



Dietary Supplement Use in a Large, Representative Sample of the US Armed Forces

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ABSTRACT

Background Dietary supplement (DS) use is prevalent among the US Armed Forces personnel, but representative cross-service comparisons and characteristics of personnel using DSs are limited.

Objective Examine DS use and characteristics associated with use in a representative sample of US Armed Forces personnel (Army, Navy, Air Force, Marine Corps, and Coast Guard) using data from the 2011 Department of Defense Survey of Health-Related Behaviors.

Design and participants A stratified random sample of service members (SMs) was contacted and asked to complete a questionnaire assessing personal characteristics and DS use.

Results Overall, 69% of the 39,877 SMs reported using DSs ≥ 1 time per week. The most commonly used DSs were multivitamin or multiminerals (50%), antioxidants (34%), individual vitamins or minerals (33%), bodybuilding supplements (27%), fish oils (26%), herbals (16%), and weight-loss supplements (16%). Multiple logistic regression indicated overall DS use was higher among women, those with higher educational levels, Marine Corps SMs, officers, those with higher body mass index, those engaged in greater physical activity and weight training, and people in weight control programs. DS use was lower when peer groups or leadership discouraged substance abuse.

Conclusions DS use was considerably higher in the US Armed Forces compared with civilian populations, although many demographic and lifestyle factors associated with use were similar. Some categories of DSs extensively used by SMs such as bodybuilding supplements have been associated with adverse events. Discouraging substance abuse through peer groups and leadership actions may reduce use of unnecessary or dangerous DSs.

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DIETARY SUPPLEMENTS (DSs) ARE COMMERCIALY available products consumed as an addition to the usual diet and include vitamins, minerals, herbs (botanicals), amino acids, and a variety of other products.¹ The Dietary Supplement Health and Education Act of 1994¹ established the regulatory framework for DSs in the United States. Since the Dietary Supplement Health and Education Act became law, US sales of DSs have increased from \$4 billion in 1994 to \$37 billion in 2014,^{2,3} a greater than ninefold increase over 21 years. The National Health and Nutrition Examination Surveys (NHANES), which continuously assess a large representative sample of the civilian population, found that about 50% of Americans use DSs,⁴⁻⁶ but surveys of US service members (SMs) suggest use is considerably higher in this population, with about 60% to 70% reporting DS use.⁷⁻¹¹ Both civilian¹² and military^{7,9,10} surveys indicate the major reason people report using DS is to improve their health, but SMs cite improved physical performance as the second most common reason, a rationale seldom reported in civilian studies,¹² but often found in

surveys of athletes.¹³⁻¹⁵ The types of DSs used by SMs are considerably different from those used by civilian populations because SMs are much more likely to use purported strength and bodybuilding supplements such as protein or amino acids, creatine, and various combination products marketed as physical performance enhancers.⁷⁻¹¹

The Department of Defense (DoD) Survey of Health-Related Behaviors regularly collects anonymous behavioral health data to examine the well-being of the US Armed Forces. The survey is administered to a large, stratified random sample of SMs from all the Armed Forces, which include the Army, Navy, Air Force, Marine Corps, and Coast Guard. The survey includes questions on DS use as well as demographic, military, and lifestyle characteristics. An analysis of the 2005 DoD Survey of Health-Related Behaviors examined some types of DS use and how they were related to demographic and lifestyle factors.¹⁶ The present investigation examines data from the 2011 DoD survey and, compared with the 2005 investigation,¹⁶ considerably expands on the number of DS categories examined, and provides an opportunity to examine

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longitudinal trends in DS use by SMs. It also permits direct comparison of DS use among the individual uniformed services based on an identical survey conducted simultaneously. Many other studies of DS use in the US Armed Forces have only examined services individually.^{7,9-11,17} The overall objective of this study was to describe the prevalence of DS use in a stratified random sample of the US Armed Forces and to examine characteristics associated with their use.

METHODS

The 2011 DoD Survey of Health-Related Behaviors was conducted by Inner City Fund International, Inc, under the supervision of the Office of Assistant Secretary of Defense for Health Affairs and Tricare Management Activity. This was the 11th iteration of the survey and the first time it was administered electronically. Survey content was developed by a group of subject matter experts from the DoD, US Coast Guard, and professionals in the fields of health and fitness. The present study was a secondary analysis of selected cross-sectional data from this survey. Details regarding sampling and administration of the survey are contained in the original report.¹⁸ Briefly, the research objective of the survey was to assess the state of the behavioral and mental health of the active duty military population. The target population included all members of the Army, Navy, Marine Corps, Air Force, and Coast Guard who were nondeployed and on active duty. For survey administration, senior officers from each service served as liaisons to work with their respective service's information technology departments to whitelist the survey's Uniform Resource Locator on their respective computer systems, to obtain a letter of support from a ranking officer within their command hierarchy to encourage participation in the survey and provide authenticity for the Web-based survey, and to act as their service's primary point of contact for respondents regarding issues and questions. The survey was pretested with a group of junior enlisted personnel at five locations (n=22). They provided numerous comments about specific survey items including suggestions for improving question and response option clarity, the addition of response options, the addition of clarification instructions, improvements to question format, and improvements to question flow and order. Survey administration was approved by the Inter City Fund International Institutional Review Board. The Human Use Review Committee of the US Army Research Institute of Environmental Medicine approved the secondary data analyses presented here.

Sampling and Recruitment

The Figure shows the number of SMs involved in each stage of the sampling and recruitment from the initial sample frame to the final respondents. To establish the sampling frame for the DoD sample (Army, Navy, Marine Corps, Air Force), the Defense Manpower Data Center's Active Duty Master Edit File was obtained. The sample frame for the Coast Guard was established from a census file of all Coast Guard active duty members. Both files were current up to June 2011. The final sample frame included all active duty members of the Army, Navy, Marine Corps, Air Force, and Coast Guard. Those who were deployed at the time of the sample selection were excluded. The specified definition of the population resulted in a sample frame with 1,262,251 eligible SMs.

RESEARCH SNAPSHOT

Research Question: What is the prevalence of dietary supplement (DS) use in the Armed Forces and what demographic and lifestyle factors are associated with DS use?

Key Findings: In this cross-sectional survey of 39,877 Armed Forces personnel, 69% reported using DSs ≥ 1 time per week. The most commonly used DSs were multivitamin or multiminerals (50%), antioxidants (34%), individual vitamins or minerals (33%), bodybuilding supplements (27%), fish oils (26%), herbals (16%), and weight-loss supplements (16%). Factors associated with greater use included female sex, higher educational levels, Marine and officer status, higher body mass index, greater physical activity, and participation in weight control programs.

For the DoD sample, the four services were considered primary strata for sampling. After finalizing the sampling frame, an initial stratified random sample of 281,872 members was selected using a computerized random sampling technique. There were 12 substrata in this sample, defined as the six pay grade levels within sex. This initial sample file was randomly divided into three groups, a primary group (n=118,971) and two holdback groups (n=83,121 and n=79,780). The holdback groups were created in case response rate was lower than anticipated. After an assessment of survey completion rates by strata subsequent to the initial fielding of the primary sample, an additional 36,797 sample members from first holdback group were randomly selected disproportionately from strata and sent invitations to participate in the survey. This resulted in a total of 155,768 DoD members who were invited to participate in the survey. No members from the second holdback group were invited to participate.

Sampling for the Coast Guard differed from the DoD. After stratification based on sex and pay grade, the Coast Guard population was subdivided into two separate groups, one for a site-centered, clustered sample and one for a distributed, unclustered sample. The first group (site centered) involved a random selection of 10 installations with a probability of selection proportional to the size of installations. The second population (other locations) consisted of all other Coast Guard members who were not part of the 10 chosen installations.

Electronic invitations for survey participation were sent by e-mail to potential respondents between August 2011 and January 2012. Potential respondents who did not have an e-mail address on file were mailed paper invitations. Reminder e-mails and postcards (to those without e-mail addresses) were sent on a staggered schedule. Participation by potential respondents was voluntary and anonymous. The initial batch of Web-survey invitations to the DoD sample was sent in August 2011. The initial invitation emails to USCG personnel were sent in October 2011. The last reminder e-mail was sent on December 29, 2011.

Survey Questions

The survey consisted of 166 primary questions and included questions on categories and frequency of DS use. The DS use

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