Nutrition Knowledge, Opinions, and Practices of Coaches and Athletic Trainers at a Division I University

Michelle Smith Rockwell, Sharon M. Nickols-Richardson, and Forrest W. Thye

The purpose of this investigation was to assess nutrition knowledge, opinions, and practices of coaches and trainers at a Division I university. Participants (n = 53) completed questionnaires regarding nutrition knowledge, opinions, and practices. Descriptive statistics and analysis of variance were used to analyze data. Overall, participants responded correctly to 67% of nutrition knowledge questions. Participants who coached/trained female athletes tended to score better than respondents who coached/trained male athletes. Strength and conditioning coaches and participants with greater than 15 years of experience scored higher than other participants. Nutrition opinions/practices responses revealed that nutritional supplements were provided for all but 6% of participants’ athletes. Participants rated body weight as more important than body composition to athletes’ performances. Over 30% of participants perceived at least one case of disordered eating within the past year. Some participants (53%) felt that athletes may consume more nutritious meals on team-sponsored trips if given larger food allowances. Thirty percent of participants reported dietitians were available to them; the same percentage reported utilizing dietitians. Coaches and trainers are knowledgeable about some appropriate nutritional recommendations, but registered dietitians or qualified sports nutrition professionals may complement the nutrition-related education and counseling of athletes (23).

Key Words: sports nutrition, supplements, athletes, college, survey

Appropriate dietary habits play a role in optimal athletic performance (1, 3, 24). College-level athletes, many of whom train at high levels of intensity, perform under rigorous competitive schedules, face a variety of academic and social stresses, and remain in periods of physical development, may be in particular need of good nutritional habits. Diets of some collegiate athletes, however, are inadequate in total energy (13, 17), specific macronutrients (10), micronutrients (11, 20), and fluids (20). As many as 45% of collegiate athletes consume some type of nutritional supplement...
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(21), and the incidence of eating disorders among collegiate athletes has been reported as ranging from 2 to 40% (6, 12, 19). Clearly, reliable sources of nutrition information and appropriate nutrition counseling are needed for collegiate athletes.

In the early 1990s, The Pennsylvania State University became the first athletic department within the National Collegiate Athletic Association (NCAA) to fund and staff a sports nutritionist position (4). Since that time, other university and college athletic departments in the U.S. have hired or consulted with nutrition professionals for dietary counseling and nutrition education of athletes and staff members (23). The practice of utilizing nutrition professionals is not nationally widespread, however, and athletes frequently identify coaches, athletic trainers, physicians, teammates, and popular media as primary sources of nutrition information (14, 18).

There is relatively little published data regarding the type and adequacy of nutrition information provided by collegiate coaches and athletic trainers to student athletes. Of the available literature, a 1979 study reported that although over 50% of many Big Ten Conference coaches planned pre-competition meals and were primary sources of nutrition information for their teams, 78% of these coaches felt that they needed further knowledge to give appropriate advice (25). In a later study, American high school and collegiate athletic trainers were better prepared to provide nutrition advice than coaches, based on performance on a knowledge assessment questionnaire (18). Parr et al. (18) attributed performance differences to a greater number of trainers having completed at least one formal nutrition course. Coaches of junior college and 4-year college teams in North Carolina responded correctly to 70% of a basic nutrition questionnaire, but only 30% rated a high degree of certainty for their responses (5).

Certified athletic trainers are required to complete at least one formal nutrition course (16), whereas coaches in general do not have a standardized minimal requirement. Yet, as athletic departments infrequently staff sports nutritionists and athletes commonly seek nutrition advice from their coaches and trainers, the ability to access and disseminate accurate nutrition information is essential for coaches and trainers. The purpose of this study, therefore, was to examine basic nutrition knowledge and nutrition-related opinions and practices of Division I collegiate coaches and athletic trainers at a university whose athletic department did not staff a full-time registered dietitian.

Methods

Questionnaire Development and Content

A three-section questionnaire was developed based on modifications of previous work by Wolf et al. (25), other published literature (2, 5, 8), and researchers’ experiences in sports nutrition. Section I, the nutrition knowledge section, consisted of nine questions in multiple choice format and 11 questions in true/false format. Each question had one correct response among answer choices. Questions were included from each of the following categories: macronutrients, vitamins and minerals, nutrition supplements, weight control, and other topics such as hydration, amenorrhea, and sources of nutrition information. The nutrition opinions/practices portion, Section II, included 10 multiple-choice questions for which participants could respond with unlimited answer choices, and 8 open-ended questions with ample blank space for writing. Questions sought to obtain data regarding participants’ personal opinions/practices;
there were no correct or incorrect responses. Topics for these questions included: nutrition supplements, body weight and body composition, perceived eating disorders, pre-game and travel meals, and sources of nutrition information. The third portion of the questionnaire requested demographic information about participants and their teams. Participants identified themselves as coaches or trainers within one of four team categories to assure response anonymity. Team categories were established based on the type of training performed in each sport (Table 1). Strength and conditioning coaches and athletic trainers typically worked with multiple teams.

Pilot testing and content validity testing of the questionnaire was conducted with coaches of university recreational sports teams; Human Nutrition, Foods and Exercise (HNFE) faculty; and HNFE students knowledgeable about this topic. Appropriate changes were made to the questionnaire based on pilot responses \( n = 8 \). Twelve individuals completed the revised questionnaire and attained a mean score of 95.6% for the nutrition knowledge section.

### Study Participants

All coaches (head, assistant, and graduate assistant) and athletic trainers (staff and students) from the 21 Division I intercollegiate sports, along with the strength and conditioning coaching staff at Virginia Polytechnic Institute and State University (VPI&SU, Blacksburg, VA) served as potential participants. Names of potential participants were obtained from a database maintained by the university’s athletic department. All procedures were approved by the Institutional Review Board for Human Subjects Testing at VPI&SU.

### Questionnaire Administration

Two-page questionnaires were hand-delivered in March 1999 to potential participants \( n = 96 \) by one of four students trained as research assistants for this project. (Research assistants were varsity athletes majoring in HNFE.) Pre-addressed envelopes were provided for return of completed questionnaires through campus mail. Duplicate questionnaires were delivered to mailboxes of participants who had not returned questionnaires within 2 weeks. Fifty-five questionnaires were completed and returned, for a response rate of 57%. Two questionnaires were omitted, as they were returned with less than 25% of questions completed, for a final sample size of 53.

<table>
<thead>
<tr>
<th>Category</th>
<th>Teams</th>
<th>( n^a )</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Basketball, football, volleyball</td>
<td>21</td>
</tr>
<tr>
<td>II</td>
<td>Cross country, swimming and diving, track and field</td>
<td>19</td>
</tr>
<tr>
<td>III</td>
<td>Lacrosse, soccer, wrestling</td>
<td>13</td>
</tr>
<tr>
<td>IV</td>
<td>Baseball, cheerleading, golf, softball, tennis</td>
<td>14</td>
</tr>
</tbody>
</table>

*Column does not add to \( N = 53 \) as some strength and conditioning coaches and trainers worked with athletes in more than one category.*
A power analysis based on the number of possible answer choices was conducted prior to distribution of the questionnaires to determine what was sufficient power. Return rates of 33% (n = 32 questionnaires) and 38% (n = 37 questionnaires) were required for the nutrition knowledge and opinions/practices sections, respectively, for sufficient power.

**Data Analyses**

Data were analyzed using the Statistical Analysis System (SAS; v. 6.12 for Windows; Cary, NC). Descriptive statistics were tabulated for responses to all questions and for accuracy of nutrition knowledge responses. One-way analysis of variance was used to detect differences in the percentage of knowledge question correct responses based on demographic categories. The Fischer Test was used to analyze differences in responses to individual questions in Sections I and II based on demographic categories. There was insufficient sample size for chi-square analysis to be conducted on all data. Statistical significance was set at the \( p < .05 \) level.

**Results**

Participants included at least one coach, one strength and conditioning staff member, and one athletic trainer from each team. In all, 35 coaches and 18 trainers (strength and conditioning staff members were included with coaches) participated in the study. Approximately 70% of participants were less than 30 years of age. Thirty-two percent had been coaching/training Division I athletes for less than 2 years, 28% had been coaching/training for 3 to 6 years, and 40% had been coaching/training for longer than 6 years. There were 25 male participants and 28 female participants. Approximately 40% worked with male athletes, 30% with female athletes, and 30% with both male and female athletes. The number of subjects within each team category is shown in Table 1.

**Section I: Nutrition Knowledge**

The percentages of correct responses for questions concerning macronutrients, micronutrients, weight control, nutrition supplements, and other topics are shown in Table 2. Table 3 summarizes questions to which greater than 70% or fewer than 40% of participants answered correctly. As a group, participants responded correctly to 67% of nutrition knowledge questions. The percentage of correct responses was similar between coaches and trainers (67% vs. 66%, respectively). Similar percentages of correct responses (71% vs. 62% vs. 70%) were given by head coaches (\( n = 8 \)), assistant coaches (\( n = 11 \)), and graduate assistant coaches (\( n = 6 \)), respectively. Strength and conditioning coaches (\( n = 10 \)), however, gave significantly (\( p < .05 \)) more correct responses (80%) compared to team coaches (\( n = 25, 62\% \)) and athletic trainers (\( n = 18, 66\% \)).

There were no statistically significant differences in the percentage of correct responses among the four different sport categories. However, there was a tendency (\( p = .06 \)) among participants who coached or trained female athletes (\( n = 16 \)) or both male and female athletes (\( n = 11 \)) to give more correct responses (74% vs. 68%, respectively) compared to participants who worked with only male athletes (\( n = 10, 62\% \)). Participants who had 15 or more years of experience (\( n = 6 \)) gave significantly
Table 2  Correct Responses to Topics in Section I

<table>
<thead>
<tr>
<th>Topic</th>
<th>Overall correct responses (%)</th>
<th>Coaches’ correct responses (%)</th>
<th>Trainers’ correct responses (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((n = 53))</td>
<td>((n = 35))</td>
<td>((n = 18))</td>
</tr>
<tr>
<td>Macronutrients</td>
<td>52</td>
<td>51</td>
<td>55</td>
</tr>
<tr>
<td>Micronutrients</td>
<td>54</td>
<td>53</td>
<td>57</td>
</tr>
<tr>
<td>Weight control</td>
<td>71</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Nutrition supplements</td>
<td>89</td>
<td>90</td>
<td>87</td>
</tr>
<tr>
<td>Other topics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(fluids, amenorrhea, sources of nutrition information)</td>
<td>92</td>
<td>92</td>
<td>92</td>
</tr>
</tbody>
</table>

Table 3  Section I Questions to Which the Most and Fewest Participants Responded Correctly

At least 70% of participants correctly answered that . . .

- meat iron is typically more available than iron in other foods.
- eating excess carbohydrate, fat, or protein can result in weight gain.
- fluids should be available to athletes before, during, and after activity.
- thirst is not necessarily the best indicator of fluid needs.
- loss of a woman’s menstrual cycle (amenorrhea) should be a concern for competitive athletes.
- the long term safety of creatine supplementation has not been scientifically proven.
- creatine supplementation is most likely to benefit athletes who perform repeated bursts of intense activity.

Fewer than 40% of participants correctly answered that . . .

- milk is the poorest source of iron (from a list of several foods).
- most healthy individuals in this geographic region can meet their Vitamin D requirements through sun exposure.
- a protein recommendation for a 180-lb. (82-kg) athlete would likely be between 80 and 160 g/day.
- the approximate amount of energy expended by a 150-lb. (68-kg) athlete during 1 hour of running at 8:00 mile pace is 900 kcals.
(p < .01) more correct responses (76%) compared to coaches with fewer years of experience (n = 47, 66%). There were no statistically significant differences in correct responses based on participants’ age or gender.

Section II: Nutrition Opinions/Practices

From a list of supplements, participants were directed to identify types of supplements that they recommended to their athletes as well as supplements provided for their athletes by the athletic department (Table 4). Additionally, almost every participant (94%) reported that water and sports drinks were provided for their athletes during practices and competitions.

Participants rated body weight as very important (39%), moderately important (37%), or slightly important (22%) to performance of their sport(s). Body weight was rated as unimportant to performance by only 2% of participants. Body composition, on the other hand, was rated as moderately important (43%) to their athletes’ performances, with few participants rating body composition as very important (6%) or unimportant (8%). In order to monitor body weight and body composition among athletes, half of participants indicated that they weighed their athletes less than once per week, 11% weighed athletes greater than once per week, and 10% had body fat measurements taken. To promote changes in body weight and body composition, 48% of participants recommended some alteration in exercise or dietary intake, with 15% responding that they instructed athletes to “go on a diet.” Some participants noted that another athletic department member, such as a physician, coach, or athletic trainer, was responsible for monitoring (21%) or promoting (33%) changes in body weight and body composition. Of these participants, 82% of team coaches identified athletic trainers as responsible for body weight and body composition monitoring and changes, while 68% of athletic trainers noted that coaches were responsible for these activities. A small group of participants indicated that they did nothing to monitor (8%) or promote (19%) changes in body weight and body composition.

When asked how many perceived eating disorders they had encountered during the last year, 64% of participants indicated none, 26% reported one or two, and 10% reported more than three. Over 50% of participants intervened in perceived eating disorder cases. Of this subgroup of participants, half referred athletes to a physician, while 12% referred athletes to another coach or athletic trainer; only 4% referred

<table>
<thead>
<tr>
<th>Supplement category</th>
<th>Recommended</th>
<th>Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamins/minerals</td>
<td>40%</td>
<td>8%</td>
</tr>
<tr>
<td>Protein</td>
<td>34%</td>
<td>34%</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>60%</td>
<td>58%</td>
</tr>
<tr>
<td>Creatine monohydrate</td>
<td>26%</td>
<td>28%</td>
</tr>
<tr>
<td>Sports bars</td>
<td>27%</td>
<td>15%</td>
</tr>
<tr>
<td>None</td>
<td>21%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 4 Percentage of Participants Recommending and Providing Supplements
to a nutrition professional. Over 30% indicated that they handled perceived eating disorder cases themselves. (Cases of eating disorders reported here represent those cases perceived by the respondents and not necessarily diagnosed cases or cases meeting established criteria.)

Figure 1 shows money allotted for athletes’ meals and types of food services used during team-sponsored travel. Fifty-three percent of participants reported that athletes could eat more nutritious meals if given more money for food, but only 27% of participants responded that they thought athletes would actually do so. Participants reported that athletes’ last meals before competition consisted predominantly of carbohydrate (53%), carbohydrate and protein (33%), protein (2%), or whatever athletes selected (12%).

Sources of nutrition information available to participants and utilized by participants are shown in Figure 2. “Dietitians” was the only category in which reported availability equaled utilization by participants, and “others” was the only category in which utilization exceeded availability.

**Discussion**

A disparity between scientific sports nutrition knowledge and nutritional practices employed by collegiate athletes may exist. One explanation for differences between

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**Figure 1** — Travel meals for athletes: (a) daily monetary allotment; (b) types of food service used.
knowledge and practices may involve the source of nutrition information available to these athletes. This study assessed the nutrition-related knowledge, opinions, and practices of coaches and athletic trainers at VPI&SU in Blacksburg, VA. Although only one university was included, this sample was likely representative of coaches and trainers at other Division I universities with similar teams and demographic representations. The 57% response rate was higher than rates reported in similar studies by other investigators (5, 8, 22). It should be noted that individuals who responded to questionnaires might have been those coaches and trainers who were most interested, knowledgeable, and/or conscientious about nutrition and thus not representative of the entire body of coaches and athletic trainers.

These participants were most knowledgeable about topics such as fluid needs, menstrual function, weight control, and creatine supplementation. The overall score was similar to scores on nutrition knowledge assessments among college-level coaches reported by Corley et al. (5). Athletic trainers, although depended on by athletes for nutrition information, have not typically been included in this type of assessment. Specific areas in which participants in the present study could gain more knowledge included micronutrients and calculation of nutrient needs.

Nutrition supplements were provided for these athletes, with only 6% of participants reporting that their athletes were not provided with supplements. The popularity of creatine supplementation has been widespread among recreational athletes as well as trained athletes. A study of almost 800 varsity athletes at the University of North Carolina (Chapel Hill, NC) reported a 28% overall creatine usage rate, with 48% of male athletes and 4% of female athletes reporting current creatine use (14). The present study indicated that supplementation was advocated and supported by approximately one quarter of this university’s coaches and trainers. In concordance with this supplementation, participants were knowledgeable about the types of athletes who may benefit from creatine supplementation and about research related to creatine. Despite adequate knowledge regarding specific supplements, participants were least knowledgeable about micronutrients even though 40% of participants recommended vitamin and mineral supplementation to their athletes. Because the
athletic community is presented with an abundant variety and supply of nutrition supplements, but typically a wealth of misinformation, it is necessary that reliable sources of information about supplements be available to coaches, athletic trainers, and athletes. If coaches and trainers make recommendations and/or provide supplements to athletes, it is essential that they be well informed about each supplement’s purpose, efficacy, and safety, particularly vitamin, mineral, and other supplements, which can inadvertently be overused.

Many participants indicated that they considered body weight more important to an athlete’s performance than body composition. Nutrition professionals recommend less emphasis on athletes’ body weight and more emphasis on their proportions of body fat and muscle. Additionally, some professionals do not emphasize body weight or body composition at all; rather, these practitioners encourage optimal performance given the current body dimensions. Few participants reported having body composition measurements taken, but half reported taking body weight measurements (less than once per week). Most of the 11% of participants who reported that they weighed their athletes once per week were in team category III, which included wrestling. Due to weight class restrictions, it is common for wrestlers to frequently weigh themselves. However, it is important that monitoring of body weight and body composition is not used to an athlete’s detriment. For example, the monitoring of body weight has been associated with an initiation of disordered eating behaviors in some athletes (9). Furthermore, if coaches and trainers recommend changes in athletes’ body weight and/or composition, it is critical that credentialled support personnel are available to assist athletes in making such changes. Some participants in the present study recommend that athletes “go on a diet,” with many coaches identifying athletic trainers as responsible for monitoring of body weight and body composition, and many trainers identifying coaches as responsible. A clear delineation of responsibilities for nutrition-related recommendations is vital. Involving registered dietitians or other qualified sports nutrition professionals in weight loss/weight gain referral systems will help to assure that athletes are appropriately counseled and monitored.

Perceived eating disorders were present among a small proportion of athletes at this university. Approximately 35% of participants reported at least one perceived eating disorder case per year, while 10% reported more than three cases per year. Because many of these coaches and trainers worked with more than one team, some of these cases overlapped. Many participants referred athletes with eating disorder symptoms to physicians, but almost one third of participants dealt with these cases themselves. Overall, nutrition professionals and psychologists were underutilized. A clear line of available support for coaches and trainers who detect disordered eating among their athletes is critical to the multidisciplinary treatment of eating disorders.

Participants commonly reported that athletes consumed high carbohydrate meals prior to competition. The majority of participants indicated that their teams frequented sit-down type restaurants and buffets on training and competition trips, but 15% of participants said that fast food restaurants were selected for meals during team-sponsored trips. As fast food restaurants typically have small selections of high carbohydrate/low fat foods, alternative choices should be encouraged. Some participants indicated that they felt that athletes were limited by the amount of meal money provided. Most athletes were reportedly provided $16–25 per day for meals, but some were provided with less than $15 per day. Many participants, however, reported that their athletes would not necessarily have made more healthy meal choices
if they were given more money. Perhaps the best approach for handling meal choices and budgeting is to directly educate athletes. The value of training and competition diets and selection of good food choices on a limited budget could be included in educational sessions presented by nutrition professionals. Another alternative is the preplanning of travel meals, a practice utilized by some athletic departments. It may be possible for team nutritionists or coaches and trainers to collaborate with restaurants or hotel caterers prior to trips for appropriate food choices for team athletes. In some cases, providing more money may be advisable, but in general, coaches, trainers, and athletes should be wise regarding food choices during athletic training.

Given the many responsibilities designated to coaches and trainers, it is understandable that attention to nutrition issues and planning is secondary. However, if athletes are not provided with ample nutrition resources, they will likely continue to depend on their coaches and trainers for information and guidance. If this is the case, it is essential that coaches and trainers have easily accessible information from reputable sources. Perhaps additional nutrition education requirements are warranted for coaches and trainers. Participants in the present study indicated an interest in nutrition based on their use of some of the sources of nutrition information provided to them. Sources they reported using included (in order from greatest usage to least usage) magazines, “others,” physicians, books, scientific journals, dietitians, and videos. All sources except dietitians and “others” were reportedly available to a greater degree than they were used. Approximately 40% of participants reported using “other” sources, but only about 20% reported an availability of “other” sources. Such a discrepancy may indicate that available sources of nutrition information are not sufficient, resulting in coaches and trainers actively seeking information from different sources. Other sources commonly reported included the internet, television, and food/supplement labels. At the very least, coaches and trainers should be provided with proper guidance regarding reliable sources of nutrition information. Interestingly, dietitians were the only category for which use equaled availability. In other words, 30% of participants responded that dietitians were available to them, and 30% of participants reported using dietitians. This suggests that coaches and trainers with knowledge of and access to dietitian services fully utilize such expertise.

Responsibilities that appear suitable for registered dietitians or qualified sports nutrition professionals staffed by athletic departments include: individual athlete counseling regarding meal planning, nutrient needs, and eating behaviors/concerns; weight loss/gain; diet and body composition analysis; staff and athlete education about nutrition supplements and other nutrition-related topics; coach and trainer assistance with meal planning for training, composition, and on-campus meals; and support systems referral and collaboration. Registered Dietitians staffed by The Pennsylvania State University (4) and the University of Washington (23) have successfully provided some of these activities. If these responsibilities were managed by a dietitian or nutrition professional, coaches and athletic trainers would be relieved of extraneous responsibilities; thus, coaches and trainers could spend more time focusing on tasks directly related to training and performance. Additionally, provision of continuing education classes for coaches and trainers regarding nutrition may open avenues for dietitians.

In the event that it is not possible for an athletic department to staff a dietitian or nutrition professional, a dietitian may be consulted in order to train coaches, trainers, and other staff members. It may be advisable to select a certain individual or group of individuals within the athletic department to be responsible for nutrition
issues and resources. For example, in the present study, strength and conditioning coaches were more knowledgeable about basic nutrition topics than other participants. Providing coaches with additional training, resources, and support from qualified nutrition professionals may be a way of providing nutrition services without hiring additional staff members. Further, an active collaboration between a university’s athletic staff/athletes and the Nutrition and/or Exercise academic departments could be a low cost alternative.

References


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