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# Nutritional ergogenic aid use in male college students

Megan Elizabeth Solloway  
*James Madison University*

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# Nutritional Ergogenic Aid Use in Male College Students

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A Project Presented to  
the Faculty of the Undergraduate  
College of Health Sciences  
James Madison University

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in Partial Fulfillment of the Requirements  
for the Degree of Bachelor of Dietetics

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by Megan Elizabeth Solloway

May 2014

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Accepted by the faculty of the Department of Health Sciences, James Madison University, in partial fulfillment of the requirements for the Degree of Bachelor of Dietetics.

FACULTY COMMITTEE:

HONORS PROGRAM APPROVAL:

---

Project Advisor: Melissa Rittenhouse PhD, RD, CSSD  
Associate Professor, Dietetics

---

Barry Falk, PhD  
Director, Honors Program

---

Reader: Jeremy Akers, PhD, RD  
Associate Professor, Dietetics

---

Reader: Joy Lohr, MS, RD  
Associate Professor, Dietetics

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## **Abstract**

The perceived need of nutritional ergogenic aids among college students produces concern regarding the safety and efficacy of such aids. The purpose of this research is to evaluate the rationale and use of nutritional ergogenic aids in male college students ages 18-25. Students participated in an anonymous survey assessing nutritional ergogenic supplementation and rationale behind use. There was no significant difference in supplement use between competitive and non-competitive athletes ( $p=0.708$ ). However, a significant difference in nutritional ergogenic aid use between heavy and light exercisers was noted, with heavy exercisers more likely to use supplements than light exercisers ( $p=0.041$ ). The primary rationale behind supplement use was to provide energy (22%), enhance recovery (19.6%), and build muscle (19.4%). Participants were most likely to obtain information on supplements from friends (79%) or the internet (79%) therefore; universities should provide education on nutritional ergogenic aids by providing reputable sources of these products.

*Keywords:* athlete, nutritional ergogenic aid, education

## **Introduction**

The perceived need for nutritional ergogenic aids has been increasing over the past few decades (Lane, 2013). Thousands of new brands and categories of supplements hit the shelves each year. In 2011 alone, retail sales of sports supplementation (including body building ready-to-drink products, nutrition bars and gels, and sports/energy drinks and shots) increased by 14% to a total \$21.4 billion, outpacing overall supplement industry growth by 7.5% (Lane, 2013). The economic growth of sports nutrition supplementation may be attributed to the increase in advertising directed towards recreational athletes, particularly towards the college student population (Jackson, Lyons, Roberts, Geary, & Williams, 2010).

The International Society of Sports Nutrition defines a nutritional ergogenic aid as a nutritional practice that prepares an individual for exercise, improves efficiency of exercise, and/or enhanced recovery after exercise (Kreider et al., 2010). For the purpose of this study, “nutritional ergogenic aid” or “sports supplement” will be used interchangeably, as all the supplements used in this study can be categorized under both of these terms.

The perceived need of nutritional ergogenic aids generates concern related to the efficacy and side effects associated with supplements. Therefore, the purpose of this study is to evaluate the use and rationale for use of nutritional ergogenic aids in a population of 18-25 year old college males. The results of this study will be used to develop nutritional ergogenic supplement education on college campuses and recreation centers. The researcher hypothesizes that about half of the James Madison University male population uses some form of nutritional ergogenic aid to achieve fitness and nutrition related goals, with the main rationale behind use being building muscle or enhancing performance.

## **Review of Literature**

### *Rise in Sports Supplementation*

In recent years, there has been an increase in consumption of sports supplements and dietary supplements in the general population (Lane, 2013; Gahche et al., 2011). In 2011 alone, retail sales of sports supplementation (including body building ready-to-drink products, nutrition bars and gels, and sports/energy drinks and shots) increased by 14% to a total \$21.4 billion, outpacing overall supplement industry growth by 7.5% (Lane, 2013). NHANES reported an increase in dietary supplements – including multivitamins/multiminerals – from over 40% of adults taking such supplement in 1988-1994 to over 50% of adults taking a supplement during 2003-2006 (Gahche et al., 2011). According to Gambriels and Lambert, the increase in sales of nutritional supplements is attributed to aggressive marketing of supplements rather than the supplements are becoming more effective (Gambriels & Lambert, 2013).

### *Frequency of Supplement Use*

Several studies have evaluated the use of nutritional ergogenic aids in college students (Jackson et al., 2010; Hoyte, Albert, & Heard, 2013; Perkin, Wilson, Schuster, & Rodriguez, 2002; Froiland, Koszewski, Hingst, & Kopecky, 2004). Jackson et al. found that about half of campus recreation users were currently taking some form of dietary supplement, with males being twice as likely as females to use supplements (Jackson et al., 2010). Hoyte and colleagues discovered that 85.9% of students surveyed had used energy drinks, dietary supplements, or prescription medications to enhance athletic performance (Hoyte et al. 2013). Perkin et al. noted that 26.3% of the general population reported use of non-vitamin, non-mineral supplements and 16% had used such supplements in the past (Perkin et al., 2002). Ginseng, Echinacea, and protein powder/amino acids were cited as the most frequently used supplements in this study (Perkin et



al., 2002). Froiland and colleagues discovered that 89% of male and female collegiate athletes reported current or previous intake of nutrition supplements (Froiland et al., 2004). Male collegiate athletes were significantly more likely ( $p<0.05$ ) to use energy and protein supplements, whereas females were significantly more likely ( $p<0.05$ ) to use vitamin and mineral supplements (Froiland et al., 2004).

### *Efficacy and Safety of Ergogenic Aids*

The primary reason for providing education on ergogenic aids and sports supplements is to encourage safe use of sports supplements by students. Ergogenic aids and sports supplements are not required by the FDA to disclose ingredients and amounts of ingredients (Eudy, Gordon, & Hockaday, 2013). Preworkout supplements and energy enhancing supplements have been shown to improve performance (Eudy et al., 2013); however, the safety of these products may be compromised if users use more than the recommended serving size (Eudy et al., 2013). Caffeine, if taken in high amounts, may cause headaches, insomnia, nervousness, and tachycardia (Clauson, Shields, McQueen, & Persad, 2008). Creatine supplementation has been widely researched and may enhance performance of high-intensity, short duration exercise (Cooper, Naclerio, Allgrove, & Jimenes, 2012). It has not been associated with major health risks in the short term (<8weeks), but safety of prolonged use has not been established (Cooper et al. 2012). Several fat burners have been associated with liver toxicity, particularly with hydroxycut (Dara, Hewett, & Lim, 2008).

### *Rationale Behind Supplement Use*

In addition to the number of college students who use supplements and the types of supplements used, rationale behind purchasing these supplements is important to understand for further research and education of students. Brown discovered that college students use sports

supplements to increase a perceived lack of nutrients (Brown, 2010). Perkin et al. found that both males and females use non-mineral, non-vitamin supplements to increase energy, facilitate weight loss, and burn fat (Perkin et al., 2002). Men were more likely to use supplements to enhance muscle growth than women were. Froiland noted that male collegiate athletes were more likely to use supplements to improve speed/agility, improve strength/power, and facilitate muscle gain (Froiland et al., 2004). According to Neuhouser, additional reasons for general supplement use included to consume a more balanced diet, to feel better, and for preventative purposes (Neuhouser, Patterson, & Levy, 1999). Krumbach et al. and Kruskall et al. both noted that most male collegiate athletes reported taking supplements to improve athletic performance and build muscle (Krumbach, Ellis, & Driskell, 1999; Kruskall & Johnson, 2001).

#### *Sources of Information on Sports Supplementation*

Krumbach et al. and Kruskall et al. both found that male athletes are more likely to rely on family members or friends for information on nutritional sports supplements. If a dietitian was not readily available, the athletes would not seek them out (Krumbach et al., 1999; Kruskall et al., 2001). If a dietitian was readily available to the athletes, these athletes would consult them for information on nutritional supplements (Krumbach et al., 1999; Kruskall et al., 2001).

Froiland also noted that male collegiate athletes were more likely to consult family members (32.4%) and fellow athletes (31.9%) for information on nutritional supplements (Froiland et al., 2004). Jackson and colleagues found that male college students reported the best source of information on dietary supplements were fitness instructors (24.3%), the internet (25.2%) and books/magazines (22.6%) (Jackson et al., 2010).

### *Purpose of Research*

As the use of nutritional ergogenic aids continue to rise in recreational athletes, education on the side effects of nutritional ergogenic aid supplementation should rise proportionally. Limited research is available on nutritional ergogenic aid use in college students, particularly in recreational athletes. Therefore, the purpose of this study is to evaluate the use of nutritional ergogenic aids and to determine the rationale behind supplementation in 18-25 year old college males.

## **Methodology**

### *Inclusion and Exclusion Criteria*

The subjects for this study were male college students between the ages of 18 and 25 attending James Madison University during the fall of 2013. Participants were recruited through a JMU bulk email request (Appendix A). Female and non-JMU students were excluded from this survey.

### *Participant Demographics*

Of the 121 college males partaking in the study, 55% of participants were 18-20 years old, 38% were 21-23 years old, and 8% were 24-25 years old. Sophomores comprised the largest proportion of the surveyed students (28%), followed by juniors (22%) and seniors (22%). Eighty-eight percent of participants were of white, non-hispanic ethnicity. Most participants exercise at UREC/UPARK (56%) or at an off-campus recreation center or gym (21%).

### *Data Procedures*

#### *Survey Protocol*

The investigator gained approval from James Madison University's Institutional Review Board prior to implementation of the survey. Participants received a JMU bulk email (Appendix A) asking them to participate in an online survey on Qualtrics, (Provo, Utah) (Appendix B) assessing nutritional ergogenic aid use. The survey investigated the types and categories of ergogenic aids students use, as well as how often and when the students use ergogenic aids. The students completed the survey anonymously, but had the option to leave their email at the end of the survey to receive a summary of the results. The email provided was not traced back to their completed survey. Students that stated that they do not use ergogenic aids were included in the data analysis, but were not required to answer questions specific to ergogenic aid use.

### *Statistical Analysis*

The statistical significance of ergogenic aid use in competitive vs. non-competitive athletes, supplement use in light vs. heavy exercisers, and the type of ergogenic aid use in light vs. heavy exercisers was analyzed using Chi squared and Fisher's exact tests through IBM SPSS Version 20 (Armonk, NY) software. The significance was set at  $p \leq 0.05$ . Percentages for the motives behind ergogenic aid use, overall ergogenic aid use by category, and types of ergogenic aid used by heavy and light exercisers were obtained through descriptive statistics in Qualtrics.

### *Survey Questions*

Competitive athletes included varsity, intermural, club, and ROTC athlete. Non-competitive athletes included recreational athletes and non-exercisers. Those who exercised 2-4 days/week, 1 day/week, or rarely were classified as light exercisers. Heavy exercisers participated in exercise 5-6 days/week or daily. Ergogenic aids under the vitamin category included multivitamins, vitamin packs, individual vitamins, individual minerals, and fish oil. The protein supplement category included casein protein, whey protein, soy protein, protein bars, and pre-made protein shakes. The amino acid category included amino acids, glutamine, carnitine, and branched chain amino acids (BCAA's). Ergogenic aids under the energy enhancer category included pre-workout, caffeine, guarana, energy drinks, and energy shots. Fat burner supplements included thermogenics, green tea, hydroxycut, green coffee bean extract, CLA, and safflower oil supplements. Creatine, mass gainer, and nitric oxide were classified as individual categories.

## Results

Of the 121 male college students that completed the survey, more than 98% reported ergogenic aid use (Table 1). There was no significant difference in nutritional ergogenic aid use between competitive and non-competitive athletes,  $p=0.708$  (Table 2). There was a significant difference in supplement use between light exercisers and heavy exercisers, with heavy exercisers being more likely to consume a nutritional ergogenic aid,  $p=0.041$  (Table 3).

**Table 1. Nutritional ergogenic aid use in surveyed college males.**

Use of Supplement	Number of Responses	
	n=	%
Yes	119	98.3%
No	2	1.7%
Total Participants	n = 121	

**Table 2. Nutritional ergogenic aid use in competitive and non-competitive male collegiate athletes.**

	Supplement Use		Total Participants	Fishers Exact Test
	Yes n (%)	No n (%)		
Competitive Athlete	27 (58.6)	19 (41.4)	n = 46	0.708
Non-Competitive Athlete	40 (54.7)	33 (45.3)	n = 73	

**Table 3. Nutritional ergogenic aid use in heavy vs. light college male exercisers.**

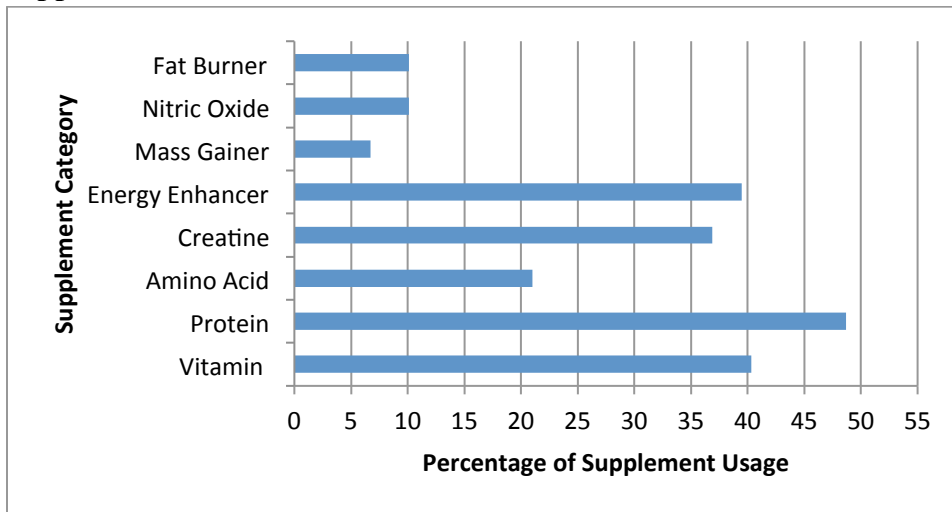
	Supplement Use		Total Participants	Fishers Exact Test
	Yes n (%)	No n (%)		
Heavy Exercisers	42 (65.6)	22 (34.5)	n = 64	0.041*
Light Exercisers	25 (45.5)	30 (54.5)	n = 55	

\* signifies significant difference between heavy and light exercisers ( $p \leq 0.05$ ).

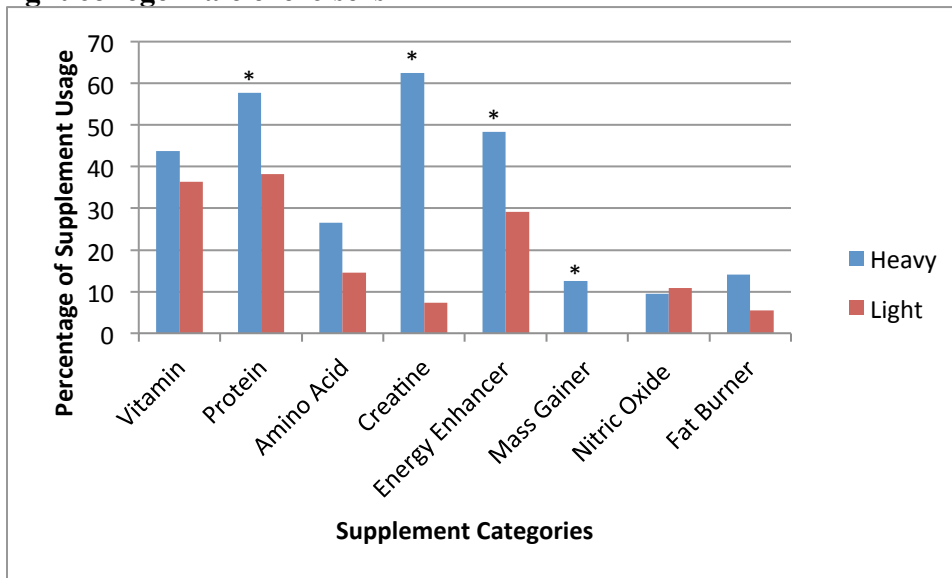
Protein, vitamin, and energy enhancers were the most used ergogenic aid by all participants who took supplements (Figure 1). Creatine, protein, and energy enhancers were the top ergogenic aids used by heavy exercisers (Figure 2). Light exercisers used mostly vitamins, protein, and energy enhancers (Figure 2). There was a significant different in use of a protein

( $p=0.043$ ), creatine ( $p=0.000$ ), energy enhancer ( $p=0.039$ ), and mass gainer ( $p=0.007$ ) between heavy and light exercisers, with the heavy exercisers reporting a higher use of ergogenic aids (Figure 2). There was no significant difference in use of vitamin ( $p=0.457$ ), amino acid ( $p=0.121$ ), nitric oxide ( $p=1.00$ ), and fat burner ( $p=0.139$ ) ergogenic aids in light vs. heavy exercisers.

**Figure 1. Percentage of nutritional ergogenic supplement use by category in all college male supplement users**



**Figure 2. Percentage of nutritional ergogenic supplements used by category in heavy and light college male exercisers**



\* signifies significant difference between heavy and light exercisers ( $p \leq 0.05$ ).

Participants were asked why they took particular ergogenic aids and were given the following options: Provide energy, enhance performance, enhance recovery, increase muscular strength, build muscle, and weight/fat loss. The most common reasons stated for vitamin supplement use was to enhance performance and provide energy Protein supplements were used to build muscle and enhance recovery. Amino acid supplements were used to enhance recovery and build muscle. Creatine was used to build muscle, increase muscular strength, and increase performance. Energy enhancers were used to enhance energy and enhance performance. Mass gainer supplements were used to build muscle and increase muscular strength. Nitric oxide supplements were used to provide energy and enhance performance. Fat burners were most commonly used for weight/fat loss and provide energy (Table 4).

**Table 4. Frequency of rationales for nutritional ergogenic supplement use cited by participants.**

Supplement Category	Motive	Number of Responses	
		n =	%
Vitamin	Provide Energy	32	22.6%
	Enhance Performance	41	29.1%
	Enhance Recovery	25	17.7%
	Increase Muscular Strength	14	9.9%
	Build Muscle	16	11.3%
	Weight/Fat Loss	13	9.2%
		Total = 141*	
Protein	Provide Energy	40	11.7%
	Enhance Performance	42	12.3%
	Enhance Recovery	92	26.9%
	Increase Muscular Strength	64	18.7%
	Build Muscle	99	28.9%
	Weight/Fat Loss	5	1.5%
		Total = 342*	
Amino Acid	Provide Energy	17	12.9%
	Enhance Performance	24	18.3%
	Enhance Recovery	37	28.2%
	Increase Muscular Strength	20	15.3%
	Build Muscle	29	22.1%
	Weight/Fat Loss	4	3.1%
		Total =131*	



Creatine	Provide Energy	11	12.1%
	Enhance Performance	20	21.9%
	Enhance Recovery	13	14.3%
	Increase Muscular Strength	20	21.9%
	Build Muscle	23	25.3%
	Weight/Fat Loss	4	4.4%
		Total = 91*	
Energy Enhancer	Provide Energy	80	55.9%
	Enhance Performance	40	27.9%
	Enhance Recovery	9	6.2%
	Increase Muscular Strength	7	4.9%
	Build Muscle	3	2.1%
	Weight/Fat Loss	4	2.8%
		Total = 143*	
Mass Gainer	Provide Energy	2	11.1%
	Enhance Performance	2	11.1%
	Enhance Recovery	2	11.1%
	Increase Muscular Strength	4	22.2%
	Build Muscle	8	44.4%
	Weight/Fat Loss	0	0%
		Total = 18*	
Nitric Oxide	Provide Energy	12	41.4%
	Enhance Performance	8	27.6%
	Enhance Recovery	3	10.3%
	Increase Muscular Strength	2	6.9%
	Build Muscle	2	6.9%
	Weight/Fat Loss	2	6.9%
		Total = 29*	
Fat Burner	Provide Energy	12	38.7%
	Enhance Performance	1	3.2%
	Enhance Recovery	1	3.2%
	Increase Muscular Strength	0	0%
	Build Muscle	0	0%
	Weight/Fat Loss	17	54.8%
		Total = 31*	

\* signifies total participant responses; participants could choose more than one motive or rationale per supplement category

When survey participants were asked where they obtained their ergogenic aid information, participants cited the internet (79%) and friends (79%) as the most utilized source of information (Table 5). Participants were less likely to turn to a registered dietitian (12%), physician (11%), or nurse (11%) for advice on supplement use (Table 5).

**Table 5. Source of sports supplement information.**

<b>Source</b>	<b>Response</b>	<b>Percentage</b>
Internet	52	79%
Friends	52	79%
Coach	18	27%
Personal Trainer	17	26%
Athletic Trainer	16	24%
Magazines	16	24%
Parent/Family	12	18%
Television	10	15%
Other	9	14%
Registered Dietitian	8	12%
Physician or Nurse	7	11%

## Discussion

Though the sample size was small, this study identified no significant difference between supplement use in competitive and non-competitive athletes. Supplement use in competitive and non-competitive athletes was about equal, which may suggest that competitive athletes are no longer the primary population associated with sports supplementation. In addition, this study identified that 98% of students of the survey population (male JMU students, ages 18-25) consume some sort of supplement. This percentage is slightly higher than the percentages reported with most of the other literature, as Hoyte et al. cited 85.9% of students consumed a supplement and Jackson et al. noted that about half of campus recreation users used a supplement (Hoyte et al., 2013; Jackson et al., 2010). A higher percentage (89%) of male and female athletes taking nutritional ergogenic aids was noted by Froiland, which is inconsistent with the results of this research which states there is no significant difference in supplement use between competitive and non competitive athletes (Froiland et al., 2004). In addition, this research supports the hypothesis that half of the James Madison University male population uses some form of ergogenic supplement. Therefore, the researcher fails rejects the null hypothesis.

There was a significant difference in supplement use between heavy and light exercises, with heavy exercisers being more likely to use supplements. The most commonly used supplements among heavy exercisers included creatine, protein, and energy enhancing supplements, while light exercisers included vitamins rather than creatine. There was a significant difference in use of protein, creatine, energy enhancer, and mass gainer supplements in heavy verses light exercisers. Therefore, heavy exercisers may perceive an increased need for supplement use to reach their fitness or nutrition goals. Unfortunately, research on supplement use based on exercise frequency is limited and unavailable to support these results.

Contrary to other research, participants were provided with example rationales to choose from, including: provide energy, enhance performance, enhance recovery, increase muscular strength, build muscle, and weight/fat loss. Other studies provided examples or allowed participants to answer the question openly (Perkin et al., 2002). Although some of explanations did not match up to other research, both this study and Perkin et al. noted that one of the primary reasons participants use supplements was to provide energy (Perkin et al., 2002). Like Froiland et al., Krumbach et al., and Kruskal et al., primary reasons for supplement use in this study included building muscle and enhancing performance (Froiland et al., 2004; Krumbach et al., 1999; Kruskal et al., 2001).

As for information on sports supplementation, the primary sources of information on nutritional ergogenic supplements included the internet (79%) and friends (79%). Jackson et al., Krumbach et al., and Kruskal et al. also noted that friends were a top choice for information on supplements (Jackson et al., 2010; Krumbach et al., 1999; Kruskal et al., 2001). In addition to friends, participants in Jackson et al.'s study reported fitness instructors and magazines as other good sources of information on sports supplementation (Jackson et al., 2010).

### *Limitations*

The small sample size (n=121) was the primary limitation in this study. Further marketing the survey, an earlier start date, and opening the survey to females or other universities could have expanded the sample size. Social media would be a good addition to bulk emails for the college crowd. In addition, an earlier start date would have provided more time for participants to take the study and to market the survey to gather more participants. Expanding the study to female students would have changed the dynamics of the original survey, but would

provide information on the variation in supplement use between genders. Including more colleges would have added diversity to the ethnicities of the study.

Another limitation to this study was the homogeneity of the surveyed population. White, non-hispanic males comprised 88% of the surveyed male population. The surveyed population was a homogenous representation of the total population of male college students; however, this sample is representative of the male population at JMU. In addition, students who did not take nutritional ergogenic aids may not have participated in the survey, which may have created a false representation of the actual population of nutritional ergogenic aid users at JMU. Students may not have participated because they did not know the survey was for all students, and not just for those who take nutritional ergogenic aids. The email sent out could have been more encouraging to students who do not take nutritional ergogenic aids.

Regarding the survey questions, participants may have had a better understanding of “Please select which products you use, how often, and the reason that best describes why you use the product” if they were asked to select one reason that best describes their use of the supplement, rather than selecting all that apply. In addition, this research may have benefitted by adding a question concerning education on supplement use provided at James Madison University or a question regarding concern about side effects of supplement use. Also, multiple categorical questions were used in this survey. Quantitative questions may have added a different perspective to the results of this study.

### *Implications*

The goal of this study was to obtain a better understanding of the number of college students using supplements, which supplements are commonly used, the rationale behind supplement use, and the student’s sources of sports supplement information. This information

can assist educators in initiating appropriate instruction on supplement use for students. Most students obtain their information on supplement use from unreliable sources – including the internet or friends – rather than healthcare professionals. Therefore, providing education on commonly used supplements could help students who choose to use supplements to do so in a healthy and safe manner.

### *Conclusions*

Supplement use among non-competitive athletes is increasing, and non-competitive athletes are equally likely to use sports supplements as competitive athletes. Heavy exercisers are more likely to use some form of supplement, particularly creatine, protein, energy enhancer, or mass gainer supplements. The primary reasons for using supplements were to build muscle, enhance performance, and provide energy. The internet and friends were the primary sources of supplement information. The information obtained from this study should be used by educators to direct education on supplement use to college students to ensure healthy and proper use of sports supplementation.

## APPENDIX A

### Email Cover Letter: JMU Bulk Email

#### Lifting and Supplement Use

This bulk email request is seeking male JMU students between the ages of 18-25 to participate in a survey on personal consumption of sports/dietary supplementation. The survey should take 15-20 minutes of your time and will be an integral piece to my senior Honors Thesis.

Specifically, this study will address the percentage of male students who use sports supplementation, evaluate which types of supplements these students commonly use, and the rationale behind supplement use. This research has been approved by the James Madison University Institutional Review Board.

Many studies have shown that sports supplement use is higher among males than females; specifically energy drinks, protein powders, and fat burners. However, success with such supplements is generally unsupported by research. Your participation will provide information on the prevalence of supplement use in college students. This information will be beneficial in providing more opportunities for education on the potential positive and negative effects of using supplements.

Your individual responses will be collected anonymously through Qualtrics (a secure survey tool) and will be combined with other responses to create an overall view of student opinions and attitudes regarding supplements.

Please follow the link below to participate in this survey:

[https://jmu.qualtrics.com/SE/?SID=SV\\_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu](https://jmu.qualtrics.com/SE/?SID=SV_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu)

Thank you for taking the time to complete this survey. I truly appreciate your willingness and time to help with my research.

Megan Solloway  
James Madison University, Class of 2014  
Dietetics Major  
UREC Nutrition Manager  
NASM Certified Personal Trainer

## APPENDIX B

### Qualtrics link:

[https://jmu.qualtrics.com/SE/?SID=SV\\_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu](https://jmu.qualtrics.com/SE/?SID=SV_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu)

Survey questions are also listed below.

#### 1) How old are you?<sup>1</sup>

- 18-20 years
- 21-23 years
- 24-25 years

#### 2) What is your gender?<sup>1</sup>

- Male
- Female
- Prefer not to answer

#### 3) What academic year are you?<sup>1</sup>

- Freshman
- Sophomore
- Junior
- Senior
- Super-senior
- Graduate student

#### 4) Which ethnicity do you identify with?<sup>1</sup>

- White (Non-Hispanic)
- African American
- Hispanic
- Asian
- Pacific Islander
- American Indian
- Other:

#### 5) Do you have any health conditions diagnosed by a physician?<sup>1</sup>

- Yes
  - Please describe your conditions:
- No

#### 6) How often do you drink alcohol?<sup>1</sup>

- Daily
- Weekly
- Monthly
- Rarely (special occasions)
- Never



**7) How many alcoholic beverages do you usually consume in one sitting? One serving is equal to 12 oz of beer, 5 oz of wine, and 1 oz of liquor.**

- 1
- 2
- 3
- 4
- More than 5

**8) Do you smoke cigarettes?**

- No
- Yes

**9) How often do you smoke cigarettes?<sup>1</sup>**

- Daily
- Weekly
- Monthly
- Rarely
- Never

**10) How often do you use “street” drugs for recreational purposes? (Ex. marijuana, cocaine, heroine)<sup>1</sup>**

- More than once a week
- Once a week
- Monthly
- Never

**11) How often do you exercise?**

- Daily
- 5-6 days/week
- 2-4 days/week
- Once a week
- Rarely

**12) How long do your exercise sessions usually last?**

- Less than 30 minutes
- 30-45 minutes
- 1 hour
- 1.5 hours
- More than 2 hours

**13) What type of athlete are you?**

- Varsity college athlete
- Club athlete
- Intermural athlete
- Recreational athlete (exercise on your own)
- ROTC
- I do not exercise often

**14) Where do you exercise?**

- Sports practices
- ROTC training
- UREC/UPARK
- Off-Campus gym or recreation center
- Outside
- I do not exercise often

**15) Why do you exercise? Select all that apply.**

- Stress relief
- To look good
- For the social benefits
- General health and wellness
- To prevent disease

**16) Do you use any sort of supplement? Supplements include dietary supplements (vitamins, minerals), herbal supplements (St. John's wort, ginseng etc.), and/or sport supplements (creatine, pre-workout, protein powders etc.).**

- No, I do not consume anything to supplement my dietary intake
- Yes

17) If you answered YES to the above question, please answer the following questions that will assess the supplements you use.

Please select which products you use, how often, and the reason that best describes why you use the product<sup>9</sup>.

Which of the following are you currently taking?	How often do you take the supplement per month?				Why? Select all that apply.					
					Provide energy	Enhance performance	Enhance recovery	Increase muscular strength	Build muscle	Weight/fat loss
	0	1-10	11-15	>15						
Multivitamin (ex. One-a-day Men's)										
Vitamin Pack (ex. joint health, hair&nails)										
Individual Vitamins (ex. Vitamin C)										
Individual Minerals (ex. calcium)										
Fish oils and Omega-3s										
Amino Acids										
Glutamine										
Carnitine										
Casein Protein										
Whey Protein										
Soy Protein										
Protein Bars										
Pre-made Protein Shakes (ex. muscle milk)										
Androstenedione										
Branched Chain Amino Acids (BCAA's)										
Creatine										
DHEA (dehydroepiandrosterone)										
HMB ( $\beta$ -Hydroxy- $\beta$ -Methylbutyrate)										
Tribulus										

NO/arginine										
Mass Gainer										
Thermogenics (ex. GNC Total Lean)										
Green Tea Extract										
Hydroxycut										
Green Coffee Bean Extract										
CLA (ex. Ab Cuts Sleek and Lean)										
Safflower Oil (ex. SafSlim)										
Preworkout (ex. Jacked, C-4)										
Caffeine										
Guarana										
Energy Drinks (ex. Red Bull)										
Energy Shots (ex. 5 hour energy)										

**18) Please list any additional supplements you take or any supplements that you are unsure which category they fall under<sup>9</sup>:**

-

**19) What is your budget for supplements per month?**

- Less than \$50
- \$50-100
- \$100-150
- \$150-200
- More than \$200
- Cost is not an issue

**20) How much are you willing to spend on a particular supplement?**

- Less than \$20
- \$21-40
- \$41-60
- \$61-80
- \$81-100
- More than \$100

**21) Do you research supplements before purchasing them?**

- No
- Yes

**22) Where did you learn about supplement use? Select all that apply.<sup>9</sup>**

- Television
- Internet
- Friends
- Coach
- Athletic Trainer
- Physician or nurse
- Registered dietitian
- Personal Trainer
- Magazines
- Parent
- Other:

**23) Please state if you have experienced the following changes with supplement use and which supplement you believe caused that change.**

**Weight loss**

- No
- Yes
- Attributed to:\_\_\_\_\_.

**Weight gain**

- No
- Yes
- Attributed to:\_\_\_\_\_.

**Increased muscular performance**

- No
- Yes
- Attributed to:\_\_\_\_\_.

**Quicker recovery time**

- No
- Yes
- Attributed to:\_\_\_\_\_.

**Increased energy**

- No
- Yes
- Attributed to:\_\_\_\_\_.

**Have you experienced any success using supplements?**

- No
- Yes

**How do you quantify this success?**

- \_\_\_\_\_.

## **APPENDIX C**

### **Consent Form**

#### **Identification of Investigators & Purpose of Study**

You are being asked to participate in a research study conducted by Megan Solloway from James Madison University. The purpose of this study is to evaluate the use and rationale behind the use of sports supplementation in male college students. This study will contribute to the student's completion of her senior honor's thesis.

#### **Research Procedures**

This study consists of an online survey that will be administered to individual participants through Qualtrics, an online survey tool. You will be asked to provide answers to a series of questions related to your personal use of supplements and your reasons for use of supplements.

#### **Time Required**

Participation in this study will require 15 minutes of your time.

#### **Risks**

The investigator does not perceive more than minimal risks from your involvement in this study (that is, no risks beyond the risks associated with everyday life).

#### **Benefits**

Your participation in this study will provide information on the prevalence of supplement use in college students. This information will be beneficial in providing more opportunities for education on the potential positive and negative effects of using supplements.

#### **Confidentiality**

The results of this research will be compiled into a manuscript and submitted for publication to NIRSA's Recreational Sports Journal. While individual responses are anonymously obtained and recorded online through Qualtrics, data is kept in the strictest confidence. No identifiable information will be collected from the participant and no identifiable responses will be presented in the final form of this study. The researcher retains the right to use and publish non-identifiable data. At the end of the study, all records will be destroyed. Final aggregate results will be made available to participants upon request.

#### **Participation & Withdrawal**

Your participation is entirely voluntary. You are free to choose not to participate. Should you choose to participate, you can withdraw at any time without consequences of any kind. However, once your responses have been submitted and anonymously recorded you will not be able to withdraw from the study.

#### **Questions about the Study**

If you have questions or concerns during the time of your participation in this study, or after its completion or you would like to receive a copy of the final aggregate results of this study, please contact:

Researcher's Name: Megan Solloway  
CSSD  
Department: Health Sciences  
James Madison University  
Email Address: [sollowme@dukes.jmu.edu](mailto:sollowme@dukes.jmu.edu)

Advisor's Name: Dr. Melissa Rittenhouse RD,  
Department: Health Sciences  
James Madison University  
Telephone: (540) 568-8971  
Email Address: [rittenma@jmu.edu](mailto:rittenma@jmu.edu)

## **Questions about Your Rights as a Research Subject**

Dr. David Cockley

Chair, Institutional Review Board

James Madison University

(540) 568-2834

[cocklede@jmu.edu](mailto:cocklede@jmu.edu)

## **Giving of Consent**

I have been given the opportunity to ask questions about this study. I have read this consent and I understand what is being requested of me as a participant in this study. I certify that I am at least 18 years of age. By clicking on the link below, I am consenting to participate in this research and will begin the survey.

[https://jmu.qualtrics.com/SE/?SID=SV\\_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu](https://jmu.qualtrics.com/SE/?SID=SV_6Qd2AKM2jFFcXL7&Preview=Survey&BrandID=jmu)

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