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Nutrition Knowledge Assessment of NCAA Division I Big Sky Conference Female Volleyball Players

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Acknowledgments
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Background: A small body of evidence exists for the quality of nutrition knowledge possessed by NCAA Division I female volleyball players and the efficacy of nutrition education received.

Objectives: To assess the quality of nutrition knowledge given to and retained by Big Sky Conference female volleyball players; to determine the sources and frequency of nutrition education received by Big Sky Conference female volleyball players

Setting: Participants completed an online survey.

Participants: NCAA Division I Big Sky Conference female volleyball players (n=22) and volleyball coaches (n=7).

Introduction

Proper nutrition promotes optimal performance of elite athletes [1]. The nutrition knowledge of NCAA Division I athletes, however, is less than adequate [2,3]. Athletes are bombarded by nutrition information from on–line sources, magazines, coaches, peers and parents [4]. Athletes possessing accurate nutrition knowledge are more able to identify the incorrect information in these sources. Athletic trainers, strength/ conditioning coaches and registered dietitians are some of the credible sources of nutrition information for college athletes. Of these three sources, a registered dietitian with a sports nutrition background can offer the most accurate educational information [5]. Athletic trainers' nutrition knowledge is inconsistent, and some trainers are overconfident in giving incorrect answers to athletes [3]. Female athletes' top two sources of nutrition information are nutritionists (undefined) and college courses [2]. Availability of a registered dietitian trained in sports nutrition is the optimal way to increase female athletes' nutrition understanding.

Female athletes in particular, lack working dietary knowledge and benefit from nutrition education [5-7]. Few studies have been performed to specifically

address the nutrition knowledge and intake of collegiate level female volleyball players. In a study performed by Valliant, eleven NCAA Division I female volleyball players' nutrition intake and knowledge were evaluated before and after a dietary intervention by a registered dietitian [5]. The participants showed a significant improvement in total caloric and macronutrient intake as well as sports nutrition knowledge. Dietary interventions and nutrition education can increase female athletes' low intake of carbohydrates, an important factor in maintaining glycogen stores [5, 8].

A study by Rosenbloom found that athletes have misconceptions of basic nutrition facts [6]. Fifty–three percent of female collegiate athletes believe that vitamin/mineral supplements increase energy, 43% believe protein is the main source of energy for muscles and 21% agreed with the statement that sport drinks are better than water. Other researchers found that nutrition education was lacking in meal timing, meal composition, carbohydrate intake, glycogen storage, total caloric intake, protein function and hydration status for the college athlete [2, 5].

In this pilot study, nutrition knowledge of female Big Sky Conference volleyball players was collected and evaluated. The survey touched on the players' understanding of meal timing and composition, hydration, and vitamin/mineral and protein function. Big Sky Conference coaches submitted information regarding frequency of nutrition education given to their teams, the professional credentials of the nutrition educators and a ranking of the importance they believe nutrition is to player performance. I believe better quality nutrition information and increased frequency of nutrition education will positively impact female volleyball players' athletic performance.

Methods

Surveys were created and distributed them using surverymonkey.com. A ten-question form (**Figure 1**) for collegiate female volleyball players and a five-question form for volleyball coaches (**Figure 2**) were sent to all eleven Big Sky Conference institutions (Eastern Washington, Idaho State, Montana, Montana State, North Dakota, Northern Arizona, Northern Colorado, Portland State, Sacramento State, Southern Utah and Weber State). The player survey consisted of demographic and nutrition questions pertaining to meal timing/composition, hydration and vitamin/mineral/protein function. The coach survey included demographic questions, and source/frequency of nutrition information given to athletes. Coaches received an e-mail with the surveys and were asked to forward the player survey on to the athletes. Collection time for the survey was 3 weeks. Data was collected on the Survey Monkey website and exported to excel for analysis.

Results

Coaches (n=7, 54.5% response rate) from six universities (Idaho State, Montana State, Northern Colorado, Sacramento State, Southern Utah and Weber State) and players (n=22, 26.1 % response rate) from four universities (Idaho State, Northern Colorado, Sacramento State and Southern Utah) completed the surveys. The sample included freshman (n=8), sophomores (n=2), juniors (n=7), seniors (n=4) and a 5th year senior (n=1). The education level of coaches and areas of study of the players is presented in **Figure 3**.

All 6 universities that participated in the survey received nutrition education. The frequency of the education varied among schools. Montana State and Sacramento State players received education once a year. Northern Colorado, Idaho State, Southern Utah and Weber State players received education twice a year. Northern Colorado, Montana State and Idaho State players received

nutrition education from a registered dietitian while Sacramento State and Weber State received education from a strength coach.

The average correct number of answers for all participants was 55.2%. Based on a scale of 0 to 100% the scores ranged from 14.3% to 100% and the median score was 57.2%. Average scores for each individual team are presented in **Figure 4**. Percentage of correct responses for each question by all participants is presented in **Figure 5.**

The average rank of the importance of a nutrition educator (question 9, **Figure 1**) on a scale of 1 to 5 (1=very helpful) for the players was 2.27 with a median of 2. The average ranking by the coaches of the importance of nutrition education on team performance (question 4, **Figure 2**) was 2.88 with a median response of 2.

As a measure of athletic performance, data from the surveys for each team were compared to team win percentage from the 2012 season. A positive correlation is seen between win percentage and frequency of nutrition education (r=0.26224) (**Figure 6**).

Discussion

The sample size in this study was small due to limited time for development, distribution and collection of the surveys. Only two months was allowed, with three weeks of that time allotted for gathering survey responses. Given appropriate time and incentives, response rate could be increased thus improving the power of the data.

Despite the small sample size a correlation between frequency of team nutrition education and performance (win percentage) was found. To our knowledge no other research has compared frequency of nutrition education with win percentages. One study performed by Corley in 1990 found no correlation when comparing college coach nutrition knowledge to win percentage [9]. Other

questions for investigation created by our research include attitude differences between male and female coaches, influence of education level of coaches and impact of athlete's year in school.

Frequency of nutrition may be a key factor in successful team performance. The source of the nutrition information for athletes, however, seems just as important. Only 60% of the teams participating in the survey received nutrition education from a registered dietitian. Further research should differentiate whether or not the registered dietitians have sports nutrition training. Studies by Juzwaik, Corley and Torres-McGehee all agree on the importance of increased nutrition training for sports staff who provide dietary advice to athletes [3, 9, 10]. They found that more intensive training in nutrition is important for professionals who interact with athletes frequently. They suggest that this group should include head coaches, trainers and strength/conditioning coaches. Not only will this impact the athletes' understanding, but will especially benefit the programs lacking the resources to employ a sports dietitian. The study by Juzwaik emphasized the importance of nutrition education for coaches that work with adolescent athletes [10]. Educating athletes at a younger age will benefit them when they enter collegiate sports. A registered dietitian, however, with a specialty in sports nutrition still remains the best resource for nutrition information [3].

The average score on the nutrition assessment for all athletes, 55.2%, is considered 'inadequate knowledge' according to the Torres-McGehee study which considered a score of •75% to be 'adequate knowledge' [3]. Torres-McGehee found that 91% of the athletes they surveyed (n=177) had 'inadequate nutrition knowledge'. Our findings were similar with 95% of athletes scoring below 75%. Torres-McGehee found that coaches (35.9%), athletic trainers (71.4%) and strength/conditioning coaches (83.1%) have adequate nutrition knowledge. These findings suggest that the lack of nutrition understanding by the athletes may not be related to the nutrition knowledge of the sports medicine team

and coaches, but more to the frequency and quality of education given to athletes on proper nutrition practices.

Despite the athletes' inadequate nutrition knowledge, they ranked access to a sports nutrition educator highly and demonstrated a belief that nutrition information from a professional would be helpful. Zawila had similar findings when polling female collegiate cross-country runners about their nutrition knowledge and attitudes [7]. These data along with ours suggest the existence of a positive attitude creating the appropriate environment for the introduction of more frequent and higher quality nutrition education. We believe collegiate athletes will be very receptive to learning optimal nutrition practices.

There is a paucity of data about female volleyball collegiate athletes and their nutrition knowledge and nutrition education. This small pilot study provides support for the further study concerning frequency of nutrition education and its effect on athletic performance. Despite the lack of strong findings, the number of females entering collegiate athletics supports the need for active nutrition counseling by trained professionals. The health of these women will have a powerful impact on future generations.

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Volleyball Player Nutrition Questionnaire

1. Choose the BEST pre workout meal.
   a. Sports Drink (Gatorade, PowerAde, etc.)
   b. Protein Bar
   c. Oriental Chicken Salad
   d. Pasta with Marinara Sauce
   e. Grilled Chicken Sandwich on a Whole Wheat Bun

2. Choose the BEST post workout meal.
   a. Sports Drink (Gatorade, PowerAde, etc.)
   b. Protein Bar
   c. Oriental Chicken Salad
   d. Pasta with Marinara Sauce
   e. Grilled Chicken Sandwich on a Whole Wheat Bun

3. The best time to have a high protein meal for an athlete is?
   a. 1 hour before a workout
   b. 1 hour after a workout
   c. 3-4 hours before a workout
   d. 3-4 hours after a workout
   e. 24 hours before a workout
   f. 24 hours after a workout

4. Protein is the primary source of energy for the muscles.
   a. True
   b. False

5. Protein supplements are needed in addition to food for muscle growth and development.
   a. True
   b. False

6. Consuming fruits and vegetables every day is important to maintain proper hydration.
   a. True
   b. False

7. Vitamin and mineral supplements provide energy for my body.
   a. True
   b. False

8. Sport drinks like Gatorade and PowerAde are better than just drinking water and should be consumed throughout the day.
   a. True
   b. False

9. Having a sports nutrition educator at my university is or would be helpful to me as an athlete. 1=very helpful 5=not helpful

   1 2 3 4 5

10. Which Big Sky University do you attend?
    a. Eastern Washington
    b. Idaho State
    c. Montana
    d. Montana State
    e. North Dakota
    f. Northern Arizona
    g. Northern Colorado
    h. Portland State
    i. Sacramento State

Figure 1

Volleyball Coach Nutrition Questionnaire

1. Does your team receive nutrition education?
   a. Yes
   b. No

2. If so, what are the credentials of your nutrition educator?
   a. Registered Dietitian, R.D.
   b. Strength and Conditioning Coach, C.S.C.S.
   c. Athletic Trainer, A.T.C.
   d. Other (please specify) _____

3. If so, how often does your team meet with a nutrition educator?
   a. 1 time every 2-3 years
   b. 1 time a year
   c. 2 times a year
   d. 3 times a year
   e. 4 or more times a year

4. On a scale of 1 to 5, how important do you believe nutrition education is to your team's athletic performance? 1=very important 5=not important

   1 2 3 4 5

5. With which Big Sky University are you affiliated?
   a. Eastern Washington
   b. Idaho State
   c. Montana
   d. Montana State
   e. North Dakota
   f. Northern Arizona
   g. Northern Colorado
   h. Portland State
   i. Sacramento State
   j. Southern Utah
   k. Weber State

Figure 2

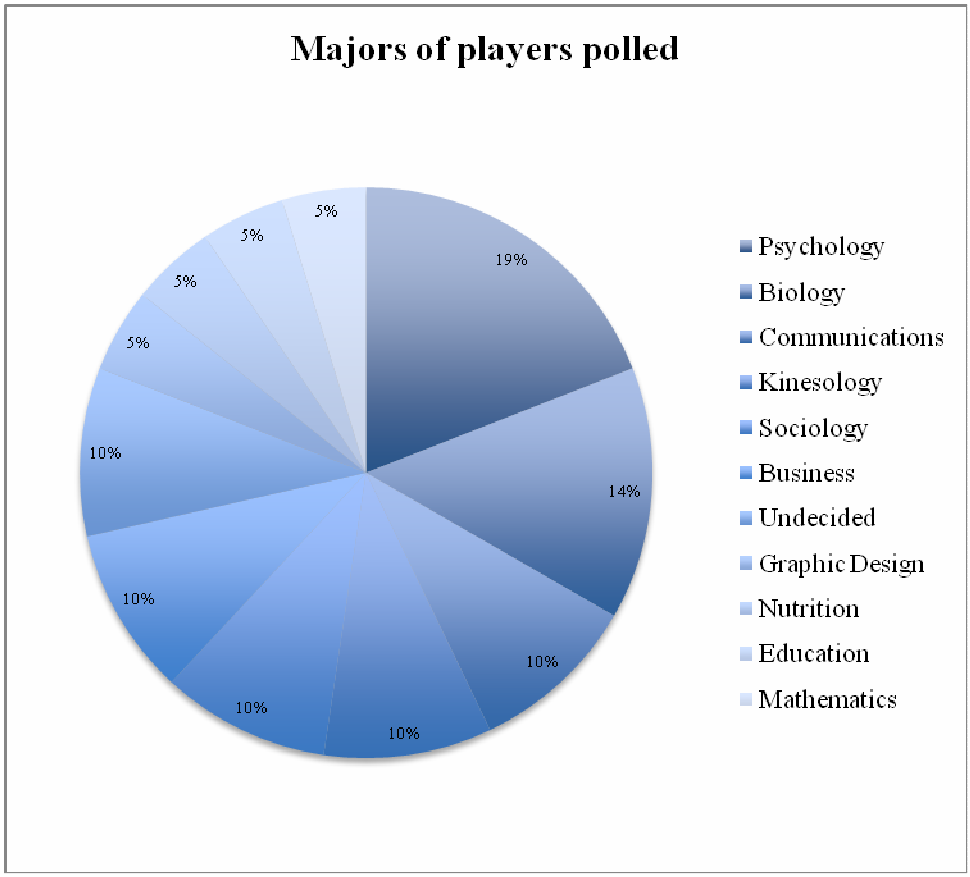
Majors of players polled
19%
14%
10%
10%
10%
10%
5%
5%
5%
5%
Psychology
Biology
Communications
Kinesology
Sociology
Business
Undecided
Graphic Design
Nutrition
Education
Mathematics

Figure 3

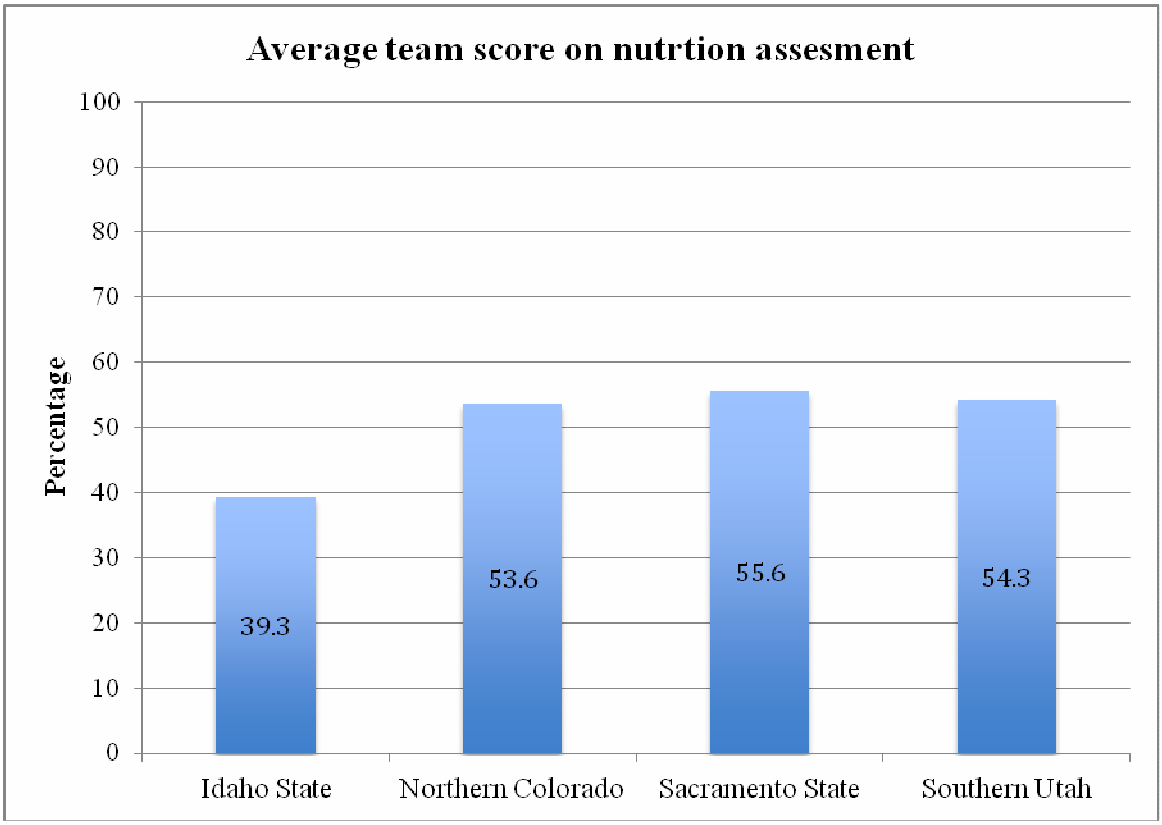
Average team score on nutrtion assesment
Percentage
100
90
80
70
60
50
40
30
20
10
0
39.3
53.6
55.6
54.3
Idaho State
Northern Colorado
Sacramento State
Southern Utah

Figure 4

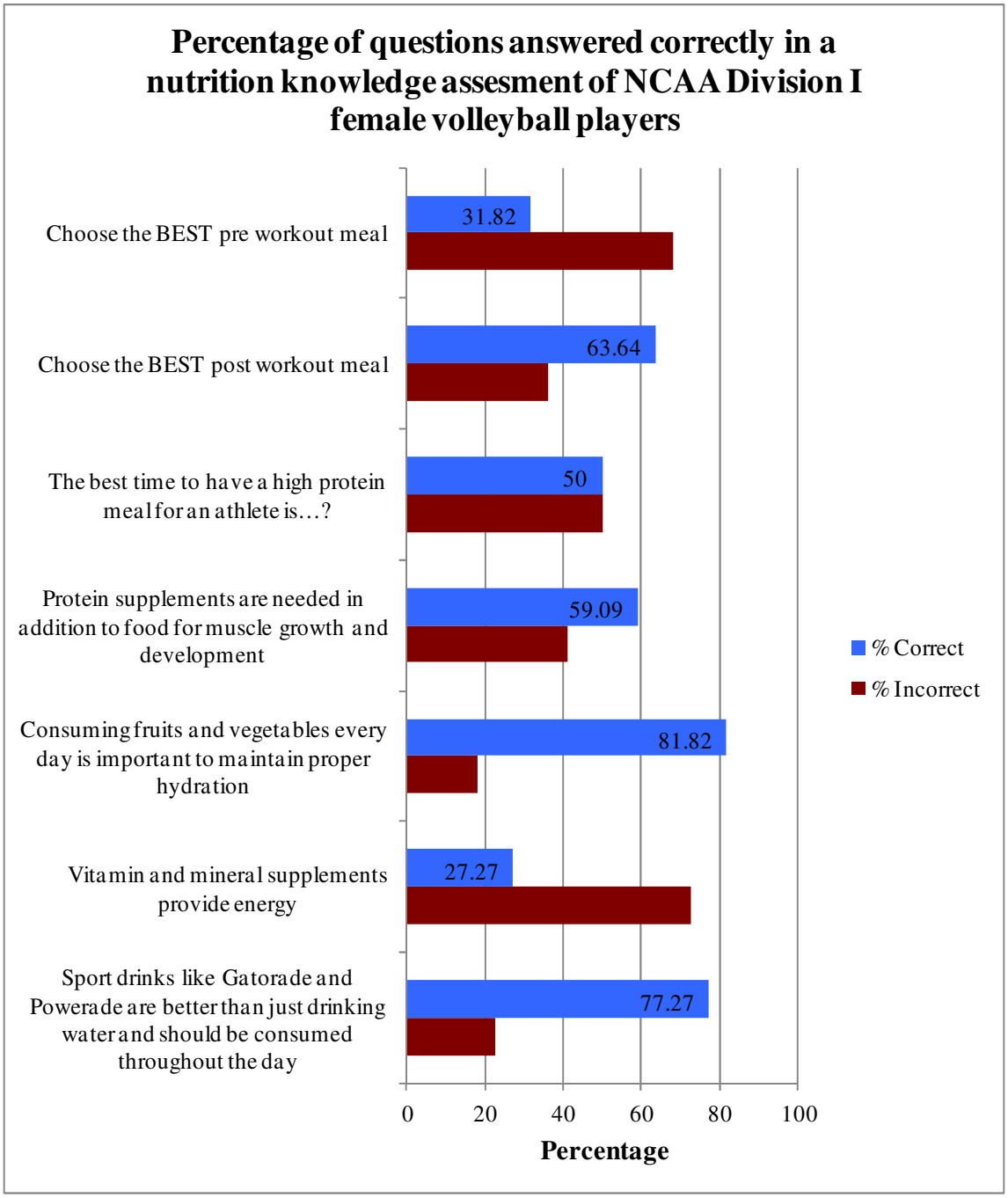
Percentage of questions answered correctly in a nutrition knowledge assesment of NCAA Division I female volleyball players
Choose the BEST pre workout meal
31.82
Choose the BEST post workout meal
63.64
The best time to have a high protein meal for an athlete is…?
50
Protein supplements are needed in addition to food for muscle growth and development
59.09
Consuming fruits and vegetables every day is important to maintain proper hydration
81.82
Vitamin and mineral supplements provide energy
27.27
Sport drinks like Gatorade and Powerade are better than just drinking water and should be consumed throughout the day
77.27
% Correct
% Incorrect
0
20
40
60
80
100
Percentage

Figure 5

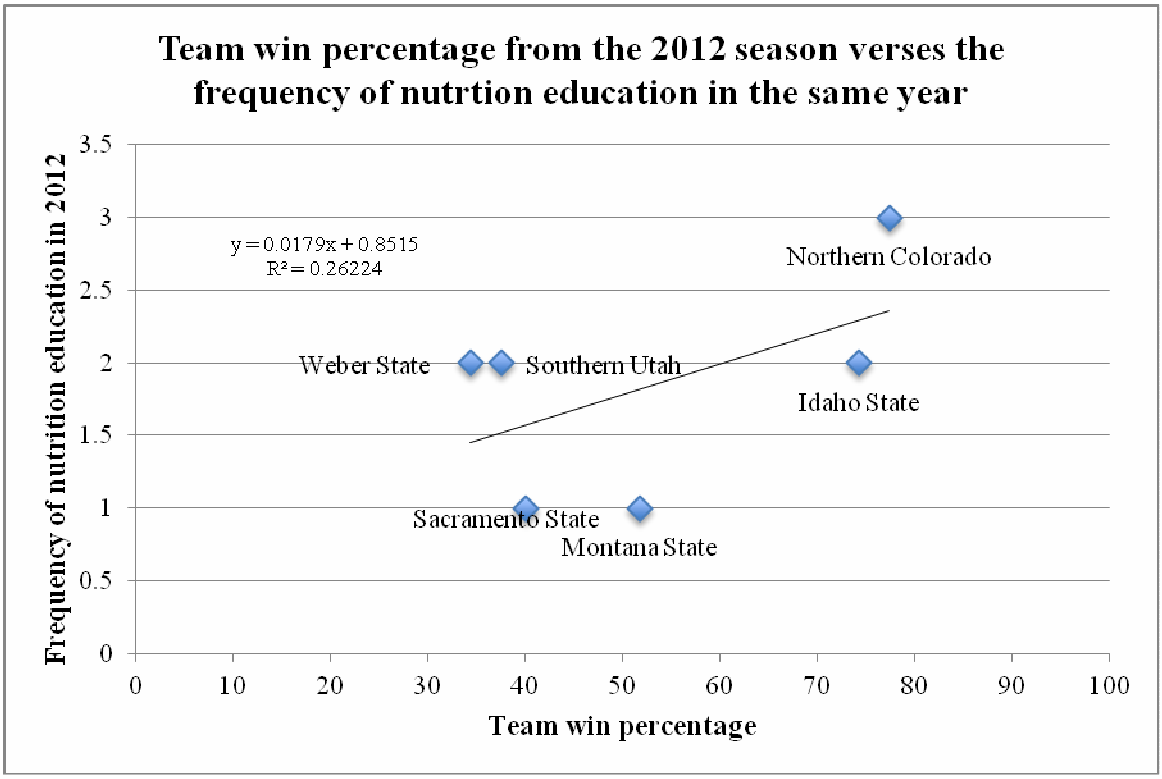
Team win percentage from the 2012 season verses the frequency of nutrtion education in the same year
Frequency of nutrition education in 2012
Team win percentage
y = 0.0179x + 0.8515
R² = 0.26224
Northern Colorado
Weber State
Southern Utah
Idaho State
Sacramento State
Montana State
0
0.5
1
1.5
2
2.5
3
3.5
0
10
20
30
40
50
60
70
80
90
100

Figure 6