine Corps		Air Force			
Gender										
Male	16.1	(0.8)	14.3	(1.2)	15.6	(2.3)	11.0	(1.1)	14.2	(0.6)
Female	6.7	(0.5)	7.7	(1.1)	6.9	(1.6)	8.2	(1.1)	7.4	(0.5)
Race/Ethnicity										
White, non-Hispanic	19.1	(1.2)	16.1	(1.4)	17.8	(2.5)	12.4	(1.2)	16.1	(0.7)
African American, non-Hispanic	4.7	(0.7)	5.0	(2.0)	4.3	(1.3)	4.4	(1.6)	4.7	(0.7)
Other	13.5	(1.9)	11.9	(2.4)	9.2	(2.4)	3.7	(1.2)	10.3	(1.1)
Education										
High school or less	22.2	(1.0)	17.8	(0.9)	18.9	(2.5)	15.6	(2.3)	19.2	(0.8)
Some college	12.9	(0.7)	12.8	(0.9)	12.2	(3.3)	11.8	(1.2)	12.5	(0.6)
College graduate or higher	2.9	(0.9)	4.2	(1.2)	2.3	(1.1)	3.2	(0.8)	3.3	(0.5)
Age										
20 or younger	18.1	(1.1)	16.1	(1.7)	17.0	(2.0)	15.5	(2.6)	16.8	(0.9)
21-25	19.1	(1.0)	13.3	(0.6)	17.6	(2.4)	12.5	(1.7)	15.8	(0.7)
26-34	11.7	(1.2)	11.7	(1.9)	10.0	(3.1)	9.4	(1.2)	10.9	(0.8)
35 or older	10.0	(1.2)	13.1	(1.7)	8.2	(1.3)	7.8	(1.1)	9.9	(0.7)
Family Status										
Not married ^a	17.7	(0.7)	15.0	(1.1)	17.8	(2.7)	13.9	(1.6)	16.0	(0.7)
Married, spouse not present	16.3	(3.0)	13.4	(1.7)	15.7	(4.3)	12.8	(5.0)	14.8	(1.6)
Married, spouse present	11.8	(1.0)	11.3	(2.0)	10.6	(2.1)	7.9	(1.0)	10.4	(0.7)
Pay Grade										
E1-E3	24.9	(1.3)	17.5	(1.4)	20.0	(2.4)	15.9	(2.6)	19.8	(1.1)
E4-E6	15.4	(0.9)	13.9	(1.6)	14.0	(2.2)	11.9	(1.4)	14.0	(0.7)
E7-E9	10.2	(1.0)	16.6	(1.4)	7.8	(1.6)	9.1	(1.7)	11.2	(0.8)
W1-W5	6.6	(2.1)	9.1	(4.3)	7.4	(2.2)	NA	(NA)	7.0	(1.7)
O1-O3	0.5	(0.4)	3.5	(1.6)	0.5	(0.5)	0.8	(0.5)	1.4	(0.4)
O4-O10	**	(**)	1.7	(0.9)	2.8	(0.8)	2.3	(0.3)	1.6	(0.3)
Region										
CONUS ^b	13.7	(1.0)	11.8	(2.6)	15.0	(2.6)	10.0	(1.2)	12.5	(0.8)
OCONUS ^c	16.5	(0.4)	14.2	(0.8)	12.1	(3.0)	11.8	(1.4)	14.4	(0.5)
Total	14.5	(0.7)	13.3	(1.1)	14.6	(2.4)	10.4	(1.0)	13.1	(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.

**Estimate rounds to zero.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Heavy Cigarette Smoking, Q46; refer to Section 2.5.1 for descriptions of sociodemographic variables).

Table D.15 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	53.8	(2.7)	49.1	(3.0)	51.8	(2.9)	41.2	(2.3)	49.0 (1.6)
Heavy smoking	24.9	(1.3)	17.5	(1.4)	20.0	(2.4)	15.9	(2.6)	19.8 (1.1)
E4-E6									
Any smoking	39.2	(2.0)	39.1	(2.6)	38.0	(3.2)	30.7	(2.2)	36.9 (1.2)
Heavy smoking	15.4	(0.9)	13.9	(1.6)	14.0	(2.2)	11.9	(1.4)	14.0 (0.7)
E7-E9									
Any smoking	21.5	(0.7)	31.0	(0.8)	17.8	(1.9)	19.2	(3.5)	22.7 (1.2)
Heavy smoking	10.2	(1.0)	16.6	(1.4)	7.8	(1.6)	9.1	(1.7)	11.2 (0.8)
W1-W5									
Any smoking	18.0	(3.5)	21.6	(7.2)	12.3	(3.0)	NA	(NA)	17.6 (2.8)
Heavy smoking	6.6	(2.1)	9.1	(4.3)	7.4	(2.2)	NA	(NA)	7.0 (1.7)
O1-O3									
Any smoking	12.7	(3.1)	14.3	(2.4)	7.7	(2.8)	7.6	(1.9)	10.8 (1.3)
Heavy smoking	0.5	(0.4)	3.5	(1.6)	0.5	(0.5)	0.8	(0.5)	1.4 (0.4)
O4-O10									
Any smoking	3.4	(1.2)	6.1	(1.5)	6.4	(1.3)	7.0	(0.9)	5.7 (0.7)
Heavy smoking	**	(**)	1.7	(0.9)	2.8	(0.8)	2.3	(0.3)	1.6 (0.3)
Total DoD									
Any smoking	35.6	(1.9)	36.0	(2.4)	38.7	(4.1)	27.0	(2.7)	33.8 (1.3)
Heavy smoking	14.5	(0.7)	13.3	(1.1)	14.6	(2.4)	10.4	(1.0)	13.1 (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.

**Estimate rounds to zero.

Source: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Any Smoking, Past 30 Days, Q45 and Q47; Heavy Smoking, Q46).

Table D.16 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	(1.0)	10.4	(1.1)	22.9	(2.9)	11.0	(1.9)	14.6	(0.9)
Female	0.8	(0.3)	1.1	(0.3)	0.8	(0.6)	0.5	(0.3)	0.8	(0.2)
Race/Ethnicity										
White, non-Hispanic	19.1	(1.7)	12.2	(0.9)	25.3	(3.8)	11.0	(1.9)	15.9	(1.0)
African American, non-Hispanic	3.1	(0.9)	1.1	(0.3)	4.5	(0.5)	0.9	(0.8)	2.3	(0.4)
Other	13.2	(2.4)	5.7	(1.0)	11.8	(3.1)	4.0	(1.6)	8.8	(1.1)
Education										
High school or less	14.5	(1.6)	11.9	(2.1)	22.9	(3.3)	12.2	(3.3)	15.1	(1.4)
Some college	14.0	(1.0)	7.8	(1.1)	18.1	(2.9)	9.4	(1.5)	11.6	(0.7)
College graduate or higher	13.0	(1.5)	5.4	(1.6)	16.0	(2.9)	4.8	(0.8)	8.5	(0.7)
Age										
20 or younger	15.6	(1.8)	9.8	(2.7)	24.2	(3.9)	9.0	(3.8)	14.5	(1.8)
21-25	14.3	(2.3)	10.9	(2.4)	20.7	(3.3)	9.0	(2.1)	13.5	(1.3)
26-34	15.3	(1.5)	8.5	(1.5)	20.3	(3.6)	10.6	(1.4)	13.0	(0.8)
35 or older	10.6	(1.6)	6.7	(1.2)	13.4	(1.9)	6.7	(1.4)	8.4	(0.8)
Family Status										
Not married ^a	14.5	(1.7)	9.7	(1.3)	22.5	(4.6)	8.6	(2.2)	13.0	(1.3)
Married, spouse not present	6.9	(1.5)	2.5	(1.9)	16.5	(2.5)	9.9	(3.5)	7.2	(1.2)
Married, spouse present	14.3	(1.1)	9.3	(1.0)	18.3	(2.0)	8.8	(1.5)	12.0	(0.6)
Pay Grade										
E1-E3	17.2	(3.0)	9.5	(2.6)	25.4	(4.0)	10.4	(2.8)	15.6	(1.9)
E4-E6	13.2	(0.9)	9.4	(0.5)	17.9	(1.9)	10.3	(1.5)	12.0	(0.6)
E7-E9	13.4	(2.4)	9.6	(0.8)	14.5	(3.3)	6.5	(1.7)	10.5	(1.1)
W1-W5	10.4	(2.3)	11.2	(2.5)	11.7	(4.2)	NA	(NA)	10.7	(1.8)
O1-O3	16.0	(1.9)	7.4	(1.4)	19.3	(6.5)	4.4	(1.6)	10.0	(1.2)
O4-O10	+	(+)	5.7	(2.2)	15.2	(1.2)	4.8	(0.6)	7.7	(1.7)
Region										
CONUS ^b	14.1	(1.1)	7.5	(1.6)	20.8	(3.6)	9.0	(2.1)	12.7	(1.1)
OCONUS ^c	13.7	(2.2)	10.1	(1.1)	17.2	(0.1)	7.9	(0.1)	11.1	(0.8)
Total	14.0	(1.0)	9.0	(1.0)	20.4	(3.3)	8.8	(1.7)	12.2	(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.

NA = Not applicable.

+Low precision.

^aEstimates by family status after 1998 are not strictly comparable to those from previous survey years. Personnel who reported that they were living as married (in 1998 and 2002) were classified as “not married.” Before 1998, 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, 2002 (Smokeless Tobacco Use, Past 30 Days, Q51 and Q54; 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, 1985-2002

	Year											
	1985		1988		1992		1995		1998		2002	
Abstainer												
Procedure A ^a	13.4	(0.6)	17.2	(0.4)	20.4	(0.8)	21.1	(0.5)	24.3	(0.6)	23.1	(0.7)
Procedure B ^b	13.3	(0.6)	17.2	(0.4)	20.0	(0.8)	20.7	(0.5)	23.8	(0.6)	23.0	(0.7)
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)	18.4	(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)	18.3	(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)	17.9	(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)	17.9	(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)	22.6	(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)	22.7	(0.4)
Heavy												
Procedure A ^a	22.9	(1.1)	17.0	(0.9)	15.1	(0.7)	17.1	(0.8)	15.0	(0.8)	18.0	(1.1)
Procedure B ^b	23.0	(1.1)	17.2	(0.9)	15.5	(0.8)	17.4	(0.9)	15.4	(0.8)	18.1	(1.1)

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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 Questions: Drinking Level, Q15-18 and 20-23).

Table D.18 Trends in Drinking Levels Based on Two Estimation Procedures for the Army, 1985-2002

	Year					
	1985	1988	1992	1995	1998	2002
Abstainer						
Procedure A ^a	14.9 (0.7)	17.1 (0.7)	21.8 (1.4)	21.1 (1.0)	23.7 (1.3)	24.1 (1.0)
Procedure B ^b	14.6 (0.7)	17.0 (0.7)	21.4 (1.4)	20.6 (1.0)	23.1 (1.3)	23.9 (1.0)
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)	18.4 (0.9)
Procedure B ^b	16.4 (1.1)	16.8 (0.9)	17.2 (0.6)	18.0 (1.4)	18.8 (1.0)	18.3 (0.9)
Moderate						
Procedure A ^a	17.6 (0.7)	19.5 (0.8)	17.3 (0.8)	18.1 (0.9)	17.0 (0.7)	16.8 (1.1)
Procedure B ^b	17.8 (0.7)	19.5 (0.7)	17.3 (0.8)	18.0 (1.0)	16.9 (0.7)	16.8 (1.0)
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)	22.1 (0.6)
Procedure B ^b	25.7 (1.8)	27.1 (0.8)	26.5 (1.4)	25.0 (1.1)	24.0 (0.8)	22.3 (0.6)
Heavy						
Procedure A ^a	25.2 (2.2)	19.4 (1.1)	17.1 (1.5)	18.0 (1.8)	16.5 (1.5)	18.7 (2.0)
Procedure B ^b	25.5 (2.2)	19.7 (1.2)	17.7 (1.6)	18.4 (1.8)	17.2 (1.6)	18.8 (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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 Questions: Drinking Level, Q15-18 and 20-23).

Table D.19 Trends in Drinking Levels Based on Two Estimation Procedures for the Navy, 1985-2002

	Year					
	1985	1988	1992	1995	1998	2002
Abstainer						
Procedure A ^a	9.6 (0.8)	15.7 (0.6)	19.9 (2.1)	19.4 (0.9)	24.4 (1.0)	22.5 (0.7)
Procedure B ^b	9.6 (0.8)	15.7 (0.6)	19.6 (1.9)	19.0 (0.9)	24.1 (1.0)	22.4 (0.8)
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)	18.5 (1.1)
Procedure B ^b	18.8 (2.0)	18.2 (0.9)	18.6 (0.9)	18.7 (1.1)	19.3 (0.9)	18.4 (1.1)
Moderate						
Procedure A ^a	18.7 (1.1)	20.8 (1.2)	20.2 (1.2)	19.0 (1.0)	19.0 (1.1)	17.9 (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)	18.0 (1.1)
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)	23.0 (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)	22.9 (0.8)
Heavy						
Procedure A ^a	24.9 (1.4)	14.6 (2.0)	13.8 (1.4)	18.8 (1.4)	13.2 (1.7)	18.1 (1.1)
Procedure B ^b	25.0 (1.4)	14.7 (2.0)	14.2 (1.7)	19.1 (1.5)	13.5 (1.8)	18.3 (1.2)

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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 Questions: Drinking Level, Q15-18 and 20-23).

Table D.20 Trends in Drinking Levels Based on Two Estimation Procedures for the Marine Corps, 1985-2002

	Year											
	1985		1988		1992		1995		1998		2002	
Abstainer												
Procedure A ^a	10.8	(2.5)	18.0	(0.9)	15.0	(0.6)	16.9	(0.7)	19.7	(0.9)	18.9	(1.1)
Procedure B ^b	10.8	(2.5)	18.0	(0.9)	14.6	(0.5)	16.4	(0.7)	19.1	(0.8)	18.8	(1.1)
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)	15.6	(1.6)
Procedure B ^b	13.6	(1.7)	16.1	(2.9)	14.4	(1.2)	13.9	(0.7)	17.5	(0.8)	15.5	(1.6)
Moderate												
Procedure A ^a	15.1	(2.1)	14.0	(1.0)	19.2	(1.4)	17.4	(1.1)	17.3	(1.2)	16.0	(1.1)
Procedure B ^b	15.1	(2.1)	13.9	(1.0)	19.5	(1.5)	17.2	(1.1)	17.3	(1.2)	16.0	(1.1)
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)	21.9	(1.5)
Procedure B ^b	31.1	(1.8)	27.6	(1.9)	25.4	(1.9)	24.0	(0.9)	23.1	(1.1)	22.1	(1.4)
Heavy												
Procedure A ^a	29.4	(3.7)	24.1	(3.9)	25.3	(1.3)	27.8	(2.4)	22.4	(2.0)	27.5	(4.3)
Procedure B ^b	29.4	(3.7)	24.4	(4.2)	26.0	(1.3)	28.6	(2.5)	23.0	(2.1)	27.7	(4.3)

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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 Questions: Drinking Level, Q15-18 and 20-23).

Table D.21 Trends in Drinking Levels Based on Two Estimation Procedures for the Air Force, 1985-2002

	Year					
	1985	1988	1992	1995	1998	2002
Abstainer						
Procedure A ^a	15.8 (1.0)	18.5 (0.8)	21.3 (0.9)	24.4 (0.9)	27.0 (1.2)	24.4 (2.0)
Procedure B ^b	15.6 (1.0)	18.4 (0.8)	21.1 (0.8)	24.2 (0.9)	26.6 (1.1)	24.4 (1.9)
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)	19.7 (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)	19.5 (0.7)
Moderate						
Procedure A ^a	20.8 (1.2)	19.8 (0.8)	21.5 (0.8)	20.5 (0.7)	19.3 (1.0)	20.3 (0.9)
Procedure B ^b	20.9 (1.2)	19.7 (0.8)	21.5 (0.7)	20.5 (0.7)	19.4 (1.0)	20.3 (0.8)
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)	23.3 (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)	23.5 (1.0)
Heavy						
Procedure A ^a	16.4 (1.4)	14.4 (1.0)	10.5 (0.8)	10.3 (1.1)	11.6 (1.1)	12.3 (1.0)
Procedure B ^b	16.5 (1.4)	14.5 (1.0)	10.6 (0.8)	10.4 (1.1)	11.7 (1.0)	12.3 (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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 Questions: Drinking Level, Q15-18 and 20-23).

Table D.22 Trends in Average Daily Ounces of Ethanol Consumed Based on Two Estimation Procedures, 1985-2002

	Year											
	1985		1988		1992		1995		1998		2002	
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)	1.06	(0.05)
Procedure B ^b	1.24	(0.06)	0.92	(0.03)	0.79	(0.04)	0.87	(0.04)	0.79	(0.04)	1.08	(0.05)
Army												
Procedure A ^a	1.38	(0.12)	1.09	(0.06)	0.83	(0.06)	0.92	(0.07)	0.84	(0.06)	1.08	(0.09)
Procedure B ^b	1.42	(0.13)	1.12	(0.06)	0.90	(0.06)	0.98	(0.07)	0.94	(0.07)	1.11	(0.09)
Navy												
Procedure A ^a	1.33	(0.10)	0.86	(0.07)	0.80	(0.10)	0.91	(0.08)	0.66	(0.06)	1.23	(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)	1.25	(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)	1.47	(0.20)
Procedure B ^b	1.49	(0.23)	1.20	(0.11)	1.04	(0.06)	1.19	(0.07)	1.08	(0.11)	1.49	(0.20)
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)	0.66	(0.06)
Procedure B ^b	0.87	(0.07)	0.66	(0.03)	0.52	(0.03)	0.54	(0.04)	0.54	(0.04)	0.67	(0.06)

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 beginning with the 1998 survey.

Source: DoD Surveys of Health Related Behaviors Among Military Personnel, 1985 to 2002 (2002 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, 1995, and 1998 DoD surveys (Bray et al., 1983, 1986, 1988, 1992, 1995, 1999). 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 computed daily volume separately for beer, wine, and 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.

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-, and 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 and 2002 surveys. 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: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Q15-18 and 20-23).

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: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Q15, 18, and 21).

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 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 wine glasses, the typical quantity for wine was simply four times the number of glasses consumed on a typical day when the respondent drank wine. Once 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. 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

²As for the drinking-level index, the algorithm for calculating the ethanol index was modified beginning 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 and 2002 surveys. 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.

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 eight or more drinks of the given beverage (i.e., had a Qn 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 Qn for 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

$$AQnF = \frac{5D + Qn(365 \times F - D)}{365} \quad (1)$$

where

$AQnF$ = 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.

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: DoD Survey of Health Related Behaviors Among Military Personnel, 2002 (Q28-30).

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 2002 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 could cloud the effect being studied. For example, we expected substance use to vary by sociodemographic 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 sociodemographic 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 2002 permitted use of this approach. In particular, the oversampling of women in 2002 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 Sociodemographic Variables Included in Standardizations

We considered the following sociodemographic 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 sociodemographic 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 2002 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 sociodemographic 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 sociodemographic 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 2002 DoD Distributions to the 1980 Distribution. In examining trends in substance use that took into account sociodemographic changes in the Military since 1980, we standardized the 2002 DoD survey data (and the 1998, 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 sociodemographic 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 2002 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 2002 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 2002 if the current 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 16.9% in 2002 (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 20.7% in 2002 (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 2002. 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 sociodemographic groups. Further, the sociodemographic 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 sociodemographic characteristics. The oversampling of women and Marine Corps personnel in 2002 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 2001 National Household Survey on Drug Abuse (NHSDA) (Office of Applied Studies, 2002) with that from the 2002 military population. 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 sociodemographic 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.
- ! 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 sociodemographic 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

2002 DoD Survey Liaison Officers

ARMY COL Regina Curtis (HLO)	AIR FORCE Dr. Paul DiTullio (HLO) Mr. Charlie Hamilton (Assistant HLO)	MARINE CORPS LT. Danisha Robbins (HLO) Mr. Cruz Martinez (HLO)
SSG Debbie Aguon MAJ Sonya Brown Ms. Lithia Carter Mr. William Franssen MSG Harold Henderson Ms. Tanya Klein Ms. Linda Lowery MAJ Andrew O'Brien 1LT Christian Peck MSG Emil Popelka SFC Jeffrey Ridenhour Mr. Mike Stewart MAJ Burton Stover 1LT Humberto Ventura Ms. Yvonne Wilbanks SFC Rachelle Wright-Woods	CPT Candace Adair CPT Karen Gremba TSgt Diane Gustafson MAJ Nancy Klein LT Alicia LaPray MSGT Sharon Proxmire CPT Iris Reedom LT Daniel C. Rigsbee 1LT Harriet R. Williams	MAJ John Armour MAJ John C. Burlingame LTCOL David S. Foy LT Maile Kalinowski GS12 George Mangual Mr. John Velker GS-13 John J. Veneziano
NAVY Mr. Linden Butler (HLO) Mr. William Flannery (HLO)		
Ms. Phadra Aguilar ABEC Jerry Bardiau GS12 Rockie Beasley Mr. Gene Beveridge STGC D. Bevilaqua AE1 Caroline Bissett LT Ed Byers LCDR Pelagio B. Caoile LTJG John M. Carmichael LT Cashion HMC Holly Celeste HM1 William Clauson HMC D. Davis CTA1 Regina Delavventura CDR D. Delvecchio EMC Leslie Desenburg CMDM Dan Dyar ABHCS Duke Ellington CDR Randy Fenz LT Steven L. Fulton CTACM Jeffery Goodwin	PNCS T. A. Gordon OSC (SW) Oscar L. Greer LT David Gwinn LT Don Heffentrager ICC Jonathan T. Hendricks LCDR Kurt Houser HMC Chris Hudson LCDR Nancy Jones HMC W. Jordan HMC Michael Kendall Mr. Al Kling LCDR Tracy Klosik ITCM Mitchell E. Kreer CDR Cynthia Kurtz SKCS Robert Lombard ENS Edward Lowery HMC Galileo Lugod SKC Christopher Lutz AVCM James D. McCarthy PH1 Kimberly E. McDonald PNCS Todd P. Miller	CMDM Pat Nicometo ATCS Stephen T. Okker LT Andrew J. Oswald LT Bill Paquette Chief M. L. Parker TMC M. C. Parker YN1 Terry Pattison LT R. Perkins CT A1 D. Reyes HM2 Joel E. Rivera SW1 Daniel Rodriguez CMDM Rick Rose BMC Scotty Scruggs HMC Charles Simmons ENC Robert Sneddon Ms. Hope Stanley CDR E. Tulenko MMC Colby Tynes CTA1 Brandy Westloskie AECS Russell White HMCS Mike Williams

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

2002 DOD SURVEY QUESTIONNAIRE