# Demographic, Lifestyle Factors, and Reasons for Use of Dietary Supplements by Air Force Personnel

Krista G. Austin; Lori Lyn Price; Susan M. McGraw; Guy Leahy; Harris R. Lieberman

- **BACKGROUND:** Dietary supplement (DS) use is common among U.S. Army personnel to purportedly improve health, provide energy, and increase strength. However, a comprehensive analysis of DS use among U.S. Air Force (USAF) personnel has not been conducted using the same survey instrument, which would permit direct comparisons to DS use by Army personnel.
  - **METHODS:** A standardized questionnaire was used to assess DS use, demographic factors, and reasons for use of DS by USAF personnel (N = 1750). Logistic regression models adjusted for age, sex, and rank were used to determine relationships among categories of DS (multivitamin and multimineral, individual vitamins and minerals, protein/amino acid supplements, combination products, herbal supplements, purported steroid analogs, and other) and demographic factors. Findings were compared to reports from other military services and civilian populations.
  - **RESULTS:** DS were used by 68% of USAF personnel: 35% used 1–2 DS ≥ 1 time/wk, 13% 3–4 DS ≥ 1 time/wk, and 20% ≥ 5 DS ≥ 1 time/wk. There were 45% of personnel who used a multivitamin and mineral, 33% protein supplements, 22% individual vitamins/minerals, 22% combination products, and 7% herbals. Logistic regression demonstrated aerobic exercise duration and strength training were associated with increased DS use. Individuals who previously deployed were more likely to use DS.
- **CONCLUSIONS:** Like Army personnel, college students and athletes, USAF personnel use more DS than the general population and are more likely to use purported performance enhancing DS, such as protein supplements, and concurrently consume multiple DS.
  - KEYWORDS: multivitamin, protein supplements, deployment history, military operations, Armed Forces, occupational health.

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n 2012, dietary supplements (DS) sales in the U.S. were estimated to total \$32 billion.<sup>16</sup> National surveys of American Ladult civilians show that approximately 50% use DS, with multivitamin and mineral DS being the most frequently consumed.<sup>4,22</sup> The primary reason cited for DS use is to improve health. Use of DS is often associated with participation in activities that require high levels of physical activity, as well as engaging in other healthy behaviors, but is also associated with use of prescription medications to treat various illnesses.<sup>11,22</sup> Some populations such as military personnel and college students report using more DS than the general U.S. civilian population, and research suggests an individual's occupation and physical activities may influence the use of dietary supplements.<sup>7,14,18</sup> Uniformed service members use substantially more protein supplements and combination products than the general population with the intent of improving their physical performance and facilitating weight loss.6,15,18

Extensive use of DS by military personnel has raised concern regarding potential safety and efficacy of DS due, in part, to numerous reports of contamination of DS.<sup>19,21</sup> Inappropriate consumption or use of contaminated DS may lead to adverse medical events which compromise service members' health and performance, and could also adversely impact military missions. Further, random drug testing is mandatory in all U.S.

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military services, including the Air Force (USAF),<sup>9,10,25</sup> and consumption of some DS may lead to positive drug tests due to the similarity of some DS to banned substances or contamination of DS with banned substances.<sup>28</sup> Since uniformed service personnel are not usually included in national health surveillance studies that monitor the use of DS by the U.S. adult population, the Institutes of Medicine (IOM) Committee on the Use of Dietary Supplement by Military Personnel has stated there is a critical requirement to evaluate DS prevalence and patterns of use in these subpopulations.<sup>13</sup>

USAF personnel perform a wide range of physically and mentally demanding occupational tasks. Many of these tasks involve heavy manual work requiring significant strength and stamina.<sup>3</sup> Some of the most common jobs in the USAF, such as aircraft maintenance, weapons preparation and loading, intelligence collection, combat specialties, and healthcare delivery, are also some of the most demanding. For example, combat and intelligence personnel conduct parachute jumps, rappel and travel overland in a variety of terrains and weather conditions to perform their job duties. Demanding activities of airmen include piloting aircraft under high G-forces. Support occupations such as aircraft maintenance, refueling specialists, and medical staff must be able to perform complex energy depleting movements necessary to sustain combat and other intense operations. USAF personnel often operate with minimal rest and recovery time, and for prolonged periods in hot environments potentially resulting in dehydration and fatigue. In addition, personnel are required to meet regulations for fitness and body weight standards to remain in AF service and be eligible for promotion. As such, AF personnel may use DS with the expectation that they will improve their ability to meet these standards and the physical demands of their occupation.<sup>26</sup>

A comprehensive study of DS use by USAF personnel has never been conducted. One report suggested that active duty USAF personnel use greater amounts of DS (63-69% users) compared to other military branches, but comprehensive, detailed surveys of different military services have not been conducted using the same procedures.<sup>7,23</sup> Given the unique and specific occupational demands of different military services, and diversity in culture and behavior patterns of each subpopulation within the Armed Forces, an accurate description of prevalence and patterns of DS use is necessary so that evidence based recommendations addressing the effects of DS use on health and readiness for each uniformed service can be formulated. Therefore, the present survey assessed use of DS, money spent on DS, use of sport nutrition products (drinks, bars, and gels) and meal replacement beverages, and reasons for the use of these products by USAF personnel. Furthermore, associations with demographic and lifestyle factors, including sex, age, rank, marital status, tobacco use, aerobic exercise, and participation in strength training were examined. By using the same survey procedures as previously published surveys, DS use patterns and types of DS consumed by USAF personnel could be compared to published reports of DS use by Army personnel and college students.

#### **METHODS**

#### Subjects

This study was approved by the Human Use Review Committee at the U.S. Army Research Institute for Environmental Medicine. The final sample consisted of 1750 U.S. Air Force personnel recruited at 8 Air Force installations (7 U.S. installations and 1 overseas site). Data were collected from 2010-2011. We did not survey individuals who were enrolled in basic training, on temporary leave, in transition to another duty station, or who were incarcerated. Users and nonusers of DS were included in the sample. Survey sites were chosen based in part on the availability of healthcare professionals to assist with survey administration. No incentives were offered to subjects for completion of the survey. Air Force service members completed the survey after they were informed it was anonymous, all information obtained would remain confidential and participation was voluntary. Investigators adhered to U.S. Army Regulation 70-25 and U.S. Army Medical Research and Material Command Regulation 70-25 on the use of volunteers in research.<sup>1</sup> Prior to administering the survey (Dietary Supplement and Caffeine Intake Survey of U.S. Air Force Active Duty Personnel), subjects were briefed by healthcare providers regarding its contents and appropriate procedures for completing all questions were presented.

#### Survey

The survey consisted of 43 questions including type of DS used, frequency of use (never, 1 time/mo, 1 time/week, > 1 time/week, and daily), reasons for use and money spent on DS. It was identical in most respects to a survey used to assess Army, Coast Guard, and college student DS use but was customized to reflect USAFspecific factors such as occupational specialty.<sup>18</sup> It was updated to reflect appearance of new DS on the market. There were 92 individual supplements listed in the survey, including 55 generic supplements such as multivitamins, individual vitamins and minerals, combination antioxidants, and 37 brand-named products. Brand-named DS were chosen for inclusion based on thencurrent patterns of DS purchases at the Army & Air Force Exchange System and General Nutrition Centre stores on or near Air Force installations. Subjects were also queried about the use of sports drinks, bars or gels, and meal replacement beverages based on previous reports indicating they are frequently used by military personnel.<sup>18</sup> These nutritional products were analyzed separately as they are not legally classified as a DS by the applicable U.S. statute, the Dietary Supplement Health and Education Act (DSHEA) of 1994.

The survey collected information on demographic and lifestyle factors including age, sex, body mass index (BMI), education, occupation, marital status, tobacco use, and participation in aerobic and strength training exercise. Aerobic exercise included running, cycling, stair climbing, swimming, and road marching either within their unit or on their own time each week for the duration ranges: lowest (0-60 min), low (61-314 min), moderate (315-464 min), and high (465+ minutes). Strength training included lifting weights or other strength conditioning exercises within their unit or on their own time each week.

# **Data Analyses**

Completed surveys were scanned using ScanTools Plus with ScanFlex (version 6.301; Scantron Corporation, Eagan, MN) and data imported into SPSS (version 20.0; IBM Corp., Armonk, NY) for conversion to a SAS (version 9.4; SAS Institute, Cary, NC) data file for all statistical analyses. Data were weighted prior to analysis to obtain a sample representative of the overall Air Force population as of November 2011. As of November 30, 2011, there were a total of 351,710 active duty USAF personnel. Weights were based on sex, age, and rank data obtained from the Defense Manpower Data Centre (www.dmdc.osd.mil/) and the characteristics of survey respondents. The survey weight was calculated by dividing the number of Air Force personnel in each cell who were eligible to take the survey by the number in the cell that completed the survey.

Prior to data analyses, individual supplement and supplement types were grouped into the following categories: multivitamin and multimineral, individual vitamins and minerals, protein/amino acid supplements, combination products, herbal supplements, purported steroid analogs, and other. Supplements were categorized based on the definitions provided in **Table I**. A standardized taxonomy similar to that used in national surveys such as National Health and Nutrition and Examination Survey (NHANES) was used to categorize DS.<sup>18</sup>

Wald Chi-squared tests were used to assess significant differences in percentages across multiple characteristic levels (e.g., education, rank, age, BMI, occupation) using the surveyfreq

Table I.	Dietary Supplement	t Categories as Defined in Dietary Supplement
and Caf	feine Intake Survey of	f U.S. Active Duty Air Force Personnel.

CATEGORY	DEFINITION
Dietary Supplement (DS)	Any DS as defined by the Dietary Supplement Health and Education Act legislation
Multivitamin	DS containing two or more vitamins and no additional supplement ingredients
Multimineral	DS containing two or more minerals and no additional supplement ingredients
Protein and Amino Acid	Amino acid mixtures, protein powders, and similar products where the intention is to provide a single or complex protein source
Individual Vitamins or Minerals	DS that were single nutrient ingredient supplements, such as calcium or vitamin D
Combination Products	DS with mixtures of ingredients from any of the above categories; included two or more categories and multiple ingredients
Herbal Supplements	DS that included one or more herbal ingredients with no nutrients or other supplement ingredients; also includes plant-derived ingredients
Purported Steroid Analogs	Steroidal hormones or herbal substitutes for hormones that were marketed as DS and included the Supplement Facts panel on the label

procedure. Analysis of variance (ANOVA) using the surveymeans procedure was used to test mean values across multiple characteristic levels. A *P*-value of < 0.05 was considered statistically significant. Standard errors were estimated using a Taylor series linearization method that incorporated sampling weights. Logistic regression models using the surveylogistic procedure were used to examine relationships between measures of DS use and demographic characteristics of USAF personnel including age, sex, education, marital status, BMI, tobacco use, and deployment history, as well as aerobic exercise duration and strength training. Models were adjusted for sex, age, and rank. We considered adjusting for education; however, since rank and education were highly associated, models were only adjusted for age, sex, and rank. Results of multivariable logistic regression are presented as odds ratios (OR) and 95% CI. The sampling weights described above were used in all analyses.

# RESULTS

# **Prevalence and Patterns of Dietary Supplement Use**

Prevalence estimates of overall DS use, money spent on DS, frequency of DS use and individual classes of DS are presented in Table II and Table III. There were 68% of USAF personnel who reported using a DS at least one time per week ( $\geq 1$  time/ wk) in the 6 mo prior to the survey: 35% of survey respondents reported using 1-2 DS  $\geq 1$  time/wk, 13% reported the use of 3–4 DS  $\geq$  1 time/wk, and 20% reported taking  $\geq$  5 DS  $\geq$ 1 time/wk. There were 45% of USAF personnel who reported multivitamin and mineral use  $\geq 1$  time/wk, protein and amino acid DS were consumed by 33% of personnel  $\geq$  1 time/wk, 22% used an individual vitamin or mineral  $\geq 1$  time/wk, 22% reported taking combination products  $\geq 1$  time/wk, and 7% consumed an herbal  $DS \ge 1$  time/wk. Of the respondents, 23% reported using a DS classified as 'other' and less than 1% reported the use of purported steroid analogs  $\geq 1$  time/wk. Supplements classified as 'other' included DS intended to improve joint or digestive health, fish oils, and other multicomponent DS. The average expenditure on DS in the 3 mo prior to the survey was 39/mo and 6% of personnel spent > 50/moon DS.

Analyses of DS prevalence and patterns by demographic and lifestyle characteristics demonstrated several consistent associations with DS use. Prevalence of any DS use, number of DS used per week, financial expenditure on DS, multivitamin and mineral, and protein and amino acid use was greater among those performing more than 60 min of aerobic exercise, engaged in regular strength training, or who had a history of deployment (P < 0.05). Odds of DS use was higher among women (P < 0.05), personnel over the age of 24 (P < 0.01), subjects who participated in more aerobic exercise (P < 0.01) and more strength training (P < 0.01), respondents with higher levels of education (P < 0.01), or personnel who were overweight as indicated by a BMI of 24–29.9 (P < 0.05). Personnel with a rank of E5-E9 (senior enlisted ranks) and officers (P < 0.01)

(N = 1750), at Least Once a Week or More Often Over the 6 mo Prior to the Survey, and Amount and Prevalence of Money Spent on DS, by Demographic and Lifestyle Characteristics, Dietary Supplement and Caffeine Table II. Weighted Population Estimates for Prevalence of Reported Use of any Dietary Supplement (DS), Sports Drink, Sports Bar/Gel, and Meal Replacement Beverage Among U.S. Air Force Active Duty Personnel Intake Survey of U.S. Air Force Active Duty Personnel, 2010.

VARIABLE		2	ESTIMATE OF TOTAL AIR FORCE PERSONNEL (N = 351,710)	ANY DS (%)	ANY SPORTS DRINK (%)	ANY SPORTS BAR GEL (%)	ANY MEAL REPLACEMENT BEVERAGE (%)	MONTHLY AMOUNT SPENT ON DS IN PAST 3 MO (\$)	\$50 OR MORE SPENT MONTHLY (%)
Sex	Male	1315	289,665	66.7 ± 1.41*	25.3 ± 1.25**	8.9 ± 0.86	8.3 ± 0.81	39.3 ± 1.92	6.1 ± 0.76
	Female	435	62,045	$71.9 \pm 2.16$	$15.6 \pm 1.77$	$7.4 \pm 1.29$	7.1 ± 1.28	39.3 ± 4.74	$5.2 \pm 1.18$
Age (years)	18 to 24	636	103,007	$60.8 \pm 1.98$ **	$30.8 \pm 1.85$ **	$6.7 \pm 1.01$	5.7 ± 0.93	33.0 ± 2.49*	$2.9 \pm 0.71$ **
	25 to 29	498	112,612	71.8 ± 2.17	$24.1 \pm 2.03$	8.5 ± 1.29	10.0 ± 1.43	$45.3 \pm 3.34$	$8.2 \pm 1.41$
	30 to 39	437	100,471	$67.6 \pm 2.53$	$16.7 \pm 1.99$	$10.0 \pm 1.64$	8.6 ± 1.40	38.3 ± 3.61	$6.7 \pm 1.34$
	40+	179	35,620	74.1 ± 3.51	$20.1 \pm 3.31$	$10.7 \pm 2.59$	7.5 ± 2.16	$41.0 \pm 6.51$	$5.7 \pm 2.02$
Education	Some HS/High School	279	50,948	55.5 ± 3.11**	24.7 ± 2.68	5.7 ± 1.48	3.2 ± 1.10**	32.5 ± 4.07	$3.2 \pm 1.18^{*}$
	Some College/ Associate Decree	1049	201,284	68.8 ± 1.52	24.5 ± 1.39	7.5 ± 0.85	8.7 ± 0.95	42.5 ± 2.44	7.0 ± 0.93
	Bachelor/Graduate Degree	405	95,999	71.8 ± 2.59	$21.4 \pm 2.25$	12.7 ± 1.86**	$9.7 \pm 1.53$	36.9 ± 3.40	5.3 ± 1.28
<b>Marital Status</b>	Single / Not Married	822	154,259	$66.9 \pm 1.78$	$27.4 \pm 1.67$ **	$9.5 \pm 1.19$	8.0 ± 1.01	$37.3 \pm 2.25$	$5.9 \pm 0.98$
	Married	926	197,088	$68.2 \pm 1.67$	$20.6 \pm 1.41$	$8.0 \pm 0.93$	8.2 ± 0.98	$40.9 \pm 2.66$	$6.0 \pm 0.91$
Rank	Enlisted 1-4	720	115,821	$62.5 \pm 1.84$ **	$30.9 \pm 1.75$ **	7.1 ± 0.97	$5.7 \pm 0.87$ *	36.4 ± 2.44	$4.2 \pm 0.80$
	Enlisted 5-9	802	172,807	$70.4 \pm 1.71$	$19.5 \pm 1.50$	7.8 ± 0.98	9.5 ± 1.10	43.1 ± 2.84	$7.3 \pm 1.07$
	Officer	228	63,082	$69.6 \pm 3.53$	$21.1 \pm 2.97$	13.8 ± 2.55*	8.6 ± 1.94	34.5 土 4.25	$5.4 \pm 1.72$
Occupation	Combat	102	29,206	$68.2 \pm 5.33$	26.1 ± 4.85	14.1 ± 4.12	7.7 ± 2.70	$40.5 \pm 7.14$	8.9 ± 3.45
	Operational	511	100,164	$68.0 \pm 2.19$	$26.7 \pm 2.03$	11.1 ± 1.45	8.6 ± 1.31	38.4 ± 2.92	$5.0 \pm 1.13$
	Support	1081	210,273	$67.3 \pm 1.54$	$21.6 \pm 1.33$	$6.6 \pm 0.81$ **	8.0 ± 0.90	39.6 ± 2.38	$6.0 \pm 0.83$
BMI (kg $\cdot$ m <sup>-2</sup> )	18.5 to 24.9	698	131,919	$64.2 \pm 1.99$	22.2 ± 1.65	$7.5 \pm 1.06$	<b>€</b> .0 ± 0.9	34.7 ± 2.66	$3.7 \pm 0.79$ *
	25 to 29.9	809	168,189	$70.9 \pm 1.72$ *	25.3 ± 1.63	$10.4 \pm 1.20^{*}$	9.3 ± 1.09	44.3 ± 2.75*	$7.6 \pm 1.11$
	30+	225	48,606	66.1 ± 3.46	21.7 ± 3.01	$5.7 \pm 1.74$	$10.1 \pm 2.07$	35.6 ± 4.75	$6.7 \pm 1.87$
Deployed	No	895	160,078	63.8 ± 1.71**	24.5 ± 1.48	8.9 ± 0.98	8.5 ± 1.03	33.7 ± 2.18**	4.6 ± 0.82
	Yes	838	187,764	70.7 ± 1.74	$22.9 \pm 1.58$	$8.6 \pm 1.11$	7.8 ± 0.97	43.8 ± 2.73	$7.0 \pm 1.02$
Aerobic Exercise	0 to 60	68	12,901	58.3 ± 6.42*	21.0 ± 5.11	3.0 ± 2.10 <b>*</b>	6.9 ± 3.43	46.3 ± 13.13	8.3 ± 4.12
(min per week)									
	61 to 314	439	87,755	63.4 ± 2.49	21.1 ± 2.10	6.6 ± 1.36	4.8 ± 1.20	39.7 ± 4.13	$7.5 \pm 1.56$
	315 to 464	510	105,137	66.3 ± 2.31	26.9 ± 2.13	$10.5 \pm 1.48$	$6.9 \pm 1.16$	30.8 土 2.51**	3.8 ± 0.94
	465 +	733	145,917	$72.0 \pm 1.80$	22.9 ± 1.61	9.0 ± 1.16	11.0 ± 1.24**	44.5 ± 2.78	$6.4 \pm 1.04$
Strength	No	273	52,318	54.3 ± 3.36**	16.0 ± 2.35**	4.0 ± 1.24**	3.6 ± 1.27**	20.7 ± 4.09 <b>**</b>	3.0 ± 1.20*
iraining eacn week									
	Yes	1477	299,392	$69.9 \pm 1.30$	24.9 ± 1.20	$9.4 \pm 0.84$	$8.9 \pm 0.79$	42.3 ± 1.95	6.4 ± 0.75

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		NUMBE	ER OF DS USED	AT LEAST Y			TYPE OF DS USEI	D AT LEAST ONCE	WEEKLY		
VARIABLE		1 TO 2	3 TO 4	5 OR MORE	MULTIVITAMIN OR MULTIMINERAL	PROTEIN & AMINO ACID	INDIVIDUAL VITAMINS OR MINERALS	COMBINATION PRODUCTS	HERBAL	PURPORTED STEROID ANALOGS	OTHER
Sex	Male	33.3 ± 1.40**	12.7 ± 0.97**	20.7 ± 1.21**	43.3 ± 1.46**	36.4 ± 1.41**	19.4 ± 1.17**	23.9 ± 1.24**	7.8 ± 0.79	1.0 ± 0.30	23.1 ± 1.26
	Female	40.9 ± 2.43	15.4 ± 1.83	$15.7 \pm 1.81$	51.6 ± 2.45	16.7 ± 1.85	35.5 ± 2.38	15.3 ± 1.74	6.0 ± 1.09	$0.4 \pm 0.27$	24.1 ± 2.13
Age (years)	18 to 24	31.7 ± 1.88**	12.3 ± 1.33	16.8 ± 1.53	33.8 ± 1.89**	31.2 ± 1.87	$20.2 \pm 1.59$	21.9 ± 1.66	$6.5 \pm 0.98$	0.8 ± 0.38	$17.5 \pm 1.52$
	25 to 29	33.6 ± 2.26	13.9 ± 1.61	24.3 ± 2.09**	51.0 ± 2.38	41.3 ± 2.36**	$22.9 \pm 2.00$	27.2 ± 2.15**	7.5 ± 1.26	$1.0 \pm 0.47$	25.0 ± 2.09
	30 to 39	$37.3 \pm 2.52$	$12.4 \pm 1.67$	$17.9 \pm 1.99$	45.6 ± 2.59	$27.9 \pm 2.37$	21.6 ± 2.09	$20.3 \pm 2.02$	7.3 ± 1.36	$0.0 \pm 0.00$	21.2 ± 2.12
	40+	38.8 ± 3.98	$15.7 \pm 3.10$ **	$19.6 \pm 3.30$	54.2 ± 4.02	25.1 ± 3.61	27.8 ± 3.64	14.4 ± 2.85	$10.6 \pm 2.49$	$3.3 \pm 1.58$	$40.4 \pm 4.04$ **
Education	Some HS/	29.9 ± 2.89**	13.5 ± 2.11	12.0±2.00**	33.4 ± 2.94 <b>**</b>	26.7 ± 2.76	16.0 ± 2.21**	19.6 ± 2.49	$4.0 \pm 1.15$ *	1.2 ± 0.76	$11.5 \pm 1.99$ **
	High School										
	Some College/ Associate degree	34.3 ± 1.55	12.6 ± 1.07	21.8 ± 1.40	42.8 ± 1.61	34.1 ± 1.56	21.7 ± 1.34	26.5 ± 1.45 <b>**</b>	8.4 ± 0.92	0.9 ± 0.29	23.8 ± 1.41
		L) ()							- - 1	000	
	Bachelor/ Graduate Degree	37.1 ± 2.65	14.4 ± 1.90	20.3 ± 2.19	54.9 ± 2.77	34.3 <u>+</u> 2.63	26.2 ± 2.34	$15.7 \pm 2.00$	/.3 ± 1.43	$0.9 \pm 0.53$	28.9 ± 2.49
Rank	Enlisted 1-4	$31.3 \pm 1.76$ *	14.3±1.33	$16.8 \pm 1.44$ *	$35.4 \pm 1.80^{**}$	$32.5 \pm 1.77$	$18.8 \pm 1.45$ *	24.0 ± 1.61	$5.9 \pm 0.89$	$1.0 \pm 0.39$	$17.0 \pm 1.41$
	Enlisted 5-9	$36.2 \pm 1.79$	$12.3 \pm 1.22$	$21.8 \pm 1.58$	$48.2 \pm 1.85$	33.3 ± 1.78	$22.8 \pm 1.55$	24.5 ± 1.63	8.3 ± 1.01	$0.7 \pm 0.32$	24.5 ± 1.61
	Officer	36.3 ± 3.53	13.5 ± 2.44	$19.8 \pm 2.87$	52.5 ± 3.69	32.5 ± 3.44	$27.0 \pm 3.14$	13.7 ± 2.50**	8.1 ± 1.99	$1.1 \pm 0.80$	$31.4 \pm 3.37$ **
Occupation	Combat	$34.1 \pm 5.25$	$10.9 \pm 3.39$	23.2 ± 4.69	$51.2 \pm 5.52$	$37.9 \pm 5.33$	$20.6 \pm 4.32$	$20.8 \pm 4.40$	$7.1 \pm 3.05$	2.3 ± 1.64	$32.3 \pm 5.17$
	Operational	31.5 ± 2.18	14.0 ± 1.69	$22.4 \pm 1.96$	45.7 ± 2.33	37.7 ± 2.30	$22.4 \pm 1.93$	22.8 ± 1.97	7.8 ± 1.25	$0.8 \pm 0.44$	23.6 ± 2.01
	Support	$36.3 \pm 1.57$	$13.0 \pm 1.06$	$17.9 \pm 1.28$	43.5 ± 1.61	29.9 ± 1.50	$22.2 \pm 1.34$	22.5 ± 1.36	$7.0 \pm 0.82$	$0.7 \pm 0.26$	$21.6 \pm 1.35$
Deployed	No	34.5 ± 1.68	11.4 ± 1.11**	17.8 ± 1.37**	40.1 ± 1.73**	31.8 ± 1.66	$20.5 \pm 1.40$	20.2 ± 1.42	6.1 ± 0.82	$0.7 \pm 0.26$	$18.3 \pm 1.35$ **
	Yes	34.3 ± 1.78	14.6 ± 1.29	$21.8 \pm 1.57$	48.6 ± 1.86	34.1 ± 1.78	$23.9 \pm 1.57$	24.1 ± 1.56	8.6 ± 1.06	1.1 ± 0.41	$27.4 \pm 1.68$
BMI	18.5 to 24.9	32.1 ± 1.91	13.8 ± 1.41	18.2 ± 1.61	42.5 ± 2.01	31.8 ± 1.92	$21.5 \pm 1.65$	$18.8 \pm 1.58$ *	$6.9 \pm 1.02$	$0.1 \pm 0.13^{*}$	$18.8 \pm 1.64^{**}$
	25 to 29.9	36.0 ± 1.83	13.3 ± 1.28	$21.5 \pm 1.59$	47.7 ± 1.88	35.5 ± 1.82	$22.1 \pm 1.55$	24.8 ± 1.64	$7.7 \pm 1.02$	1.3 ± 0.41	$26.9 \pm 1.69$
	30+	36.7 ± 3.44	11.0 ± 2.14	$18.4 \pm 2.72$	41.9 ± 3.51	27.4 ± 3.18	$24.2 \pm 3.08$	23.6 ± 2.90	7.4 ± 1.92	$1.7 \pm 1.02$	23.1 ± 2.96
Aerobic Exercise (min	0 to 60	29.8 ± 5.97 <b>**</b>	3.2 ± 2.24**	25.4 ± 5.88	31.2 ± 5.79 <b>**</b>	32.8 ± 6.11	19.3 ± 5.03	25.0 ± 5.71	7.2 ± 3.60	3.9 ± 2.80	21.3 ± 5.42
per week)	1100+12	01 C + C - C	- - - - -	104 + 107	51 C + 200	700 + 010	1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	0000+000			01 C + O C C
	01 10 314	35.5 ± 2.49	90.1 ± 5.11	10.0 1 1.9/	10.2 I 0.95	2/.2 ± 2.34	21.5 ± 2.10	10.5 ± 2.00		0.2 ± 0.20	22:0 ± 2:18
	404 01 CI S	34.8 ± 2.29	CO.I T 0.01	14./ ፲ 1./1	4/.4 1.2.40	C2.2 I C.US	06.1 ± 0.02	76.1 I C.61	20.1 ± 0.0		CK.1 I U.U2
	465+	34.5 ± 1.89	12.6 ± 1.26	24.9 ± 1.75**	47.1 ± 1.97	38.0 ± 1.93**	24.1 ± 1.69	26.3 ± 1.72*	7.9 ± 1.10	$0.7 \pm 0.27$	26.6 ± 1.77
Strength Training each	N	35.3±3.26	7.5 ± 1.71**	11.6 ± 2.01**	32.2 ± 3.03 <b>**</b>	12.5 ± 2.09 <b>**</b>	19.0 ± 2.48	11.2 ± 2.05 <b>**</b>	3.4 ± 1.13 <b>**</b>	0.3 ± 0.34	19.9 ± 2.65
	Yes	34.5 ± 1.33	$14.2 \pm 0.96$	21.2 ± 1.17	47.0 ± 1.39	36.4 ± 1.36	22.8 ± 1.5717	24.3 ± 1.19	8.2 ± 0.77	1.0 ± 0.28	23.9 ± 1.21

Values are mean  $\pm$  SE. \*P < 0.05; \*\*P < 0.01 for comparisons against other groups within demographic or lifestyle variable.

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multiple deployments (data not shown) had higher prevalence of DS use and use of other DS and those soldiers with multiple deployments also had greater use of multivitamins and minerals. The amount of money spent on DS was significantly greater in personnel over the age of 24 (P < 0.05) or who were overweight (P < 0.05).

Comparison of individual DS classes identified specific demographic and lifestyle associations with patterns of DS use (Table III). Multivitamin and mineral use was significantly greater in female respondents (P < 0.01), those over the age of 24 (P < 0.01), increased with level of education or rank (P <0.01), and was greater in respondents with a history of deployment (P < 0.01). Protein and amino acid use was significantly greater in male subjects (P < 0.01) and respondents who were 25–29 yr of age (P < 0.01). The use of individual vitamins or minerals, like use of multivitamins and minerals, was greater among women (P < 0.01) and increased with level of education (P < 0.01) and rank (P < 0.05). Use of combination products was more prevalent among men (P < 0.01), respondents with some college education (P < 0.01), or personnel with a BMI of 25 or greater (P < 0.05). Officers or enlisted personnel 40 yr or older used less combination products than all other personnel (P < 0.01). Respondents with some college education or a college degree (P < 0.05) reported greater use of herbal supplements. Purported steroid analog use was significantly greater among respondents with a BMI of  $\geq 25$  (P < 0.01). Supplements categorized as 'other' were less likely to be used by personnel aged 18-24 (P < 0.01). Use of 'other' DS increased with level of educational attainment or rank (P < 0.01) and was more prevalent among former tobacco users (P < 0.05).

#### **Prevalence and Predictors of Sport Nutrition Product Use**

Approximately 24% of respondents consumed sports drinks  $\geq$  1 time/wk, 9% consumed sports bars or gels, and 8% consumed a meal replacement beverage (Table II). Use of sports nutrition products, except for sports drinks, was associated with performing more than 60 min of aerobic exercise per week or engaging in strength training. Specific demographic associations were identified for each form of sport nutrition product. Use of sports drinks was more prevalent among men (P < 0.01), personnel 18–24 yr of age (P < 0.01), subjects who were single (P < 0.01), or E1–E4 personnel (P < 0.01). Use of sports bars or gels was more prevalent among respondents with a college degree (P < 0.01) and those whose military specialty was combat-related (P < 0.01). Users of meal replacement beverages were more likely to have some college education or a bachelor's degree (P < 0.01), or a BMI greater than 24 (P < 0.05).

#### Multivariate Analysis of Dietary Supplement Use

After adjusting for the demographic characteristics of sex, age, and rank, logistic regression (**Table IV**) showed female personnel were more likely to use any DS (P < 0.05), were less likely to use 5 or more DS (P < 0.05) or a protein and amino acid DS (P < 0.01), and were almost 1.5 times more likely to use a multivitamin and mineral DS (P < 0.01). Personnel 18–24 yr of age were less likely (P < 0.05) to use a DS, particularly a

multivitamin and mineral, and subjects 25-29 yr of age were twice as likely to use protein and amino acid (P < 0.01) or combination (P < 0.05) DS compared to personnel 40 or older. Attaining higher levels of education was associated with multivitamin and mineral, protein and amino acid, combination and herbal DS use. Personnel with a bachelor or graduate degree (P < 0.01) were more likely to use a multivitamin and mineral DS as well as protein and amino acid DS compared to those with a high school degree. Respondents with some college education were also more likely to use combination or herbal products (P < 0.05). Personnel with a BMI of 25–29.9 were more likely to use a combination product compared to those with a BMI less than 25 (P < 0.05). Subjects who engaged in high volumes of aerobic exercise or strength training were more than twice as likely to use 5 or more DS per week (P < 0.01), including multivitamins and minerals (P < 0.01), protein and amino acid DS (P < 0.01) or combination products (P < 0.01). Participation in strength training was also significantly associated with a greater use of herbal DS (P < 0.05). Regression modeling indicated that only BMI was associated with high DS expenditures (> \$50/mo; P < 0.05).

#### **Reasons for Dietary Supplement Use**

Reasons for the use of DS are reported in **Table V**. The most common reason cited for DS use was to promote general health (52%), followed by increasing muscle strength (23%), providing more energy (21%), enhancing performance (21%), or 'other' (16%). Users of multivitamins and minerals, individual vitamins and minerals, herbals, and 'other' DS primarily reported using these DS classes to promote general health. However, users of protein and amino acid DS primarily used this class of DS to increase muscular strength (21%), and subjects reporting the use of combination products did so with the hope of enhancing performance (11%).

# DISCUSSION

A very high proportion of USAF personnel (68%) regularly use DS, much more than the general civilian population (49%).<sup>5</sup> Active duty USAF personnel were particularly more likely to use purported performance enhancing DS compared to the general population.<sup>5</sup> For example, 33% of USAF personnel used protein and amino acid DS and 24% used combination products containing mixtures of ingredients such as creatine, 1,3 dimethylamylamine (DMAA; an ephedra-like DS), caffeine and beta-alanine, all of which are promoted as performance enhancers. Supplements classified as 'other,' which included products intended to improve joint or digestive health, fish oils, and other multicomponent DS, were also very popular among USAF personnel. In surveys of the civilian population, only about 4% use protein and amino acid DS, and less than 1% report use of combination products.<sup>4,5</sup> Among college students, 17% reported the use of protein and amino acid DS, and 6% used combination products, well below what we found in USAF personnel but much higher

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VARIARI F		ANV DS	5 OR MORE	MULTIVITAMIN OR MILITIMINERAL	PROTEIN & AMINO ACIDS	COMBINATION	HERRAI	\$50 OR MORE SPENT MONTHLY
Sex	aleM	10	10	10	10	10	10	10
	Female	1.32 (1.03, 1.68)*	0.73 (0.54, 0.99)*	1.46 (1.16, 1.83)**	0.35 (0.26, 0.47)**	0.59 (0.44, 0.79)**	0.76 (0.49, 1.18)	0.88 (0.52, 1.52)
Age (years)	18 to 24	0.60 (0.37, 0.97)*	1.11 (0.65, 1.90)	0.58 (0.37, 0.90)**	1.59 (0.97, 2.59)	1.32 (0.74, 2.33)	0.83 (0.38, 1.81)	0.43 (0.16, 1.20)
	25 to 29	0.91 (0.60, 1.40)	1.38 (0.86, 2.21)	0.99 (0.68, 1.45)	2.20 (1.44, 3.42)**	1.86 (1.11, 3.12)*	0.72 (0.39, 1.35)	1.35 (0.60, 3.05)
	30 to 39	0.72 (0.47, 1.12)	0.89 (0.55, 1.46)	0.73 (0.50, 1.08)	1.20 (0.76, 1.89)	1.39 (0.82, 2.34)	0.66 (0.34, 1.27)	1.13 (0.49, 2.62)
	40+	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Education	Some HS/ High School	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Some College/ Associate Degree	1.61 (1.19, 2.18)**	1.99 (1.31, 3.02)**	1.25 (0.92, 1.69)	1.62 (1.17, 2.23)**	1.55 (1.08, 2.20)*	2.03 (1.09, 3.78)*	1.77 (0.80, 3.94)
	Bachelor/ Graduate Degree	2.13 (1.33, 3.41)**	1.93 (1.09, 3.40)**	2.20 (1.42, 3.40)**	2.17 (1.37, 3.45)**	1.09 (0.64, 1.87)	1.24 (0.54, 2.83)	1.02 (0.35, 2.94)
<b>Marital Status</b>	Single/Not Married	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Married	0.90 (0.71, 1.15)	0.77 (0.57, 1.03)	0.84 (0.67, 1.06)	0.81 (0.63, 1.04)	0.94 (0.72, 1.23)	0.66 (0.43, 1.00)	0.77 (0.46, 1.27)
Occupation	Combat	1.04 (0.60, 1.81)	1.42 (0.79, 2.56)	1.20 (0.73, 1.98)	1.29 (0.76, 2.17)	1.32 (0.73, 2.40)	0.93 (0.37, 2.33)	1.77 (0.73, 4.29)
	Operational	1.09 (0.85, 1.39)	1.29 (0.97, 1.72)	1.19 (0.94, 1.50)	1.28 (1.01, 1.64)	0.95 (0.72, 1.24)	1.12 (0.73, 1.71)	0.83 (0.48, 1.44)
	Support	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deployed	Yes	1.25 (0.96, 1.63)	1.16 (0.85, 1.59)	1.18 (0.92, 1.52)	1.08 (0.82, 1.42)	1.34 (0.99, 1.83)	1.32 (0.83, 2.11)	1.23 (0.68, 2.24)
	No	1.0	1.0	1.0	1.0	1.0	1.0	1.0
BMI (kg $\cdot$ m <sup>-2</sup> )	18.5 to 24.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	25 to 29.9	1.34 (1.04, 1.72)*	1.17 (0.87, 1.56)	1.17 (0.93, 1.48)	1.09 (0.85, 1.40)	1.43 (1.09, 1.89)*	1.01 (0.66, 1.55)	2.01 (1.18, 3.43)*
	30+	1.03 (0.71, 1.49)	0.95 (0.61, 1.47)	0.88 (0.62, 1.25)	0.77 (0.52, 1.14)	1.34 (0.89, 2.01)	0.93 (0.48, 1.82)	1.61 (0.76, 3.40)
Aerobic Exercise Duration	Low	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Medium	1.35 (1.01, 1.80)**	1.44 (1.04, 2.00)**	1.22 (0.93, 1.60)	1.33 (1.00, 1.77)**	1.47 (1.09, 1.97)**	1.07 (0.66, 1.73)	1.26 (0.70, 2.29)
	High	2.50 (1.59, 3.93)**	3.13 (2.09, 4.71)**	2.08 (1.42, 3.05)**	3.01 (2.06, 4.39)**	1.82 (1.22, 2.70)**	1.17 (0.59, 2.33)	1.89 (0.84, 4.27)
<b>Strength Training</b>	No	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Yes	2.02 (1.50, 2.72)**	1.95 (1.29, 2.96)**	1.92 (1.41, 2.60)**	3.67 (2.46, 5.49)**	2.45 (1.59, 3.76)**	2.51 (1.24, 5.08)*	2.17 (0.93, 5.10)
* P < 0.05; **P < 0.01.								

Table IV. Association of Number and Type of Dietary Supplement (DS) Used at Least Once per Week Over the Previous 6 mo and Amount Spent per Month With Selected Demographic and Lifestyle Characteristics, cion Modeling Adimeted for Ade Sev and Bank ad on Logistic Do ted Rac In (CI) and Drac 1040 av. 2010: Odde Batios and 95% Confider , IIS Air Fo

 Table V.
 Reported Reasons (%; Mean ± SE) for Using Any Dietary Supplement (DS) and Specific DS Types at Least Once per Week Over the 6 mo Prior to the Survey Among U.S. Air Force Personnel (N = 1750).

				INDIVIDUAL			PURPORTED	
REPORTED REASONS		<b>MULTIVITAMIN OR</b>	<b>PROTEIN &amp;</b>	VITAMINS OR	COMBINATION		STEROID	
FOR DS USE	ANY DS	MULTIMINERAL	AMINO ACIDS	MINERALS	SUPPLEMENTS	HERBALS	ANALOGS	OTHER
Promote General Health	51.6 ± 1.28	$40.1 \pm 1.26$	$8.8 \pm 0.77$	$17.0 \pm 0.96$	$2.6 \pm 0.42$	$3.2 \pm 0.46$	$0.2 \pm 0.13$	15.1 ± 0.95
Give More Energy	$21.2 \pm 1.06$	$3.3 \pm 0.45$	$3.2 \pm 0.49$	$3.4 \pm 0.46$	$6.9 \pm 0.66$	$1.1 \pm 0.29$	$0.1 \pm 0.09$	$5.3 \pm 0.58$
Greater Muscle Strength	$23.2 \pm 1.10$	$1.8 \pm 0.35$	$20.8 \pm 1.06$	$0.3 \pm 0.11$	$7.6 \pm 0.69$	$0.7 \pm 0.21$	$0.1 \pm 0.08$	$0.6 \pm 0.23$
Performance Enhancer	$21.1 \pm 1.07$	$2.7 \pm 0.43$	$9.9 \pm 0.79$	$1.1 \pm 0.30$	$11.3 \pm 0.83$	$1.4 \pm 0.31$	$0.5 \pm 0.19$	$2.4 \pm 0.42$
Weight Loss	$10.0 \pm 0.77$	$1.1 \pm 0.26$	$2.7 \pm 0.42$	$0.9 \pm 0.25$	$5.8 \pm 0.60$	$0.5 \pm 0.17$	$0.1 \pm 0.06$	$0.8 \pm 0.24$
Increased Endurance	$10.7 \pm 0.80$	$1.3 \pm 0.31$	$4.3 \pm 0.51$	$0.3 \pm 0.14$	$5.3 \pm 0.60$	$0.3 \pm 0.13$	$0.0 \pm 0.00$	$0.9 \pm 0.26$
Not Sure	$5.4 \pm 0.55$	$0.4 \pm 0.16$	$0.4 \pm 0.15$	$0.8 \pm 0.22$	$0.1 \pm 0.09$	$0.3 \pm 0.13$	$0.1 \pm 0.05$	$0.6 \pm 0.17$
Other	15.7 ± 0.95	$0.8 \pm 0.21$	$2.5 \pm 0.42$	$3.1 \pm 0.44$	$0.8 \pm 0.23$	$2.1 \pm 0.38$	$0.1 \pm 0.05$	$2.6 \pm 0.43$

than the general population.<sup>17</sup> Several of these types of DS have been found to be dangerous and/or adulterated.<sup>19</sup>

Multivitamins and minerals were the most prevalent DS used by USAF personnel; but they used slightly less of them than previously reported (45% vs. 50%).<sup>7</sup> Use of multivitamin and minerals was greater in USAF personnel than previously reported for soldiers (38%),<sup>18</sup> civilians (33%)<sup>4</sup> and college students (42%).<sup>17</sup> Compared to active duty Army soldiers and college students, USAF personnel were 11% more likely to use multiple DS ( $\geq 2$  or more) at least one time per week and 8% more likely to use 5 or more DS once per week.<sup>17,18</sup> Among USAF personnel, use of all DS classes was greater than Army soldiers with the exception of purported steroid analog use. Patterns of DS use also differed between USAF personnel and soldiers; in the USAF, there was greater use of protein supplement and combination products, as well as greater use of individual vitamins or minerals. Like the civilian population but unlike soldiers, female USAF personnel reported overall greater use of DS than men due to their increased use of multivitamins and multiminerals and individual vitamins or minerals. The present study also found a significant positive relationship of deployment history and increased DS use among USAF personnel and confirmed that strength training is significantly associated with DS use in an Armed Forces population. Differences in DS use between USAF personnel in the current study and previous surveys of Army soldiers<sup>18</sup> likely reflect the increases in DS use among all branches of the service, especially during deployment.<sup>2,15</sup> The high prevalence of history of deployment (48%) in the current sample compared with the earlier survey of Army personnel, where only 7% had deployed,<sup>18</sup> supports this hypothesis rather than indicating there were inherent differences in DS use and preference between USAF and Army personnel. In addition, since the survey and methods used to define DS users and categories of DS in the current study were identical to ones used previously,2,18 methodological differences are unlikely to account for the higher DS use reported in the current investigation.

Patterns of DS use identified in the present study suggest there have been changes in the nature of DS consumed by USAF personnel over time. Our data, in contrast to data from the 2005 DoD Survey of Health Related Behaviors,<sup>7</sup> suggest that in 2005 USAF personnel used more individual vitamins or minerals (28% vs. 22%) and herbal DS (11% vs. 7%). However, total DS use by USAF personnel was similar to previous reports due to their extensive use of protein and amino acid use and DS described as 'other'. Apparently, USAF personnel have recently been substituting these products for multivitamins. Consistent with previous reports of DS use by USAF personnel, multivitamin and mineral and individual vitamin or mineral use remained more common among women and increased with age.<sup>7</sup> The use of combination products continued to be more prevalent among male USAF personnel but male and female USAF personnel used equal amounts of herbal DS.<sup>7</sup>

Like active duty soldiers, recreational athletes and gym participants, sport nutrition products were frequently used by USAF personnel.<sup>12,18,24</sup> However, unlike soldiers, use of sports drinks by respondents was not related to participation in aerobic exercise and use of bars or gels (9% vs. 6%) and meal replacement beverages (8% vs. 3%) was more common.<sup>18</sup>

Among civilians and college students, participation in vigorous cardiovascular exercise and strength training have been consistent predictors of DS use; however, patterns of DS use vary depending on the form of exercise.<sup>17,20,22</sup> Increased use of multivitamins, multiminerals and calcium is associated with participating in cardiovascular exercise while use of protein supplements and creatine is frequently associated with strength training.<sup>20,22</sup> In the present study, the use of all DS classes by USAF personnel was associated with both aerobic and strength training exercise. Participation in aerobic exercise by USAF respondents far exceeded norms for the civilian population.<sup>27</sup> Given that most civilians are not required to perform physically strenuous occupational tasks, engage in mandatory physical training or meet specific fitness, weight and body composition standards to retain their jobs and be eligible for promotion, these differences in patterns of DS use may be a function of military occupational demands that require a high level of physical training to ensure operational readiness.

Like civilians, the most common reason cited for the use of DS by USAF personnel was to improve their health. Over 50% of USAF personnel reported using multivitamin or individual vitamin or mineral DS to accomplish this. However, in contrast to NHANES data collected from the civilian population,<sup>5</sup> a significantly greater proportion of USAF personnel reported the use of DS to increase energy (21%), to improve muscle strength (23%), enhance performance (21%), increase endurance (11%), and facilitate weight loss (10%). These findings are similar to

the reasons cited by soldiers for the use of DS and reflect the increased use of protein, amino acid, and combination products among these populations.

On average, USAF personnel spent \$39 dollars on DS per month which is similar to expenditures reported by soldiers (\$38 per month), but significantly greater than college students (\$17 per month).<sup>18</sup> However, almost 25% of soldiers reported spending \$50 or more per month on DS whereas only 6% of USAF personnel reported this level of expenditure. We also observed greater expenditure on DS among USAF personnel with a history of deployment (\$44 vs. \$34) consistent with the greater use of DS by these respondents and greater use of multiple DS as a function of the number of deployments.<sup>2</sup> Despite a lack of evidence for the efficacy of most DS, USAF personnel, like soldiers, spend a significant amount of their discretionary income on DS. Additional research is necessary to understand why military personnel and civilian populations are willing to invest in unproven methods to enhance occupational performance and personal wellness in spite of the fact their confidence in the efficacy and safety of DS is limited.<sup>8</sup> Further, given the requirement of mandatory drug testing<sup>9</sup> and the possibility of contamination of DS,<sup>19</sup> it is important to increase educational awareness about the safety and known health effects of DS use for all members of the U.S. Armed Forces.

Although the current analyses provide insight into DS use among USAF personnel, certain study design limitations should be acknowledged. First, since participation was voluntary personnel with strong beliefs regarding DS use may have been more willing to complete the survey. In addition, as with all self-reported survey data, report and recall bias cannot be ruled out. However, since the data were weighted prior to analyses to obtain a sample representative of the overall Air Force population, sampling bias should have been reduced. The current study has focused on DS use among USAF personnel and comparisons to other branches of the U.S. Armed Forces since the methodology used to conduct the surveys and analyze the data were consistent among studies. Comparisons of DS use with reports from other countries' military members<sup>6</sup> must be interpreted with caution due to the inherent differences in data collection metrics and analyses.

In conclusion, USAF personnel, like Army and Coast Guard personnel, use more DS than civilians and are particularly heavy users of purported performance enhancing DS such as protein and amino acids. Like the Army, participation in extensive aerobic exercise and strength training was associated with heavy DS use in USAF personnel. Furthermore, patterns of DS use observed in this study suggest selection of DS by USAF personnel have changed over time. The prevalence of multivitamin, individual vitamin or mineral, protein supplements, combination products and DS classified as 'other' and the use of multiple supplements as assessed by a nearidentical survey procedure and questionnaire was greater than previously reported for other military personnel.<sup>18</sup> Differences in use of DS between military populations and the relationship of occupational demands to DS use warrant further investigation. Understanding cultural differences between the populations which drive prevalence and patterns of DS use is critical for development of appropriate educational interventions to prevent the inappropriate use of DS by these populations.

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