Journal of Physical Fitness, Medicine & Treatment in Sports

Juniper Publishers key to the Researchers

Research article
Volume 1 Issue 5 - February 2018
DOI: 10.19080/JPFMTS.2018.01.555571

J Phy Fit Treatment & Sports

Beyond Scope of Practice: Inferring High School Tennis Coaches' Behavior from their Nutrition and Eating Disorder Knowledge

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Submission: January 23, 2018; **Published:** February 01, 2018

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Abstract

The primary purpose of this study was to assess high school tennis coaches' knowledge of macronutrients and disordered eating (e.g., etiology). Other purposes included identifying confidence in knowledge and any differences between the participating coaches' knowledge and demographic variables. To address these purposes, the 27-question Nutrition and Eating Disorders in Tennis ("NET") Survey was created. The study design involved a one-time voluntary assessment of the Indiana coaches' demographic variables, knowledge, sources of knowledge, and level of confidence (e.g., Not At All or Very Confident). Overall, the results revealed that the coaches lacked knowledge. The average score was 70.6%, which was below the criterion for adequate knowledge. Furthermore, the coaches lacked adequate knowledge in three of the five knowledge domains: Treatment and Prevention of Disordered Eating (63.6% ± 22.9%), Disordered Eating Signs and Symptoms (60.0% ± 21.7%), and Macronutrients (57.0% ± 22.4%). There were no significant differences between coaches' education level, gender, or type and knowledge. However, there was in experience; the more years coached, the lower the scores. Finally, there was a trend of overconfidence in answers.

Keywords: Nutrition Knowledge; Eating Disorder; Scope of Practice; High School Coach

Abbreviations: NET: Nutrition and Eating Disorders in Tennis; DWCB: Disordered Weight Control Behaviors; ED: Eating Disorder; IHSAA: Indiana High School Athletic Association; SD: Standard Deviations; RD: Registered Dietitian

Introduction

Sport's coaches' lack of nutrition knowledge is well documented [1-8]. The type of reported lacking nutrition knowledge varies from basic (e.g., nutrient sources) to complex (e.g., etiology of eating disorders) and general health to specific diseases [4-9]. Moreover, the literature reports that higher level coaches (e.g., college) do not exhibit superior knowledge compared to coaches of lower level athletes (e.g., high school) nor does any specific sport coach (e.g., football, tennis, or soccer) demonstrate higher knowledge [10-12].

However, few investigations have explored coaches' nutrition knowledge-related behavior such as what and how frequently they recommend weight loss [5,7-9]. The practice of disseminating inaccurate nutrition and weight loss counsel by both high school and college coaches has been reported [1-3,5-8].

Besides going beyond his/her scope of practice, this is problematic since the coach can be highly influential in an athlete's development of Disordered Weight Control Behaviors (DWCB), an umbrella term for any harmful behavior with objective of weight maintenance and/or weight loss. DWCB are hallmarks of eating disorder (ED) etiology [10-16]. Adolescence is recognized as the period when DWCB is most likely to originate since the biggest predictor of DWCB, negative body image, is most impressionable (e.g., puberty changes) [17-19].

Statement of Purpose

The purpose of this study was to identify any relationship between Indiana high school tennis coaches' behavior and knowledge of the following domains:

1) Macronutrients and Energy,
2) Etiology of ED,
3) Identifying Signs and Symptoms of ED,
4) Tennis Coaches' Scope of Practice, and
5) Treatment and Prevention of ED.

Methods

Participants

All Indiana varsity and junior varsity high school tennis coaches (head and assistant) from 2014-2016 was this study's

population. The 2014-2015 Indiana High School Athletic Association (IHSAA) School Directory served as the resource for all coaches' names and emails of all those schools who had at least one tennis program (boys', girls', or both) and athletic department personnel (e.g., Athletic Directors) contact information. This information was verified through respective school website and/or athletic director, which totaled 338. Participants were any coach from this pool who completed the entire Qualtrics administered survey and informed consent during the regular season (i.e., before Sectionals). Each participant acknowledged that participation was 100% voluntary and he/she may stop at any time. The study was approved by the Indiana University Institutional Review Board.

Instrument

The Nutrition & Eating Disorders in Tennis (NET) Survey collected three types of data: (a) coaches' demographics, (b) nutrition and eating disorder knowledge, and (c) open-ended responses to hypothetical scenarios in order to get insight into coach's behavior (e.g., what would you do or suggest?). Data sets (b) and (c) were correlated to ultimately address the purpose statement. The NET Survey was constructed since no instrument specific to all of the research purpose topics (e.g., knowledge of energy, scope of practice, ED) existed. An instrument designed by Zemke [8] for similar purposes among wrestling coaches entitled Wrestlers, Coaches and Parents Eating Disorders and Sport Nutrition Knowledge Questionnaire provided a template for the NET survey. The questions taken from Zemke's questionnaire originally appeared in Turk et al. [9] instrument entitled Five Domains of Eating Disorders: A Survey for Collegiate Coaches [8,9]. Permission was also granted to use, in whole or part, the instrument employed by Turk et al. [9]. Thus, the second part (b) of NET Survey is a combination of original (16) and borrowed (9) multiple choice and Yes/No Questions. Collectively, these 25 questions were equally divided into 5 sections based on the distinct domains they were designed to assess (i.e., 1. Macronutrients and Energy, etc., presented in purpose).

Part (c), consists of two scenarios structured around four concepts each; energy consumption, carbohydrate intake, and scope of practice while protein intake and scope of practice are unique to the first and second, respectively. Thus, there were eight possible answers between the two questions. The coaches' open-ended responses were analyzed to produce two sets of scores: (1) percent of concepts correctly addressed and (2) responses organized into themes by frequency. For the latter, any type of statement/sentiment that emerged in at least 10%, 25%, or 50% of responses was labeled a Common, Major, or Prevailing Theme, respectively.

Similar to methods of Torres-McGehee et al. [7], the new questions (16) were reviewed by a panel of nine experts (e.g., Registered Dietitian, child development and psychology) for construct and face validity and underwent a pilot study. Finally, the target readability level was between 7th and 9th grade, which mirrors past research and recommendations. The widely accepted Flesch-Kincaid Grade Level test was used as the official determinant of reading level.

Data Analysis

Both Microsoft Excel and SPSS for Windows (23.0 Edition; SPSS Inc., Chicago, Il., USA) were used to analyze the Qualtrics provided data. Means, standard deviations (S.D.), and modes were calculated for data set (a) demographic variables and (b) knowledge test scores. Along with the same for data set (c) Scenario responses, a Spearman's correlation was also performed to unearth any relationship between (b) and (c). Similar to criteria (75%) employed by previous authors such as Torres-McGehee et al. [7], 80% was deemed the threshold for adequate knowledge in data set (b). The α level was set at .05 for all analyses.

Results

Data Set (a): Demographics

The emailed NET Survey received 7.7 Flesch-Kincaid Grade Level score, which represents a seventh grade reading level. According to Israel's [20] statistical precision table, 78 to 187 completed surveys were needed to achieve significant statistical power of 90% to 95%, respectively, for a population of 350. As previously noted, the population size was 338; thus, the 79 completed surveys met the criterion for 90% statistical power (i.e., 10% precision level). Most of the 79 were male (77.2%, n=61) and serve as head coaches (86.1%, n=68). The mean age was 43.97 years (+/- 11.97). A majority (n=63, 79.7%) conveyed a competitive background that the coaches may correctly or incorrectly draw upon for knowledge of nutrition and/or ED. This notion is supported as a preponderance of coaches (n=38, 48.1%) cited their Experience as an Athlete as the number one source of nutrition knowledge. In contrast, only one coach (1.3%) cited a Registered Dietitian (RD) as his/her primary source of such knowledge. Of the 82.3% (n=65) who earned a college degree, none cited nutrition as major; Education (n=15, 25.0%) was the most frequently reported. None of the coaches have reported being an RD.

Data Set (b): Nutrition Knowledge

One of the originally planned 25 questions was inadvertently repeated, which left out another. The mean score for all completed surveys (n = 79) was 17.01 out of 24 or a 70.9% ± 10.9% (Range = 46% – 92%). So, per the established criteria (i.e., 80%) for "adequate knowledge," the data conveys that, overall, the responding Indiana high school tennis coaches lack the assessed nutrition knowledge. They also demonstrated inadequate knowledge in three of five domains: in descending order, 5. Treatment and Prevention (63.6% ± 22.9%), 3. Signs and Symptoms (60.0% ± 21.7%), and 1. Macronutrients and Energy (57.0% ± 22.4%). This mirrors previous findings of Torres-McGehee et al. [7], where college coaches also had the lowest mean score on macronutrient domain (62.6% ± 22.3%). Further,

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the mean of ED domain scores (i.e., 2. Etiology, 3. Symptoms and 5. Treatment) was 68.8% (± 14.2%), which represents the participants' overall knowledge of ED.

Data Set (c): Open-Ended Responses

Data set (c) consists of (1) percent of concepts correctly addressed and (2) responses organized into themes by frequency. No significant relationship was found between data set (b) or (c). Yet, there was a dearth of information gleaned. (1) A participant's possible score was 0%, 12.5%, 25.0%, 37.5%, 50.0%, 62.5%, 75.0%, 87.5%, or 100% (i.e., 0 of 8 to 8 of 8). The mean combined score of Scenario 1 and 2 (hereafter referred to as behavior score) was 24.8% (± 11.8%). The highest score was 50.0 % (i.e., 4 of 8 correctly addressed), which was achieved by only 4 (5%) of the participants. Moreover, no coach addressed at least 75% of the concepts correctly and only 19 (24%) correctly addressed at least 37.5% (3 of 8) of the possibilities Tables 1 & 2 summarize the data gleaned from Scenarios 1 and 2, respectively.

Table 1: Scenario 1 Theme Summary: Ranked Frequencies and Types.

Theme	*Response Frequency	**Theme Percentage	***Theme Type
1. Response revealed incorrect or no knowledge of energy and macronutrients.	39	55.7%	Prevailing
2. The player needs to consume more calories.	30	42.9%	Major
3. Coach's recommendations based on misinformation.	20	28.6%	Major
4. I lack knowledge.	19	27.1%	Major
5. Response reflects he/she understands appropriate scope of practice.	18	25.7%	Major
6. Response reflects an inappropriate scope of practice.	11	15.7%	Common
7a. Response of incorrect recommendation(s) of macronutrient intake.	10	14.3%	Common
7b. Recognizes registered dietitian as appropriate nutrition expert.	10	14.3%	Common
8. Recognizes professional(s) other than registered dietitian as nutrition expert.	8	11.4%	Common

*Response frequency refers to the number of responses that linked to the respective theme.

**Theme Percentage refers to the number of responses that linked to the respective theme divided by the total n (70) of responses.

***Achieved theme percentage of 10%-24.99% (Common), 25%-49.99% (Major), or 50% or greater (Prevailing).

Table 2: Scenario 2 Theme Summary: Ranked Frequencies and Types.

Theme	*Response Frequency	**Theme Percentage	***Theme Type
1. Response revealed incorrect or no knowledge of macronutrient and energy deficiency.	42	60.0%	Prevailing
2. Response supports referral to a dietitian for nutrition counsel.	38	54.3%	Prevailing
3. Coach's recommendations based on misinformation.	18	25.7%	Major
4. Recognizes registered dietitian as appropriate nutrition expert.	13	18.6%	Common
5a. Recognizes professional(s) other than registered dietitian as nutrition expert.	12	17.1%	Common
5b. The player needs to consume more calories.	12	17.1%	Common
6. Disordered eating behaviors or attitudes are a potential issue.	10	14.3%	Common
7. Response reflects an inappropriate scope of practice.	9	12.9%	Common

*Response frequency refers to the number of responses that linked to the respective theme.

**Theme Percentage refers to the number of responses that linked to the respective theme divided by the total n (70) of responses.

***Achieved theme percentage of 10%-24.99% (Common), 25%-49.99% (Major), or 50% or greater (Prevailing).

(2) Prevailing (50%), Major (25%), and Common (10%) themes emerged. While in different frequencies, several of the same themes were seen in each. For Scenario 1, 12 different categories of responses yielded 9 themes: 4 Common Themes, 4 Major Themes, and 1 Prevailing Theme. The most prevalent response (in 55.7% of responses) was the coaches' lack of or incorrect response regarding appropriate macronutrient intake. Analysis of Scenario 2 responses also produced 12 different categories of responses and unearthed 8 themes compared to Scenario 1 with 9. There were 5 Common Themes, 1 Major Theme, and 2 Prevailing Themes. The most prevalent response (in 60% of responses) involved appropriately addressing the severe calorie deficiency. Only 18.6% of responses conveyed recognition of an RD as an expert in nutrition.

Discussion

The themes provided insight into predicted behavior of these surveyed coaches. In regard to both scenarios, almost as many coaches conveyed that RDs are experts in nutrition as those (17.1%) who saw non-qualified individuals as more qualified

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than an RD. Athletic trainers, parents, and the coaches themselves were among this non-qualified group. It is alarming that an RD's expertise was not seen as the expert, especially weight loss physiology. And, in each case where the coach conveyed he/she possessed the same qualifications as an RD, the response contained wrong information. Such coaches are theorized to (a) refer athletes to an RD and (b) unwittingly provide inaccurate information and/or go beyond his/her scope of practice. The latter is the most concerning behavior: recommending and assisting in weight loss are beyond their scope of practice, which are highly touted precursors to DWCB [21-25].

Scope of Practice

It is just as important for coaches to know what they are not qualified to do either through training, credentialing and/or education, as it is for what they can do [4,5,6]. Due to previously presented connection to DWCB, numerous authors regard weight loss recommendations and/or similar practices by coaches (e.g., recommend caloric restriction or body composition assessments) as the most serious violation of scope of practice [26-28]. Reel [6] assert that "Decisions on who is 'overweight' or who needs to gain weight should be made with (by) trained professionals such as registered dietitians." Yet, the common practice of coach recommended weight loss ultimately demonstrates coaches are not knowledgeable about their scope of practice [4,5,6,8,26]. However, it would be irresponsible to not acknowledge Lynn Thornton's [29] words of caution:

> Parents, teachers, coaches, fitness instructors and health educators do not cause, cannot control, and cannot cure eating disorders. But they can contribute either negatively by allowing life threatening maladaptive behavior to continue or positively by detecting and referring eating disordered individuals to qualified health professionals.

Coaches' Roles

While passing on knowledge remains an enduring role of the sports coaching, authors implore the type of information remain within scope of practice as determined by credentials and education [2,4,5,8,21,22]. Recall, none of the participants had such qualifications to recommend weight loss or caloric restriction (i.e., RD); inferences drawn on responses suggest that not only would they participate in behaviors in the future, but they already do currently. Instead, coaches should appropriately model consuming diets high in carbohydrate and appropriate caloric intake to avoid energy deficiency [4-6,8,21,26]. Frequently misunderstood information involves caloric intake; many erroneously believe calories are to be avoided and a healthy practice is limiting kcals [5,10,29]. This is a hallmark of DWCB thinking, which typically precipitates their emergence [5,10,11,30]. Manore [30] Few understand a fundamental sports nutrition maxim: "Food should be thought of as the fuel for sport, not as something to be afraid of or avoided" [30].

Most importantly, high school coaches should model the positive view that any body type can be successful in sports and are beautiful [31]. Morrison, 2005, affirms "A coach can also serve as a positive role model for adolescent female athletes" [31]. As a highly influential member of an athlete's peer group, a coach is a model of behaviors and attitudes, positive or negative [5,6,8,21,28]. Thus, if a coach has inappropriate, misguided views of weight management, then there is a great risk of the athlete perpetuating them [5,6,8,21,28]. Perpetuating the incorrect behaviors and information is especially likely for individuals (e.g., female athletes) who feel modeling such actions and views are positively linked to their athletic success (i.e., maintaining coach's approval for playing time or scholarship) [4,5,28,29]. This is behavior is highly probable as a coach's influence can be as powerful as that of an athlete's parent(s) [4,5,28,29].

> Very often in college athletics the coaches play the role of "in loco parentis", that is they substitute the roles of parent and teacher for student athletes. In this role of authority a coach generally has a great deal of influence on the athletes and increasing their knowledge of eating disorders seems to be a logical step in prevention of eating disorders. Coaches are in a position to play a primary role in the prevention and management of clinical or non-clinical eating disorders [4].

Despite being beyond their scope of practice and expertise, the literature consistently reports that coaches are typically an athlete's first resource for nutrition information [2,6,7,12]. The information, whether correct or not, is likely to be heeded as coaches are highly influential figures in their respective athletes' actions and beliefs, especially among adolescents [2,3,6,12,28]. Moreover, adolescents don't have the education to recognize incorrect weight loss and/or dietary intake recommendations [3,7,8,10-12].

Conclusion

The surveyed Indiana high school tennis coaches scored below the minimum criterion for "Adequate Knowledge." Specifically, they demonstrated highly deficient knowledge of macronutrient functions, daily macronutrient needs, and the impact of their behaviors and roles in the etiology of ED. They indicated that their sources of nutrition information were replete with misinformation. Based on available literature, we recommend that athletic departments provide a position statement for respective coaches outlining scope of practice, especially in the area of weight loss. This would require additional insight into scant research on coaches' behavior, which this study added to in the nutrition area.

Research Recommendations

We've coined the phrase *Erroneous* Food Intake (EFI) for the phenomenon whereby athletes consume food based on well-intended, but incorrect recommendations from a confident individual. Thus, our primary research recommendation involves

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exploring strategies to stop EFI. In an ideal world, the first goal would be to prevent EFI. However, since there is no universal requirement to be labeled a nutritionist, there will always be someone providing incorrect information. This can exist in a variety of forms ranging from an online blog to an athletic department offering "nutrition education" led by an unqualified coach. So, one area of research could involve identifying populations where EFI is most prevalent. For example, does one sport type (LES, team, and individual) or level (high school or college) exhibit a greater frequency or degree of EFI?

Another research recommendation entails interviews with coaches and subsequent qualitative analysis about their specific nutrition/education behavior. Recall that behavior refers to what he/she actually teaches and/or recommends to athletes about dietary intake. While confident in the methods used in this study, the behaviors were inferred from indirect responses to scenarios. More detailed insight derived from more pointed questions as to what coaches would specifically say and why they feel qualified to say so is greatly needed. Finally, while there were a large percentage of coaches who responded correctly to knowledge questions in Part 2 domains involving Scope of Practice and Etiology, the responses to scenarios indicated there is still some insufficient knowledge. A more comprehensive list of (a) what coaches feel they can and do perform along with (b) different types of triggers needs to be assessed. In other words, more questions than five per domain would provide more detail.

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