



**AFRL-RH-WP-TP-2010-0010**

**Prevalence of Energy-Drink and Supplement  
Usage in a Sample of Air Force Personnel**

**Regina M. Schmidt  
Lindsey K. McIntire  
Biosciences and Protection Division  
Biobehavioral Performance Branch**

**John A. Caldwell  
Archinoetics, LLC.  
Topa Financial Center  
700 Bishop Street, Suite 2000  
Honolulu HI 96813**

**Chris Hallman  
Great Circle Consulting, Inc.  
86 Lancaster Way, Suite 200  
Newnan GA 30263**

**May 2008**

**Interim Report for October 2007 to May 2008**

**Approved for public release;  
distribution is unlimited.**

**Air Force Research Laboratory  
Human Effectiveness Directorate  
Biosciences and Protection Division  
Biobehavioral Performance Branch  
Wright-Patterson AFB OH 45433**

## NOTICE AND SIGNATURE PAGE

Using Government drawings, specifications, or other data included in this document for any purpose other than Government procurement does not in any way obligate the U.S. Government. The fact that the Government formulated or supplied the drawings, specifications, or other data does not license the holder or any other person or corporation; or convey any rights or permission to manufacture, use, or sell any patented invention that may relate to them.

This report was cleared for public release by the Wright Site Public Affairs Office and is available to the general public, including foreign nationals. Copies may be obtained from the Defense Technical Information Center (DTIC) (<http://www.dtic.mil>).

AFRL-RH-WP-TP-2010-0010 HAS BEEN REVIEWED AND IS APPROVED FOR PUBLICATION IN ACCORDANCE WITH ASSIGNED DISTRIBUTION STATEMENT.

//signed//

---

Richard A. McKinley, Work Unit Manager  
Biobehavioral Performance Branch

//signed//

---

Mark M. Hoffman, Deputy Chief  
Biosciences and Protection Division  
Human Performance Wing  
Air Force Research Laboratory

This report is published in the interest of scientific and technical information exchange, and its publication does not constitute the Government's approval or disapproval of its ideas or findings.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188		
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Washington Headquarters Service, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.					
<b>PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.</b>					
1. REPORT DATE (DD-MM-YYYY) May 2008		2. REPORT TYPE Interim Report		3. DATES COVERED (From - To) October 2007 – May 2008	
4. TITLE AND SUBTITLE Prevalence of Energy-Drink and Supplement Usage in a Sample of Air Force Personnel			5a. CONTRACT NUMBER IN-HOUSE		
			5b. GRANT NUMBER NA		
			5c. PROGRAM ELEMENT NUMBER 62202F		
6. AUTHOR(S) Regina M. Schmidt, Lindsey K. McIntire* John A. Caldwell** Chris Hallman***			5d. PROJECT NUMBER 7184		
			5e. TASK NUMBER 03		
			5f. WORK UNIT NUMBER 71840307		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **Archinoetics, LLC.                      ***Great Circle Consulting, Inc. Topa Financial Center                      86 Lancaster Way, Suite 200 700 Bishop Street, Suite 2000          Newnan GA 30263 Honolulu HI 96813			8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) *Air Force Research Laboratory Human Effectiveness Biosciences and Protection Division Biobehavioral Performance Branch Wright Patterson Air Force Base OH 45433-7947			10. SPONSOR/MONITOR'S ACRONYM(S) AFRL/RHPG		
			11. SPONSORING/MONITORING AGENCY REPORT NUMBER  AFRL-RH-WP-TP-2010-0010		
12. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES 88ABW cleared 7Aug08, WPAFB-08-5069.					
14. ABSTRACT This study was implemented to determine the prevalence of energy drink consumption and the factors influencing energy drink usage in a U.S. Air Force population. In addition, vitamin intake and nutritional-supplement intake data also were collected. The reported prevalence for the study population exceeded that of the general population. However, the frequency with which the studied Air Force population consumes such beverages is low. Despite the low frequency of reported energy-drink consumption, several negative and positive side effects were reported. Mass availability of energy drinks both on base and Air Force work installations were also reported. A low level of vitamin and nutritional supplement intake was reported in comparison to an earlier study suggesting that energy drink usage may be taking the place of vitamins and nutritional supplements. It is recommended that careful studies be performed to investigate safety and efficacy of energy drinks. Also recommended is that the research community and the military leadership should endeavor to correct whatever problems underlie the prevalence of energy drink consumption. Finally, it is recommended that a similar survey be administered to other military populations in order to compare the prevalence rate and influencing factors of energy drink consumption across the U.S. military.					
15. SUBJECT TERMS Energy drink usage, survey data, nutritional supplements, vitamin intake					
16. SECURITY CLASSIFICATION OF:		17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 20	19a. NAME OF RESPONSIBLE PERSON Regina M. Schmidt	
a. REPORT U	b. ABSTRACT U			c. THIS PAGE U	19b. TELEPHONE NUMBER (Include area code)

THIS PAGE IS INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
2.0	METHODS.....	2
2.1	Subjects .....	2
2.2	Procedures .....	3
3.0	RESULTS.....	4
3.1	Energy Drink Prevalence .....	4
3.2	Energy Drink Effects, Side Effects, and Influencing Factors.....	4
3.3	Vitamin Prevalence, Effects, Side Effects, and Influencing Factors .....	5
3.4	Nutritional Supplement Prevalence, Effects, Side Effects, and Influencing Factors.....	6
4.0	DISCUSSION .....	6
5.0	FUTURE DIRECTIONS .....	7
	REFERENCES .....	8
	Appendix A: Installation Notice .....	10
	Appendix B: Energy Drink and Nutritional Supplement Consumption Survey .....	11

THIS PAGE IS INTENTIONALLY LEFT BLANK

## 1.0 INTRODUCTION

The consumption of energy drinks such as Blue Ox, Red Bull, Adrenaline Rush, Power House, and Atomic Energy has steadily increased over the past decade. Particularly among younger populations, these drinks have become an encouraged source (or perceived source) of physical stamina, mental alertness, and nutrition. Despite the fact that some colleges in the U.S. and Canada have banned the selling of energy drinks due to increased abuse and associated negative consequences such as heart arrhythmia, seizures, and death [1], two published studies reveal the extent to which energy-drink consumption has continued to increase. In 2001, only 22 percent of young college students were using energy drinks [2], whereas two years later in 2003, 42.3 percent of adolescents (age 11-18) were consuming these beverages [3].

The dramatic increase in consumption of energy drinks may be due to the fact that adolescents and young adults are not getting sufficient sleep on a day-to-day basis. According to the National Sleep Foundation, teens and adolescents tend to function on a later circadian cycle (making it more difficult for them to be alert early in the day) and require more sleep (a minimum of 8.5-9.25 hours per day) than their adult counterparts [4]. Since work and school schedules rarely take these facts into account, a recent poll suggests that only 20 percent of adolescents are getting sufficient sleep [5]. Carskadon, Acebo, and Jenni [6] likewise reported that adolescents sleep too little, and that their sleep occurs at the wrong circadian phase. As a result, the younger population suffers from increased risks for excessive sleepiness, difficulty with mood regulation, impaired academic performance, learning difficulties, school tardiness and absenteeism, and increased risk of accidents and injuries.

This young population is currently entering into our U.S. military, and anecdotal reports reveal that a high percentage of these individuals are consuming energy drinks. Presumably, this is because of effective marketing on the part of manufacturers [7] as well as peer pressure and perceived health benefits [3]. In addition, empirical evidence suggests that energy drinks offer some cognitive benefits. Specifically, a study that compared a caffeinated-aurine drink (energy drink) to both sugar-free and sugar-containing drinks found that energy drink consumption improved attention and verbal reasoning without affecting memory in non-caffeine-deprived subjects. [8]. A comparison of a caffeinated drink, a glucose-containing drink, a ginkgo biloba drink, and a whole drink (containing all three ingredients) in caffeine-restricted subjects revealed a synergistic effect of the combined ingredients which led to improved memory and attention [9]. Further investigation into the effects of combined glucose-caffeine drinks indicated mitigation of vigilance decrements and decreased subjective ratings of mental fatigue during extended testing periods [10]. A recent electrophysiological/performance study showed that a caffeinated glucose beverage not only improved accuracy and reaction time during sustained mental work, but enhanced characteristics of visual evoked responses associated with visual cortical processing and decision making [11]. In terms of the ability of energy drinks to alleviate fatigue from sleep loss, Reyner and Horne [12] found that simulated driving performance and subjective fatigue ratings both were improved after consumption of 250 ml of Red Bull in comparison to placebo in sleep-restricted volunteers. Thus, there are several factors that make the consumption of energy drinks attractive to young adults.

However, this is not to say that energy-drink consumption is universally accepted as safe and effective. In terms of physical performance, athletes relying on these drinks to produce a “competitive edge” could be at greater risk of dehydration due to the fact that caffeinated drinks produce diuretic and natriuretic effects [13]. In terms of cardiac risk, Cannon, Cooke, and McCarthy [14] described a case in which a 25-year-old (with a pre-existing heart condition) suffered intractable ventricular fibrillation after consuming an energy drink containing a high concentration of caffeine. In terms of the mental benefits of energy-drink consumption, it may be that immediate benefits are offset by later decrements particularly in fatigued individuals. Contrary to the results obtained earlier by Kennedy and Scholey [10], Anderson and Horne [15] found that subjects did not consistently benefit from a caffeinated-glucose drink. During the first part of testing (after sleep restriction), there was no difference between the drink and placebo; however, towards the end, both performance lapses and subjective ratings of sleepiness were higher under the energy-drink condition than under placebo. Furthermore, it should be noted that the combination of energy-drinks and alcohol can be quite dangerous. Ferreira, de Mello, Pompeia, and deSouza-Formigoni [16] found that energy-drink consumption reduced subjective symptoms of intoxication, but did not affect the objective impairments in motor coordination and reaction times.

In light of the conflicting evidence on the safety and efficacy of energy-drinks consumption in the general population, it is disconcerting that no studies have been performed on the prevalence of energy-drink usage among young military personnel. As was noted earlier, subjective reports (Chris Hallman, & John Caldwell, 2007; personal communication) are that many of our younger troops are consuming several of these beverages each day. More disturbing is that fact that some military leaders may be encouraging the use of these beverages despite the lack of clear evidence of safety and effectiveness.

Clearly, there is a need to understand whether or not energy-drink consumption should be a matter of concern for the military research and medical communities. In addition, since personnel who rely on energy drinks for performance enhancement may be co-administering other types of nutritional supplements, an examination of supplement consumption appears warranted as well. The main objective of the present survey is to provide a basic appreciation for the extent of beverage/supplement consumption in one sample of young Air Force personnel (USAF aviation mechanics, inspectors, and managers from the installations).

## **2.0 METHODS**

Letters of Agreement were distributed to and preliminary plans were made to collect survey data at select U.S. Air Force installations. Specifically, these installations included McChord AFB, Hurlburt Field, Dover AFB, and RAF Mildenhall. Unfortunately, McChord AFB was the only installation to return a signed and approved installation notice (see Appendix A).

### **2.1 Subjects**

USAF maintainers, support, medical and operational personnel from the McChord Air Force Base installation were selected for this study. A total of 400 surveys were returned out of approximately 3000 sent (though it could not be identified how many of these individuals were deployed). Since 23 surveys were completed by civilian and retired ranks, and the objective of

the investigation was to survey active-duty military, these surveys were deleted from the sample. Thus, only 377 surveys are included in the following assessment. A total of 82.76% of the respondents were Males. The age range for this group is from 19 to 59 (average age = 29.48) and includes all ranks with both enlisted and officers represented. The following ranks are listed in percentages in Table 1.

Table 1: Representation of Enlisted and Officer Ranks

Enlisted RANKs		Officer RANKs	
E2	0.80%	O1	2.12%
E3	11.67%	O2	5.84%
E4	16.45%	O3	14.06%
E5	11.94%	O4	1.86%
E6	10.34%	O5	1.06%
E7	10.88%		
E8	2.65%		
E9	0.27%		

It is implied from this sample that a broad range of educational backgrounds and work experience are represented. Specifically, the representation of Years in Service ranges from 5 years to 34 years with an average of 9.07 years reported. To secure anonymity, no other demographics were collected. In fact, the survey itself stated that rank and years in service is not required if the participant feels that it may reveal his/her identity. For this reason, the above percentages may be under representative of the reported ranks. Specifically, 9.8% of the surveys did not contain information regarding rank.

## 2.2 Procedures

Upon obtaining approval from the Wright Site Institutional Review Board, a Survey Control Number was requested and subsequently issued from the Air Force Survey Office. The attached survey (see Appendix B) was sent via email to the flight community and other enlisted and officer personnel at McChord AFB. An informed consent brief was included in the email to ensure that each participant understood that participation was voluntary and so that contact information was available to each potential participant in case any problems or complaints occurred. This informed consent information is presented below:

---

**Informed Consent Document for  
Prevalence of Energy-Drink and Supplement Usage in a Sample of Air Force Personnel**

Principle Investigators: Regina M. Schmidt, Air Force Research Laboratory Contractor,  
937.255.5156, Regina.Schmidt.ctr@wpafb.af.mil  
Chris Hallman, LtCol, U.S. Air Force Special Operations Command,  
678.343.1635, Christopher.hallman@hurlburt.af.mil

Associate Investigators: Lindsey K. Reed, Air Force Research Laboratory Contractor, 937-255-4395, Lindsey.Reed@wpafb.af.mil

The purpose of this study is to gain information regarding the usage of energy drinks and nutritional supplements within a U.S. Air Force population. Your participation in this study is voluntary and no adverse action will be taken against you should you choose not to participate. You will be asked to complete a short survey regarding your levels of consumption of energy drinks and nutritional supplements. The survey is anonymous. The data collected from this study will be recorded in such a way that your personal identification can not be revealed. If you have any questions or concerns regarding this study, you may contact Regina Schmidt at 937.255.5156.

---

Surveys were completed online and submitted via email to the principle investigator's secure Wright Patterson AFB email account. All surveys were then downloaded and renamed to eliminate any personal identification from the responses. Appendix B includes a summary of the results from 377 surveys. A discussion of these results is presented below.

## **3.0 RESULTS**

### **3.1 Energy Drink Prevalence**

Of 400 surveys that were returned, 377 are included in this report (civilian and retired ranks were not included in this summary). Overall, 61.01% of respondents reported energy drink usage with 30.5% reporting the consumption of energy drinks at least once per week. Recall that a prevalence rate of 22% for college students was reported in 2001 [2] and 42.3% usage for adolescents in 2003 [3]. 23.61% reported moderate usage, while only 5.57% reported daily consumption. Another interesting statistic is that 37.02% of those reporting energy drink usage claims to have been drinking them for 1-3 years and 18.63% reported having consumed energy drinks for 4-6 years.

The majority of energy-drink users reported that Monster and Red Bull were their primary brand choices. These two name brands were also listed as the primary second choices indicating that those who responded that either brand was their top choice also selected the other as a second choice. By far, this makes Monster and Red Bull the top two name brands listed by this enlisted and officer population. Full Throttle and Rockstar also were considered popular brands (percentages are listed in Appendix B). When asked why certain brands were preferred, the number one answer was taste followed by several "health-related" statements such as lower calories, fewer side effects, and more vitamins. In addition, availability and price were mentioned.

### **3.2 Energy Drink Effects, Side Effects, and Influencing Factors**

The number one energy-drink effect reported by the present population was increased mental alertness (77.39%) followed by increased mental endurance (39.13%). Increased physical endurance also was reported by 35.22%. Several negative side effects were reported as well. Included were: Increased heart rate (31.30%), trouble falling asleep (30.87%), dehydration (20.87%), nervousness (10.87%), trouble staying asleep (10.87%), headaches (7.39%), nausea (7.83%), and dizziness (4.78%). One individual reported hallucinations and another individual reported nosebleeds. Both of these participants stated they rarely used such products. Several individuals felt that they had not experienced any of the listed side effects. Table 2 includes a

breakdown of the percentage of reported side effects by frequency of intake. In general, the positive and negative side effects are only slightly higher for those who consume energy drinks more regularly. However, dehydration and trouble staying asleep appear to be side effects most associated with regular consumption.

Table 2: Breakdown of the Percentage of Reported Side Effects by Frequency of Intake.

Side Effects	Rarely (<1-6/week)	Occasionally (1-6/week)	Regularly (1-2/day)	Frequently (>3/day)
Increased mental alertness	72.17%	77.53%	85.71%	80.00%
Dehydration	18.26%	16.85%	38.10%	20.00%
Nausea	6.96%	10.11%	0.00%	0.00%
Larger Muscles	0.87%	0.00%	0.00%	20.00%
Dizziness	4.35%	4.49%	4.76%	0.00%
Headaches	6.96%	6.74%	0.00%	0.00%
Increased physical endurance	22.61%	41.57%	57.14%	60.00%
Seizures	0.00%	0.00%	0.00%	0.00%
Improved creativity	4.35%	11.24%	28.57%	40.00%
Nosebleeds	0.87%	0.00%	0.00%	0.00%
Increased heart rate	33.04%	25.84%	28.57%	60.00%
Increased mental endurance	28.70%	43.82%	61.90%	60.00%
Heart arrhythmia	2.61%	1.12%	4.76%	0.00%
Hallucinations	0.87%	0.00%	0.00%	0.00%
Increased physical strength	3.48%	11.24%	19.05%	0.00%
Nervousness	13.91%	5.62%	9.52%	0.00%
Trouble staying asleep	9.57%	4.49%	33.33%	20.00%
Trouble falling asleep	27.83%	29.21%	33.33%	40.00%
Other	13.04%	11.24%	19.05%	0.00%

When asked about factors that influenced the participants’ decisions to use energy drinks, the three dominant responses included: “they increase my mental energy” (57.39%), “I enjoy the taste” (53.48%), and “they increase my physical energy” (49.57%). In addition, the majority of “write-in” responses (included in the “Other” category) were related to fatigue. Specific comments include to “increase alertness,” “ability to stay awake,” and “reduces fatigue.”

Discontinued use was mostly due to perceived negative health effects or negative side effects (various responses were written additions included in the “Other” category). In addition, 19.75% of individuals claimed high expense as an influencing factor.

Very few individuals claimed to use energy drinks as a meal replacement (3.17%). As for ready availability of the products, 93.90% claim mass availability on base, and 33.42% of respondents claim that energy drinks are readily available in their work area. It is important to note that the reported preferred brand of energy drink may be due to its availability on Air Force installations.

### 3.3 Vitamin Prevalence, Effects, Side Effects, and Influencing Factors

Interestingly, less people reported vitamin intake (51.46%) than energy drink usage. The majority of respondents claiming to take vitamins reported the daily intake of some form of multivitamin. While a very small percentage of respondents reported negative side effects (less than 5%), a moderate percentage reported positive side effects of vitamin use including: increased mental alertness increased physical endurance (28.35%), increased mental endurance

(21.65%), and increased physical strength (14.95%). Several individuals reported that they experienced no side effects.

### **3.4 Nutritional Supplement Prevalence, Effects, Side Effects, and Influencing Factors**

Only a moderate percentage of respondents reported nutritional supplement intake (19.89%). Of these respondents, most said their nutritional supplement consisted of some form of glucose or protein supplement (e.g., Glutamine, Whey Protein, protein shakes, etc.). Of the supplement users, a large percentage reported occasional (37.33%) or daily intake (40.00%). The most frequently reported effects include: increased physical endurance (54.67%), larger muscles (42.67%), increased physical strength (40.00%), increased mental alertness (32.00%), and increased mental endurance (21.33%).

## **4.0 DISCUSSION**

The present study was implemented in order to determine the prevalence of energy drink consumption and the factors influencing energy drink usage. In addition, vitamin intake and nutritional-supplement intake data also were collected. Overall, the percentage of people who use energy drinks in this Air Force enlisted and officer population apparently exceeds that of the general population (22% of college-age students [2] and 42.3% adolescents [3]), although direct comparisons are difficult. However, the frequency with which the present Air Force population consumes such beverages is low. While 61.01% of respondents claim to consume energy drink beverages, only 6.90% drink one or more beverages per day. In light of America's average per capita caffeine consumption of 193 mg per day mainly from coffee [17], and despite the fact that energy drinks contain other potential stimulants, the consumption of a single additional drink per day at first does not appear to be cause for concern especially since the Institute of Medicine has concluded that up to 800 mg caffeine per day is safe [18]. However, it is disconcerting that despite the low frequency of energy-drink consumption, several negative side effects were reported including increased heart rate, dehydration, nervousness, trouble falling asleep, and trouble staying asleep. Negative side effects that are more specific to regular users include trouble staying asleep and dehydration. Regardless of such negative side effects, the fact that 77.39% claim increased mental alertness as well as other positive effects (increased physical and mental endurance) appears to make the negative side effects bearable to users, though some indicated stopping consumption due to these effects.

Are the positive effects of energy drinks "real" or are they simply perceived based on user expectations? As discussed above [10,15], this is a point of debate that presently remains unanswered. As a health research community with the goal of maintaining safety, effectiveness, and general well being, it seems important to address this issue with additional controlled studies, and if in fact that cost/benefit analysis of energy drinks turns out to be less than favorable, better, more reliable, and safer methods of increasing alertness and stamina should be promoted. If for instance, personnel are consuming these products to overcome the effects of on-the-job sleepiness, there are several scientifically-proven fatigue management strategies such as proper shift scheduling, naps, and improved sleep that should be considered as healthier alternatives.

Unfortunately, the mass availability of energy drinks both on base (93.90%) and at Air Force work installations areas (33.42%) creates the appearance that these beverages are acceptable alternatives to more natural alertness-enhancing strategies. The fact that approximately 1 in 3 Air Force service members has immediate access to energy drinks; may in and of itself promote the usage of these products. In fact, 10.00% of respondents indicated that they consume these beverages simply because of mass availability and the limited availability of other beverages.

An interesting implication of the current investigation is that energy-drink consumption may be overtaking the use of vitamins and supplements in the military. The present study revealed that 60% of respondents consumed energy drinks, but only 52% took vitamins and only 20% used supplements. This level of vitamin and supplement use is dramatically lower than the 76% of vitamin/supplement use within an earlier sample of Army soldiers [19]. Although direct comparisons are likely confounded by many factors, such a discrepancy might indicate a new trend worthy of further investigation. Are issues related to fatigue management (which appear primarily responsible for energy-drink usage) overriding basic health concerns (for which vitamins are taken) or a focus on increased physical endurance and muscle size (for which supplements are reportedly being taken)? If so, such a change further validates data from the general population that there is an upward trend in the amount of sleep deprivation (and related fatigue) in America [20]. Perhaps more attention should be paid to correcting this problem than to designing or promoting artificial means of sustaining day-to-day performance.

## **5.0 FUTURE DIRECTIONS**

Despite limited information in the literature regarding the safety and efficacy of energy drinks in operational settings, there is evidence that these beverages are widely available and frequently consumed by military service members. Although some energy-drink ingredients may provide a short term benefit, the combination of these ingredients with high levels of sugar may also contribute to the “crash” that has been found to occur after consumption [15]. Thus, at a minimum, careful studies should be performed in order to determine which ingredients and combination of ingredients are safe and efficacious. Meanwhile, perhaps the research community and the military leadership should endeavor to correct whatever problems underlie the prevalence of energy drink consumption. If fatigue is the problem, more sleep and better schedules are safer solutions.

Finally, a similar survey should be administered to other military populations in order to compare the prevalence rate and influencing factors of energy drink consumption across the U.S. military. It is critical to have documentation of the use of potentially harmful substances so that safety regulations can be generated if such a need occurs.

## REFERENCES

1. Kapner, D. A. (2004). "Ephedra and energy drinks on college campuses." *InfoFacts Resources*, April. The Higher Education Center for Alcohol and Other Drug Abuse and Violence Prevention.
2. Collegiate Presswire (December 18, 2001). "College students report energy drain during finals week; half pull 'all-nighters' to study for exams."
3. O'Dea, J. A. (2003). "Consumption of nutritional supplements among adolescents: usage and perceived benefits." *Health Education Research: Theory and Practice*, 18, 98-107.
4. National Sleep Foundation. Washington DC. Sleep in America Poll 2007.
5. National Sleep Foundation. Washington DC. Sleep in America Poll 2006.
6. Carkadon, M. A., Acebo, C., & Jenni, O. G. (2004). "Regulation of adolescent sleep: Implications for behavior." *Adolescent Brain Development: Vulnerabilities and Opportunities*, 1021, 276-291.
7. Bryce, D. J., & Dyer, J. H., (2007). "Strategies to crack well-guarded markets." *Harv. Bus. Rev.*, 85(5), 84-92.
8. Warburton, D. M., & Bersellini, E., & Sweeney, E. (2001). "An evaluation of a caffeinated taurine drink on mood, memory and information processing in healthy volunteers without caffeine abstinence." *Psychopharmacology*, 158, 322-328.
9. Scholey, A. B., & Kennedy, D. O. (2004). "Cognitive and physiological effects of an 'energy drink': An evaluation of the whole drink and of glucose, caffeine and herbal flavouring fractions." *Psychopharmacology*, 176, 320-330.
10. Kennedy, D. O., & Scholey, A. B. (2004). "A glucose-caffeine 'energy drink' ameliorates subjective and performance deficits during prolonged cognitive demand." *Appetite*, 42, 331-333.
11. Roa, A., Hu, H., & Nobre, A. C. (2005). "The effects of combined caffeine and glucose on attention in the human brain." *Nutr Neurosci*, 8(3), 141-153.
12. Reyner, L. A., & Horne, J. A. (2002). "Efficacy of a 'functional energy drink' in counteracting driver sleepiness." *Physiology & Behavior*,
13. Riesenhuber, A., Boehm, M., Posch, M., & Aufrecht, C. (2006). Diuretic potential of energy drinks. *Amino Acids*, 31, 81-83.
14. Cannon, M. E., Cooke, C. T., & McCarthy, J. S. (2001). Caffeine-induced cardiac arrhythmia: an unrecognized danger of health food products. *Medical Journal of Australia*, 174(10), 520-521.
15. Anderson, C. & Horne, J. A. (2006). A high sugar content, low caffeine drink does not alleviate sleepiness but may worsen it. *Human Psychopharmacology*, 21, 299-303.
16. Ferreira, S. E., de Mello, M. T., Pompeia, S., & de Souza-Formigoni, M. L. (2006). Effects of energy drink ingestion on alcohol intoxication. *Alcohol Clin Exp Res*, 30(4), 598-605.
17. Frary, D. C., Johnson, R. K., & Wang, M. Q. (2005). Food sources and intakes of caffeine in the diets of persons in the United States. *Journal of the American Dietetic Association*, 105(1), 110-113.
18. Institute of Medicine (2001). Committee on Military Nutrition Research. *Caffeine for the sustainment of mental task performance: Formulations for military operations*. Washington, DC: National Academy Press.
19. Bovill, M. E., Tharion, W. J., & Lieberman, H. R. (2003). Nutrition knowledge and supplement use among elite U.S. soldiers. *Military Medicine*, 168(12), 997-1000.

20. National Sleep Foundation. *2005 Sleep in America poll*. Washington: National Sleep Foundation 2005.

## Appendix A: Installation Notice

Sep 04 07 08:42a

62 AW/SE McCHORD AFB, WA (253) 984-6553

**Prevalence of Energy-Drink and Supplement Usage in a Sample of Air Force Personnel**  
**Installation Approval Notice**

Michael F. Richards, LtCol, USAF, MC, FS  
Chair, Wright Site IRB  
AFRL/HEH  
2245 Monahan Way, Bldg 29  
WPAFB OH 45433-7008

LtCol Michael F. Richards and associated Institutional Review Board members:

As an authorized representative of 62AW McChord AFB,  
I give permission to the U.S. Air Force Research Laboratory to collect data regarding  
the prevalence of energy drink and nutritional supplement consumption during the  
2007-2008 academic year on my installation.

It is my understanding that participation is voluntary and that each student has the right  
to decline participation without penalty. It is also my understanding that the purpose of  
this study, associated risks, the Privacy Act Statement of 1974, and up-to-date contact  
information will be presented to each participant prior to data collection.

A copy of the survey that will be administered to the students at my installation was  
provided to me for my review. I understand that I have the right to withdraw my  
installation's participation at anytime and that any questions or concerns can be  
directed to either Dr. John Caldwell from the Air Force Research Laboratory at 937-255-  
0880 or LtCol Christopher Hallman at 678-343-1635.

62AW  
Organization

McChord AFB  
Name of Installation

Jerry P. Martinez, COL, USAF  
Print Name

62AW/CC  
Title

  
Signature

30 AUG 07  
Date

**Appendix B: Energy Drink and Nutritional Supplement Consumption Survey**

# Energy Drink and Nutritional Supplement Consumption Survey (SCN: 07-057)

Representatives of the U.S. Air Force Research Laboratory and the Air Force Special Operations Command greatly appreciate your time completing the following survey. The information collected with this survey will be used to determine the frequency of consumption of "energy drinks" and nutritional supplements within the U.S. Air Force population as well as associated positive and negative effects of consumption. Please answer the following questions with accuracy and honesty (responses are anonymous).

Thank you,  
 Your U.S. Air Force Research Laboratory and Air Force Special Operations Command Representatives



1. How often do you consume "energy drinks" such as Red Bull, Monster, Viper, etc? (Please select. If you answered "never" you may skip to item #9).

**377** Total Surveys are included in this summary

- Never 38.46%
- Rarely (less than 1 per week) 30.50%
- Occasionally (1-6 per week) 23.61%
- Regularly (1-2 per day) 5.57%
- Frequently (>3 per day) 1.33%

**61.01% Report Energy Usage with 30.50% reporting Usage at Least once per Week.**

2. Please rank-order your top three brands. If you only drink one or two brands, only name one or two.

First Choice	223 Responses
Monster	32.29%
Red Bull	30.04%
Rockstar	10.31%
Full Throttle	7.17%
Rip It	2.69%
Amp	2.69%
Sobe No Fear	3.14%
XS	2.24%
Starbucks Shots	0.90%
Other	8.52%
Second Choice	159 Responses
Monster	21.38%
Red Bull	35.22%
Rockstar	13.84%
Full Throttle	8.81%
Rip It	1.89%
Amp	1.89%
Sobe No Fear	4.40%
XS	0.00%
Starbucks Shots	2.52%
Other	9.43%
Third Choice	61 Responses
Monster	24.59%
Red Bull	27.87%
Rockstar	6.56%
Full Throttle	13.11%
Rip It	4.92%
Amp	8.20%
Sobe No Fear	4.92%
XS	0.00%
Starbucks Shots	1.64%
Other	8.20%

3. Why do you prefer your favorite brand?

These statistics are percentages of responses for only those who reported energy drink usage.

- I prefer the way it tastes **69.49%**
- This one gives me more energy than other brands I've tried **4.66%**
- My friends drink this brand **2.54%**
- I like the way the can looks **0.42%**
- This drink has the highest "cool" factor **1.69%**
- Other **21.19%**

Please list other reasons here:

Examples include price, availability, and health reasons such as lower calories, less jitters, more vitamins, etc.

4. How long have you consumed energy drinks?

- A few months **8.37%**
- 1-3 years **37.02%**
- 4-6 years **18.63%**
- more than 6 years **6.46%**
- I do not regularly consume energy drinks **28.52%**

5. Please fill in what you have experienced as a result of consuming "energy drinks." (You may check more than one)

- Increased mental alertness **77.39%**
- Dehydration **20.87%**
- Nausea **7.83%**
- Larger muscles **0.87%**
- Dizziness **4.78%**
- Headaches **7.39%**
- Increased physical endurance **35.22%**
- Seizures **0.0%**
- Improved creativity **10.00%**
- Nosebleeds **0.43%**
- Increased heart rate **31.30%**
- Increased mental endurance **39.13%**
- Heart arrhythmia (to your knowledge) **2.61%**
- Hallucinations (visual illusions) **0.43%**
- Increased physical strength **8.26%**
- Nervousness **10.87%**
- Trouble staying asleep **10.87%**
- Trouble falling asleep **30.87%**
- Additional (please list below): **16.09%**

additional experiences:

Examples include tremor, heartburn, increased performance, no side effects, diarrhea, crashing,

	and increased motivation.
6. Please fill in any factor that has influenced your decision to consume "energy drinks." (You may check more than one).	<input type="radio"/> They make me healthier/give me better nutrition 0.00% <input type="radio"/> They increase my mental energy 57.39% <input type="radio"/> They increase my physical energy 49.57% <input type="radio"/> They increase my muscle size 0.43% <input type="radio"/> My friends use them/recommend them 4.35% <input type="radio"/> Mass availability/easy to buy (other beverages limited) 10.00% <input type="radio"/> My leader encourages me/us to use them 0.87% <input type="radio"/> I enjoy the taste 53.48% <input type="radio"/> Other 16.96% list other factor here: The majority of listed factors were related to fatigue.
7. If you no longer drink energy drinks, why did you discontinue their use?	<input type="radio"/> I did not like the taste 9.88% <input type="radio"/> I did not find that they boost my energy 7.41% <input type="radio"/> They cause upset stomach or nausea 7.41% <input type="radio"/> I crash too hard after drinking one 8.64% <input type="radio"/> They are prohibitively expensive 19.75% <input type="radio"/> Other: 46.91% please list other reasons here: Majority of responses are related to health reasons or negative side effects.
8. Do you sometime use an energy drink as a meal replacement?	<input type="radio"/> Yes 3.17% <input type="radio"/> No 67.11%
9. Are energy drinks readily available on your base?  All respondents were asked this and the following questions (377)	<input type="radio"/> Yes 93.90% <input type="radio"/> No 1.06%
10. Are energy drinks readily available in your work area?	<input type="radio"/> Yes 33.42% <input type="radio"/> No 62.33%
11. Are energy drinks provided to you from your organization as part of a "hydration" plan?	<input type="radio"/> Yes 1.06% <input type="radio"/> No 94.16%
12. a). Do you take vitamins?	<input type="radio"/> No (you may skip to #14) 45.62% <input type="radio"/> Yes. I take... 51.46% please list vitamins here

Almost all responses included a version of Multivitamin

12. b). What is your frequency of vitamin intake?

- Never
- Rarely (less than 1 per week) **6.12%**
- Occasionally (1-6 per week) **24.74%**
- Regularly (1-2 per day) **67.01%**
- Frequently (>3 per day) **4.21%**

13. Please list your experiences as a result of consuming vitamins. (You may check more than one)

- Increased mental alertness **36.08%**
- Dehydration **1.03%**
- Nausea **3.09%**
- Larger muscles **3.61%**
- Dizziness **0.00%**
- Headaches **0.00%**
- Increased physical endurance **28.35%**
- Seizures **0.00%**
- Improved creativity **9.79%**
- Nosebleeds **0.00%**
- Increased heart rate **1.03%**
- Increased mental endurance **21.65%**
- Heart arrhythmia (to your knowledge) **0.00%**
- Hallucinations (visual illusions) **0.00%**
- Increased physical strength **14.95%**
- Nervousness **0.00%**
- Trouble staying asleep **0.00%**
- Trouble falling asleep **0.52%**
- Other: **27.84%**

additional experiences:

Most responses involved reporting No side effects, others include health reasons and increased immune system.

14. a). Do you take nutritional supplements?

- No (you may skip to #16) **76.13%**
- Yes. **I take...** **19.89%**

please list nutritional supplements here:

The majority of responses included some form of glucose or protein supplement.

14. b). What is your frequency of nutritional supplement intake?

- Never
- Rarely (less than 1 per week) **13.33%**

- Occasionally (1-6 per week) **37.33%**
- Regularly (1-2 per day) **40.00%**
- Frequently (>3 per day) **8.00%**

15. Please fill in what you have experienced as a result of consuming "nutritional supplements." (You may check more than one)

- Increased mental alertness **32.00%**
- Dehydration **1.33%**
- Nausea **0.00%**
- Larger muscles **42.67%**
- Dizziness **0.00%**
- Headaches **0.00%**
- Increased physical endurance **54.67%**
- Seizures **0.00%**
- Improved creativity **13.33%**
- Nosebleeds **0.00%**
- Increased heart rate **6.67%**
- Increased mental endurance **21.33%**
- Heart arrhythmia (to your knowledge) **0.00%**
- Hallucinations (visual illusions) **0.00%**
- Increased physical strength **40.00%**
- Nervousness **0.00%**
- Trouble staying asleep **0.00%**
- Trouble falling asleep **1.33%**
- Additional: **28.00%**  
additional experiences:  
Responses include mostly health and no side effects.

16. Please report the following information (none of this will be used in an attempt to identify you personally):

Age:  
please list age here: Minimum Age = 19; Maximum Age = 59; Average Age = 29.48; Median Age = 27

Rank:  
please list rank here:

E RANKs		O RANKs	
E2	0.80%	O1	2.12%
E3	11.67%	O2	5.84%
E4	16.45%	O3	14.06%
E5	11.94%	O4	1.86%
E6	10.34%	O5	1.06%
E7	10.88%		
E8	2.65%		
E9	0.27%		

- Gender:
- Male **82.76%**
  - Female **13.26%**

Years in Service:

please list years of service here: Minimum = 0.5;  
Maximum Age = 34; Average Age = 9.07; Median  
Age = 7

**NOTE:** If you feel that supplying some part of the information requested above in #16 will identify you personally, and you would rather not provide it, please write "would rather not answer" in the blank. For instance, if you are the only Master Sergeant in the unit, you may wish to leave Rank blank.

*Thank you for your participation!*