Energy Beverage Consumption Among Naval Aviation Candidates

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INTRODUCTION: Since the debut of energy beverages, the consumption of energy beverages has been immensely popular with young adults. Research regarding energy beverage consumption has included college students, European Union residents, and U.S. Army military personnel. However, energy beverage consumption among naval aviation candidates in the United States has yet to be examined. The purpose of this study was to assess energy beverage consumption patterns (frequency and volume) among naval aviation candidates, including attitudes and perceptions regarding the benefits and safety of energy beverage consumption.

METHODS: A 44-item survey was used to assess energy beverage consumption patterns of 302 students enrolled in the Aviation Preflight Indoctrination Course at Naval Air Station Pensacola, FL.

RESULTS: Results indicated that 79% of participants ($N = 239$) reported consuming energy beverages within the last year. However, of those who reported consuming energy beverages within the last year, only 36% ($N = 85$) reported consuming energy beverages within the last 30 d. Additionally, 51% ($N = 153$) of participants reported no regular energy beverages consumption. The majority of participants consumed energy beverages for mental alertness (67%), mental endurance (37%), and physical endurance (12%). The most reported side effects among participants included increased mental alertness (67%), increased heart rate (53%), and restlessness (41%).

DISCUSSION: Naval aviation candidates appear to use energy drinks as frequently as a college student population, but less frequently than expected for an active duty military population. The findings of this study indicate that naval aviation candidates rarely use energy beverages (less than once per month), but when consumed, they use it for fatigue management.

KEYWORDS: energy beverages, military, aviation.

Sather TE, Delorey DR. *Energy beverage consumption among naval aviation candidates*. Aerosp Med Hum Perform. 2016; 87(6):557–564.

The uses of nutritional supplements are common among the U.S. adult population. In fact, the use of nutritional supplements has increased from over 40% between 1988 to 1994 to over 50% from 2003 to 2006.[16] Among military personnel, the use of nutritional supplements appears to be even higher. Surveys of various groups in the military have shown that military personnel self-reported that between 60–85% of members use them.[5] Military women reported using nutritional supplements more often than men.[20] Among deployed personnel, an estimated 47% of those surveyed reported that they have used at least one type of supplement during deployment with 22% reporting using multiple supplements.[17]

Energy beverages are one popular class of nutritional supplements used to combat fatigue and attempt to increase physical and mental performance.[34] Energy beverages are packaged similarly to soft drinks and are often sold alongside them. Energy beverages, including 1.5 to 2 oz "shot" products such as 5-h Energy®, are readily available in gas stations, grocery stores, convenience stores, and a variety of other places. Data obtained from the National Health and Nutrition Examination Survey 2007 to 2010 found that 2.7% (SE = 0.2%) of the American population (above 1 yr of age) have used energy beverages. Even though the relative percentage of the U.S. population that consumes energy beverages is low, certain subgroups use energy beverages at much higher rates. Energy drinks can have

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This manuscript was received for review in September 2015. It was accepted for publication in January 2016.

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DOI: 10.3357/AMHP.4477.2016

high amounts of caffeine per serving. **Table I** presents a list of commonly used caffeinated energy drinks.

Several studies have reported that energy beverages have performance-enhancing effects.[6,32,33] In partially sleep-deprived healthy volunteers, a concentrated caffeinated energy beverage known as an energy shot has been found to improve important aspects of cognitive functions.[36] The energizing effects of energy beverages are fairly common. Energy beverages have a significant dose effect to produce a rapid increase in alertness and energy (jolt) followed by an equally sudden drop in energy (crash) event.[23] Researchers have found that 51% of college users consumed greater than one energy beverage each month to deal with insufficient sleep (67%) and to increase energy (65%). However, approximately one-third of the respondents also reported manifesting some unwanted side effects such as heart palpitations (20%), insomnia (10%), headaches and tremors (5.7%), nausea and vomiting (4.2%), and nervousness (2.8%).[6] Between 2004 and 2012, 34 deaths have been linked to the consumption of energy drinks,[13] while a 20-fold increase in the number of emergency department visits due to energy drink consumption[10] was seen between 2005 and 2011. Researchers have begun examining the impact of energy drink consumption on young, healthy individuals and speculate that nonidentified or hidden sources of caffeine may have a detrimental and sometimes fatal effect.[27]

Stronger versions of energy beverages known as preworkout beverages are also readily available for purchase at most general stores and pharmacies. These products are marketed to enhance physical performance. Many of these preworkout beverages do not disclose all ingredients, their precise amounts, and lack evidence to support the professed performance-enhancing benefits.[15] Ingredients found in preworkout beverages include supplements that are amphetamine derivatives such as DMAA, 1,3-dimethylamylamine, methylhexanamine, or geranium extract. These ingredients have been cited by the FDA to be dangerous and have been deemed illegal after they had been involved in five deaths.[31,35]

Table I. Commonly Consumed Energy Beverages.

BEVERAGE	SERVING SIZE	CAFFEINE (mg)
Coffee (brewed)	8 oz. (237 ml)	95–200 mg
Espresso (restaurant-style)	1 oz. (30 ml)	47–75 mg
Coffee (instant)	8 oz. (237 ml)	27–173 mg
Black tea	8 oz. (237 ml)	14–70 mg
Green tea	8 oz. (237 ml)	24–45 mg
Iced tea	8 oz. (237 ml)	5–40 mg
Coca-Cola	12 oz. (355 ml)	23–35 mg
Diet Coke	12 oz. (355 ml)	23–47 mg
Diet Pepsi	12 oz. (355 ml)	27–37 mg
Dr. Pepper (regular and diet)	12 oz. (355 ml)	36–42 mg
Mtn. Dew (regular and diet)	12 oz. (355 ml)	42–55 mg
Pepsi	12 oz. (355 ml)	32–39 mg
Amp (regular or sugar-free)	8 oz. (237 ml)	71–74 mg
5-Hour Energy shot	2 oz. (60 ml)	200–207 mg
Full Throttle (regular or sugar-free)	8 oz. (237 ml)	70–100 mg
Red Bull (regular or sugar-free)	8.4 oz. (248 ml)	75–80 mg
Rockstar (regular or sugar-free)	8 oz. (237 ml)	79–80 mg
Jolt	23 oz. (680 ml)	280 mg

Adapted from Journal of Food Science, 2010; Pediatrics, 2011; Journal of Analytical Toxicology, 2008; USDA National Nutrient Database for Standard Reference, Release 26; Journal of Analytical Toxicology, 2006; Starbucks, 2014; Food and Chemical Toxicology, 2014. Retrieved from http://www.mayoclinic.org/healthy-lifestyle/nutrition-and-healthy-eating/in-depth/caffeine/art-20049372?pg=1&p=1.

The military has also seen the danger of preworkout beverage usage. In 2011, preworkout beverages were reported to have contributed to the death of two U.S. Army soldiers who consumed a popular supplement prior to engaging in fitness exercise.[14] The supplement was correlated with the soldiers experiencing a heart attack that led to their demise.[21] Another case involved a Special Operations soldier who consumed a popular preworkout supplement and subsequently experienced a cerebral hemorrhage.[42] A third involved a USN Special Operations Force sailor who developed atrial fibrillation with rapid ventricular response after consuming a commonly used supplement that contains DMAA and caffeine.[3] A final case involved a USMC aircrew member who experienced a hypoxic incident during an in-flight emergency after consuming a preworkout supplement.[11]

Researchers have identified additional risks of consuming energy beverages. For example, studies suggest that energy beverages may serve as a gateway product, which can lead to other forms of drug dependence.[26] Among young adults, a high frequency of consumption has been associated with a greater risk of alcohol dependence.[4] Woolsey et al.[38,39,40] reported a possible link between energy beverage consumption and the increased illicit use of prescription stimulant medications.

Separately, over-consumption of caffeine can lead to nervousness, irritability, and insomnia. In adults, 4 to 12 mg $\cdot$ kg^{-1} of body mass of caffeine is associated with anxiety, jitteriness, headaches, and fatigue.[29] In women, chronic caffeine consumption has been associated with low birth weight of newborns and miscarriages.[8]

Doses of caffeine over 250 mg consumed over a short period can trigger a condition called "caffeine intoxication." This clinical syndrome is marked by nervousness, anxiety, restlessness, insomnia, gastrointestinal upset, tremors, rapid heartbeat, and pacing. In some people, they may also experience euphoria and muscle twitches. There are actually four caffeine-related syndromes that are associated with the overconsumption of caffeine as listed in the *Diagnostic and Statistical Manual of Mental Disorders*.[2] These diagnoses are caffeine intoxication, caffeine-induced anxiety disorders, caffeine-induced sleep disorders, and caffeine-related disorder not otherwise specified.

Acute clinical caffeine toxicity may occur after consumption of 1000 mg of caffeine.[29] Caffeine consumed in extremely large doses can be deadly and typically requires the consumption of more than 5000 mg of caffeine.[19] Medical interventions for caffeine intoxication are focused on stabilization of heart rate and blood pressure, controlling seizures, decontamination, and correction of electrolyte imbalances.[41]

The purpose of this study was to determine[1] energy beverage consumption patterns among naval aviation candidates,[2] prevalence and frequency of energy beverage use for the following 10 situations: increase concentration, increase mental performance, improve physical performance, increase alertness,

stay awake, increase energy, increase social interaction, enjoy the taste, hydration, weight management,[3] and prevalence of energy beverage side effects among naval aviation candidates.

METHODS

The authors used a 44-item modified version of the European Consortium Nomisma-Areté survey[43] that assessed consumption patterns of energy beverages among naval aviation candidates. Survey items asked about frequency and volume of beverage consumption, brand preference, sugar content, and caffeine content. The survey also collected self-reported reasons and occasions during which such beverages were consumed, as well as perceptions regarding the potential benefits and risks of their consumption.

From the first week of January 2015 to mid-March 2015, 302 naval aviation candidates were presented the survey during week 5 of aviation preflight indoctrination. All candidates who were presented surveys elected to complete it, resulting in a 100% response rate. The average time to complete the survey process was approximately 30 min.

Data from the surveys were collected via SurveyMonkey® and analyses were performed using SPSS. Consumption trends including frequency, quantity, types of beverages consumed, etc. were examined using descriptive statistics. Descriptive statistics included means, standard deviations, 95% confidence intervals, and frequency distributions.

An a priori power analysis was conducted to determine the necessary sample size for the current study. The projected sample size required to complete this study was set at 300 participants. No specific groups were excluded (e.g., age, gender). With an anticipated effect size $r^2 > 0.06$, power = 0.80, and P-value maintained at 0.05, the required sample size for multiple regression analyses was calculated to be 290. Analysis requirements for hypothesis testing were all anticipated to be below this sample size.

Students enrolled in the Aviation Preflight Indoctrination course instructed by Naval Aviation Schools Command were eligible for involvement in the study after they had completed the first 4 wk of didactic instruction. Participants were verbally informed as a group that an opportunity existed to participate in a study being conducted by Naval Aerospace Medical Institute researchers on energy beverage consumption patterns. To minimize the possibility of coercion or undue influence, unit commanders were not present at the time of recruitment. Participants were informed during the recruitment phase and on the consent form that their decision to participate or not participate would in no way affect their class standing or final grade. Participants were informed that their results would be reported in aggregate form so that individual results could not be tied back to any single participant, and that their participation would in no way affect their standing in naval aviation training or on their naval careers.

Approval to conduct this study was obtained from the Naval Medical Research Unit – Dayton Institutional Review Board, Commanding Officer of the Navy Medicine Operational Training Center, Commanding Officer of the Naval Aviation Schools Command, and the Officer in Charge, Naval Aviation Survival Institute. Human subjects approval for this study was granted by the Navy Medicine Operational Training Center Scientific and Ethical Review Committee and the Institutional Review Board at the Naval Medical Research Unit – Dayton.

RESULTS

The subjects for this study were naval aviation candidates attending aviation preflight indoctrination who were in good standing with the Naval Aviation Schools Command. The naval aviation candidates consisted of individuals who were either designated as USN and USMC Student Naval Aviators (SNA) or Student Naval Flight Officers (SNFO). In selecting the participants for this study, the researcher used consecutive sampling of students attending survival training at the Naval Survival Training Institute's Naval Air Station Pensacola Aircrew Indoctrination course between the months of January through March 2015. There were 302 participants who completed the questionnaire. The data consisted of 274 (90.73%) men and 28 (9.17%) women ranging in age from 21 to 35 yr of age (M = 23.68, SD = 1.99). A majority of the sample were Caucasians (N = 245, 81.13%), with Asian (N = 23, 7.62%), Hispanic (N = 17, 5.63%), African American (N = 11, 3.64%), and Native American (N = 3, 0.99%) individuals comprising the remainder of the sample. Three (0.99%) individuals elected not to identify a racial category. All participants had earned a baccalaureate degree, while four participants reported earning a graduate degree.

In regards to the rank of the participants, desired/prospective profession, and desired platform, all respondents held a rank of between O1-O3 (USN Ensign/USMC 2nd Lieutenant to USN Lieutenant/USMC Captain). Members of the U.S. Navy accounted for 74.83% of the respondents (N = 226) and 78.48% identified themselves as desiring to be a pilot (N = 237). Of the four classifications of aircraft, 57.95% (N = 175) of the study subjects identified themselves as desiring to fly Class 1 jet aircraft (e.g., AV-8, EA-6, F/A-18, F-35).

Approximately 79% of participants (N = 239) reported consuming energy beverages within the last year. The energy beverages consumer sample used for analyses was comprised of 93.31% men (N = 223 of 274; 81.39%) and 6.69% women (N = 16 of 28; 57.14%). Among those who reported consuming energy beverages within the last year, 85 (35.56%) reported consuming energy beverages within the last 30 d. Men again comprised 94.12% of the affirmative respondents (N = 80). There were 153 (50.66%) participants who reported not regularly consuming energy beverages, while 63 (20.9%) reported no use of energy beverages in the past year. The frequencies and percentages for energy beverage consumption are reported in **Table II**.

To determine how often participants used energy beverages, the question, "in an average week, in the past year, what best describes your consumption pattern of energy beverages/shots"

Table II. Energy Beverage Consumption Frequency (%) Habits.

CONSUMPTION QUESTIONS	FREQUENCY (%)
Over the last year, have you consumed any energy drinks/shots?	
Yes	239 (79.1)
No	63 (20.9)
During the past 30 days, have you consumed any energy drinks/shots?	
Yes	85 (28.2)
No	217 (71.9)
How long have you consumed energy drinks/shots?	
A few months	4 (1.3)
1-3 yr	47 (15.6)
4-6 yr	73 (24.2)
More than 6 yr	25 (8.3)
I do not regularly consume energy drinks/energy shots	153 (50.7)

* $N = 302$.

was asked. Out of all the SNAs and SNFOs ($N = 302$), 44.37% ($N = 134$) reported consuming energy beverages "Rarely (less than once a month)." For regular consumers of energy beverages ($N = 204$), almost all (98.04%, $N = 200$) reported drinking one serving or less a day. Only 2.32% ($N = 7$) of those surveyed met the operational definition of a high chronic consumer by "drinking energy beverages four to five days per week or more." **Table III** presents the consumption frequency and quantity of energy beverages consumed over time.

To investigate the situations for consuming energy beverages, 10 statements were listed and participants were asked to rate their agreement/disagreement using a 5-point Likert scale (5 = Strongly Agree to 1 = Strongly Disagree). The most common reasons cited for energy beverage consumption was "to stay awake longer" ($M = 3.89$, SD = 1.09), followed by "to increase motivation/ energy level" (M = 3.15, SD = 1.05), and "to help study/increase concentration" (M = 3.08, SD = 1.45). The least popular reasons for energy beverage consumption were "weight management" (M = 1.36, SD = 0.66) and hydration (M = 1.38, SD = 0.66). **Table IV** presents the energy beverage consumption patterns for the 10 situations assessed.

When asked to select what side effects energy beverages have caused on the consumer via the question, "I have experienced the following after consuming energy beverages/shots (check all that apply)", results indicated that 87.22% of men ($N = 239$) and 92.86% of women ($N = 26$) reported noticing some effect(s) after consumption. The most frequently reported side effects were increased mental alertness (67.36%, $N = 161$), increased heart rate (52.72%, $N = 126$), and restlessness (40.59%, $N = 97$). It was found that 11.30% of respondents ($N = 27$) reported experiencing no effect after consuming energy beverages. The data for the reported side effects by energy beverages consumed are reported in **Table V**.

Table III. Energy Beverage Consumption Frequency (%) and Quantity Consumed Over the Last Year.

CONSUMPTION QUESTIONS	*N*	FREQUENCY (%)
Over the last year, have you consumed any energy drinks/shots?	302	
Every day		1 (0.3)
4-5 d a week		6 (2.0)
2-3 d a week		12 (4.0)
Once a week		13 (4.3)
One to three time a month		38 (12.6)
Rarely (less than once a month)		134 (44.4)
Never		98 (32.5)
In an average day, what best describes your consumption pattern of energy drinks/shots?	204	
< 1 per day		174 (85.3)
1 per day		26 (12.8)
2 per day		4 (2.0)
3 per day		0.0
4 per day		0.0
5 per day		0.0
In the past 30 days, what is the maximum number of energy drinks/shots consumed in one day?	204	
None		109 (53.4)
<1		13 (6.4)
1		50 (24.5)
2		25 (12.3)
3		4 (2.0)
4		3 (1.5)
Over the last year, what is the maximum number of energy drinks/shots you have consumed on a single occasion?	204	
<1		8 (3.9)
1		79 (38.7)
2		73 (35.8)
3		17 (8.3)
4		23 (11.3)
5		3 (1.5)
>5		1 (0.5)

DISCUSSION

Energy beverage consumption appears to have continued to rise in popularity since its introduction in 1987 in Australia and 1997 in the United States.[23] Energy beverages also appear to be more popular among young adults and to be used more by men than women.[24] There are limited studies examining energy beverage consumption among military personnel, particularly in aviation. Research performed by Bird[9] at the U.S. Air Force Research Laboratory reported that the effects of coffee and energy beverages were essentially the same when controlling the confounding factors of caffeine and sugar. Despite this finding, there is a difference between authorizations for use of these products in flight by the USN and USMC due to the lack of regulation of energy beverages' herbal ingredients. Coffee with sugar can be consumed freely as long as it is within a USN Medicine recommended limit of less than 450 mg of caffeine per day.[28] Energy beverages usually fall within this range of caffeine; however, due to other unknowns related to the multiple other ingredients as part of the proprietors' "energy blend," an aviator is grounded for 24 h after consuming an energy beverage. This could partially be due to there being over 500 brands of energy beverages and the difficulty in evaluating the safety of their various ingredients.

Table IV. Frequency (%) of Reported Reasons for Consuming Energy Beverages.

	STRONGLY AGREE (5)	AGREE (4)	NEUTRAL (3)	DISAGREE (2)	STRONGLY DISAGREE (1)	MEAN
To help study/increase concentration	31 (15.2)	77 (37.7)	24 (11.8)	21 (10.3)	51 (25.0)	3.08
To increase mental performance	20 (9.8)	58 (28.4)	41 (20.1)	33 (16.2)	52 (25.5)	2.81
To improve physical/athletic performance	7 (3.4)	16 (7.8)	32 (15.7)	57 (27.9)	92 (45.1)	1.97
To wake up in the morning/increase alertness	32 (15.7)	60 (29.4)	25 (12.3)	34 (16.7)	53 (26.0)	2.92
To stay awake longer	58 (28.4)	104 (51.0)	17 (8.3)	11 (5. 4)	14 (6.9)	3.89
To increase motivation/energy level	24 (11.8)	88 (43.1)	30 (14.7)	19 (9.3)	43 (21.1)	3.15
To be more sociable	5 (2.5)	27 (13.2)	34 (16.7)	55 (27.0)	83 (40.7)	2.10
Refreshment/Enjoy the taste	11 (5. 4)	52 (25.5)	33 (16.2)	41 (20.1)	67 (32.8)	2.50
Hydration	0	3 (1.5)	11 (5.4)	44 (21.6)	146 (71.6)	1.37
Weight management	0	1 (0.5)	17 (8.3)	37 (18.1)	149 (73.0)	1.36

* $N = 204$

Research by Schmidt and McIntire on USAF personnel in 2008 found that 61% of respondents reported using energy beverages with 30.5% consuming energy beverages at least once a week. According to a 2012 USAF research by Shalita,[30] 87% of all active-duty members consumed energy beverages, with 40% drinking at least one energy beverage per week. This study found that approximately 79% reported using energy beverages. Lieberman et al.[22] found that about 45% of combat troops consumed at least one energy beverage a day, with 13% reporting that they consumed three or more. The current study suggests that energy beverage use may have recently decreased among the tested population as educational and prevention efforts have increased in the test site location. However, the results of this study indicate that energy beverage usage is still active in SNA and SNFO communities despite the fact that there is a military directive that precludes its use by aviation personnel. This study found that the SNAs and SNFOs reported consuming energy beverages rarely within the past year (less than once per month) and the 30-d average quantity of energy beverage consumption was less than one serving when energy beverages were consumed.

To further evaluate this data, it seems reasonable to compare the results of this research against energy beverage use research on similarly aged cohorts. Pettit and DeBarr[25] found that 61.4% of the college students surveyed at one Midwest university ($N = 136$) reported consuming between one to three energy beverages on one occasion with 8.7% stating they consumed four to six. This study found that 82.8% of the naval aviation candidates surveyed reported consuming up to three energy beverages on one occasion with 13.3% consuming four or more energy beverages. Pettit and DeBarr[25] also found that the average consumption of energy beverages was one to two beverages within a 30-d period.

Table V. Frequency (%) of Reported Energy Beverage Consumption Effects.

ANSWER CHOICES	FREQUENCY (%)
Increased mental alertness	161 (67.4)
Increased heart rate	126 (52.7)
Increased mental endurance	89 (37.2)
Restlessness	97 (40.6)
Difficulty sleeping	80 (33.5)
Improved physical endurance	28 (11.7)
Dehydration	71 (29.7)
Nervousness	25 (10.5)
Heart palpitations	9 (3.8)
None	27 (11.3)

* $N = 239$

Regarding high levels of consumption, the current study suggests that high chronic consumption of energy beverages is lower than what is reported by other populations. However, with the possible consequences faced by naval aviation candidates, motivations to avoid energy beverage use may be higher than other studied populations. To illustrate, this study found that naval aviation candidate high chronic users (4 or more days per week) accounted for only 2.32% compared to Zucconi and colleagues,[42] who found that about 12% of their sample were classified as high chronic users. However, for high acute users (four or more energy beverages in one setting), this reversed to 13.24% of naval aviation candidates being classified as high acute users compared to approximately 11% as seen in the Zucconi study.

Among the tested hypotheses, this study found that there was no statistically significant difference in the energy beverage consumption rate patterns of SNA vs. SNFO candidates, as well as their respective branches of service. However, this study did find that coffee was consumed more often and in greater quantities than energy beverages. Thus, future studies should examine if this pattern of consumption follows the aviators to the training air wings and squadrons to further ascertain if the findings continue throughout their careers. Gaining more insight into the proclivity of energy beverage use by naval aviators could help with future health promotion endeavors and disease prevention program strategies.

Regarding the gender of energy beverage consumers, a higher relative percentage of male participants consumed energy beverages when compared to female participants. This corroborates similar studies in which it was found that men consumed energy beverages more often than women.[1,24] It should be noted that, at least for this sample, men were the preponderance of the respondents (90.73%, $N = 274$).

Results from this research indicate that fatigue mitigation, staying awake, and mental clarity are the primary motivating situations for participants consuming energy beverages vs. improving physical performance. Research has found that the most common reasons people cited for energy beverage use

was to improve mental alertness (61%), to improve mental endurance (29%), and to improve physical endurance (20%).[27] For this study, the reasons cited for energy beverage use was to increase mental alertness (67.36%), increase mental endurance (37.24%), and increase physical endurance (11.72%).

Bawazeer and AlSobahi[7] found that among their medical student population ($N = 257$), approximately one-third of participants ($N = 70$) reported manifesting some unwanted side effects such as heart palpitations (20%), insomnia (10%), headaches and tremors (5.7%), nausea and vomiting (4.2%), and nervousness (2.8%). In this population, only 3.77% reported experiencing heart palpitations, but 33.47% had difficulty sleeping (insomnia) and 10.46% experienced nervousness.

As mentioned previously, many participants reported consuming energy beverages to stay awake or to wake up in the morning. Malinauskas et al.[23] showed the average number of energy beverages consumed to compensate for lack of sleep or for low energy was one beverage. The results of the current study follow the same pattern. However, it should be noted that Malinauskas and colleagues[23] as well as other studies above such as Pettit and DeBarr[25] did not control for serving size. As described by Woolsey,[38] with many energy beverages being sold in 16-oz cans (equivalent to two energy beverages), this may have an impact on the quantity/frequency results presented by other studies that do not control for this confounding factor.

As the goal is to ensure student safety, military supervisors, educators, and healthcare professionals may wish to focus on the accessibility of energy beverages instead of focusing on consumption behavior. Following the Ecological Model perspective, it may be beneficial to change the environmental availability of energy beverages on military bases.[37] As cited in Johnson et al.,[18] 93% of military personnel reported energy beverages are easily available to them, with 33% indicating that they are even available in their work areas. Since these products are normally sold right next to other beverages such as soda, sports beverages, and bottled water, individuals may select these because energy beverages do contain caffeine along with herbal ingredients. Additionally, by positioning energy beverages next to known safe products, the proximity may influence military members to believe that energy beverages are as safe as the other FDA supervised products. By removing energy beverages from base stores and/or at minimum separating them from other beverages, this will likely reduce the consumption of energy beverages by military personnel.

The USN and USMC focus a great deal of time and energy in aviation on fatigue mitigation and management. From specific orders dictating number of hours of required rest periods to the use of Go/No-Go pills during combat operations, the USN seeks to combat the effects of fatigue in aviators.[12] However, this level of focus is not applied to improving human performance. While the USN and USMC have specific physical fitness standards that are tested twice a year as well as instructions that specify how frequently and how long personnel should participate in physical activities (cardio and weight training), the same laser-like focus as seen in combating fatigue is not seen in performance enhancement. Instead, the naval services put forth opportunities to participate in extracurricular activities often times through Morale, Welfare, and Recreations departments. With the exception of required specific classes of instruction all aviators must attend per the Naval Air Training and Operating Procedures Standardization program on a quadrennial basis regarding G-tolerance improvement, no systematic human performance enhancement training is required.

It appears that few naval aviation candidates use energy beverages primarily as an ergogenic supplement to enhance athletic performance. While the study performed by the European Consortium Nomisma-Areté in 2011 reported that approximately 52% of their adult consumers indicated they consumed "energy" beverages while undertaking sporting activity,[43] this study found a relatively low percentage (11.17%) of reported energy beverage usage for enhancing physical performance. Additionally, only 13.24% of participants who admitted energy beverage usage consumed four or more energy beverages on a single occasion, and none admitted to routinely consuming more than four in a typical day. Furthermore, the motivation "To improve physical/athletic performance" was low on the motives among this population as a reason for consuming energy beverages. Since there have been reported cases of sudden cardiac arrhthymias and syncope related to energy beverage consumption and physical training or sport, this result is reassuring.

One encouraging finding of this study pertained to the frequency of use and illicit drug use. Woolsey et al.[38,39,40] found that an increased frequency of energy beverage use was associated with increased probability of illicit use and legal misuse of prescription stimulants. Based upon that concern, the SNAs and SNFOs in this study may be at low risk for future problems with stimulant abuse. Additionally, 21% of this group did not consume any energy beverages in the last year, and more than half of those who did (52%) reported no regular consumption of energy beverages.

In all, this study provided beneficial insights into the frequency and type of energy beverage consumption patterns by naval aviation candidates. Other factors that possibly influence or impact energy beverage consumption were examined. Suggestions for further studies include assessing flight student knowledge of the potential positive and negative effects of ingredients within energy beverages as well as short-term fatigue and potential long-term negative effects.

The goal of this study was to examine energy beverage consumption patterns among naval aviation candidates. We found that approximately 79% of participants ($N = 239$) reported consuming energy beverages within the last year. Interestingly, of those who reported consuming energy beverages within the last year, only 85 (35.56%) reported consuming energy beverages within the last 30 d.

Among naval aviation candidates' energy beverage users, it was found that consuming energy beverages is most used for fatigue mitigation, staying awake, and mental clarity. The most reported side effects among naval aviation candidates' energy beverage users included: increased mental alertness, increased

heart rate, and restlessness. Further research should identify if naval aviation candidates recognize the amounts of caffeine that are present in the wide variety of caffeine-containing products they consume and the negative physical side effects associated with caffeine consumption on aviation skills.

ACKNOWLEDGMENTS

The authors would like to thank the panel of experts (Dr. Brett M. Hart, Dr. Mark Edwards, Dr. Henry F. Casey, III, Dr. Tatana Olson, and Ms. Sabrina Drollinger) for their professional commitment, assistance, and constructive suggestions. This study was made possible through the support and cooperation of the Naval Survival Training Institute, Naval Aviation Schools Command, and the Bureau of Medicine and Surgery of the U.S. Navy.

The views expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, or the U.S. Government.

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