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Nutrition Resources for Football Players in Division I Institutions: The Athletic Trainer's Perspective and Role

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NUTRITION RESOURCES FOR FOOTBALL PLAYERS IN DIVISION I INSTITUTIONS: THE ATHLETIC TRAINER'S PERSPECTIVE AND ROLE

by

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ABSTRACT

Background: The importance of nutrition on athletic performance is evident. Athletic trainers (ATs), nutritionists/RDs, strength and conditioning specialists (SCSs), and other athletic department personnel may be available to student-athletes and can be solicited for nutrition advice. Multiple studies have found that although some universities have a sports nutritionist on staff, student-athletes approached an AT most often for nutrition advice rather than an SCS, nutritionist or other person. ATs have the necessary education to provide proper nutrition information to student-athletes; however, it is not the primary role of an AT.

Objective: The purpose of this study was to examine the quantity, quality and variety of nutrition support offered to Division I student-athletes who participate in football. Additionally, the purpose was to gain the perspective of the AT with regard to their role in educating football players on basic nutrition principles.

Design: Cross sectional.

Setting: Participants completed a web-based questionnaire.

Patients or Other Participants: 253 Division I institutions were identified; from those institutions 120 head ATs were randomly chosen to receive the questionnaire. Responses from 30 (25%) head ATs (Football Bowl Subdivision 53.6%; Football Championship Subdivision 46.4%) were analyzed.

Results: A majority (69%, n=20) of the institutions provided access to a nutritionist/RD. When asked who they believed student-athletes would solicit nutritional advice from first, respondents

ranked their answers as follows: AT (n=11, 36.7%), SCS (n=10, 33.3%), nutritionist/RD (n=7, 23.3%), and coach (n=2, 6.7%). However, in the Likert scale questions, participants felt between neutral and slight agreement regarding their own responsibility, or that overall, ATs should feel responsible to teach nutrition or promote proper eating habits. In another question, participants were asked who is responsible for educating football players about nutrition at their institution and were able to select more than one response. Participants felt that all three professionals had a fairly high level of responsibility (SCS n=26, 86.7%; AT n=23, 76.7%; nutritionist/RD n=21, 70%). ATs ranked their perception of who helped with management of specific medical issues as follows: AT (n=26, 86.7%), nutritionist/RD (n=21, 70%), physician (n=18, 60%), and SCS (n=3, 10%). FBS institutions seem to provide more nutrition services compared to FCS institutions; 73.7% of FBS institutions are providing access to a nutritionist/RD and whereas only 26.5% of FCS institution provide this service.

Conclusions: ATs from our study strongly agreed that nutrition plays an important role in performance. As shown in previous studies, ATs and SCSs were found to be the primary sources of nutrition information for student-athletes in Division I settings. This study gathered the AT's perspective and perceived roles regarding where student-athletes receive nutrition information from most often. The ATs in this study confirmed that they felt the ATs and SCSs were primarily approached for nutrition advice. Although these ATs responded that the SCSs, ATs, and nutritionist/RDs were all responsible to educate football players at their institutions, the ATs answers were conflicting when they said that they did not feel the ATs role should be responsible for educating football players on nutrition and performance. Because ATs did perceive themselves as qualified, it is suggested that they may feel another professional of the sports

medicine team is more appropriate to fill this role. A sports medicine team consisting of ATs, SCSs, nutritionists/RDs and physicians should work together to promote the benefits of nutrition and provide optimal services within their professional scope of their practice. In the absence of one or more professional, effective knowledge and communication must be maintained to assure that the roles of nutrition services are still provided to football players.

Key words: Athletic trainer, nutrition, resources, football, college, FBS, FCS

DEDICATION

I would love to dedicate this research to my parents, Judy and Alex Giannini, who have given me the freedom and tools to grow, learn, and pursue my passions. With high expectations for myself, I continue to work tirelessly to prove my gratitude for their love and investment in my future. With a base of strength in my faith, I have experienced the joy in being a servant to others. The unwavering support of my family and friends through my change in career paths, gave me a chance to follow my heart for serving others. This has provided me many opportunities to serve and care for others through the sports medicine field.

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CHAPTER 1: INTRODUCTION

The importance of nutrition and its impact on performance can be dated back to the 1908 Olympic Games.[1] Research conducted in 1952 by Jokl found that elite athletes were not consuming enough nutritionally dense foods in proportion to their energy exerted.[2] Today's researchers continue to show the various ways nutrition can impact an athletes' health and performance.[3-12] According to many researchers, an athlete cannot reach their maximum performance potential unless they are providing their body with the proper nutrients needed to operate effectively and efficiently.[4-6,8,13,14] Many researchers also agree that optimal nutrition will not only allow for peak performance, but will also decrease chance of injuries and improve recovery time.[5,6,8,13,14]

In highly demanding multi-position sports like football, each position group will have different performance needs. A kicker or wide receiver has different biomechanical and metabolic requirements than an offensive or defensive lineman. Additionally, practice time, food allergies, personal preference, medical history, and supplement use, all influence nutritional needs and food intake.[5-6,15-17] Given the variety of positions and individual needs, the expertise of a trained professional can be helpful.[4-6,11,14,17-21] According to the *Joint Position Statement: Nutrition and Athletic Performance* by the American Dietetic Association, Dietitians of Canada, and the American College of Sports Medicine, a nutritionist/RD has a role in addressing all challenges that may impact the health and/or performance of the athlete.[6] Although some student-athletes have access to a nutritionist/registered dietitian (RD), a great deal of research shows that athletic trainers (ATs) and strength and conditioning specialists (SCSs) are the primary sources of nutrition information for student-athletes. [10,12,16,19,22,23] Student-athletes also

seek nutrition knowledge from coaches, physicians, parents, peers and the media.[9,11,12,14,16,19,22,24,25]

Purpose Statement

The purpose of this study was to examine the quantity, quality and variety of nutritional support offered to Division 1 student-athletes who participate in football. Additionally, the purpose was to gain the perspective of the AT with regard to their role in educating student-athletes on basic nutrition principles.

CHAPTER 2: REVIEW OF LITERATURE

History of Sports Nutrition

The 100 meter gold medalist from the 1896 Olympics would have finished the race approximately three seconds, or 20 meters, behind today's Olympic gold medalist winner. While some of the three seconds can be attributed to extrinsic factors like shoes and surfaces, intrinsic factors related to exercise physiology, sport psychology and nutrition account for the rest. Improvements in extrinsic and intrinsic factors have led to a marked performance increase in what most would consider a simple activity.[3] In 1997, Grandjean researched the diets of Olympic and elite athletes'[1] and compared the findings with a similar study done in 1952 by Jokl.[2] The comparison of studies demonstrated that hydration, energy intake, and pre-competition meals have changed drastically with regard to proteins, carbohydrates, and fats.[1] Maughan stressed the importance of nutritional interventions stating that an elite athlete will certainly not see their true potential if unhealthy eating habits are in place; this could be the difference between winning and losing at the highest level of competition.[5]

Importance of Nutrition for Athletes

The timing and quality of food and fluid intake has an influence on athletic performance.[4,17] Bonci emphasizes that refueling the body before, during and after exercise will lead to proper stamina, strength and speed.[4] Her study is consistent with the *Joint Position Statement* as they both mention the importance of protein, fiber and fat being in the diet before a game or practice.[4,6] In a study by Brown et al. a majority of athletes did not report consuming any food one hour prior to workouts.[13] Seventy-five percent of the participants also reported

feeling fatigue during practice,[13] which could be explained by the lack of energy intake prior to practice.[6]

In Bonci's study, most athletes only consumed water during workouts,[4] and as suggested by the *Joint Position Statement*, an athlete should come some type of fluid containing electrolytes throughout any exercise greater than one hour.[4,6] A lack of electrolyte intake during practice could also explain why participants reported feeling fatigue during practice. Finally, refueling of the body post-exercise is based on the duration, type of exercise, and amount of energy expended throughout the activity. Replenishing the body with appropriate amounts of carbohydrates, proteins, and fats are essential in post-exercise muscle repair.[4,6]

The *Joint Position Statement* and the National Collegiate Athletic Association (NCAA) stress the importance of providing quality nutrients to student-athletes for energy.[6,20] The *Joint Position Statement* states that low energy intake can result in the following concerns: loss of muscle mass; menstrual dysfunction; loss of bone density or failure to gain bone density; increased risk of fatigue, injury and illness; and a prolonged recovery process.[6] One study found that many athletes are classified as obese.[12] Obesity puts the athlete's health at risk and can contribute to many long-term health consequences, such heart disease, diabetes, and hypertension.[12]

Additionally, studies show that poor nutrition knowledge in athletes leads to unmet basic nutritional needs.[6,12,25] Researchers found that athletes who eliminate single or multiple food groups from their diets are also at high risk for being deficient in macro and/or micronutrients.[6,12] One researcher studied the eating habits of 28 Division I collegiate football players and found that they were deficient in fruits and vegetables.[12] This can lead to deficiencies in the essential

vitamins and minerals needed for healing and prevention of bone and musculoskeletal injuries.[8,15,26] One vitamin that has been traced to affect musculoskeletal injuries in National Football League athletes is vitamin D.[8,26] Maintenance of proper essential nutrient levels is important for prevention of injury but is not easy when facing the high demands of being a Division I student-athlete.[11,14]

Athletes' Current Knowledge and Interest of Nutrition

The desire to gain a competitive advantage is prevalent today and has been seen since the 1908 Olympic Games. As displayed in Grandjeans' research, athletes in the 1908 Olympics would drink alcohol as an ergogenic aid. This was an accepted behavior, prior to and during training. Performance enhancing supplements have clearly evolved; however, it is obvious that athletes were willing to consume any substance that would allegedly increase their performance.[1] The athletes' desire to gain a competitive advantage is still highly prevalent today.[5]

The *Joint Position Statement* made recommendations regarding how much, how often and what is best to eat and drink; however, research shows that athletes are not very knowledgeable about the basic principles of nutrition.[6] From carbohydrate, fat, and protein intake to vitamins, minerals and supplements, athletes lack perspective on what their bodies need, especially during training.[6,12,25,27] Student-athletes' nutritional needs and interests were revealed, and the study concluded that most student-athletes have an interest in learning how to eat properly and do believe that nutrition enhances performance.[13,19]

Yelverton surveyed 174 student-athletes and 53% reported concern for nutrition knowledge; 42% specifically expressed a concern with "what and how to eat healthy".[19] Literature shows that student-athletes are lacking knowledge regarding nutrition;[10,12,13,19]

however, their willingness to become more knowledgeable is evident because some seek advice from various medical professionals in their sports medicine department.[13,19,21,28]

Who Athletes Rely on For Information

Athletes often solicit ATs, SCSs, nutritionists/RDs or other athletic department personnel for nutrition advice. With busy schedules and keeping up with on and off the field demands, student-athletes need reliable resources readily available to assist them in their many goals. The sports medicine/wellness team includes: ATs, SCSs, nutritionist/RDs, physicians, coaches, academic counselors, sports psychologists, and self-referred athletes. The goals of the sports medicine team include: assessment, diagnosis, treatment, education, and/or referral to the best-trained medical professional for providing care to a student-athlete. This approach, described by Quatromoni, stresses the importance of identifying student-athletes' with compromised health and then referring them for help.[14] Each professional plays a pivotal role in providing healthcare to student-athletes. With combined care under an AT, SCS and nutritionist/RD, the student-athlete should be evaluated, treated, and educated by the appropriate provider.[14,21,22,29,30]

Athletic Trainer

The National Athletic Trainers' Association, 5th edition of the Athletic Training Education Competencies, lists the required knowledge, skills, clinical abilities that a student in professional AT programs must learn. The competencies expect ATs to understand the content areas of: evidence based practice, prevention and health promotion, clinical examination and diagnosis, acute care of injuries and illnesses, therapeutic interventions, psychosocial strategies and referral, healthcare administration, professional development and responsibility, and clinical

integration proficiencies.[29] Several key principles listed within the 200 "Prevention and Health Promotion" competencies include: reading food labels, knowledge of supplements and performance enhancing drugs, analysis of body composition or health status in order to manage weight, injuries, eating disorders, and/or strength training. Suggestions for macronutrients, micronutrients, and hydration and electrolyte replacement, before, during and after exercise are also listed items in the scope of an ATs practice.[29]

The NATA strongly recommends all practicing ATs utilize and implement evidence-based practices published by the NATA. An updated listed of "Position Statements" and "Consensus Statements" provide best practices that all ATs are expected to follow when managing specific health concerns.[29] Nutrition and performance related position statements include: "Fluid Replacement for Athletes";[31] "Evaluation of Dietary Supplements for Performance Nutrition";[32] "Preventing, Detecting, and Managing Disordered Eating in Athletes";[33] and "Safe Weight Loss and Maintenance Practices in Sport and Exercise".[34] Comprehensive prerequisite knowledge by the AT allows them to identify potential nutrition problems in the student-athlete.[29,30] In the event an AT feels their student-athlete needs nutrition therapy, they should be referred to a nutritionist/RD for their professional services.[4,6,14]

Strength and Conditioning Specialist

Strength and conditioning specialists (SCSs) can also be known as strength and conditioning coaches, fitness professionals, or certified personal trainers. All of these can be interchangeably used, according to Santana.[30] The SCS is regarded to have adequate training in providing general nutrition advice when analyzing food labels and recommending goals for improved health and fitness.[30,35] As previously mentioned by multiple authors, supplementing

nutrition with exercise will allow for optimal performance.[1-6,8-12] Santana states that the SCS is the best fit to providing general nutrition advice since SCSs have training in both exercise and nutrition.[30] The National Strength and Condition Association's (NSCA) offers a variety of certifications.[35] The "Certified Strength and Conditioning Specialist" (CSCS) and "National Strength and Conditioning Association- Certified Personal Trainer" (NSCA-CPT) certifications, commonly seen in collegiate athletics, require a standard level of knowledge.[30,35] Knowledge levels are tested by the NSCA during certification examination and must be appropriately demonstrated prior earning the CSCS or NSCA-CPT certification.

Some certifications require a bachelor's degree from an accredited program in order to be a candidate for the exam.[30,35] The CSCS certification is one that is more reputable due to its structured requirements. Conversely, not all aspiring fitness professionals require a bachelor's degree for their certifications.[35] Although most SCSs appear to have basic nutrition knowledge, lack of regulation for various certifications as an SCS may discredit or question the certification process. As Santana explain, many SCSs understand that it is their responsibility to recognize issues out of their scope of practice and refer the athlete to a nutritionist for nutrition therapy.[30,35]

Registered Dietitian/Sports Nutritionist

According to the *Joint Position Statement* on nutrition and athletic performance, the role of a sports nutritionist includes everything from individual nutritional assessments, to educating student-athletes on the importance of nutrition for health and performance. Their many responsibilities include reducing risk of illness and injury while aiding in recovery. The nutritionist/RD also plays a key role in meal planning, preparation, or suggestion, prior to and

following exercise.[6,17,21,24] The *Joint Position Statement* lists the expected competence level of a sports dietitian, in order to provide any athlete with the best care. Some of these include: the ability to evaluate, assess, educate, diagnose, treat, plan, and manage nutrition issues or problems that hinder performance and health of an athlete. These can all be done through a thorough evaluation summarized with a personalized plan of action.[6]

The sports dietitian is also a member of the multidisciplinary, sports medicine team.[6] The difference between a nutritionist/RD and SCS is that nutritionists/RDs can legally provide nutrition therapy whereas SCSs and ATs cannot.[6,30,35] Although state laws vary in the degree of who can provide care with nutrition services, many states differentiate between assessing, counseling, and educating patients.[30]

Prior to recent changes made by the NCAA, nutritionists/RDs were not consistently found members on each sports medicine teams. An increased demand for their services within the last decade has led sports medicine teams to add a nutritionist/RD on staff.[13,14,16,20-22] As some researcher's found, providing additional nutrition services also energizes athletes to work through a through full day of competition and exercise.[4,6,36] The extent of increased performance is still being researched but a positive relationship was found between nutrition knowledge of athletes and winning competitions.[36]

Others

CHAMPS/Life Skills staff (Challenging Athletes' Mind for Personal Success), physicians, coaches, parents, friends, and the internet are a few other sources student-athletes may seek for access to nutrition information.[9,11,12,14,16,19,22,24,25] In 1994, the NCAA added the position of the CHAMPS/Life Skills staff. This staff member assists student-athletes with

developing transitional skills, as many of them attempt to balance stress from academics, social, athletic, and family needs. Since nutrition is an individual need of the athlete, it falls under the category of personal development.[11,24] Coaches, parents, friends, and the internet have been sited as sources for nutrition information; [9,11,12,14,16,19,22,24,25] however, there is no data to support the idea that they possess consistent training in nutrition.[16,37]

Comparison of ATs, SCSs, Nutritionist/RDs, and Coaches

Multiple studies found that although some universities have a nutritionist/RD on staff, student-athletes approached an AT or SCS most often for nutritional advice[16,19,10] Because of this frequent contact, the AT and SCS should be fully knowledgeable and prepared to assist student-athletes regarding sports nutrition concerns.[16,22] Several researchers have examined the basic nutrition knowledge of ATs, SCSs and coaches, and have found that ATs were the most knowledgeable of the three.[16,22,25] Torres-McGehee et al. found that collegiate ATs and SCSs had enough basic knowledge on nutrition; however, she concluded that the magnitude of responsibilities put on them might hinder their ability to provide the full services to student-athletes. Although she found that 50.8% of student-athletes had access to a nutritionist/RD, they did not rank the nutritionist/RD as a top choice for nutrition information. Torres-McGehee et al. also stressed the importance in referring the student-athlete to a nutritionist/RD when outside the ATs' scope of practice.[16] A study by Eck et al. in 1988 demonstrated that only one athlete out of 43 received nutrition information from a sports dietitian. Although this study was conducted nearly thirty years ago, this shows that nutritionists/RDs were at least present in the athletic setting.[23] Research has also found that some student-athletes did not know a nutritionist/RD was available, but they would be willing to see one, if a nutritionist/RD was available.[13,22,28]

Regulations from the NCAA

The type of foods and number of meals allowed per day was restricted by the NCAA for Division I institutions prior to 2014. It was feared that if not restricted, institutions with more resources would use it as an unfair advantage; they could provide gourmet meals and multiple meals per day as a recruiting tool.[21,38] On August 1st of 2014, the NCAA lifted the restrictions and deregulated how much, how often, and what type of foods could be provided to the student-athletes by the university. The NCAA did this to allow universities to provide student-athletes with consistent but smaller meals throughout the day. Furthermore, the NCAA wanted to give universities the option of providing their student-athletes with a large variety of higher quality foods.[20,21,38,39] Since this occurred, many institutions are paying attention to the quality and quantity of nutrition education and resources that they provide to their student-athletes.[13,19,40]

CHAPTER 3: METHODS

Subjects and Recruitment

Sixty schools were randomly selected from the 125 Division I Football Championship Subdivision (FCS) schools and 60 were randomly selected from 128 Division I Football Bowl Subdivision (FBS) schools (Table 1). The head AT or head football AT was identified by name and email address through the institutions athletic website. The one hundred and twenty ATs were then reached through email and invited to complete the questionnaire based on their knowledge and experience as the Division I collegiate AT for the football program. The initial recruitment message contained information about the researchers, the purpose of the study, the selection process, the nature of the questionnaire, and IRB information. We sent two follow-up emails; the first occurred one-week after the original request, and the second occurred two weeks following the first notice. Data was collected via an online collection site (Qualtrics, Provo, UT) during the fall of 2015. Participation required access to a computer or other mobile device with access to the internet. The research proposal was evaluated and approved as exempt from regulation by the researchers' university Institutional Review Board (IRB). Participants were informed that their completion of the questionnaire served as their consent to participate.

Questionnaire Design

The questionnaire had two sections: the first section addressed the perceived importance of nutrition and the role of the AT; and the second section asked the AT to indicate frequency and type of interactions related to nutrition, nutrition resources offered at the institution, and demographics of the institution and AT.

A review of the literature did not reveal a reliable and valid perceived importance of AT role questionnaire. Therefore, the researchers designed a series of 16 Likert questions to determine the ATs perspective (Table 2). The questions addressed their perceived level of concern (4 questions), responsibility (4 questions), qualifications (4 questions) and importance (4 questions). The four questions under the constructs of concern, responsibility, and qualifications were worded so that two assessed the ATs personal perspective ("I am…") and two assessed their perception of ATs in collegiate settings ("ATs in collegiate settings should be/are…"). The fourth construct assessed the participant's perspective on the overall attitude and importance placed on nutrition for football student-athletes at their institution. Participants were asked to report "strongly disagree", "disagree", "neither agree nor disagree", "agree" or "strongly agree" regarding each of the sixteen statements given.

Questions were phrased to best gain information on the relationships, responsibilities, and functions of the various personnel in charge of providing nutritional information to football student-athletes, five tables requesting demographic information were included. Participants were instructed to answer based on their current role as the football AT. The first section (Table 3) asked how many times per week the AT was approached, gave nutrition advice, and referred a football player to a nutritionist. Participants were asked to check only one answer and the choices were: 0, 1-3, 4-6, 7-9, 10-12, 13-15, 16-18, 19-21 and >21. The second section asked participants to identify the managed the nutritional needs of the football players (Table 4). Participants were asked to select "all that apply" from the following list: athletic trainer (AT), nutritionist/RD, strength and conditioning specialist (SCS), coaches, CHAMPS/Life Skills staff, physician, other and none. The third table asked which professional the football players primarily sought for

advice; who was responsible for creating the menu for team meals/snacks on non-game days; and who was responsible for creating the menu for team meals/snacks prior to and following games. Participants were asked to select "select only one answer" from the following list: AT, nutritionist/RD, SCS, coaches, CHAMPS/Life Skills staff, physician, other and none.

Section four (Table 5) listed 11 informative education resources. Participants were asked to check if the resources were provided to their football players. Participants were also asked to specify how often are these resources were readily updated/posted for the football players to access/view. They were able to choose from the following choices: "No", "1-2 times a semester", "1-2 times a month", "1-2 times a week", and "3-4 times a week". Table 5 also listed interactive nutrition education resources. Participants were asked to report how often each resource was provided based on the following choices: "Never", "Weekly", "Monthly", "Once a Year" and "Twice a Year".

The six multiple-choice "smart questions" asked participants to answer the questions assuming the reference person was a full scholarship football player (since some institutions exclude partial scholarship players from meal plans). Question one asked participants to reveal if their football players had a nutrition assessment done "at some point" during their time at your institution. If participants answered "Yes" they were asked to specify who facilitates the assessment and analysis by indicating all personnel involved from the following list: AT, nutritionist/RD, SCS, coach, CHAMPS/Life Skills staff, physician, and other. If the participant answered "No" to the original question they were asked to specify why by choosing all answers that applied to their situation based on the given list: "Because it is not mandatory for players",

"Because it is not important", "Because it is not important to the athlete", and "Other (please specify)".

Question two asked participants if their athletic department provided football players' access to a nutritionist. If "Yes" was selected, participants were asked three additional sub-questions. The first asked if each football player was required to meet with that nutritionist. Participants were able to answer this based on the following choices: "Yes, at least once during their time at the institution", "Yes, at least once per year", and "The student-athletes are not required to meet with the nutritionist". The second sub-question asked participants to specify the employment status of the nutritionist by selecting any applicable answer choice from the following: "Full-time athletics (30-40 hours)", "Part-time athletics (nc-30 hours)", "Part-time athletics (10-20 hours)", "Private practice contracted", "On-campus", "Off-campus" and "Other (please specify)". The third sub-second question asked participants how many football players the nutritionist sees every week. Participants were able to choose from the following answers: "0", "1-3", "4-6", "7-9", "10-12", "13-15", "16-18", "19-21" and "More than 21". If the participants answered "No" to the original question, they were asked to specify why. Participants were asked to choose all that applied to their scenario from the following answer choices: "It is not in the budget", "It is not a priority of the staff", "It is not requested by football players", "The football players should take responsibility for this", and "Other (please specify)".

Question three asked participants if their athletic department requires football players to take a nutrition course (for class credit). Participants were asked to choose one of the following: "Yes", "No", or "No, but nutrition is offered as an elective course for student-athletes to take".

Question four asked participants if the institution provided a training table, cafeteria or dining hall exclusively for football players. Participants could choose "Yes" or "No". If "No" was selected, participants were asked where their football players got their food. Participants were asked to select all that apply from the following choices: "Stipend- they buy their own food/cook their own meals", "School cafeteria", "Restaurant catering" and "Other (please specify)".

Question five asked participants if added guidance regarding food choice was provided at each meal. If the participant said "Yes" to this question they were asked to specify the type of guidance provided. Choices included: "Color coded meals (red, yellow, green)", "Rotating menu cycle (weekly/every day 10 days)", "Nutritionist present at meals", and "Other (please specify)". If "No" was answered, participants were asked to give their insight on factors that influenced the football players diet, in the absence of a guidance system. Participants were asked to "check all that apply" from the following choices: "They just eat what they want", "Education through nutrition classes provided by the university", "Knowledge based on outside sources such as the Internet, teammates, and parents", "Advice from team nutritionist (or medical professional playing the role of the nutritionist" and "Other (please specify)".

Question six asked participants if their institution provided football players access to a snack/nutrition bar in between meals. If "Yes" was selected, participants were asked to check all that apply from the list: "Protein bars", "Protein shakes/smoothies", "Protein powder", "Fruit", "Nuts", "Peanut Butter", "Yogurt", "Milk", "Sandwiches/bagels", "Honey", "Spinach/kale" and "Other (please specify)". If "No" was selected in the original question, participants were asked to specify why. Participants were asked to check all that apply based on the following choices: "It

is not in the budget", "It is not a priority to the staff", "The football players should take responsibility for this", "The football players can provide their own snacks" and "Other (please specify)".

The survey concluded with 2 demographic questions to categorize participants based on division of competition. Participants were presented with the two choices as: "Division I FBS" and "Division I FCS". The final question asked the participants to report all credentials or certifications they currently hold.

Questionnaire Validity and Reliability

A review of literature was used to determine appropriate topics for questions and a questionnaire was constructed. The questionnaire was given to five ATs: two ATs serving as faculty in a professional AT program; two ATs serving as staff in a Division I institution; and one AT serving as the head athletic trainer in a Division I football program. The questionnaire was also given to two registered dietitians, including a sports nutritionist affiliated with a Division I institution. Each person evaluated the questionnaire for completeness, clarity, and accuracy. The questionnaire was revised according to their feedback.

Following data collection, a post-metric analysis was conducted to examine reliability. Cronbach's Alpha value for all 16 Likert scale items was 0.842. Aggregate scores were created for the four factors: concerned, responsible, qualified, and importance. Descriptive statistics were used to calculate means and standard deviations for the four factor scores. Answers of "strongly disagree", "disagree", "neither agree nor disagree", "agree" or "strongly agree" and points were assigned as 1, 2, 3, 4, 5, respectively. Therefore, the maximum value one participant could score on each construct was a 20 (5 x 4 questions) and the minimum was 4 (1 x 4

questions). Cronbach's Alpha values for the four factors/constructs of concerned, responsible, qualified, and importance were .836, .819, .900, and .785 respectively. The questionnaire as well as the four factor scores were found to have an optimal level of internal consistency.

Statistical Analysis

The results were analyzed using SPSS version 21 (SPSS IBM, New York, U.S.A.). Frequencies were calculated for each question. Descriptive statistics were used to calculate means and standard deviations for concerned scores, responsible scores, qualified scores, importance scores, and nutrition education resources. Aggregate scores were created from the nutrition education resources reported by participants. If the participant answered "No", they were awarded zero points. If the participants indicated yes by selecting a frequency of availability (ex. 1-2x/semester), they were awarded one point. There were 11 resources listed and therefore the range of total points for each participant could be between zero and 11. An independent samples t-test was conducted to determine if there was a difference in the nutrition education resource score that was dependent on the institution's athletic division (FBS or FCS). The initial alpha level was set at $p \leq .05$.

CHAPTER 4: RESULTS

Response Rate and Participant Data

Of the 120 ATs contacted for participation, 33 responded (27.5%). Three participants began the survey but stopped after the first question thus data was only collected for 30 participants. This yielded a response rate of 25%. All thirty participants indicated that they were currently a practicing AT in a Division I collegiate setting who has oversight and/or clinical responsibility for the football team. Fifteen (50%) participants indicated that their institutions were in the Football Bowl Subdivision (FBS; formerly Division I-A), 13 participants (43.3.4%) indicated that their institutions were in the Football Championship Subdivision (FCS; formerly Division I-AA) and 2 participants (6.7%) did not answer this question. Every participant (n=27, 100%) who answered the final question confirmed that they currently held the ATC ® credential, and six of the 27 (22.2%) held, or currently hold, credentials related to strength and conditioning (Table 1).

Thirty (100%) participants responded to all sixteen Likert scale questions and results are included in Table 2.

Concerned Score

The mean score (n=30) on the concerned section was 16.53 ± 2.662 out of a possible 20 points. This means that participants, for the most part, agreed with the statements that they are concerned, or that overall, ATs should be concerned (Table 2). Skewness (-.422) and kurtosis (-.440) were reasonable; however, Shapiro-Wilks Test of normality (p = <.011) histogram and Q-Q plots indicated non-normality.

Responsible Score

The mean score (n=30) on the responsible section was 12.90 ± 2.833 out of a possible 20. This means that the participants felt between neutral and slight agreement regarding their own responsibility, or that overall; ATs should feel responsible (Table 2). Skewness (-155) and kurtosis (.790), Shapiro-Wilks Test of normality (p = <.430), histogram, and Q-Q plots all indicated that normality is a reasonable assumption.

Qualified Score

The mean score (n=30) on the qualified section was 14.70 ± 2.891 out of a possible 20. This means that participants generally agreed that they are qualified, and that ATs overall are qualified (Table 2). Skewness (-1.111) and kurtosis (1.336) were reasonable; however, Shapiro-Wilks Test of normality (p = <.003) histogram and Q-Q plots indicated non-normality.

Importance Score

The mean score (n=30) on the qualified section was 18.37 ± 1.771 out of a possible 20. This means that participants highly agreed that nutrition was important (Table 2). Skewness (-.562) and kurtosis (-1.419) were reasonable; however, Shapiro-Wilks Test of normality (p = <.000), histogram and Q-Q plots indicated non-normality.

Advising and Referral

This section of the questionnaire asked how many football players approached the participant for nutrition advice on a weekly basis (Table 3). All 30 participants answered this question. Most participants (n=26; 86.7%) stated that they were approached by at least 1 football player per week. Of the 26 participants who said they were approached, 12 (46.2%) answered 1-

3 players per week, nine (34.6%) answered 4-6 players per week, two (7.8%) answered 10-12 players per week, and three (11.5%) answered >21 players per week.

Participants were asked how many football players they provide with nutritional advice on a weekly basis (Table 3). Most (n=24; 80%) participants answered that they provide advice to at least 1 football player weekly. Of the 24 participants who said they provide nutrition advice weekly, 10 (41.7%) answered 1-3 players per week, nine (37.5%) answered 4-6 players per week, two (8.3%) answered 10-12 players per week, one (4.2%) answered 16-18 players per week, and two (8.3%) answered >21 players per week.

Participants reported their knowledge on how many football players they refer to a nutritionist/registered dietitian on a weekly basis (Table 3). Most (n=22, 73.3%) stated that they refer at least one football player weekly. Of the 22 participants who refer at least one football player weekly, nine (40.9%) answered 1-3 players per week, four (18.2%) answered 4-6 players per week, three (13.6%) answered 10-12 players per week, and two (9.0%) answered 13-15 players per week, one (4.5%) answered 16-18 players per week and three (13.6%) answered >21 players per week.

Access to an RD

Participants were asked if their athletic department provides football players with access to a nutritionist and 29 participants responded. Of the 29, twenty (69%) said "Yes" and nine (31%) said "No". Three additional sub-questions were asked of the 20 participants who said "Yes". The first sub-question asked the 20 participants if each football player is required to meet with the nutritionist. Thirteen (65%) said "The student-athletes are not required to meet with the

nutritionist", four (20%) answered "Yes, at least once during their time at the institution" and three (15%) answered "Yes, at least once per year".

The second sub-question asked the 20 participants to specify the employment status of the nutritionist by selecting all choices that applied. Six (30%) reported that their nutritionist is "full-time athletics (30-40 hours)", three (15%) said "part-time athletics (20-30 hours)", five (25%) said "part-time athletics (10-20 hours)", one (5%) said "part-time athletics (less than 10 hours)' and two (10%) said "private practice or contracted". Six (30%) reported that their nutritionist is "on-campus", two (10%) reported "off-campus", and two (10%) reported "other".

The third sub-question asked the 20 participants to approximate how many football players are seen by their nutritionist on a weekly basis. Two (10%) participants answered "0", nine (45%) answered "1-3", four (20%) answered "4-6", one (5%) answered "10-12", two (10%) answered "16-18" and two (10%) answered ">21".

The nine (31%) participants who answered "No" to the original question regarding access to a nutritionist were asked to provide the best reasoning why football players do not have access to a nutritionist. Participants were allowed to check one more than one response. Most (n=7, 77.8%) participants answered "It is not in the budget", while three (33.3%) answered, "It is not a priority of the staff".

Source of Education

Participants were questioned on which person is responsible for educating football players about nutrition (Table 3). Participants were able to select more than one response. Participants chose SCS most often (n=26, 86.7%), then the AT (n=23, 76.7%), nutritionist/RD

(n=21, 70%), physician (n=8, 26.7%), coach (n=5, 16.7%), and CHAMPS/Life Skills staff (n=1, 0.33%).

Roles in Managing Nutritional Needs

Participants were asked who helps football players manage dietary health restrictions (ex. vegan, allergy)" at their institution (Table 3). Participants were able to select more than one response. Participants chose nutritionist/RD most often (n=21, 70%), then AT (n=17, 56.7%), SCS (n=11, 36.7%%), physician (n=7, 23.3%), and coach (n=2, 6.7%). No participants chose the CHAMPS/Life Skills staff.

Participants reported their knowledge on the main personnel that help football players manage SPECIFIC medical conditions related to nutrition (ex. diabetes, anemia) at their institution (Table 3). Participants were able to select more than one response. Participants chose AT most often (n=26, 86.7%), then nutritionist/RD (n=21, 70%), physician (n=18, 60%), and SCS (n=3, 10%). No participants chose the coaches or CHAMPS/Life Skills staff.

Most Likely Sought

Participants were questioned which person is the football player is most likely to seek nutritional advice from FIRST (Table 4). Participants were asked to select only one answer. The AT was selected most often (n=11; 36.7%). SCS was a close second (n=10; 33.3%) followed by nutritionist/RD (n=7; 23.3%) and coach (n=2; 6.7%). No participants chose the CHAMPS/Life Skills staff, or physician.

Creates Team Meals

Participants reported their knowledge on who created the menu for team meals/snacks during non-game days at their institution (Table 4). They were asked to select only one answer. The nutritionist/RD was selected most (n=12, 40%), followed by the SCS (n=7;23.3%), coach (n=7;23.3%) and other (n=3;10%). No participants chose the AT, CHAMPS/Life Skills staff, or physician.

Participants were asked, who creates the menu for team meals/snack prior to and following games at their institution (Table 4). Eleven (36.7%) participants chose the coaches, followed by nutritionist/RD (n= 9;30%), SCS (n=6;20%), AT (n=2;6.7%) and other (n=2;6.7%). No participants chose the CHAMPS/Life Skills staff, or physician.

Availability of Nutrition Education Resources

Participants were questioned whether their athletic department requires football players to take a nutrition course (for class credit). All (n=29; 100%) participants said "No" but 14 of the 29 (48.3%) selected, "No, but nutrition is offered as an elective course for student-athletes to take".

Participants reported their knowledge on the educational and interactive nutrition education resources provided at their institution. Results are reported in Table 5.

Nutritional Assessment

Participants were asked if each football player partakes in a nutritional assessment "at some point" during their time at their institution. Of the 29 participants who responded, 51.7% (n=15) answered "Yes". The participant was then asked to report who facilitates the assessment

and analysis and were allowed to choose more than 1 answer. The most often selected answer was the nutritionist/RD (n=11, 37.9%). AT (n=4, 13.8%) and SCS (n=4, 13.8%) tied for the second most selected answer, and 2 (6.9%) chose the physician. The 14 participants (48.3%) who responded "No" to the original question were provided a drop down menu of explanations and were allowed to select more than one answer. Nine of the 14 participants (64.3%) answered "Because it is not mandatory for players" and seven (50%) answered "Other" and wrote in answers that indicated that they lacked resources.

Dining Services

Participants reported their knowledge on the availability of a training table, cafeteria, or dining hall exclusively for football players. Eight of 29 respondents (27.6%) answered "Yes" and 21 (72.4%) said "No". Those 21 were asked where the football players get their food. Participants could select more than one response. The most frequently chosen were; "School cafeteria" (n=19, 90.5%), "Stipend - they buy their own food/cook their own meals" (n=12, 57.1%), and "Restaurant catering" (n=6, 28.6%).

Participants were questioned if there was a system that provides football players with guidance in choice of foods for each meal (ex. color coded meals, rotating 10-day menu, nutritionist present at meals). Twenty-eight participants responded; 11 (39.3%) answered "Yes", and 17 answered "No" (n=17, 60.7%). The 11 who said "Yes" were asked to describe the system of guidance. Participants were allowed to select more than one answer. Eight (72.7%) participants selected "Color coded meals (red, yellow, green)", eight (72.7%) selected "Rotating Menu Cycle (weekly/every 10 days)" and six (54.5%) selected "Nutritionist present at meals". The 17 participants who answered "No" were asked to provide insight on how football players

decide what to eat for each meal. Participants were allowed to select more than one answer. The top responses included: "They just eat what they want" (n=15, 88.2%), "Advice from team nutritionist (or medical professional playing the role of the nutritionist)" (n=5, 29.4%), "Knowledge based on outside sources such as the internet, parents, and teammates" (n=4, 23.5%), and "Education through nutrition classes provided by the university" (n=2, 11.8%).

Additional Dining Resources

Participants were asked if their institution provided a snack/nutrition bar for football players to access between meals. Twenty-eight participants responded. Most (n=20, 71.4%) participants said "Yes". A follow up question requested those 20 participants to select all items that are provided. The most often chosen was "Protein bars" (n=16, 80%), "Milk" (n=15, 75%), "Peanut butter" (n=15, 75%), "Fruit" (n=14, 70%), "Sandwiches/bagels" (n=13, 65%), "Protein shakes/smoothies" (n=12, 60%), "Nuts" (n=11, 55%), "Yogurt" (n=10, 50%), "Protein powder" (n=7, 35%) and "Honey" (n=6, 30%). The eight (28.6%) participants who answered "No" to providing a snack bar were asked to answer "Why" and to select all answers that applied. Eight (100%) selected, "It was not in the budget" while 3 (37.5%) responses selected "It is not a priority of the staff".

Comparing Results FBS vs FCS

Access to an RD

Frequencies were calculated to determine how many institutions provided access to a nutritionist/RD. Of the 28 who answered both of these questions, 19 (67.9%) responded "Yes"

and nine (32.1%) reported "No". Of those 19 who provide access to a nutritionist, 14 (73.7%) were in the FBS and 5 (26.3%) were in the FCS.

Snack/Nutrition Bar

Frequencies were calculated to determine how many institutions provided a snack/nutrition bar in between meals. Of the 28 who answered both of these questions, 20 (71.4%) responded "Yes" and eight (28.6%) responded "No". Of those 20 who provide a snack/nutrition bar in between meals, 14 (70%) were in the FBS and 6 (30%) were in the FCS.

Training Table

Frequencies were calculated to determine how many institutions provided a training table or dining hall exclusively for football players. Of the 28 who answered both of these questions, 8 (28.6%) said "Yes" and 20 (71.4%) said "No". Of those 8 who do provide a training table exclusively for football players, 6 (75%) were in the FBS and 2 (25%) were in the FCS.

Nutrition Education Resources

All participants (n=28, 100%) indicated that their institution provided at least one type of nutrition education resource from the list of 11 nutrition education resources. An independent samples t-test was conducted to determine whether there is a significant difference between the nutrition education resource means that is dependent upon the participant's athletic division (FBS or FCS). Skewness (.239), kurtosis (-.799), Shapiro-Wilk's Test of Normality ($p = .151$), histogram, and Q-Q plots all indicated that normality was a reasonable assumption. Levine's Test of Homogeneity of Variances showed that equal variances could be assumed. There was not a significant difference between the nutrition education resources means of the Division I FBS

(x=5.20, SD=2.62) and the Division I FCS (x=4.54, SD 2.22) groups (t (26) = .714, p=.482). The small sample size likely lacked the power to determine if an actual difference in means exists between FBS and FCS institutions.

CHAPTER 5: DISCUSSION

Introduction

Although past studies have looked at the student-athlete's perspective, this research gathered the ATs perspective on the nutritional resources offered at each of their Division I football institutions. Previous research found that student-athletes seek out a person on the sports medicine team (the AT, SCS, nutritionist/RD, physician, etc), a parent, or a teammate, when looking for nutrition advice.[9,11,12,14,16,19,22,24,25] Many studies found that the AT or SCS were most commonly pursued for nutrition information;[10,12,16,19,22,23] however, researchers challenge the knowledge level of ATs and SCSs.[13,14,16,25,27] As proposed benefits of nutrition becomes more prevalent, many Division I institutions are adding components of nutrition support for their student-athlete in the form of education, dining services, and nutritionist/RD availability.[13,19,21,38,40]

The Importance of Nutrition

With high exercise demands of a Division I football player, it is important student-athletes receive proper nutrients to refuel and recover. Education resources should also be provided to these student-athlete, as this will help them understand how nutrition can impact their health during and after their times as athletes. Many researchers have found that most student-athletes lack nutrition knowledge;[10,12,13,19] despite this, many student-athletes are interested in receiving nutrition education to better understand its' impacts on performance.[13,19,21] This study found that ATs are clearly concerned about what their football players consume and they also believe nutrition is important for performance (Table 2). Although we did not study the nutritionist/RDs, SCSs, and coaches' perspectives, much research finds that nutritionists/RDs

desire to assist in providing nutrition support,[4-6,11,13,21,22,24,38,40] while many SCSs also promote a balance of proper diet with exercise.[30,35] On a national level, the NCAA is concerned about student-athlete health and diet as they have recently taken action to create healthy environments for their student-athletes.[13,20,38,40]

Roles and Role Strain

Questions arise concerning who is, or should be responsible for providing nutrition support to student-athletes. This study found that although 69% of institutions provide a nutritionist/RD, most nutritionist/RDs are not full-time (70%). Seventy-three percent of ATs did report that they refer at least 1-3 football player per week, to a nutritionist/RD (Table 3). Additionally, 86.7% (n=26) of ATs chose the SCS as the responsible sports medicine personnel to provide general nutrition education to football players (Table 5). When asked about specific medical and clinical matters, the AT predominantly chose the nutritionist/RD, physician and themselves (AT). Since the AT mainly chose medical professionals as appropriate sources for managing clinical issues, it can be concluded that the AT mainly sees the SCS as an appropriate source for education of general nutrition principles rather than appropriate for managing those with specific nutritional issues. This may explain why the AT reported that they felt qualified yet unsure about their responsibility to provide education to their football players; they may have felt the SCS is better suited to this task.

When a nutritionist/RD is not present, ATs may experience both role confusion and role strain. It can be assumed that the AT and SCS are expected to fill every nutrition responsibility when a nutritionist/RD is not on staff. All ATs must complete their education through an accredited program regulated by the Commission on Accreditation of Athletic Training

Education (CAATE) Board.[29] The regulatory board requires completion of the NATA Competencies, including knowledge in "Prevention and Health Promotion", which covers basic nutrition principles.[29] A combination of knowledge and skills in this areas such as proper food intake, nutrients, hydration, performance, and evaluations, properly prepares an entry-level AT to assist an active individual on a fundamental level.[29] The AT must complete all competencies through their accredited program prior to eligibility for licensure through the BOC ® examination.[29]

An SCS can obtain a certification through the NSCA as young as 18 years old or a graduating senior in college. Their basic knowledge does not qualify them to be certified or specialized in nutrition, either.[35] Research shows that basic nutrition integrated with exercise will not yield optimal performance.[4-6,21] Because nutritionist/RDs have a higher level of sports nutrition knowledge, the nutritionist/RD is best fit to assist with nutrition therapy. Their ability to specialize in meeting specific needs and goals of the athlete can be beneficial to the athletes' health and performance.[6,11,19-22,24]

Although the AT and SCS may not be the best resources for student-athletes to utilize when needing nutrition guidance, their knowledge does allow them to recognize and refer to an appropriate health care professional. Because the AT is frequently approached, they play a unique role as the gatekeeper in communicating student-athlete needs and managing student-athlete referrals. It is crucial that the AT understands and supports the value of the nutritionist/RD when one is available at the institution. It is also imperative for the AT to accommodate in the absence of nutritionist/RD.[14] Unless nutritionists/RDs become more

uniformly available, the AT and SCS will continue to be approached, and therefore researchers suggest an increase in nutrition educational requirements[10,12,16,19,22,25,27]

Nutrition Dining Services

ATs concerns for football players dietary intake is justified, as research shows that the many demands on a Division I college football student-athlete makes it hard for them to find the time to prepare a high quality meal. Multiple researchers found that student-athletes' admit to skipping meals and eating fast food frequently due to time constraints.[21,28] When the NCAA deregulated food for Division I student-athletes, many institutions began to provide their players with additional nutritional resources like training tables and snack bars.[20,38,39] As one researcher found, many Division I student-athletes believe a training table provides an advantage for performance and health.[13] Forty-two percent of football student-athletes from this study even said they would reallocate funds in order to have it financed.[13] This research found that 71.4% of institutions provided a snack bar for football players to access in between meal times; however, only 28.6% of institutions provide training tables or dining services exclusively for football players. This research found that 90.5% of institutions use a school cafeteria to provide meals to their football players, 57.1% provide a meal stipend, and 28.6% provide restaurant catering.

Nutrition Education Services

The findings of this study revealed that 69% (n=20) of institutions provide their football players' with access to a nutritionist. Torres-McGehee et al. found that 58.2% of ATs, SCSs, coaches and athletes at Division I, II and III institutions had access to nutritionist/RD.[16] Burns et al. found that 49.5% of Division I institutions provide athletes access to a nutritionist/RD, while

the Collegiate & Professional Sports Dietitians Association found that 39% of Division I FBS institutions provide full-nutritionists/RDs to their student-athletes.[41] Much progress has been made, as nutritionist/RDs are now making their way onto sports medicine teams in many athletic departments.

Researchers have found that student-athletes are interested in improving their nutrition habits.[19,21,38] Many institutions are educating student-athletes on basic eating, cooking, and purchasing of foods.[20,21,24] Although this study found that 100% of FBS and FCS institutions are providing at least one resource from the 10 listed in Table 5, athletic departments are not mandating that student-athletes use the resources provided. For example, nearly half of the ATs in this study said that nutrition was offered as an elective for student-athletes to take; however, it was not required. Additionally, 24.1% of ATs reasoned that players did not undergo a nutrition assessment because it was not mandatory for the players to do so.

This research found that 100% of FBS and FCS institutions are providing at least one type of nutrition education resource (Table 5). When comparing the nutrition support for FBS and FCS institutions, it is seen that the FBS institutions provide more support than FCS institutions (Figure 1-4). At least one form of nutrition education was provided at every institution (100%). As previously stated, the AT reported the SCS as the primary person responsible for educating football player. This suggests that in the absence of a nutritionist/RD, the AT or SCS is likely providing nutrition education. Since only 69% of institutions reported having a nutritionist/RD and 74% of those institutions represent FBS institutions, it can also be concluded that the AT and SCS have more nutrition-related responsibilities at FCS institutions.

This again aids the argument nutrition education content should be increased during the education of both the AT and SCS.

Specifically we found that institutions are providing signs in lockers/bathrooms (76.7%), pamphlets/handouts (66.7%), personalized education sessions (51.7%), and team educational sessions (82.8%) at least once per year. A study in 2004 conducted by Burns et al, found very similar data, revealing that institutions provided brochures and handouts (75%), personalized counseling (47.5%) and group classes (70%) at least once per year as well.[22] Although this study had a smaller sample size, the percentages were all similar. With only a slight increase in the percentages of provided resources from now compared to 2004, it is suggested by authors that nutrition education needs to increase.[9,11,12,16,19,21,27]

FBS vs FCS Comparison

The NCAA's Eleven-Year Trends in Division 1 Athletics breaks down revenues and expenses in the FBS and FCS.[42] The FBS primarily generated income from ticket sales, alumni contributions, and NCAA/conference distributions.[43,44] Because FBS teams have the ability to compete in major bowl games, such a BCS Bowl Series, they are able to generate greater revenue. A large increase in funds comes from television contracts, selling of team merchandise, bowl games, and earned championships. The FBS has primary expenses in salaries and benefits, grants-in-aid, and facilities and maintenance. The FCS primarily generates income from direct institution support, student fees, indirect institution support, and alumni contributions.[42-44] Although FCS institutions can earn championships, the fan base and alumni contributions are only 8% of their generated revenue where as the FBS alumni contribute to 21% of the revenue.[42,43]

It was reported that FBS institutions have a median budget of $45,887,000 and FCS institutions have a median budget of $12,019,000.[42,44] The NCAA's data on the finances of college athletics from 2013 shows that 84% of institutions in the FBS have more expenses than generated revenue.[45] Conversely, FCS institutions saw positive generated income.[45] One researcher found that, overall FCS institutions spend less money on coaches' salaries, grants-in-aid, and median expense per athlete.[44] Interestingly this seems to contradict our findings since FBS institutions were found to provide more resources than FCS institutions; however, this could be explained by the difference in budget size of each affiliation. Authors also found that football was the primary major money generator, and men's basketball was secondary. Institutions that struggle the most financially are those that are unsuccessful in both sports.[44]

Proposed Benefits of Spending and Investing

One FBS institution and football program that shows the power of spending and investing money is the 2016 National Champions of College Football, the Alabama Crimson Tide. They are only the eighth highest valued team yet generate the second most amount in revenue. They spent $51 million of their $97 million generated, on their football program alone.[46] Although there is no break down of where that money is spent, according to the institution's information, they have 3 nutritionists on staff;[47] provide at least 1 nutrient dense meal per day, and have many fast and healthy snacks available throughout the day for student-athletes.[40] The reward for investing money for resources and support has shown to pay off in winnings for this football program.

Researchers have found that winning can significantly impact a university in multiple ways. [48-51] Walker studied the financial effects on Division I colleges after winning a major BCS

football game or making an appearance to the Final Four in men's basketball. His results found private contributions doubled over two years.[49] Additionally several researchers found that winning increased the academic competition, academic reputation, and donations brought in to the university and athletic department. [48-51]

This research found that there is a difference in resource availability based on Division affiliation. Although this study only had 30 participants and therefore lacked statistical power, the data does suggest that a correlation is likely between FBS institutions and FCS institutions. When we compared data from participants in FBS versus FCS institutions we found that 73.7% (n=14) of FBS institutions had nutritionists and only 26.3% (n=5) of FCS institutions provided a nutritionist. According to this study, FBS institutions provided more nutrition resources than FCS institutions. Twenty institutions reported providing a snack bar in between meals. Fourteen (70%) of the institutions were in the FBS and 6 (30%) were in the FCS. When participants answered why they did not provide player's access to a nutritionist, 77.8% (n=7) said "It is not in the budget".

It is logical to conclude that FBS institutions provide more nutritional resources than FCS institutions due largely in part to increased overall revenue generated. These results can suggest the financial state of FBS institutions regarding revenue, expenses, and allocation funds. With higher demands for nutrition services and/or efficient budgeting within an athletic department, it is suggested that more FBS institutions are making it a priority to hire a full-time nutritionist/RD, provide a training table/dining services, a snack bar, and more educational nutrition resources to student-athletes.

Limitations

The voluntary participation of the AT could limit the sample size and could potentially lead to bias or misrepresentation of data scores. Those who are not listed as head ATs at their institutions or as the AT for their football team were not included on the list. The questionnaire was also sent out in the middle of football season, as many ATs may be busy during that time and could have disregarded the email. Interpretation of the context in the survey could have lead to inaccurate answering by the participant. A lack of knowledge by the participants' pertaining to the nutrition services provided at their institution and/or their personal involvement with student-athletes could have yielded inaccurate responses.

Recommendations

Future studies should be interested in the rank in which student-athletes seek ATs for advice in regard to physical, psychological, and nutritional needs. Knowledge of the level of concerns and requests by student-athletes when approaching their ATs and SCSs can analyze the common needs of the student-athlete. This can help estimate the frequency of each demanded service and whether additional staff members are desired to reach the needs of student-athletes.

Future research should also question student-athletes, SCSs and nutritionists/RDs regarding their perspective on the quality, quantity and various educational resources provided at their institution. With the recent deregulation of food by the NCAA, a comparison study should examine the student-athletes' eating habits during college and following their college careers. This can measure the longevity of nutrition education provided to student-athletes.

With many institutions adding nutrition programs, it is important to evaluate who is making the decision regarding nutrition resources at NCAA institutions, as well as the motives

behind these decisions. This includes an examination of the many influences behind the allocation of money. This also includes where money is spent within each football program, and who has the power to spend it (coaches, athletic director, sports medicine staff, etc).

Research should also examine the NCAA's role in regulating various staff/positions of Division I athletic departments. Scientific evidence of nutrition's impact on student-athlete's current performance and future health should provide the NCAA with reason to require Division I, II, and III programs to provide a full-time nutritionist/RD for student-athletes.

CHAPTER 6: CONCLUSIONS

It is the job of all health professionals to assist their patients in safely achieving maximal health and peak performance. With the high performance demands put on Division I college football athletes, it is to the benefit of the student-athlete to receive assistance from the best-qualified individual. The AT perceives the ATs and SCSs as the primary professionals approached for nutrition advice by student-athletes. The AT feels the SCS, AT, and nutritionist/RD all play a role in providing education to student-athletes; however the AT perceives clinical issues such as dietary restrictions and medical conditions to only be managed by health care providers (ATs, nutritionist/RDs, and physicians). Due to frequent contact, it is assumed that ATs take on many of these responsibilities in the absence of immediate contact with a nutritionist/RD or physician.

In brief, it can be understood as to why the role of the AT may be strained, as their various skills and services are in high demand. As this study has shown, meeting all of the necessary nutrition demands of a football players in Division I institutions, may not be possible without the help of nutritionist/RD. When an institution does not provide a nutritionist/RD, the AT and SCS share the added responsibilities, suggesting that ATs and SCSs should advance in nutrition knowledge. It is also important for ATs to advocate for the presence of a nutritionist/RD as an important contributor to the student-athletes' health and performance. An increase in the number of nutritionists/RDs may reduce role strain and stress on the AT and allow them to concentrate their efforts on other healthcare tasks.

Appendix A: Questionnaire

Default Question Block

Nutritional Resources for Student-Athletes in Division I College Football Institutions: The Athletic Trainer's Perspective and Role

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Your are being invited to take part in a research study. Whether you take part is up to you.

The purpose of this study is to examine the quantity, quality and variety of nutritional support offered to division I student-athletes who participate in football. Additionally, the purpose is to gain the perspective of the athletic trainer with regard to their role in educating student-athletes on basic nutrition principles.

This research involves the completion of a questionnaire. The questionnaire will asses the athletic trainers opinion on the importance of nutrition, the athletic trainers perceived knowledge, actual knowledge, prevention practices, and demographic information. You will not have to answer any question you do not wish to answer. You can discontinue participation at any time. Your identity will not be revealed as your answers are reported anonymously.
This survey should take no longer than 10 minutes.

You must be 18 years of age or older to take part in this research study.

Study contact for questions about the study or to report a problem: If you have questions, concerns, or complaints If you have questions, concerns, or complaints, or think the research has hurt you, talk to Kristen C. Schellhase, Faculty, Department of Health Professions, (407) 823-3463, Kristen.schellhase@ucf.edu, or Giovanna Giannini, Athletic Training Student, (941) 350-2775.

IRB contact about your rights in the study or to report a complaint: Research at the University of Central Florida involving human participants is carried out under the oversight of the Institutional Review Board (UCF IRB). This research has been reviewed and approved by the IRB. For information about the rights of people who take part in research, please contact: Institutional Review Board, University of Central Florida, Office of Research & Commercialization, 12201 Research Parkway, Suite 501, Orlando, FL 32826-3246 or by telephone at (407) 823-2901.

By choosing "yes", I certify that I am an athletic trainer who oversees the football program and I consent to take part in this questionnaire.

Yes

No

Please answer the following questions according to <u>your</u> beliefs regarding nutrition in football players.

	Strongly disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I am concerned about the **quality** of the food that my football players consume.	○	○	○	○	○
It is my responsibility to teach my football players about nutrition.	○	○	○	○	○
I am qualified to give football players advice about nutrition.	○	○	○	○	○
It is important that football players are educated about proper nutrition.	○	○	○	○	○
I am concerned about the **quantity** of the food that my football players consume.	○	○	○	○	○
It is my responsibility to promote proper eating habits among football players.	○	○	○	○	○
I am qualified to educate football players about how nutrition prevents injury.	○	○	○	○	○
It is important that football players eat properly.	○	○	○	○	○
ATs in collegiate settings should be concerned about the **quality** of the food that their football players consume.	○	○	○	○	○
ATs in collegiate settings should be responsible for teaching football players about nutrition.	○	○	○	○	○
ATs in collegiate settings are qualified to give football players advice about nutrition.	○	○	○	○	○
If football players do not eat properly, their performance will	○	○	○	○	○

decline.					
ATs in collegiate settings should be concerned about the **quantity** of the food that their football players consume.	○	○	○	○	○
ATs in collegiate settings should be responsible for promoting proper eating habits among football players.	○	○	○	○	○
ATs in collegiate settings are qualified to educate football players about how nutrition prevents injury.	○	○	○	○	○
Providing nutritional resources and educating the football players is important for their future.	○	○	○	○	○

Please answer the following questions based on your role as an athletic trainer for the football team at your institution.

On a weekly basis.....

	0	1-3	4-6	7-9	10-12	13-15	16-18	19-21	>21
How many football players **approach** you for nutrition advice?	○	○	○	○	○	○	○	○	○
How many football players do you **provide** with nutrition advice?	○	○	○	○	○	○	○	○	○
How many football players do you **refer** to a nutritionist/ registered dietitian?	○	○	○	○	○	○	○	○	○

Please answer the following questions based on your perspective and knowledge of the nutritional resources provided to the collegiate football players of your university. Check **ALL** that apply

At your institution…..

	Athletic Trainer	Nutritionist/RD	CSCS (or similar)	Coaches	CHAMPS/Life Skills Staff	Physician	Other	None
Who is responsible for **educating** football players about nutrition?	☐	☐	☐	☐	☐	☐	☐	☐
Who helps football players manage dietary health restrictions? (ex. Vegan, allergy)	☐	☐	☐	☐	☐	☐	☐	☐
Who helps football players manage **SPECIFIC** medical conditions related to nutrition? (ex. Diabetes, anemia)	☐	☐	☐	☐	☐	☐	☐	☐

Please answer the following questions based on your perspective and knowledge of the nutritional resources provided to the collegiate football players of your university. Select **only** one answer.

At your institution…

	Athletic Trainer	Nutritionist/RD	CSCS (or similar)	Coaches	CHAMPS/Life Skills Staff	Physician	Other	None
Which person is the football player most likely to seek nutritional advice from **FIRST**?	○	○	○	○	○	○	○	○
Who creates								

the menu for team meals/snacks during **non-game days**?	○	○	○	○	○	○	○	○
Who creates the menu for team meals/snack **prior to and following games**?	○	○	○	○	○	○	○	○

Are these resources available to football players? If so, how often are these resources readily updated/posted for the football players to access/view?

	No	1-2 Times a Semester	1-2 Times a Month	1-2 Times a Week	3-4 Times a Week
Signs in Lockers/Locker-rooms/Bathrooms	○	○	○	○	○
Pamphlets/Handouts	○	○	○	○	○
Social Media Updates (Twitter, Instagram, Facebook)	○	○	○	○	○
Newsletters	○	○	○	○	○
Emails	○	○	○	○	○
School App (mobile)	○	○	○	○	○
Other (please specify)	○	○	○	○	○

Through the course of a year, how often is a football player at your institution exposed to the following nutritional resources? Select only ***one*** answer.

	Never	Weekly	Monthly	Once a Year	Twice a Year
Team Educational Sessions	○	○	○	○	○
Personalized Educational Sessions (1 on 1)	○	○	○	○	○
Grocery Store Field Trips	○	○	○	○	○
Cooking Classes	○	○	○	○	○

Cook Off Competitions	○	○	○	○	○
Other (please specify)	○	○	○	○	○

Please answer the following questions based on your perspective and knowledge of the nutritional resources provided to the collegiate football players of your university.

For this section please assume that the football players are full-scholarship athletes.

Does each football player partake in a nutritional assessment at some point during their time at your institution?

Yes
No

Who facilitates the assessment and analysis? **Check all that apply.**

Athletic Trainer
Nutritionist/RD
Strength & Conditioning Specialist (other credentials)
Coach
CHAMPS/Life Skills Staff
Physician
Other

Why? **Check all that apply**

Because it is not mandatory for players
Because it is not important
Because it is not important to the athlete
Other (please specify)

Does your athletic department provide football players with access to a nutritionist?

Yes

No

Is each football player required to meet with the nutritionist?

Yes, at least once during their time at the institution

Yes, at least once per year

The student-athletes are not required to meet with the nutritionist

Please specify the status of the nutritionist. **Check all that apply**.

Full-time athletics (30-40 hours)

Part-time athletics (20-30 hours)

Part-time athletics (10-20 hours)

Part-time athletics (less than 10 hours)

Private practice contracted

On-campus

Off-campus

Other (please specify)

Approximately how many football players are seen by this nutritionist per week?

0

1-3

4-6

7-9

10-12

13-15

16-18

19-21

More than 21

Please provide the best reasoning why football players do not have access to a nutritionist. **Check all that apply.**

It is not in the budget

It is not a priority of the staff

It is not requested by football players

The football players should take responsibility for this

Other (please specify)

Does your athletic department **require** that football players take a nutrition course (for class credit)?

Yes

No

No, but nutrition is offered as an elective course for student-athletes to take

Does your school have a training table, cafeteria or dining hall **exclusively** for football players?

Yes

No

Where do football players get their food? **Check all that apply.**

Stipend- they buy their own food/cook their own meals

School cafeteria

Restaurant Catering

Other (please specify)

To your knowledge, is there a system that provides football players with guidance in choice of foods for each meal (color coded meals, rotating 10-day menu, nutritionist present at meals)?

Yes

No

Please describe the system of guidance in choice of foods for each meal. **Check all that apply.**

Color coded meals (red, yellow, green)

Rotating Menu Cycle (weekly/every 10 days)

Nutritionist present at meals

Other (please specify)

Please provide insight on how football players decide what to eat for each meal. **Check all that apply.**

They just eat what they want

Education through nutrition classes provided by the university

Knowledge based on outside sources such as the Internet, teammates, and parents

Advice from team nutritionist (or medical professional playing the role of the nutritionist)

Other (please specify)

Does your school provide a snack/nutrition bar for football players to access in between meals?

Yes

No

Please select all that are provided. **Check all that apply.**

Protein bars

Protein shakes/smoothies

Protein powder

Fruit

Nuts

Peanut Butter

Yogurt

Milk

Sandwiches/bagels

Honey

Spinach/kale

Other (please specify)

Please provide the best reasoning why. **Check all that apply.**

It is not in the budget

It is not a priority of the staff

The football player should take responsibility for this

The football players can provide their own snacks

Other (please specify)

Which of the following best describes your current collegiate setting?

Division 1 FBS

Division 1 FCS

Which of the following credentials have you held in the past or do you presently hold? **Check all that apply.**

ATC

RD

CSSD

PT

PA-C

MD

CSC, NSCA, TSAC-F, CSPS, PES, NASM, CES- other related strength and conditioning credentials

EMT-B, EMT-I and/or EMT-P

CCRN, RN, MSN- other related nursing credentials

Other (please specify)

Block 1

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Appendix B: IRB APPROVAL LETTER

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Approval of Exempt Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Kristen C. Schellhase** and Co-PI: **Giovanna M. Giannini**

Date: **October 15, 2015**

Dear Researcher:

On 10/15/2015, the IRB approved the following modification to human participant research that is exempt from regulation:

Type of Review:	Exempt Determination
Modification Type:	Protocol revision, Recruitment letter revision
Project Title:	Nutritional Resources for Student-Athletes in Division I College Football Institutions: The Athletic Trainers' Perspective and Role
Investigator:	Kristen C. Schellhase
IRB Number:	SBE-15-11592
Funding Agency:	
Grant Title:	
Research ID:	N/A

This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these changes affect the exempt status of the human research, please contact the IRB. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Patria Davis on 10/15/2015 10:49:11 AM EDT

IRB Coordinator

Appendix C: Tables

Table 1: Participant Demographics

Table 1. Participant Demographics	
Variable: Collegiate Setting **N=28**	**Frequency % (n)**
Division 1 FBS (1-A)	53.6% (15)
Division 1 FCS (1-AA)	46.4% (13)
Variable: Credentials **N=27**	**Frequency % (n)**
ATC	100% (27)
CSCS,NSCA, TSAC-F, PES, NASM, CES, or related strength & conditioning	22.2% (6)
EMT	3.70% (1)

Table 2: Likert Scale

Table 2. Opinions on the importance of nutrition and the athletic trainer's role regarding nutrition in football						
		Frequency % (n)				
Factors	Knowledge and beliefs regarding nutrition in ATs football players- Questionnaire items	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
How concerned ATs are	I am concerned about the quality of the food that my football players consume.	-	10% (3)	-	46.7% (14)	43.3% (13)
	I am concerned about the quantity of the food that my football players consume.	-	16.7% (5)	13.3% (4)	43.3% (13)	26.7% (8)
	ATs in collegiate settings should be concerned about the quality of the food that their football players consume.		-	-	63.3% (19)	36.7% (11)
	ATs in collegiate settings should be concerned about the quantity of the food that their football players consume.	-	3.3% (1)	10% (3)	56.7% (17)	30% (9)
How responsible ATs feel	It is my responsibility to teach my football players about nutrition.	-	20% (6)	50% (15)	23.3% (7)	6.7% (2)
	It is my responsibility to promote proper eating habits among football players.	-	16.7% (5)	20% (6)	60% (18)	3.3% (1)
	ATs in collegiate settings should be responsible for teaching football players about nutrition.	6.7% (2)	30% (9)	43.3% (13)	16.7% (5)	3.3% (1)
	ATs in collegiate settings should be responsible for promoting proper eating habits among football players.	3.3% (1)	13.3% (4)	26.7% (8)	50% (15)	6.7% (2)

Table 2 (continued)

Table 2. Opinions on the importance of nutrition and the athletic trainer's role regarding nutrition in football

		Frequency % (n)				
Factors	**Knowledge and beliefs regarding nutrition in ATs football players- Questionnaire items**	**Strongly Disagree**	**Disagree**	**Neither Agree Nor Disagree**	**Agree**	**Strongly Agree**
How qualified ATs feel	I am qualified to give football players advice about nutrition.	-	10% (3)	26.7% (8)	56.7% (17)	6.7% (2)
	I am qualified to educate football players about how nutrition prevents injury.	-	10% (3)	10% (3)	63.3% (19)	16.7% (5)
	ATs in collegiate settings are qualified to give football players adivce about nutrition	-	16.7% (5)	26.7% (8)	53.3% (16)	3.3% (1)
	ATs in collegiate settings are qualified to educate football players about how nutrition prevents injury.	3.3% (1)	6.7% (2)	10% (3)	66.7% (20)	13.3% (4)
How important ATs feel nutrition is	It is important that football players are educated about proper nutrition.	-	-	-	30% (9)	70% (21)
	It is important that football players eat properly.	-	-	-	30% (9)	70% (21)
	If football players do not eat properly, their performance will decline.	-	3.3% (1)	6.7% (2)	33.3% (10)	56.7% (17)
	Providing nutritional resources and educating the football players is important for their future.	-	-	-	46.7% (14)	53.3% (16)

Table 3: Advising and Referral

Table 3. Advising and Referral (N=30)										
		Frequency % (n)								
Factor	**Knowledge and beliefs regarding frequency in advising and referral of football players - Questionnaire items**	**0**	**1-3**	**4-6**	**7-9**	**10-12**	**13-15**	**16-18**	**19-21**	**>21**
On a weekly basis....	How many football players **approach** you for nutrition advice?	13.3% (4)	40% (12)	30% (9)	-	6.7% (2)	-	-	-	10% (3)
	How many football players do you **provide** with nutrition advice?	20% (6)	33.3% (10)	30% (9)	-	6.7% (2)	-	3.3% (1)	-	6.7% (2)
	How many football players do you **refer** to a nutritionist/RD?	26.7% (8)	30% (9)	13.3% (4)	-	10% (3)	6.7% (2)	3.3% (1)	-	10% (3)

Table 4: Roles in Managing Nutritional Needs

Table 4. Roles in Managing Nutritional Needs (N=30)							
		Frequency % (n)					
Factors	**Knowledge and beliefs regarding roles of Personnel on Sports Medicine Team - Questionnaire items**	**Athletic Trainer**	**Nutritionist /RD**	**SCS/CSCS (or similar)**	**Coaches**	**CHAMPS / Life Skills**	**Physician**
Select ALL that apply	Who is responsible for educating football players about nutrition?	76.7% (23)	70% (21)	86.7% (26)	16.7% (5)	0.33% (1)	26.7% (8)
	Who helps football players manage dietary health restrictions? (ex. Vegan, allergy)	56.7% (17)	70% (21)	36.7% (11)	6.7% (2)	-	23.3% (7)
	Who helps football players manage **SPECIFIC** medical conditions related to nutrition? (ex. Diabetes, anemia)	86.7% (26)	70% (21)	10% (3)	-	-	60% (18)
Select **only** **one** answer	Which person is the football player most likely to seek nutritional advice from **FIRST**?	36.7% (11)	23.3% (7)	33.3% (10)	6.7% (2)	-	-
	Who creates the menu for team meals/snacks during **non-game days**?	-	40% (12)	23.3% (7)	23.3% (7)	-	-
	Who creates the menu for team meals/snacks **prior to and following games**?	6.7% (2)	30% (9)	20% (6)	36.7% (11)	-	-

Table 5: Nutrition Education Resources

Table 5: Nutrition Education Resources						
	Frequency n (%)					
Please mark "Yes" to the following resources provided to football players at your institution. If chosen "yes", please continue by specifying how often these resources are readily updated/posted for the football players to access/view?	No	1-2x/semester	1-2x/month	1-2x/week	3-4x /week	Did not respond
Signs in Lockers/Bathrooms	23.3% (7)	56.7% (17)	10.0% (3)	3.3% (1)	6.7% (2)	-
Pamphlets/Handouts	33.35% (10)	46.7% (14)	13.3% (4)	3.3% (1)	3.3% (1)	-
Social Media (Twitter updates)	44.8% (13)	27.6% (8)	3.4% (1)	17.2% (5)	6.9% (2)	1
Newsletter	72.4% (21)	20.7% (6)	3.4% (1)	3.4% (1)	-	1
Email	55.2% (16)	20.7% (6)	10.3% (3)	10.3% (3)	3.4% (1)	1
School App (mobile)	77.8% (21)	14.8% (4)	-	3.7% (1)	3.7% (1)	3
	Never	Weekly	Monthly	1x/year	2x/year	Did not respond
Team Educational Sessions	17.2% (5)	6.9% (2)	6.9% (2)	44.8% (13)	24.1% (1)	1
Personalized Educational Sessions	48.3% (14)	20.7% (6)	10.3% (3)	20.7% (6)	-	1
Grocery Store Field Trip	58.6% (17)	6.9% (2)	10.3% (3)	24.1% (7)	-	1
Cooking Class	79.3% (23)	3.4% (1)	10.3% (3)	3.4% (1)	3.4% (1)	1
Cook Off Competitions	96.6% (28)	-	3.4% (1)	-	-	1

Appendix D: Figures

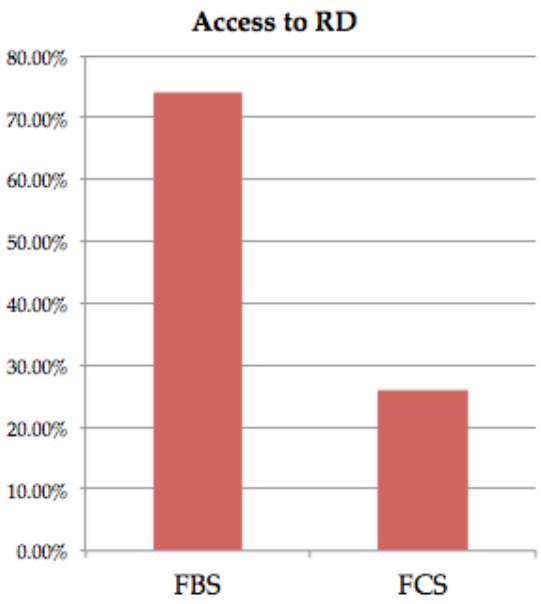

Figure 1: Access to RD

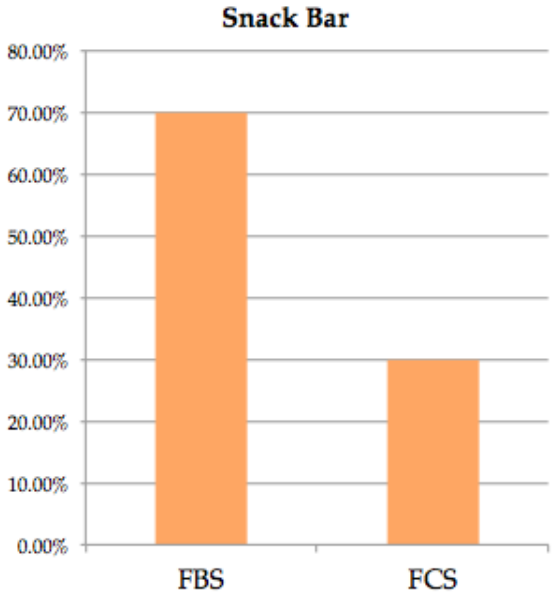

Figure 2: Snack Bar

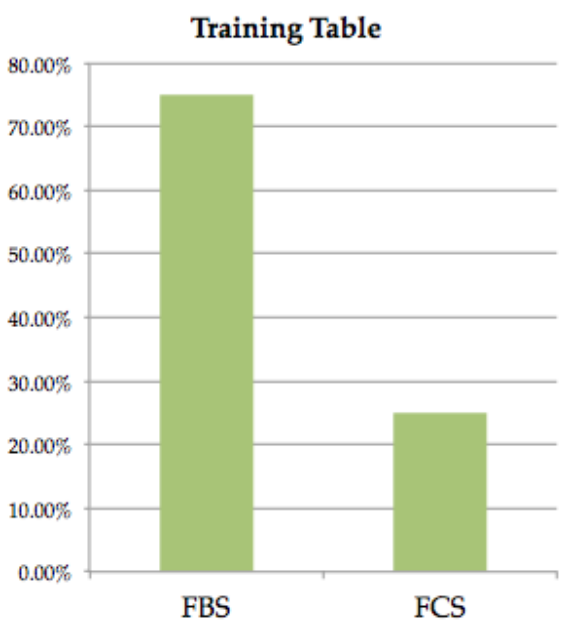

Figure 3: Training Table

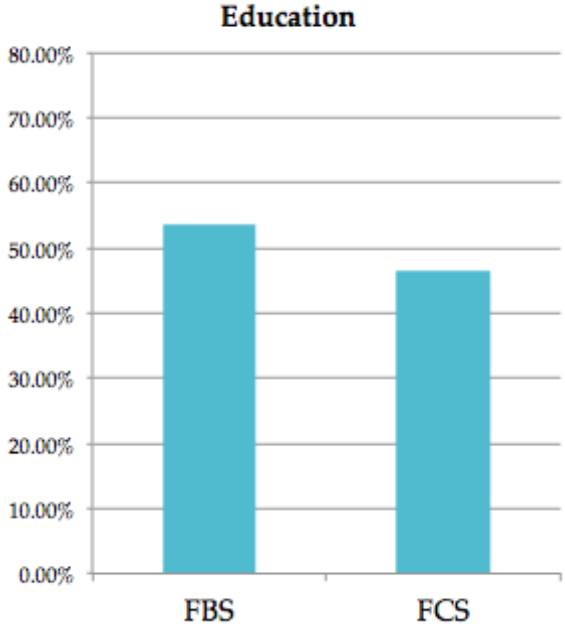

Figure 4: Education

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