

# Relationship Between Energy Drink Consumption and Nutrition Knowledge in Student-Athletes

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## ABSTRACT

**Objective:** To identify the relationships between energy drink consumption, nutrition knowledge, and socio-demographic characteristics in a convenience sample of student-athletes.

**Design:** Cross-sectional.

**Setting:** Online survey.

**Participants:** A total of 194 student-athletes (112 female and 82 male).

**Main Outcome Measures:** Socio-demographic characteristics, knowledge of human nutrition, energy drink consumption habits.

**Analysis:** Chi-square tests of independence, independent *t* tests, and hierarchical regression analyses were applied.

**Results:** Most student-athletes in the sample (85.5%) did not consume energy drinks, but those who did tended to be male ( $P = .004$ ), had lower overall knowledge of nutrition ( $P = .02$ ), and had a lower grade point average ( $P < .001$ ) than did nonusers. Also, energy drink consumption was associated with the overall nutrition knowledge score when adjusted for socio-demographic characteristics, with nonusers having greater nutrition knowledge ( $P = .007$ ) than users.

**Conclusions and Implications:** Student-athletes tend to refrain from energy drink use but those who use it have a tendency to have lower nutrition knowledge than do nonusers. Therefore, nutrition education targeted toward student-athletes should encompass the consumption of energy drinks because limited evidence shows the benefits of collegiate athletes consuming energy drinks.

**Key Words:** nutritional supplements, energy drink consumption, nutrition knowledge, student-athletes, sports, college students (*J Nutr Educ Behav.* 2017;49:19-26.)

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## INTRODUCTION

Gaining a competitive advantage in sports goes beyond traditional training measures such as working harder in the weight room and on the practice field compared with competitors. There is also a need to consider athletes' dietary behaviors, because optimal nutrition

may enhance athletic performance. In general, nutrient requirements can be achieved through a healthy diet with no need for nutritional supplements or ergogenic aids.<sup>1</sup> However, studies exploring athletes' diet quality showed that their diets tend to be inadequate in nutrients (especially vitamins E and D, folate, pantothenic acid, calcium,

magnesium, potassium, total fat, dietary fiber, and phosphorus) and low in fruits, vegetables, and dairy products.<sup>2-4</sup> Moreover, studies found that ergogenic aids such as energy drinks are popular among student-athletes.<sup>5</sup>

Energy drinks are often a combination of caffeine (main active ingredient), taurine, guarana, glucuronolactone, B vitamins, and ginseng.<sup>6,7</sup> Regulation of these highly caffeinated beverages has been challenging.<sup>8</sup> Energy drinks contain 72–300 mg caffeine/8-oz serving compared with 65–125 mg caffeine/8-oz serving of percolated coffee.<sup>7,9</sup> Consuming 150–200 mg/kg caffeine can lead to fatal caffeine overdose as a result of ventricular tachycardia.<sup>10</sup> Although the consumption of excess caffeine can be life-threatening, energy drink manufacturers tend to target young males, claiming that their product increases energy and alertness and improves athletic performance.<sup>8,9</sup> Emond et al<sup>11</sup> suggested that adolescents are exposed to

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these claims by advertisements that are run on television channels popular within their age group. This is concerning because frequent energy drink consumption has been correlated with higher intake of sugar-sweetened beverages, which contributes to undesired weight gain and obesity.<sup>12-14</sup>

It has been suggested that collegiate student-athletes consume these beverages to improve athletic performance.<sup>15</sup> However, there is conflicting evidence regarding whether performance actually improves as a result of consuming energy drinks.<sup>6,16-22</sup> Performance improvements may result from the content of caffeine and/or carbohydrates in the energy drinks, and questions exist regarding whether energy drinks are the proper mode of delivery for high doses of caffeine required to stimulate neuromuscular performance.<sup>20,23</sup> Regardless, studies showed that athletes have low overall nutrition knowledge, especially concerning the relationship between diet and diseases.<sup>4,24</sup> Evidence from the literature also showed that nutrition knowledge is related to dietary intake in the general population.<sup>4,25</sup> Studies looking at this relationship within athletes found that fruit and vegetable consumption seemed to be weakly predicted by athletes' nutrition knowledge, but no study was found exploring the relationship between nutrition knowledge and the consumption of energy drinks.<sup>4</sup> Therefore, there is a need to better understand whether nutrition knowledge is related to energy drink consumption in athletes, because consumption of these drinks has increased in the young adult population (aged 18–25 years), especially among males.<sup>8,26</sup>

This study aimed to identify the relationships among general nutrition knowledge, energy drink consumption, and socio-demographic characteristics in a convenience sample of American student-athletes who compete at the National Collegiate Athletic Association (NCAA) Division III level. The NCAA consists of 3 separate levels, I, II, and III, in which differences exist both athletically and academically. Performance expectations are greater for NCAA I student-athletes because athletic programs have higher budgets and athletic scholarships are available to student-athletes, whereas NCAA III athletic

program budgets are lower and athletic scholarships are not available to student-athletes.<sup>27</sup> Overall, Division III athletes tend to play for the enjoyment of the sport.<sup>28</sup> Academically, Umbach et al<sup>29</sup> reported that students at Division III institutions undergo a greater degree of academic challenge and have more interaction with faculty than do students at Division I institutions. Furthermore, they reported that students at Division III institutions engage more in active and collaborative learning activities than do their peers at Division I institutions. Robst and Keil<sup>30</sup> found that student-athletes competing at NCAA III schools have higher grade point averages (GPAs), enroll in classes of greater difficulty, and have higher graduation rates than do non-student-athletes at the same institutions.

Based on that, the current researchers formulated 2 hypotheses. The first hypothesis was that NCAA Division III student-athletes who did not consume energy drinks would have higher knowledge of nutrition than would student-athletes who consumed energy drinks and competed within the same athletic division. The second hypothesis was that NCAA Division III student-athletes who did not consume energy drinks would have a higher GPA and would more likely be female compared with student-athletes who consumed energy drinks and competed within the same division.

## METHODS

### Survey Design and Participants

The University of Minnesota Institutional Review Board determined that this investigation was exempt from review under federal guidelines. This cross-sectional study was administered online to undergraduate student-athletes. The student-athletes competed within the Upper Midwest Athletic Conference, a member of the NCAA, at the Division III level. The survey was available to these athletes from November 10 to December 21, 2014. Nine colleges and universities competed within the conference, 5 of which voluntarily participated in this study. For athletes to be eligible for this study, they had to have been undergraduate student-athletes from 1

of the 5 participating universities and at least age 18 years.

### Procedure

Athletic directors from the participating universities directly e-mailed the survey link and informational letter to their student-athletes. Student-athletes received 2 separate e-mails. First, they received an introductory e-mail that explained the investigation and a link to the online survey. Fourteen days after they received the introductory e-mail, student-athletes received a follow-up e-mail that reiterated the introductory e-mail and the link to the survey was again provided to them. In total, 984 eligible student-athletes were invited to take part in this study. A cookie was placed on their computer to prevent respondents from taking the survey more than once. No incentives were provided.

### Survey Design

The survey was administered using the online tool, Qualtrics (Qualtrics Labs, Provo, UT, 2014). All participants completed the online survey consisting of questions regarding gender, age, college cumulative GPA, nutrition courses taken during high school and college, student-athlete status, sport(s) in which they currently participated, the General Nutrition Knowledge Questionnaire for adults (GNKQ), and consumption of energy drinks. The GNKQ is a valid and reliable scale that has been deemed useful for assessing the relationship between knowledge and dietary behavior.<sup>31</sup> The GNKQ was designed by Parmenter and Wardle<sup>31</sup> for the UK adult population and consists of 4 sections: dietary recommendations, sources of foods/nutrients, choosing everyday foods, and diet-disease relationships. Some wording changes were performed on the original GNKQ to adapt it for the American adult population; these changes did not affect the validity of the questionnaire (Cronbach  $\alpha = .74$  for the overall score). This instrument was used in other published investigations that assessed nutritional knowledge of student-athletes.<sup>32,33</sup> The researchers obtained permission to use this instrument. The research team designed energy drink questions to be answered only

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