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# DIETARY HABITS AND NUTRITIONAL KNOWLEDGE: THE IMPORTANCE OF SPORTS NUTRITION PROFESSIONALS

Sieger M. Giroux

*Southern Illinois University Carbondale*, [giroux@siu.edu](mailto:giroux@siu.edu)

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DIETARY HABITS AND NUTRITIONAL KNOWLEDGE: THE IMPORTANCE OF SPORTS  
NUTRITION PROFESSIONALS

by

Sieger Giroux

B.S., Southern Illinois University Carbondale, 2015

A Research Paper  
Submitted in Partial Fulfillment of the Requirements for the  
Master of Science

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in the Graduate School  
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Fulfillment of the Requirements

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in the field of Exercise Science & Food and Nutrition

Approved by:

JULIE PARTRIDGE, PH.D.

WILLIAM J. BANZ, PH.D., R.D., Chair

Graduate School  
Southern Illinois University Carbondale  
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The academic career of college athletes can be one of the most exciting and fulfilling periods of their lives, but it can also be one of the most tumultuous. Many variables impact the transition from high school to college, such as physiological changes, making new friends, determining a career path, and getting used to autonomy (Vinci, 1998). These things can contribute to or detract from their overall performance and success in their sport. Some of these variables occur outside of their classes and training, and some are a direct component of their job as an athlete. In terms of performance and health, the two main focal areas are their physical training and their nutrition. Physical training is an elemental part in their day-to-day activities, whether it is practice, competition, strength training, agility training, and/or physical therapy. Nutrition, on the other hand, has only recently begun to garner attention from the athletes as well as the coaching staff (K. L. Clark, 1994).

It is well documented that what we eat, and the nutrients we consume, play a large role in maintaining healthy bodily function, preventing disease, and boosting cognitive performance, as well as fueling physical performance and recovery (Collins, Samantha, Susan, & Adam, 2011; Hagerman & Eric, 2013; Murtaugh, Janet, Bea, Ellen, & Maureen, 2010; Roth, Kathryn, Karen, & Sara, 2010). Nutrients are important to maintain normal physiological function. The importance of nutrients is the same for athletes, but typically to a greater degree given the increased turnover of various nutrients. Athletes typically require modestly increased intakes of macronutrients and micronutrients. The extra intake is required for proper repair and recovery, energy, metabolic function, and endocrine function (American Dietetic et al., 2009; Clark, 2013; Collins et al., 2011; Cpsda, 2014). All of these processes become very important when you are required to perform, physically and/or mentally, almost every day of the week. The problem is that the typical collegiate athlete has a nutritionally inadequate diet, and their knowledge of

nutrition is more commonly characterized by misconceptions rather than research-based information (Heaney, O'Connor, Michael, Gifford, & Naughton, 2011; Rosenbloom, Jonnalagadda, & Skinner, 2002).

Some studies have looked at the nutrition knowledge of college athletes. It has generally been found that an adequate knowledge base of proper intake is missing from this population (Cpsda, 2014; Heaney et al., 2011). A potential exception to this rule would be students in nutrition or exercise-related fields (e.g., dietetics or exercise science) as they would be expected to have higher levels of nutrition knowledge, due to their education in the field. It has also been found that athletes generally have slightly higher nutrition knowledge than their non-athlete counterparts, but it is still not at the desired level (Wilson, 2014). Given the effects of proper nutrition on performance, their knowledge regarding nutrition is an issue that needs addressed as it can hinder the potential ability of athletes and their corresponding teams to perform at their highest level.

The actual intake that the athletes consume is also a very important part of their adequate nourishment (American Dietetic et al., 2009; Clark, 2013). They must be discussed separately, however, due to the lack of a strong association between the two variables (Heaney et al., 2011). Intake (much like nutrition knowledge) is also often poor in collegiate athletes (CPSDA, 2014; Shriver, Betts, & Wollenberg, 2013). It is common dogma that knowledge does not equal behavior change or habits, and this can be clearly seen in the collegiate athlete population (Maibach, 2003). It is often found that student athletes are provided with various sources of info, and may even have an adequate basal level of nutritional wisdom, yet their intake is still characteristic of the "Standard American Diet" (Heaney et al., 2011; Spronk, Kullen, Burdon, & O'Connor, 2014). Their intake generally consists of higher quantities of energy-dense,

processed, and fast food choices in order to meet their increased energy and nutrient needs. It has been found that many of these athletes eat diets that are often deficient in the essential micronutrients needed for normal bodily functions as well as the carbohydrates needed for proper fueling of these athletes (Cpsda, 2014). It is especially important for an athlete to consume nutrient-dense foods due to the increased turnover of various nutrients required for metabolic function as well as overall bodily health. In terms of macronutrients, the general guidelines, provided by nutrition authorities such as the Academy of Nutrition and Dietetics, state that athletes should consume at least 1.2 g/kg of protein, 4-7 (and up to 10 if loading) g/kg of carbohydrates, and the remaining 20-30% of their caloric intake should come from fats (American Dietetic et al., 2009; Collins et al., 2011). Generally, fat intakes are high whereas carbohydrate (and sometimes protein) intake suffers. It has long been known that adequate protein is needed for tissue maintenance and recovery, and is especially important in aesthetic sports or any situation in which calories may be restricted to a degree in order to lose fat mass and/or weight in order to minimize catabolism of lean tissues (Phillips, 2014). Some research has even shown that protein intakes of up around 2.3 – 3 g/kg may be needed in some individuals in order to maximize muscle protein synthesis and maintain nitrogen balance in bodybuilding-style training, but this is outside the scope of this paper (Helms, Aragon, & Fitschen, 2014). In order for athletes to meet these recommendations and obtain valuable nutrients from whole, natural foods, they need to know what to look for and how to use it. They need to know how to navigate a grocery store, evaluate an ingredients label (as well as understand that some of the best food choices don't come with a label), and have the basic cooking skills needed to make their nutritious choices appealing and appetizing to them. This shows that collegiate dietitians and nutritionists need to be proactive in providing athletes with knowledge as well as the tools and



ability needed to apply that knowledge to their own food choices. This effort to promote change can be augmented by the use of a theoretical framework such as the Transtheoretical Model, as this can assess their readiness to change as well as provide them with tools to help them progress in an appropriate manner (Massey, 2013).

The purpose of this study was two-fold. First, we wanted to evaluate the nutrition knowledge and intake of football players at Southern Illinois University Carbondale, an NCAA FCS (i.e., “mid-major”), Division I school. We hypothesize that intake and knowledge will not be significantly correlated. Second, a search of the literature was performed in order to illustrate the importance of nutrition professionals in collegiate athletics. We wanted to assess one of our largest teams in order to evaluate the need for further nutrition support and intervention for our athletes. The participants in the present study were evaluated via an existing, validated nutrition survey (Paugh, 2005). The resulting data will be used to tailor the athletic nutrition team’s message and direction in order to better meet the needs of our athletes.

## **Review of Current Literature**

The existence of a dependable source of nutrition within the collegiate athletic realm has been repeatedly shown to be beneficial to multiple facets of the athletes' lives and performance (Wilson, 2014). At the most basic level, they have increased nutrient and energy needs in order to optimize tissue repair, recovery, and maintenance of performance (American Dietetic et al., 2009; Collins et al., 2011). They also have unique psychological stressors and adaptations that may put them at risk for various issues such as disordered eating (Quatromoni, 2008; Vinci, 1998). Luckily, various nutrition programs have shown promise in increasing nutrition knowledge, intake of nutritionally-dense foods, and also addressing other sources of stress that may be unique to the college athlete population (Baer, Walker, & Grossman, 1995; K. L. Clark, 1994; Quatromoni, 2008; Vinci, 1998).

### **The Importance of Nutrition in This Population**

College athletes have an increased need for nutrition support, and this is reflected by professional organizations as well as the literature. Position statements from the Collegiate and Professional Sports Dietitian Association (CPSDA) as well as the Academy of Nutrition and Dietetics (AND) and American College of Sports Medicine (ACSM) reflect this (American Dietetic et al., 2009; Cpsda, 2014). Such a statement from the CPSDA outlines the need of the current population, stating that student-athletes have "...substantially increased needs for food and fluids...", "...often have poor diets...", "...and "...are often misinformed about nutrition, have little variety in their diets, hold onto rigid, unrealistic beliefs about their diets, and have distorted views of their body image (Cpsda, 2014)..." These statements help to outline potential disparities in nutrition within athletics. A joint position statement from the AND (then ADA) and

the ACSM reflect similar views as stated by the CPSDA, as well as noting the importance of nutrition in performance and recovery and also indicating specific nutrient needs for college athletes.

The specific nutrient needs of athletes can vary by sport, but are typically higher than that of their non-athlete counterparts. Generally, there is an increased need for calories, protein, carbohydrates, fluids, and certain micronutrients (American Dietetic et al., 2009; Collins et al., 2011). For example, the RDA for protein is typically stated to be 0.8g/kg in normal adult populations. This has been repeatedly found to be inadequate for athletes, and a range of 1.2-1.8g/kg appears to be more ideal with perhaps even higher levels needed for energy-restricting sports (e.g. wrestling) and those that engage in aesthetic/ bodybuilding type training (Helms et al., 2014; Phillips, 2014). Carbohydrate needs typically range from 4-7 (and up to 10) g/kg which can be far above the needs of a non-athlete (Clark, 2013). Micronutrient needs can increase simply from increased utilization and turnover. If athletes are not properly educated on such needs, it can be very easy for them to fall short of recommendation that could help them perform optimally (Collins et al., 2011).

The nutrition professional's role within collegiate athletics is hard to elucidate without mention of the prevalence of various eating disorders and psychological implications. A study by Quatromoni (2008) looked to identify the prevalence of nutrition risk and disordered eating in a large Division I college in order to create an effective counseling team that could respond to such incidences. Student-athletes were evaluated by meeting various clinical criteria through a screening tool. It was found that roughly half of the students screened had some form of disordered eating behavior. A study by Baer et al. (1995), discovered similar findings within student athletes at the University of Cincinnati. . The common challenges that the athletes listed

were similar to the stressors and expectations mentioned previously, such as physiological changes, making new friends, determining a career path, and getting used to autonomy (Vinci, 1998). It has been shown that the presence of a dietitian, with knowledge in sports nutrition, at the center of a disordered eating response team can be very beneficial for program success and efficacy (Baer et al., 1995; Burns, Schiller, Merrick, & Wolf, 2004; K. L. Clark, 1994; Quatromoni, 2008). A registered dietitian is capable of identifying nutritional/psychological risk and counseling the athlete towards positive behavior change.

### **Nutrition Knowledge of College Athletes**

Recent research on the nutrition knowledge of athletes is not as abundant as one would hope, but the articles that do exist deliver a similar message. A systematic review by Heaney et al. (2011) compiled data from 29 different studies that were pulled from peer-reviewed journals. Their findings indicate that college athletes report similar but slightly greater nutrition knowledge than non-athletes (5 out of 7 studies) and knowledge may be higher in females than in males. The authors also found a weak correlation between knowledge and improved intake for college athletes and suggest that this may be due to issues in applying what was learned rather than a lack of knowledge. The limitations of the review include only 12 of the 29 studies being completed since 2000, variations in data collection methods of the study, and although most of the studies were completed in college athletes, there were some data from the elite athlete population which may have affected the overall conclusions. Regardless of its limitations, the findings of the review coincide with the general findings from other studies. A survey study by Rosenbloom et al. (2002) on 328 Division I athletes also found that there was a high occurrence of misconception regarding nutrition information and both male and female athletes had poor

nutrition knowledge. Knowledge was assessed in 328 (237 men, 91 women) via a nutrition knowledge questionnaire. The average score was  $5.8 \pm 1.8$  (mean  $\pm$  standard deviation) out of 11, which amounts to a 53% correct-response rate. The results of a study by (Wilson, 2014) in college athletes found a similar score of 56.4%.

A question that needs to be addressed in further detail is the connection (or lack of) between nutrition knowledge and intake. Spronk et al. (2014) indicated a weak, but positive correlation between the two variables. This systematic review however, looked at data from the general population as well as athletes. This possibility further advances the notion presented by Wilson (2014) that perhaps the issue is the application of knowledge rather than the lack thereof.

### **Intake of College Athletes**

In regards to the intake of college athletes, one must also keep in mind the recent NCAA guideline changes that allow Division I student-athletes to receive unlimited meals and snacks as opposed to the previous rule of only allowing one training-table meal per day, five days per week (Cpsda, 2014; Ncaa, 2014). This will likely change the landscape of intake for athletes and can be a useful tool for the nutrition professional in this realm.

Historically, the nutritional intake of college athletes has been suboptimal, much like the existence of knowledge in sports nutrition. As stated previously from the CPSDA, college athletes tend to have poor diets, often have irregularly-timed meals, and fail to consume the recommended amounts of macronutrients. A study by (Shriver, Betts, & Wollenberg, 2013) on the intakes of 52 Division I athletes found inadequate intakes of energy and carbohydrates, irregular meal patterns, and inadequate hydration monitoring. A limitation of this study was that it was confined to female athletes. In a study by (Cole et al., 2005), Division I football players

were found to have similar intakes to that of age and gender matched non-athletes, and their energy intake was found to be significantly inadequate compared to their activity level.

Another potential issue that can emerge from inadequate knowledge and intake is the use of supplements and performance enhancing drugs (PEDs). The high level of competitiveness that exists in college athletics can leave athletes looking for an edge over the opponent. If their diet is poor and nutrition knowledge is inadequate, this may cause them to have less energy and get sick more often. In order to remedy this, they may turn to questionable alternatives for competitive advantages. It has been shown that athletes are more likely to use various supplements and PEDs (Sobal & Marquart, 1994; Yusko, Buckman, White, & Pandina, 2008). Some of these supplements may be safe and even beneficial, but given the irregularity of supplement safety it is advisable for athletes to focus on optimizing their intake rather than using questionable or illegal products. There is also the possibility that the product they were using was only marginally affective because of a placebo effect. The assessment of supplements is another avenue in which the nutrition professional can clear up misconceptions and base the athlete's foundation on quality food prior to discussing/ implementing any supplement protocols.

### **Program Successes**

Various colleges and universities across the United States have begun utilizing nutritional professionals in their athletic staff, and some have been employing the services of one, or multiple, registered dietitians for many years. An article by K. L. Clark (1994) chronicled the presence of a dietitian in the athletic department of Penn State. The position began in 1985 as graduate assistantship and eventually turned into a full-time position. This became the first full-time sports nutrition position in the country, and has been a source for many beneficial programs and services for the sports division of Penn State as well as promoting good nutrition across

campus. It has resulted in cost savings due to a reduction in the consumption and purchasing of desserts and red meats as well as an increase in the consumption of fruits and vegetables, among other things. There are also various colleges that have employed the NCAA CHAMPS/ Life Skills Program (now known simply as Life Skills). This program consists of a multi-disciplinary team, including a dietitian, which addresses the nutrition and intake of the athletes as well as their stress and psychological well-being. It aided in providing a smooth transition into college life (Vinci, 1998).

A study by Baer et al. (1995) showed that a nutrition/ disordered eating program at the University of Cincinnati has also been successful. The program was initiated by the head athletic trainer and also includes a team physician, dietitian, and a psychologist. If an athlete is suspected of demonstrating disordered eating behaviors, he or she is referred to the athletic trainer. This then sets off a chain of events which includes an appointment with the team physician, food and behavior counseling from the dietitian, and sessions with the staff psychologist. After the athlete has met with all of the team members, the group meets and a treatment plan is developed specifically for the athlete. The plan usually consists of weekly meetings with the dietitian and psychologist, as well as monthly meetings with the team physician. Evaluations of the program have shown that athletes like the format of the program and the information provided. As a result of the program, athletes improved their intake of carbohydrate-containing foods, increased non-caffeinated fluids, and increased dietary intake of iron and calcium.

A major limitation of assessing such nutrition-related programs in athletics is that they can only typically be evaluated via surveys and/or evaluations. Trying to assess increases in performance can be highly confounded by multiple other variables and metabolic/ biochemical testing can be costly. However, given the importance of nutrition to quality of life in general, it

can be expected that the presence of a strong evidenced-based, nutrition culture in collegiate athletics would be beneficial and most certainly could not hurt.

## **Summary**

Dietitians and/or other nutrition professionals can be an integral part of the health and success of college athletes. The purpose of this study was two-fold. First, we wanted to evaluate the nutrition knowledge and intake of football players at Southern Illinois University Carbondale, an NCAA FCS (i.e., “mid-major”), Division I school. We hypothesize that intake and knowledge will not be significantly correlated. Second, a search of the literature was performed in order to illustrate the importance of nutrition professionals in collegiate athletics. We wanted to assess one of our largest teams in order to evaluate the need for further nutrition support and intervention for our athletes. The message that we can take from research shows us that there is often a disparity in the nutrition knowledge and intake of athletes, but this can be remedied by an effective nutrition program/team that can provide psychological support as well food-behavior counseling. In order to assess the needs of the athletes at SIUC, we provided them with a dietary habits/ intake and nutritional knowledge survey. We hope to identify any disparities and utilize this information in order to improve our current program and the health of our student-athletes.

## **Methods**

### **Participants**

Participants in this study included 55 football players present for spring training at Southern Illinois University Carbondale. All participants were male. The 55 participants that



completed the survey were a convenience sample that represented approximately 63% of the possible 87 football players present. The average age of the participants was  $20.6 \pm 1.2$  years (mean  $\pm$  standard deviation). The class breakdown as well as the average year is provided in table 1.

Table 1

*Frequency of Participants by Year in College*

	Year	Frequency
1	Freshman	10
2	Sophomore	10
3	Junior	18
4	Senior	16
	Total	54
	Average	$2.8 \pm 1.1$

## Materials

This study utilized a pre-validated survey from Paugh (2005) that was updated to reflect current nutrition research and included revisions such as recommended servings as well as question clarification. Questions regarding the Food Guide Pyramid were updated to match the recommendations based on the USDA's current MyPlate tool. One question was deemed too advanced for the current survey and 3 others were updated to match current sports nutrition, macronutrient guidelines. The survey contained a demographic section, a nutritional habits questionnaire, and a nutritional knowledge questionnaire. The demographic section asked for various information including year in college, age, if they had taken a previous nutrition course, and their typical source of nutrition information. Participants remained anonymous and did not put their name on the survey. The habits section made food frequency inquiries regarding various foods and food groups (e.g. how often do you eat at least 3 base meals per day?) and consisted of

19 questions. Answers ranged from 1 (never) to 4 (always: 5-7 days per week). The potential score range for this section was 19-76. The knowledge section contained questions to assess general as well as sports nutrition-specific wisdom (e.g. According to MyPlate, one should consume  $\geq 3$  cups of vegetables. Answers ranged from 1 (strongly disagree) to 4 (strongly agree). The potential score range for this section was 27-108. Reliability coefficients were calculated for both subscales of the questionnaire and were found to be  $\alpha = .66$  for habits and  $\alpha = .65$  for knowledge.

For the knowledge section, four points were given for each “correct” answer with a step-wise reduction in score for each answer closer to the “wrong” answer. For example, if the correct answer was “4” and they answered “1,” they would only receive 1 point. Any unanswered questions were given a score of 1. This occurred 7 times throughout the 55 surveys.

One participant failed to complete an entire page of the knowledge section, therefore only their responses to the habits section were utilized. Source of nutrition information was condensed into two categories: inside (trainer, coach, and nutritionist) and outside of the athletic department. This was done to be able to more easily evaluate the data via correlation and regression analyses, and therefore will show the effect of the reported source of athletes’ nutrition information.

## **Design & Procedure**

Due to this project being used for internal information only, the SIU Human Subjects Committee determined that it would fall under quality improvement and would not need to be reviewed by the IRB, nor would we need informed consent from the participants.

Subjects were asked to voluntarily participate in the survey after their strength-training sessions throughout a 2-week time period in March of 2015. They were given points towards their respective Alpha Dog teams for participating. The Alpha Dog program splits the teams into various groups with respective captains, and awards points for doing extracurricular activities, community service, and completing various other opportunities. The survey was completed without any sources of information or assistance from other individuals. The survey took approximately 10 minutes to complete.

### **Data Analysis**

Descriptive statistics (means and standard deviations) were calculated for all of the variables. A correlation analysis was used to determine any association between habits and knowledge. Correlations were also conducted between these individual variables and all other variables included in the data collection (year in college, age, previous nutrition course, and source of information).

Multiple linear regression analyses were conducted with both habits and knowledge as the target variables, and year in college, age, previous nutrition course, and source of information as predictor variables in order to determine any significant effects of each variable on their scores.

### **Results**

The mean scores of the current study were similar to that of the previous research by Paugh (2005), except the current scores were slightly higher. The mean and percentage scores

are summarized in Table 2. The scores from Paugh (2005) only include male participants (n = 74) due to the absence of females being included in the current study.

Table 2

*Mean & Percentage Survey Scores*

	Paugh, 2005		Giroux, 2015	
Habits	43.37	46.99%	55.65	64.30%
Knowledge	84.24	63.51%	88.15	75.49%

The correlation between habits and knowledge was characterized by a weak, positive association ( $r = .0190$ ), but was non-significant ( $p = 0.168$ ). No other correlational analysis resulted in statistical significance.

A regression analysis was calculated to predict participants' habit scores based on year in college, age, previous nutrition course, and source of information. The regression equation was not significant ( $F(5,41) = 0.957, p > .05$ ), with an  $R^2$  of .117. Age, year in college, previous nutrition course, nor source of information were found to account for differences in habit scores on the survey. A regression analysis was also performed on knowledge scores, with similar results ( $F(5,41) = 1.087, p > .05$ ), with an  $R^2$  of .104. Once again, differences in knowledge scores were not predicted by age, year in college, previous nutrition course, nor source of information.

### **Discussion**

College athletes have sport, school, and potential job requirements and responsibilities that create a very busy schedule. The demands of this schedule can be quite cumbersome. The ideal situation is that the athlete keeps his/her grades high, as well as performs optimally in their respective sport. The responsibility of the athletic department is to facilitate an environment in

which the students have the resources they need to reach these goals. A nutritionist can be a viable component of this team.

In looking at the results from the survey, we supported our hypothesis that knowledge and intake would not be significantly correlated. There was a positive association, but it was weak and not statistically significant ( $r = .190$ ,  $p = .168$ ). This can be compared with the weak to moderate association ( $r < .44$ ) found in the review by Heaney et al. (2011) as well as the review by (Spronk et al., 2014) on athletes as well as non-athletes ( $r < .5$ ). This illustrates the need, not only for more nutrition education, but also for a system that teaches them how to apply the recommendations and provides them the tools to do so. There is a need to get involved with the day-to-day lives of the athletes in order to educate them on things such as grocery shopping, cooking, making healthy choices at restaurants, etc. Following the recommendations of Wilson (2014), it may be beneficial to put more effort into developing sports nutrition-specific nutrition courses and other services such as cooking classes. Given the high prevalence of misinformation regarding nutrition and healthy eating, it is important that they have reliable resources to turn to in order to dispel the myths and provide dependable information.

Much like habits and knowledge, none of the other correlations between the multiple variables showed any statistical significance. However, some of the relationships were interesting to see. The closest correlation to reaching significance was the negative association between year in college and source of nutrition information ( $r = -.248$ ,  $p = .080$ ). The source of information was set up in the data collection as follows: 0 = outside the athletic department, 1 = inside the athletic department (trainer, coach, and/or nutritionist) or a combination of both. This association means that as the athletes progress through college, they tend to rely more on sources of information from outside the athletic department. This could be potentially risky if they are

unsure where to turn for quality sources of information. This could also be something that could be addressed as part of a comprehensive nutrition program for the athletes. They could be educated on how to find good sources of nutrition information and nutrition-related materials if they choose to augment their knowledge with self-education. This may also support their autonomy, in that they can choose to look up whatever they may have an interest in or about which they have questions.

The combined effect of the four predictor variables was not significant for habits, ( $F(5,41) = 0.957, p > .05$ ) or for knowledge ( $F(5,41) = 1.087, p > .05$ ). All predictor variables failed to predict for the dependent variables of habits as well as knowledge. The respective significance values are listed in Table 3. One interesting finding is the lack of effect of the previous nutrition course. The nutrition course accounted for a larger amount of unique variance for habits ( $\beta = .099, t = .660, p > .05$ ) than for knowledge ( $\beta = .011, t = .075, p > .05$ ). Seven of the 29 participants that said they had taken a previous nutrition course were freshmen

Table 3

Regression Significance (P value) Between All Dependent and Independent Variables

Independent Variable	Dietary Habits	Nutritional Knowledge
Year in College	0.195	0.132
Age	0.266	0.234
Nutrition Course	0.513	0.940
Source of Info	0.132	0.292

*Note:* Significance set at .05

in the 2014-2015 school year and took a sports nutrition-specific course in the summer prior to the fall 2014 semester. The details of the course taken by the other 22 participants are unknown (length of time since course was taken, location of course, etc.). This result is reflected by the

weak correlation values between the previous nutrition course and habits ( $r = .145$ ,  $p = .290$ ), and knowledge ( $r = .064$ ,  $p = .647$ ). This weak, yet positive, association may tell us that much more is needed to influence knowledge and behavior than just one introductory course. Also noteworthy, is that year in college seemed to have a slight, non-statistically significant effect on habits and even more so on knowledge. This is a result that would be hoped for, in that, as the athletes age they attain more beneficial knowledge.

There are multiple variables that could have contributed to the lack of statistical significance in our results. Although there has been nutrition information disseminated by the strength and conditioning staff as well as athletic trainers and other sources, the resources for creating a strong nutrition culture in athletics has been limited. Only in the previous year (2014-2015) has there been a staff member (graduate assistant) with the sole purpose of being the sports nutritionist. The duties of this position were centered on nutrition education, counseling, and also management of the newly developed refueling station for the athletes. Also new to the curriculum is the creation of an athlete-specific basic nutrition course that is offered in the summer. All of these have been positive changes towards promoting healthier athletes, but they are still very new. Some teams were better able to utilize these services than others, given their scheduling differences. Also, the few football athletes within our sample that took the summer nutrition course ( $n = 7$ ) had taken the course almost 8 months prior to participating in the survey. It's hard to measure any effect of the course due to the amount of time that had passed.

These results suggest that there is most certainly room for improvement in the nutrition culture of SIUC athletics, as is likely the case for many colleges across the United States. The realm of sports nutrition and specialized dietitians in this field seems to be a growing force. Many coaches, as well sports management, are realizing that nutrition is vital to health and

performance. It's also becoming popular in the eyes of recruits, as having some nutrition component in their program (dietitian, nutrition graduate assistant, refueling station, training table, etc.) is becoming a sought-after service as they search for a home for their future in athletics. Given the successes of other programs (Baer et al., 1995; K. L. Clark, 1994; Vinci, 1998), as well as the documented need of specialized nutrition in this population (American Dietetic et al., 2009; Collins et al., 2011; Cpsda, 2014; Helms et al., 2014; Phillips, 2014), it would be in our best interest to provide some form of dedicated nutrition support to the athletes. This would help to insure that their health and performance (physical and cognitive) are being fully supported on both sides of the training/ health (nutrition, sleep, psychology, etc.) dichotomy.

There are multiple limitations to the present study. First, given that it is survey-based, there is always the risk of error in self-reporting. Second, this was a convenience sample of available athletes; therefore, the participants consisted of only male football players. It would have been more beneficial to make the survey available to both men and women and to all of sports at SIUC. Lastly, research regarding the influence of dietitians and various nutrition programs is lacking; therefore assumptions regarding the benefits of nutrition professionals are mainly based upon the research supporting enhanced needs of athletes, a few documented programs, and science-based assumptions.



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## APPENDICES

Dietary Habits and Nutritional Knowledge Questionnaire



	4 Always:5-7 days	3 Often:3-4 days	2 Sometimes:1-2 days	1 Does not occur at all
3. How often do you take vitamin supplements?	4	3	2	1
4. How often do you take mineral supplements?	4	3	2	1
5. How often do you eat at least three meals per day?	4	3	2	1
6. How often do you record what you eat?	4	3	2	1
7. How often do you drink water?	4	3	2	1
8. How often do you drink sweetened beverages?	4	3	2	1
9. How often are you on a "diet"?	4	3	2	1
10. How often do you eat breads, cereals, pasta, potatoes, or rice?	4	3	2	1
11. How often do you eat fruits, such as apples, bananas, or oranges?	4	3	2	1
12. How often do you eat vegetables, such as broccoli, tomatoes, carrots, or salad?	4	3	2	1
13. How often do you eat dairy products such as milk, yogurt, or cheese?	4	3	2	1
14. How often do you eat complete sources of protein such as beef, chicken, turkey, eggs, and fish?	4	3	2	1
15. How often do you eat berry jams, cookies, candies, or other sweets?	4	3	2	1
16. How often do you snack on foods like potato chips, cakes, candies, donuts, or soda?	4	3	2	1
17. How often do you snack on foods like bagels, yogurt, popcorn, pretzels, or fruits?	4	3	2	1
18. How often do you eat fast food?	4	3	2	1
19. How often do you seek out nutrition information?	4	3	2	1



Please circle the number for each statement indicating to what extent you agree or disagree with each of the following statements.

4 Strongly agree

3 Agree Somewhat

2 Disagree Somewhat

1 Strongly Disagree

1. Skipping breakfast can negatively affect athletic performance.	4	3	2	1
2. Proteins are the best and most efficient source of energy.	4	3	2	1
3. Nutrition affects mental performance	4	3	2	1
4. A pre-event meal should be eaten 3-4 hours prior to competition.	4	3	2	1
5. Alcohol can hinder nutrient absorption and recovery.	4	3	2	1
6. According to MyPlate, one should consume ~8 servings from the bread, cereal, rice and pasta group.	4	3	2	1
7. According to MyPlate, one should consume ≥2 cups of fruit.	4	3	2	1
8. According to MyPlate, one should consume ≥3 cups of vegetables.	4	3	2	1
9. According to the MyPlate, one should consume 3 servings from the dairy group.	4	3	2	1
10. According to the MyPlate, one should consume 6-7oz from the meat group.	4	3	2	1
11. Eating breakfast can improve concentration.	4	3	2	1
12. 50-70% (~5-7g/kg) of total calories should come from carbohydrates.	4	3	2	1

	4 Strongly Agree	3 Agree Somewhat	2 Disagree Somewhat	1 Strongly Disagree
13. Carbohydrates and protein are more quickly and easily digested without fat.	4	3	2	1
14. Excess vitamin consumption can be toxic.	4	3	2	1
15. Anemia is a deficiency in iron.	4	3	2	1
16. Average percentage of body fat in males is 16-19%	4	3	2	1
17. Cereal, bread, bagels, and pasta are good sources of carbohydrates.	4	3	2	1
18. Tofu, nuts and beans are good sources of plant-based proteins	4	3	2	1
19. Athletes need to consume at least 50% more protein than the general population.	4	3	2	1
20. The best sources of iron come from animal products and fish.	4	3	2	1
21. Eating cereals or breads enriched with iron should be eaten with a source of vitamin C to enhance absorption of iron	4	3	2	1
22. Proteins act to repair and build muscle tissue and make hormones to boost the immune system.	4	3	2	1
23. Fats are essential in all diets.	4	3	2	1
24. If a diet is lacking in carbohydrates, fat and proteins are then used for energy.	4	3	2	1
25. Oatmeal, legumes, and fruits are sources of soluble fiber.	4	3	2	1
26. The recommended amount of fiber is 38 grams per day.	4	3	2	1
27. Vitamin C is also known as ascorbic acid.	4	3	2	1

Scoring Key

## QUESTIONNAIRE SCORING KEY

## SECTION II: Habits

1. How often do you eat breakfast in the morning?	4
2. Based on three meals per day, how often do you skip at least one meal per day?	1
3. How often do you take vitamin supplements?	1
4. How often do you take mineral supplements?	1
5. How often do you eat at least three base meals per day?	4
6. How often do you record what you eat?	4
7. How often do you drink water?	4
8. How often do you drink sweetened beverages?	1
9. How often are you on a "diet"?	1
10. How often do you eat breads, cereals, pasta, potatoes, or rice?	4
11. How often do you eat fruits, such as apples, bananas, or oranges?	4
12. How often do you eat vegetables, such as broccoli, tomatoes, carrots, or salad?	4
13. How often do you eat dairy products such as milk, yogurt, or cheese?	4
14. How often do you eat complete sources of protein such as beef, chicken, turkey, eggs, and fish?	4
15. How often do you eat berry jams, cookies, candies, or other sweets?	1
16. How often do you snack on foods like potato chips, cakes, candies, donuts, or soda?	1
17. How often do you snack on foods like bagels, yogurt, popcorn, pretzels, or fruits?	4
18. How often do you eat fast food?	1
19. How often do you seek out nutrition information?	4

Range of Scores:19-76

## SECTION III: Knowledge

1. Skipping breakfast can negatively affect athletic performance. 4
2. Proteins are the best and most efficient source of energy. 1
3. Nutrition affects mental performance 4
4. A pre-event meal should be eaten 3-4 hours prior to competition. 4
5. Alcohol can hinder nutrient absorption and recovery. 4
6. According to MyPlate, one should consume ~8 servings from the bread, cereal, rice and pasta group. 4
7. According to the Food Guide Pyramid, one should consume  $\geq 2$  cups of fruit. 4
8. According to MyPlate, one should consume  $\geq 3$  cups of vegetables. 4
9. According to the Food Guide Pyramid, one should consume 4 servings from the dairy group. 4
10. According to the Food Guide Pyramid, one should consume 2-3 servings from the meat group. 4
11. Eating breakfast can improve concentration. 4
12. 50-70% of total calories should come from carbohydrates. 4
13. Carbohydrates and protein are more quickly and easily digested without fat. 4
14. Excess vitamin consumption can be toxic. 4
15. Anemia is a deficiency in iron. 4
16. Average percentage of body fat in males is 16-19% 4
17. Cereal, bread, bagels, and pasta are good sources of carbohydrates. 4
18. Tofu, nuts and beans are good sources of plant-based proteins 4
19. Athletes need to consume at least 50% more protein than the general population. 4

20. The best sources of iron come from animal products and fish. 4
21. Eating cereals or breads enriched with iron should be eaten with a source of vitamin C to enhance absorption of iron 4
22. Proteins act to repair and build muscle tissue and make hormones to boost the immune system. 4
23. Fats are essential in all diets. 4
24. If a diet is lacking in carbohydrates, fat and proteins are then used for energy. 4
25. Oatmeal, legumes, and fruits are sources of soluble fiber. 4
26. The recommended amount of fiber is 38 grams per day. 4
27. Vitamin C is also known as ascorbic acid. 4

Range of Scores: 27-108

Classifications:

\*excellent=85-100%

\*good=70-84%

\*fair=55-69%

\*poor=54% or lower

VITA

Graduate School  
Southern Illinois University

Sieger Matthew Giroux

Giroux0518@gmail.com

Southern Illinois University Carbondale  
Bachelor of Science, Human Nutrition & Dietetics, May 2013

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SPORTS NUTRITION PROFESSIONALS

Major Professor: Julie Partridge, PH.D