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A Nutrition Survey of Division II Athletes in Ohio

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A Nutrition Survey of Division II Athletes in Ohio

Abstract

This study was an endeavor to delve into the discrepancies between nutrition knowledge, nutrition education, and the prevalence of these topics in collegiate athletes. Despite there being an extensive amount of research conducted on the impact on nutrition on athletic performance, there is often a lack of nutritional knowledge, among collegiate athletes (Abbey, et. al., Joint position statement). We used an electronically distributed nutrition survey (49SNKI) to assess the nutrition knowledge of Division II NCAA athletes in Ohio. When comparing participants based on whether they had completed a nutrition class or not, the research team found statistically significant differences in mean scores between the two groups. This shows that individuals who have had previous education in nutrition score better on the 49-SNKI. A solid knowledge base and professional guidance will potentially increase performance/recovery in athletes and also promote healthier eating habits and lifestyles that will have a lasting impact on athletes.

Keywords

Nutrition, 49SNKI

A Nutrition Survey of Division II Athletes in Ohio

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Kinesiology and Allied Health

Introduction

Nutrition intake is widely recognized as a key factor that impacts athletic performance and recovery (Joint position statement). The impact of macronutrient balance, fluid intake, timing of refueling, micronutrient levels and consumption of supplements have all been observed in various settings. Even though there has been an extensive amount of research conducted on the impact of nutrition on athletic performance, there is often a lack of nutritional knowledge among collegiate athletes (Abbey, et. al., Joint position statement).
Athletic populations that lack nutrition knowledge often display poor eating behaviors, resulting in an inappropriate consumption of macronutrients (Jagim et. al). Even though these individuals display a lack of nutritional knowledge, many exhibit positive attitudes towards healthy nutrition behaviors (Dunn et. al). In an attempt to improve athletes' nutrition, many institutions have implemented nutrition education sessions as a part of team training or preseason activities (Heaney et al.)

There appears to be a lack of nutritional knowledge and healthy dietary practices even at the resource-rich professional or Division I level (Andrews et. al, Smith-Rockwell et. al, Jonnalagga et. al). Division II (DII) athletic populations, which often have fewer resources and team nutritional education opportunities, may be at an even higher risk of poor nutritional practices. To facilitate increased nutritional practices among Division II settings, we propose a baseline assessment of nutritional knowledge among these populations. The main outcome of this study is to determine whether current athletic communities in DII settings have an appropriate and comprehensive understanding of modern nutrition guidelines. Additionally, this study will provide baseline information to help shape the development and implementation of nutritional education programs to impact dietary practices among DII athletic populations.

Research question: Using a nutrition survey, do the current athletic communities in D2 colleges in the State of Ohio have an appropriate/comprehensive understanding of modern nutrition that shapes how they eat and perform in athletics?

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Review of Literature

While innumerable sources exist associated with nutrition and its complicated application, our study focused on literature that targeted nutrition principles relevant for and related to collegiate athletes/athletics. From our in-depth look into the literature, we found that one of the most common subjects of nutrition research in the collegiate athlete setting were members of Division I institutions (Andrews, et. al., Rosenbloom, et. al., Madrigal, et.al., Smith-Rockwell, et. al., etc.). Far fewer sources researched nutrition topics in lower Divisions. There are a few obvious differences between Division I, Division II, and Division III schools such as size and level of competition. Other factors such as access to nutrition professionals, quality of food provided, and standard nutrition education are also present between these different institutions (Karpinski). Because of this, our research seeks to provide information about a comparatively understudied portion of collegiate athletes, namely Division II, small-school, student-athletes.

Regardless of Division, there are many important trends in the existing literature regarding the nutrition knowledge of student-athletes. Although the literature uses many different questionnaires, food-logs, and interventions, they often have very similar topics of study. Athletes' knowledge about basic nutrition was one of the most common nutrition topics studied (Abbey, et. al., Trakman, et. al., Andrews, et. al., Smith-Rockwell, et. al., etc.). Commonly, the studies used some form of questionnaire to assess the athletes' knowledge. While many different questionnaires appear throughout the literature, studies commonly used the general nutrition knowledge questionnaire developed by Parameter and Wardle (Parameter and Wardle). Parameter and Wardle's questionnaire allows the researcher to learn about the connection between the patient's knowledge of nutrition and their dietary behaviors (Parameter and Wardle). While this exact questionnaire appears in more of the literature of the early 2000's (the questionnaire was first developed in 1999), recent studies still use the original or slightly modified version of this questionnaire (Dickson-Spillman, et. al., Spronk, et. al.).

Different Types of Questionnaires

Another common type of questionnaire used by researchers more recently are questionnaires specifically about nutrition knowledge important for sports. In the last few years, researchers Trakman, Forsyth, Hoye, and Belski have been some of the driving leaders in the formation of questionnaires specifically about sports nutrition knowledge (Trakman, et. al. 2017). Their questionnaire, the nutrition for sport knowledge questionnaire (NSKQ), created in 2017, is made up of several unidimensional subsections that include weight management, macronutrients, micronutrients, sports nutrition, supplements, and alcohol (Trakman, et. al.). This questionnaire was designed so that an individual can use each subsection by itself, or use the entire questionnaire as whole (Trakman, et. al. 2017). Because of this format, the study may be applied to several different ages, populations, and gender (Trakman, et. al. 2017). Trachman et. al. also

further developed the NSKQ in 2018 into a shorter, more palatable version called the abridged NSKQ (ANSKQ) (Trakman, et. al. 2018). The research group sought to validate a shorter version of the NSKQ to determine if the response rate would be higher if the questionnaire were shortened (Trakman, et. al. 2018).

Karpinski, Dolins, and Bachman developed another questionnaire focused on sports nutrition in 2019. They titled this questionnaire, the 49-Item Sports Nutrition Knowledge Instrument, or the 49-SNKI. While similar to other recent questionnaires in the fact that it focused on sports nutrition knowledge, the 49-SNKI is different in that it focused specifically on an adult population (Karpinski, et. al.). The 49-SNKI questionnaire asked questions about six categories of nutrition knowledge that would be particularly impactful for athletes: carbohydrate, protein, fat, hydration, micronutrients, and weight management (Karpinski, et. al.).

Researchers commonly either modify or design their own nutrition questionnaires for their research studies (Dickson-Spillman, et. al., Rosenbloom, et. al., Rash et. al. etc.). Oftentimes, these modifications or designs were a way of addressing the research topic and answering the research problem in the best manner. Our research team plans to add questions to the 49-SNKI to increase the quality of data we receive regarding sample characteristics and other important subjects. As these questions are not changing the content or the presentation of the 49-SNKI, we feel there is no need for concern about these modifications skewing the results of the questionnaire.

While nutrition knowledge questionnaires are very common in the field of nutrition research, food frequency questionnaires (FFQ), food logs/diet records, and other similar tools are also consistently utilized. We chose to not incorporate FFQs, food logs, and diet records into our research study. We made this decision based on the type of content FFQs and food logs and diet records normally cover. In the current body of literature, studies using these measures normally seek to understand something about the *practice* of nutrition by their sample population. Common practice-type studies focus on the sample's tendency to meet nutritional guidelines during the study (Abbey, et. al., Wall, et. al., Ha and Caine-Bish, etc.). These research tools are by no means less effective or valid than nutrition knowledge questionnaires. However, they are not appropriate for our study since they focus on the application or practice of nutrition, instead of the knowledge of nutrition.

Consistent Themes Found in Literature

A consistent theme throughout much of the literature was that athletes did not have a solid foundation of nutrition knowledge. A key article by Heaney S, et al, a systematic review of nutrition literature, evaluated 29 different studies, and found several important implications arising from them (Heaney, et. al.). The strongest conclusion found consistently throughout the literature was a general lack of nutrition knowledge in athletes as well as others. It is important to note that the articles in this review also showed strong correlations between a lack of nutrition knowledge/education and nutrition deficiencies.

Another study by Andrews, et. al. also shows the extreme lack of nutrition knowledge common in collegiate athletes. In this study, a nutrition questionnaire was completed by 123 Division I athletes, and only 11 of the athletes scored above a 75% on the questionnaire (Andrews, et. al.).

Additionally, we found several studies that assessed the sources of nutritional information. These studies primarily identified family, teammates, and the internet as the main sources for nutrition information and practice. In one of these studies, the entire athletic staff was also part of the survey. Of all the athletic staff, Athletic Trainers were found to be most knowledgeable about nutrition. However, it is obvious that many athletes are not aware of this, as only a few listed their athletic trainer as their source of information.

Conversely, the literature indicates that nutrition education is helpful in both nutrition consumption assessments and in scores on nutrition knowledge tests. Many athletes who scored well on these surveys had taken nutrition classes or been informed by an educated professional. Unfortunately, the number of "good" scores (75% or higher) was quite low on the nutrition surveys that we encountered.

There is certainly a desire from athletes to be more knowledgeable about what they eat. Several of these surveys included a question in their questionnaires that inquired of the level of interest in further nutrition education. A strong response in this regard was noted. In light of this, we also believe that there is a strong interest in nutrition education in the athletic community at large. We anticipate response rates for our questionnaire to be high and that significant results could be gleaned from a study such as ours. The desire to have good nutrition stems from the strong belief that nutrition is important, even critical to general health and athletic performance.

Many if not most of the participants in these various studies verified the importance of good nutrition. These populations seem to understand, at least in concept, that healthy food affects one's body in a positive way, particularly when one is regularly active. One source was specifically intent on driving this point home (Sceery, S. Nutritional Impact on Performance in Student-Athletes: Reality and Perception). This study saw several athletes who agreed that good nutrition was essential yet did not follow those claims with action.

Another reason why we believe that our research proposal is important is because there are many people that believe that they know enough about nutrition to be healthy and sustain their athletic activities. Two surveys that we reviewed (Jagim AR, et al and Sangeetha, K. M) included questions about how much the individual thought they knew about nutrition and compared those answers to those individual's scores. Many participants were much more confident in their personal nutrition knowledge than their scores showed.

Many of these nutrition questionnaires include the inquiry of the source of the participants' nutrition. For many of the collegiate athletes, the dining hall on campus was the primary source of food. Thus, the athletes must comply with the availability of whatever the dining

hall serves that day. As a result, students tend to do their own shopping to satisfy hunger. Quick calorie dense snacks were a consistent source of nutrition such as candy bars and pre-packaged/canned foods. These negative nutritional habits can be attributed to the high speed of college life and lack of tangible understanding of how these habits will affect their performance.

Finally, the strongest theme that we found in our review of literature was the recommendation from the authors for nutritional experts to educate the participants, particularly in the athletic collegiate setting. There is a great need for sport dieticians and nutritionists in active settings so that athletes can have a readily available, reliable source of information. Again, several surveys in our review found that the largest sources of nutrition information were family members, close friends, and the internet. Nutrition experts were rarely consulted. Combining the correlations between nutrition education sources, the belief that personal nutrition knowledge is adequate, and low scores on many of these nutrition surveys is highly suggestive of the need for readily available nutrition experts, particularly in athletic settings.

Comparison to Other Studies

While the set-up of our research study closely mirrored many other previous studies in terms of general population and general application process of the questionnaire, our study was also different than many in the following key ways. It studied student-athletes from Division II institutions in order to help increase the body of research regarding nutrition knowledge of Division II collegiate athletes. This is an important difference since Division II student-athletes are currently under-represented in the available literature regarding nutrition knowledge compared to other Divisions. It utilized the 49-SNKI questionnaire. We believe that the use of this questionnaire gave our study two important distinctions from others. First, because this is a more recent questionnaire, the body of available literature surrounding it is very limited. While other nutrition knowledge questionnaires may have larger bodies of literature surrounding them, we were excited to work with a questionnaire so “young.” Second, this questionnaire is tailored to assess sport relevant nutrition knowledge. Because of this, our study was dissimilar from many previous studies.

Methods

We conducted a quantitative descriptive research study. This study was sent to Division II athletic programs throughout Ohio in the Great Midwest Athletic Conference (GMAC) in the Fall of 2020 academic semester. Any individual that was a current student athlete in a DII university could be eligible for participation in this study. This study utilized the 49-SNKI questionnaire as well as a few accompanying questions that reinforced the purpose of the study and created a more comprehensive survey to the DII population. Our research team added several questions regarding sample characteristics. These questions addressed the following topics: gender, current year in school, current course of study, current institution,

sport(s) played, previous or current nutrition education, access to sport nutritionist/dietitian, and main source of nutrition information. We chose the 49-SNKI, as opposed to other questionnaires, because it is one of the newer questionnaires that has specific focuses on both athletic and adult populations. This survey has also undergone an extensive development and validation process. Other advantages of the 49-SNKI are clear, distinct transitions from section to section, standard, close-ended answer options throughout the entirety of the questionnaire, and appropriate length. Because of these characteristics, the relevance of this questionnaire for our research study is higher than others.

We administered our survey in an electronic format that came to the athletes via email. We asked head athletic trainers to share our questionnaire with their athletes. By asking these individuals to send out our questionnaire on our behalf we hoped that athletes would be more prone to complete the questionnaire as opposed to if our research team were to contact athletes directly. In hopes to increase participation and sample size, any participants had a chance to win a $15 Amazon gift card. If participants wanted to be included in the chance of winning the gift card, they could enter their email address after finishing the survey. There was a statement preceding the answer box saying that their email address would not be used for any means/purposes other than contacting a single participant to say that they won the gift card. The research team made it clear in the initial informed consent section that participation in the research study was completely optional and that any participation was a voluntary act of the participant. The research team sent the questionnaire to the head athletic trainers of 9 different institutions in Ohio from the Great Midwest Athletic Conference. Of these nine schools, two participated in the questionnaire. The survey was available to participants for 2.5 weeks in the middle of September 2020**.** Before accessing the questionnaire, participants were required to read and respond to a statement of informed consent. Upon completion of the survey, the results for each individual were automatically sent to the researchers' database where they were stored for review, analysis and compilation of the data.

In total, the research team received data from 150 participants from two different Ohio GMAC institutions. The 49-SNKI offers three answers for each true or false question: "True," "False," or "Don't Know." Any question answered with the "Don't Know" option gets a score of 0 for the question. Correct responses are scored as a 1, and incorrect responses (not "Don't Know" answers) are scored as a -1. The questions the research team added to the questionnaire for population specification were not included in the score. The mean of the scores was 16.4 points, with a range of 52 points (min: -7; max: 45). For the following distinctions, the total number of participants will not always equal 150, because some participants chose to not answer specific questions. Of the participants that chose to include their gender, 47 were male, and 77 were female. As for the year in school, 46 were freshmen, 36 were sophomores, 29 were Juniors, 33 were seniors, and 6 were graduate students. The respondents participated in many different sports. The research team chose to split these sports into three different categories: team-contact, team-noncontact, and

individual. The most common category was individual sports with 69 athletes, followed by team-contact with 41, and team-noncontact with 39. The research team split participants by their course of study into two groups, either medical-based studies or non-medical-based studies. There were 64 participants studying in health-related fields and 84 in non-health related fields. The research team asked participants what their biggest source of nutrition information was and provided the following six options: "friends/family," "personal research/internet," "personal trainer/coach," "athletic trainer," "nutrition class," or "none of the above." Of the participants who chose to respond, 26 responded "friends/family," 83 responded "personal research/internet," 17 responded "personal trainer/coach," 2 responded "athletic trainer," 16 responded "nutrition class," and 4 said "none of the above." One last distinction in the population the research team asked about was whether participants had taken a nutrition class before. Of the participants that answered, 34 answered that they had previously taken a nutrition course, and 116 replied that they had not taken a nutrition class before.

Results

The research team did many different tests based on the differentiation questions added to the end of the 49-SNKI questionnaire looking for significant differences within the respondents. Only one test came back as significant. When comparing participants based on whether they had completed a nutrition class or not, the research team found statistically significant differences in mean scores between the two groups. The Levene's Test for Equality of Variances was not significant, with a value of 0.467. The t-test for equality of means came back with 2-tailed significance values of 0.002 and 0.005. Because both of these values were below the alpha level of 0.05, and because Levene's Test for Equality of Variances could be rejected, the research team concluded that participants who had completed nutrition classes had significantly better scores than participants who had not completed a course (Data for these tests can be found in Appendix B). The research team did not find statistically significant differences between scores on the bases of institution, major, type of sport, primary source of nutrition information, or gender.

Discussion

The research team found statistical significance between scores of individuals that had taken a nutrition class and those that had not. This concurs with Abbey EL, et al. who found that football players at a Division III school also scored better when previously exposed to a general or sport specific nutrition course. The research team believes that the findings of this study justify a call for more readily available nutrition education. The body of current nutrition research strongly supported this call to action. Many other published research teams come to the same conclusion about the need for better education for athletes in the field of nutrition (Abbey EL, et al., Heaney S, et al., Karpinski C, et al., Parks RB, et al.).

Several sources show that even individuals that have a low level of nutrition knowledge frequently possess a positive attitude toward nutrition knowledge and healthy nutrition practices (Dunn et. al 2007, 2008, Sceery et. al). One limitation to our study is that we did not assess athlete attitudes toward nutrition. This could be an area of further study in the future, in order to support current research. An additional limitation from our study is the fact that our participants were limited to only two universities. While our survey was made available to all Ohio GMAC institutions, we only received responses from individuals from two of those universities. Another limitation is that this study limited participants to college-athletes and did not include other populations such as professional athletes. Finally, it could be beneficial to compare the results of the 49-SNKI with results of other more established nutrition questionnaires in order to establish cross validation. Our findings fit with the current body of literature for other qualifications of nutrition knowledge, but our study would have been strengthened by comparing results of two different questionnaires.

The purpose of this study was to contribute to the pool of knowledge relating to nutritional knowledge and practices among college athletics. This study observed the nutritional knowledge among athletes in the Division II setting. The results of this study could be the basis for several additional research projects. Nutritional behavior could be observed by using a food log in order to determine the correlation between nutrition knowledge and eating behaviors. In addition, the results of this study could be used to create educational sessions that are specific to the nutritional knowledge at each university. Finally, a study could be done splitting participants into control groups and educating one set of participants and comparing changes in nutritional habits and athletic performance.

Based on current literature and studies, the research team expected to find a common lack of nutrition information among the collegiate student-athletes. The findings from this study confirmed that. As consistent with previous studies (Andrews A, et al.), the research team deemed 75% as the threshold for determining “sufficient” proficiency in sports nutrition. Only 19 out of the 150 participants scored above 75% or higher on the 49-SNKI in this study. That comes out to a 28.5% of athletes who possessed “sufficient” nutritional knowledge to support their athletic performance according to the criteria.

Further, based on previous literature the team expected to find the common idea that protein is the only way to gain muscle or recover from a workout. While this is not totally accurate, we think this belief is tied to the common sources of nutrition information such as friends, family, or the internet. However, this hypothesis was not supported by the data found in this study. The spread of correct answers concerning questions about protein were inconclusive and no consistent trend could be determined that might have any research significance

Lastly, we hypothesized that endurance athletes will score higher on our survey simply because the nature of endurance sports tends to produce athletes who are very conscientious about their performance numbers and what they consume in regard to nutrition. This was not found in the data analysis. The research team compared the scores

of endurance athletes with non-endurance athletes, and no significant differences between athletes could be determined based on the independent t-test conducted.

Conclusion

The data from this study shows that individuals who have had previous education in nutrition score better on the 49-SNKI, a validated measure of sport-specific nutrition knowledge. This result mirrors other previous findings in the body of nutrition research. Because of the trend of significant difference in scores based on nutrition class participation, the research team recommends nutrition education should be commonplace for athletes participating at the collegiate level. A solid knowledge base and professional guidance will potentially increase performance and recovery in athletes. It could also promote healthier eating habits and lifestyles that will have a lasting impact on athletes.

What did we find that was not significant, and what other sources agree with that?

> Source 4: Further, our research team found that there were *very few* individuals that scored over 75%. There was no difference between individuals who took a class and those that didn't.
>
> Source 8: The use of a Mobile nutrition cart because it was determined that athletes did not have access to proper nutrition.
>
> Source 9: The *majority* of athletes have a healthy attitude *toward* nutrition, even if their specific nutrition knowledge is *low*.
>
> Source 10: Meta Analysis stating that there is a lot of nutrition misinformation and a need for better education.
>
> Source 17: Suggests furthering of nutrition education in ATs after graduation--McGehee.
>
> Source 20: There is a *high* desire to be healthy but a *low* rate of knowledge.
>
> Source 23: *Specific* categories and nutrition knowledge.
>
> Source 27: Student athletes believe nutrition is important, *but* they often have no access to proper nutrition sources or nutritional education—additional education is necessary.
>
> Source 28: Student athletes do not often get the *best* nutrition information from their primary source—*recommends a joint nutrition class with athletes and dietitian.*
>
> Source 29: Information regarding creation of a sports-specific nutrition course.
>
> Source 30: Females scored higher than males.

Source 32: Parents, friends, and internet are the most common nutrition sources—*however,* ATs have a nutrition knowledge base that can be utilized in the absence of a registered dietitian.

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Appendix A

	True	**False**	**Don't Know**
Carbohydrate			
1. Eating a low carbohydrate diet will reduce muscle carbohydrate stores (glycogen) which can cause early fatigue			
1. A high carbohydrate diet helps athletes reduce muscle protein breakdown in the body.			
1. An athlete's plate should consist of more carbohydrate-rich foods than protein foods.			
1. Carbohydrates are the main fuel source for muscles during weight lifting.			
1. An endurance athlete such as a marathon runner, distance cyclist or Ironman distance triathlete should consume 60-90 grams of carbohydrate hourly during training/competition.			
1. Both carbohydrate and protein foods should be consumed after exercise to enhance recovery.			
1. The best time to eat carbohydrate to restore glycogen (carbohydrate) muscle stores is 4 hours after exercise.			
1. Swishing a sports drink or gel in the mouth without swallowing it during endurance exercise may reduce fatigue.			

1. An endurance athlete does not need to eat a high carbohydrate diet during training as long as they load up on carbohydrate prior to competition.			
1. Glycogen (carbohydrate stores) is the muscle's main fuel for high intensity exercise such as sprinting.			
1. Drinking alcohol after exercise makes it harder for muscles to recover.			

	True	**False**	**Don't Know**
Protein			
1. Protein is the primary source of energy used by muscles during strength training.			
1. Protein supplements are necessary for building muscle mass.			
1. Protein needs increase when athletes restrict calories and carbohydrates.			
1. It is less important to eat protein at every meal when a protein supplement is consumed after a workout.			
1. Sports drinks with protein are beneficial for athletes during sports such as basketball, soccer and track.			
1. Trained athletes need more protein than individuals beginning a training program.			
1. A whey protein supplement will enhance muscle growth more effectively than milk or eggs.			
1. Consuming protein and amino acid supplements decreases the amount of training needed to increase muscle mass.			
1. Milk and egg protein does not build muscle as well as meat and poultry.			

	True	**False**	**Don't Know**
Fat			
1. Aerobic training such as jogging or cycling increases the body's ability to use fat for fuel during exercise.			
1. Most athletes should eat as little fat as possible.			
1. An athlete who eats very little fat may have difficulty absorbing certain vitamins.			
1. Most athletes should avoid high fat foods such as bacon or nuts in the few hours before competing.			

1. Fat is a major fuel source for high-intensity exercise, such as sprinting.			
1. Eating a high fat, low carbohydrate diet for several days prior to a long race is an effective way to make carbohydrate stores last longer.			
1. Eating a high fat meal such as a cheeseburger and French fries after exercise will limit the ability to replenish carbohydrate stores in the body.			

	True	**False**	**Don't Know**
Hydration			
1. Sports drinks are always the best way to replace body fluids regardless of exercise duration.			
1. An athlete who is concerned about water sloshing in the stomach can maintain hydration by rinsing out his or her mouth.			
1. An athlete who loses 1 pound during an hour of exercise should drink 1 cup of water to replace what was lost from sweat.			
1. Drinking too much water during endurance exercise can lead to hyponatremia (low levels of sodium in the blood).			
1. An athlete can train his/her body to comfortably tolerate adequate fluids by gradually increasing intake during training.			
1. The best drink to consume during an intense 2-hour workout is water with protein.			
1. Drinking fluids during exercise helps to decrease the body's core temperature.			

	True	**False**	**Don't Know**
Micronutrients			
1. Athletes should routinely take an iron supplement as iron deficiency is common in athletes.			
1. Iron deficiency even without anemia can compromise athletic performance.			
1. Eating foods high in antioxidants is more effective at enhancing training adaptations than taking antioxidant supplements.			
1. Vitamin D is only important for athletes because of its role in maintaining bone health.			

1. Consuming extra calcium will prevent stress fractures for an athlete who is not consuming enough calories.			
1. Potassium is the main electrolyte lost in sweat and must be replaced after exercise.			
1. Athletes should not add salt to their food because it causes fluid retention.			

	True	**False**	**Don't Know**
Weight Management			
1. An athlete trying to lose weight should avoid bread and starchy foods.			
1. Slow weight loss is more likely to reflect losses in body fat while quick weight loss is more likely to reflect losses of muscle and water.			
1. To increase muscle mass, it is recommended to increase resistance training and eat more protein but not carbohydrate.			
1. Body Mass Index (BMI) is an accurate way to estimate percent body fat in athletes.			
1. It is unlikely that an athlete will be able to build muscle and lose fat at the same time.			
1. The best way to monitor changes in body fat is to weigh oneself daily.			
1. An athlete wanting to lose weight should replace high fat meats such as salami or hot dogs with turkey or chicken breast rather than eliminating all bread.			
1. An athlete who increases the duration and intensity of their workouts must also increase calories to prevent a breakdown of muscle.			

Appendix B

Tables of Significant Findings

Nutrition Class Vs. No Nutrition Class

T-Test

T-Test - Group Statistics - November 3, 2020

Nutrtition Course Completion

	VAR00002	N	Mean	Std. Deviation	Std. Error Mean
Nutrition Course	Yes Course	34	20.56	9.346	1.603
	No Course	116	15.25	8.578	.796

Nutrition Course Completion

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
VAR00001	Equal variances assumed	.532	.467	3.109	148	.002	5.309	1.707	1.935	8.683
	Equal variances not assumed			2.966	50.426	.005	5.309	1.790	1.715	8.903