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# Nutritional Impact on Performance in Student-Athletes: Reality and Perception

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Running head: NUTRITIONAL IMPACT ON PERFORMANCE IN STUDENT-ATHLETES:  
REALITY AND PERCEPTION

**Nutritional Impact on Performance in Student-Athletes: Reality and Perception**

M.S. Health and Wellness Management

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May 2017

### **Abstract**

**Context:** The sports nutrition field is experiencing incredible growth and development. Athletes are often epitomized for optimal health yet are susceptible to many nutrition related risks that can have a profound impact on both positive and negative performance gains. The student-athlete population is of particular interest based on their nutrition knowledge and where information is obtained. Little is known about their perception on nutrition overall. **Objective:** The purpose of this study was to examine student-athlete perceptions of nutrition and their attitudes about how nutrition impacts performance. **Design:** Qualitative semi-structured interviews were facilitated with the study population. **Participants:** A total of 10 Division II student-athletes enrolled in this study. **Data Analysis:** Data was analyzed using a grounded theory approach. Credibility was established through member checks and written notes served as triangulation. **Results:** Several themes and subthemes emerged from the data. Accessibility, knowledge, time and physical feelings all tie into how student-athletes perceive the nutritional impact on performance and were the primary themes. The subthemes, which further broke down the student-athlete perspectives and perceptions on how nutrition can impact performance, included the traveling, costs and resources in relation to accessibility, understanding versus utilization of nutritional knowledge and the performance or hunger effects students attribute to the physical feelings of nutrition. **Conclusions:** Student-Athletes believe nutrition is important for their overall health and wellbeing. They perceive that it has the potential to positively or negatively impact performance. However they do not always have the resources or knowledge necessary to consume nutrition properly balanced to improve performance, therefore additional nutritional education is recommended.

## **Introduction**

### **Background**

There are many factors that influence health status and greatly impact everyday life. One of the most modifiable and controllable areas is diet and nutrition. Diet is simply what you consume and the quantities of how much you consume, therefore fueling the body and profoundly impacting how an individual functions physically, mentally and even socially. Nutritional choices determine and greatly effect health status. Maintaining a healthy and well-balanced diet is essential for the overall health and wellness of all populations and individualizing those nutritional needs based on behaviors is critical.

Nutrition currently sits at the forefront of major public health concerns with many nutritional choices trending toward poor decisions, developing unhealthy habits and the associated effects. Obesity is one of the largest health concerns of Americans, accounting for increased risk of disease, mortality, morbidity and billions of health care dollars spent each year. While obesity is the most common indicator of poor nutrition, other main stream diseases including diabetes, cardiovascular disease and stroke are all linked to nutritional factors as well. In fact, 117 million individuals or close to one half of Americans have one or more chronic diseases related to poor diet (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015, p.xi) therefore emphasizing the importance of intervention.

As these numbers are alarming, the general population are not the only population at risk from poor nutritional habits. Athletes are a sub-population that are particularly affected by poor nutrition which can have a substantial impact on both their health and physical performance. In the case of athletes across all levels, a quality well-balanced diet is essential for proper health and achieving performance goals (*Nutrition and Athletic Performance*, 2016). The athlete

population spans a large range of nutritional needs. Performance goals vary immensely between different types of athletes, therefore emphasizing the importance of individualism. Furthermore, proper nutritional supplementation and emphasis on balance is important for all athletes. Current evidence supports the idea that nutrients such as protein, calcium, and iron can have significant positive impacts on performance (Moran, McClung, Kohen, & Lieberman, 2013). However, education and awareness around sports nutrition is largely lagging behind. This is especially true and concerning in the case of student-athletes (Torres-McGehee et al., 2012 & Webber et al., 2015). This literature review will examine the perceptions of nutrition on performance, student-athletes nutritional knowledge and the factors that influence these decisions.

### **Why does Nutrition Matter for Athletes?**

Athletes at all levels from recreational to the international competitive scale place incredible demands on their bodies. Through the combination of physical work, energy expenditure, time and recovery periods, by nature they are pushing their bodies to further limits. In doing so, athletes therefore require additional energy and fuel through nutrients and ultimately their diet. According to renowned Sports Nutritionist, Nancy Clark and her Sports Nutrition Guidebook (2013), eating for every day active people must be different than those who are more sedentary. In this case, athletes are assumed to be much more active individuals. Furthermore, just as a medication plan or physical training regimen, these eating patterns, needs and requirements are unique to every individual athlete or “active person.”

This concept of individualism is one that is essential when considering sports nutrition. The Dietitians of Canada, the Academy of Nutrition and Dietetics and the American College of Sports Medicine (2016) highlight that nutrition plans must be individualized for athletes to

account for their own specific goals and uniqueness of the event, performance goals, practical challenges, food preferences and responses to what works and ultimately what does not. The differences are evident in the comparison of a 250lb offensive lineman versus a 115lb female gymnast. Two incredibly unique individuals with different goals. One is not necessarily healthier than the other or works any harder but what they put into their bodies to achieve those individualized goals matters. Athletes walk a fine line between balancing to train hard enough to reach those goals and avoiding the risk to injury. Nutrition and the benefits it can provide, fall somewhere right in the middle (*Nutrition and Athletic Performance*, 2016). There is evidence to support the fact that an increase in energy (calories) is important for maintaining a balance and appropriate consumption of the right protein sources can have a profound impact on muscle recovery, stimulation and synthesis and that caffeine may have a positive stimulus effect on sustaining endurance (Moran et al., 2013). In addition, in order to maintain a balance and modification the standard dietary guidelines of incorporating the micronutrients in fruits and vegetables must not be forgotten (U.S. Department of Health and Human Services and U.S. Department of Agriculture, 2015).

### **Nutrition in College Athletes**

Led by Dietitians of Canada, the Academy of Nutrition and Dietetics and the American College of Sports Medicine (2016) these guidelines and research continue to improve and expand in this area of health but there is room for growth for the athletes' overall understanding and implementation of these guidelines. A study done by Webber et al. (2015) on the diet quality of collegiate athletes demonstrated that on average student-athletes only scored a 51 out of a possible 100 on the Healthy Eating Index (HEI). The HEI is a measure of diet quality that assesses how closely individuals follow the dietary guidelines outlined and is one of the most

popular tools to monitor diet quality in the US. A diet score of 80 is considered “good” while 51-80 is considered “fair”. Therefore, this study emphasizes both the need for nutrition intervention and nutritional education for student-athletes.

In taking it one step further and actually assessing diets, a dietary recall done by researchers on the eating habits of female collegiate athletes specifically found that energy and carbohydrate intakes were far below the recommended minimum amount with only 9% of participants meeting their energy needs. 75% of these Division I athletes did not even consume the minimum carbohydrate requirements (Shrivcr, Betts & Wollcnbetg, 2012). With carbohydrates often serving as a main source of energy, this is concerning for the short term performance impacts and long term sustainability of athletes.

Furthermore, disordered eating is a large concern for this population. According to the Academy of Nutrition and Dietetics (2015), disordered eating is defined as “a wide range of irregular eating behaviors...” It is categorized as a descriptive term, not necessarily a diagnosis but the phrase can lead to serious conditions such as anorexia nervosa, bulimia nervosa, risks of the female triad and even abuse of supplement usage. A recent study by Achiro and Theodore (2015) highlighted the increased use and dangers associated with supplement usage, highlighting the trend as the newest form of disordered eating. The authors found that men who were body conscious used supplements in an excessive manner resulting in forms of disordered eating. 29% of the group studied were concerned about their use of supplements while 22% stated they used supplements to replace meals. The prevalence of disordered eating in this area expands the overall categorization of eating disorders, putting a greater number of athletes at risk.

Disordered eating poses physical and mental health risks to athletes and the prevalence of disordered eating is high among the specific student-athlete population. The NCAA, which

functions as the largest oversight board and governing institution for college athletes, identified that 25% of female athletes and close to 20% of male athletes have disordered eating symptoms (Voelker, 2012). Another study concluded that a significant number of female collegiate athletes suffer from eating disorders and many used exercise as an outlet. The disorder was seen at the symptom level and subclinical, not necessarily requiring specific treatment yet still incredibly problematic (Greenleaf, Petrie, Carter, & Reel, 2009). Adams, Goldufsky and Schlaff (2015) highlight the gender differences of disordered eating, dietary behavior and inherent risks among both populations. As disordered eating continues to expand, the high prevalence among college athletes is concerning.

The concern and risk of disordered eating scales well beyond college athletics both from the early stages of development and post-college in professional athletics. Older literature found team settings and group dynamics of peer pressure can include these risk factors on both a positive and negative level for high school athletes. An article focused on the concepts of reduced risk behavior and increasing positive behavior draws attention to the ATLAS (Athletes Training and Learning to Avoid Steroids) and ATHENA (Athletes Targeting Healthy Exercise & Nutrition Alternatives) programs. “The ATLAS and ATHENA programs’ positive findings support strengthen sports’ health-engaging mission by incorporating harm reduction and health promotion curriculum into the athletic team setting (Elliot et al., 2006)”, highlighting both the important influences an athletic team can have as well as the risks that can be associated with sport and competition to succeed. The accuracy of this data is limited however due to self-report behaviors of high schoolers which has the potential to be subjective. However while information no longer exist on these programs, the article demonstrates the importance of calling attention to this area and idea of how health promotion can be tied to athletic teams in the areas of disordered

eating and nutrition. No similar programs or interventions were found for collegiate athletes.

Specific literature was not explored in depth for professional athletes, the general assumption can be made that they do not always receive adequate nutrition guidance based on media outlets, influential studies and personal affiliation of the increased steroid usage, nutrition discussion and drive to succeed by professional athletes.

### **Nutrition Influencing Factors**

What must be noted and emphasized in evaluating the nutritional risks for student-athletes is the component of influence and identifying the specific factors that influence nutritional decisions. An evaluation of how actual food choices are made by student-athletes and those things that influence their decisions play a key role in how they fuel their bodies, where they obtain their nutritional information and personal perceptions as college students.

As Buckton and Combet (2015) highlight, healthy eating can be confused with diet and weight management. This association between healthy eating and weight management is a problem for the overall health population and relates back to the risk factors of disordered eating for athletes. It is estimated that individuals make 220 food choices each and every day. These choices are impacted by a substantial amount of internal and external factors highlighted by physiological factors such as hunger, food and taste preferences and gastronomical discomfort (Birkenhead & Slater, 2015). New diet evidence and trends around gluten now play a role more than ever for athletes. While specific benefits are unclear around gluten free diet benefits on performance, when it comes to preference more and more endurance athletes are choosing to take this route (Lis, Stellingwerff, Shing, Ahuja, & Fell, 2015). The research reported in this study has a likelihood of bias based on the self-report information and possibility that subjects

adhere to a gluten free diet based on a number of other factors. However, it is interesting to consider the current trends and new influencing factors in sports nutrition.

Lifestyle and knowledge factors also play a role in decision making of both nutritional and sport decisions. As highlighted by Birkenhead and Slater (2015):

“Motives for participating in sport may influence the importance placed on food choice as personal goals may differ from an athlete with physique goals to another who enjoys the freedom of eating whatever they desire...motivation to participate in sport may be based on a lifestyle choice that influences food choice (p.1515).”

The choice to physically be active and partake in sporting activities may alter student’s food choices linking the two closely together. This can have a large impact on how student-athletes feel about nutrition and food choices.

Psychological factors of body image and weight control along with social and cultural factors all are incredibly essential in evaluating the nutrition of student-athletes. One of the few studies that actually examines the perceptions associated with nutrition for college athletes focused on the concept of psychological factors. As Adams et al. (2015) highlighted, gender differences of dietary behaviors occur, influencing nutrition. Females were more preoccupied with body weight factors and “...more likely to report a great level of agreement with statements relating to performance declines attributed to weight gain...” (p.21) while “males have a positive perception of performance enhancement directly associated with supplement utilization” (p.22). Understanding the influences of nutritional perceptions is important and perceptions also extend beyond psychological factors. As Ono, Kennedy, Reeves and Cronin (2012) point out, food choice and perception is not traditional nutritional science instead it is more anthropology, sociology or physiology (p.99). The authors are able to formulate stronger conclusions based on a mixed methods approach of both nutritional intake assessment, determining what and when the

athletes are eating, followed by qualitative interviews allowing for a comprehensive understanding of their attitudes and perceptions of food choices. This understanding could better define the need for increased nutritional guidance.

For college students, food selections are often based on taste, time, convenience and cost rather than nutritional value. Two qualitative surveys looking specifically at collegiate football players highlighted the fact that not only is time essential, and often what your meals are structured around but it is also part of establishing a routine (Kicklighter, Koonce, Rosenbloom, & Commander, 2010 and Long, Perry, Unruh, Lewis, & Stanek-Krogstand, 2011). The limitation in this study, as well as several other pieces of literature found, is the narrow focus of the study population on one specific sport. It can be assumed based on trends and general knowledge that the idea of routine development is important but understanding that a sport like football may have very different schedule routines or dynamics than other sports.

As demands on college athletes continue to increase and pressure surmounts to “be the best” and “compete at the highest level” these routines become incredibly important and structuring food into those routines matters. Socially, it is who you are eating with, who is cooking and who you are around that impact food decisions. Often times, those social settings are with teammates, coaches and athletic trainers, therefore playing an incredibly important role in where nutritional information is obtained.

The role athletic trainers and coaches play in nutritional education is an essential one. Athletic trainers and coaches have the significant ability to influence decisions (Torres-McGehee et al., 2012 and Long et al., 2011). Based on multiple studies, it is evident that coaches, strength and conditioning coaches and athletic trainers serve as a primary source of nutrition information

for student-athletes. These figures play a critical role in shaping an athlete on all aspects and nutrition is part of that full package. Yet, there is a gap in knowledge of these sources that is being provided. Torres-McGehee et al. (2012) also found that across Division I, II and III schools, athletic trainers and strength and condition coaches have adequate knowledge but the coaches do not. Furthermore a study done on international football players supports this idea emphasizing that coaches often follow their own traditions and health beliefs, imparting that wisdom on the team. In some cases, outside information from professionals is not even welcomed in (Ono et al., 2012). The lack of resources and lack of sports dietitians is evident at the college and professional level.

The research about sports dietetics in a college setting is limited. While the full article was unable to be located, a summary of an comparative assessment done on self-efficacy of NCAA athletes found that athletes at schools who had a sports dietician were more likely to seek out nutritional information, demonstrated more knowledge about nutrition and felt more confident making decisions (Wallinga et al., 2013). As the evidence-based research field of nutritional impact on performance continues to grow, the area of Sports Dietetics is continuing to become more popular and there is a demonstrated need (*Nutrition and Athletic Performance*, 2016). Similar to the medical field, it is clear that obtaining information from experts is more beneficial for student-athletes than peers, the internet or social media. Because information delivery is still derived from a variety of areas, it leads to an incredible gap in knowledge of nutrition for the athletes.

## **Nutritional Knowledge**

Where student-athletes obtain their nutritional knowledge, their personal nutritional habits, internal and external influence factors all play a critical role in baseline nutritional knowledge and ultimately how the nutritional impact on performance is perceived. The Torres-McGehee et al. (2012) study found that only 9% of student-athletes studied across Division I, Division II and Division III institutions had adequate nutrition knowledge while the cross-sectional questionnaire used with Iranian College Athletes found that although nutrient knowledge is prevalent, supplement knowledge is not and there are gaps in overall baseline knowledge (Jessri, Jessri, Rashidkhani, & Zinn, 2010). An older study which focused on triathletes used the General Nutritional Knowledge Questionnaire (GNKQ) to identify there is a gap and also highlighted that there are limited studies on knowledge (Birkenhead, 2013). A variety of studies ranging from 1981-2002 were found that supported this point yet the literature around current data was limited. Conclusions however could be drawn between knowledge and beliefs. Both health and specifically nutrition can have difference meanings for individuals and athletes are susceptible to this generalization. As Birkenhead and Slater (2015) summarizes “...beliefs about nutrition and level of knowledge may determine the importance placed on food choices as influenced by the athlete’s understanding of the role of nutrition on health and sport performance (p.1515).” For example, non-celiac athletes adopt the gluten free diet for perceived health benefits even though there is no evidence based research to support this (Lis et al., 2015). From a more general and broad perspective, further identifying what student-athletes know about nutrition, how they feel it can impact their performance and the perceptions they have both positively and negatively are important for educating this population.

## **Nutritional Behaviors**

Understanding nutritional influencing factors, motivators and nutritional knowledge are essential for this population and consideration for any type of intervention. Taking it one step further to understand how each of these components actually impacts their behavior is also important. In a study looking at behavioral intentions, Karpinski and Milliner (2016) use the underlying constructs of the Theory of Planned Behavior to help identify barriers to healthful eating. The Theory of Planned Behavior has been explored across many health decisions with the assumption that behavioral intention or intention to change, is the strongest predictor of actual behavior, with a stronger intent resulting in a more likely behavior change. The three major constructs that affect behavior intentions are attitude, subjective norms and perceived behavior control. The authors tested this theory among Division II athletes examining female and male student-athletes intentions of eating healthy and found that attitude had the greatest influence yet further exploration of attitudes around nutrition were needed. Furthermore, questions in their cross-sectional survey related to nutritional motivation included concepts of endurance, concentration and impact on performance, therefore supporting ideas generated for the guided interview questions of this proposed study. While this specific proposed study will not investigate behavior change, this concept supports the idea that attitudes and perceptions effect change and understanding those constructs is essential for athletes to make proper nutrition decisions.

## **Rationale**

Maintaining a healthy and well-balanced diet that is individualized is critical for student-athletes. Diet can not only reduce the risk of disease but also increase health gains and improve

performance. The literature and evidence around nutritional impact on performance continues to develop and exist as a popular topic in the health field. Student-athletes and the athletic population are an important example of where diet can directly impact performance gains or losses in addition to having positive or adverse health effects. While research identifies and highlights the many internal and external factors that can impact or influence an athlete's nutritional choices, how those factors can be modified and the nutritional education gap for this population needs further work, resources and time. As Adams et al. (2015) summarize, "research conducted with a heavily qualitative focus may serve beneficial in exposing the roots of body weight perceptions and dietary behaviors among athletes" (p.23). Therefore this study is aimed at identifying how and what student-athletes perceive about nutrition, their attitudes about the performance impact and nutritional motivations.

### **Research Objectives**

The purpose of this study was to examine student-athlete perceptions of nutrition and their attitudes about how nutrition impacts performance. The three main aims were to identify how student-athletes feel about nutrition, their beliefs on the relationship between nutrition and performance and their nutritional motivations.

### **Methodology**

#### **Research Design**

This qualitative study was focused on exploring the knowledge, attitude and perception of collegiate athletes about the nutritional impact on performance. Research was conducted through voluntary interviews with Division II student-athletes at a Catholic College in the Northeast. Comprehensive selection was used to recruit the entire student-athlete population. The sample population was determined through non-random purposive selection based on the response timeline.

#### **Participants**

A total of 10 participants enrolled in the study. Data analysis was ongoing and based on a project timeline no further additional participants were recruited. There were 7 females and 3 males. Athletic team representation included Track and Field, Women's Lacrosse, Crew, Baseball, Basketball, Hockey and Men's Lacrosse. Table 1 includes further information about the student participants.

**Table 1. Student-Athlete Participants**

<b>Student</b>	<b>Class Year</b>	<b>Athletic Team</b>
K1	Sophomore	Women’s Lacrosse
R2	Sophomore	Crew
A3	Freshman	Women’s Lacrosse
T4	Junior	Track and Field
C5	Senior	Track and Field
L6	Junior	Baseball
J7	Junior	Baseball
S8	Senior	Women’s Basketball
R9	Freshman	Hockey
D10	Sophomore	Men’s Lacrosse

**Procedures**

Institutional review board approval was obtained before data collection. The principal investigator sent an email to all head coaches who served as the gate keepers in January 2017. Coaches were asked to forward the email to all of their student-athletes with the principle investigator’s contact information (See Appendix A). Several participants responded directly to the email. A reminder email to coaches was sent during the first week of February, which was followed by individual conversations with coaches requesting their athlete’s participation.

Once participants enrolled in the study, the researcher conducted semi structured interviews that lasted approximately 20-30 minutes. The interviewer used a guided interview process to ensure consistency among participants. Guided interview questions can be found in Appendix B. The interview instrument was developed using predetermined, semi-structured, open-ended questions designed to address the gap in literature around student-athletes knowledge and perception of the impact it has on performance. The interviews were conducted in person when possible or over the phone. All in person interviews were recorded on a lap top microphone for transcription. Audio interviews were transcribed by the investigator.

### **Data Analysis**

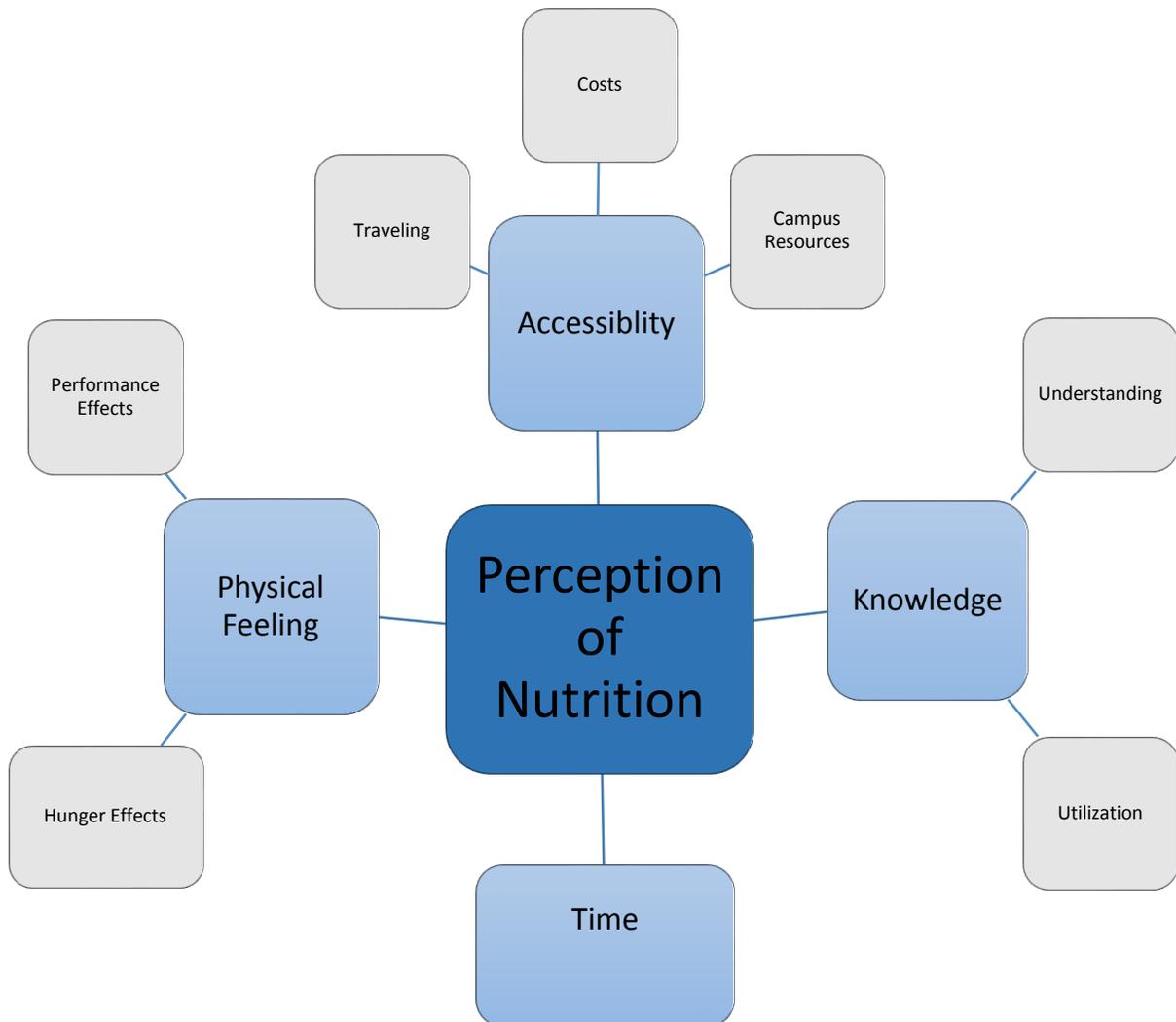
A grounded theory approach was used to determine themes from the data. Initially transcripts were read in their entirety to gain a sense of the data and identify concepts regarding the participants' knowledge and perception. Transcripts were then reread and coded with categories that were later organized into more specific themes. These themes were used to analyze relationships, trends and commonalities among student-athlete responses.

### **Data Creditability**

Before data analysis, member checks with the interview participants were used to enhance credibility. Each participant was emailed his or her transcript with a request to review it for accuracy. All participants replied and only minor changes were necessary. Written notes from the interviews served as triangulation.

## **Results**

An overview of major themes and subthemes is presented in Figure 1. These included accessibility, knowledge, time and physical feeling in relation to student-athletes' perception of nutrition. In depth descriptions of each of these themes from the data are presented below.



**Figure 1. Major Themes and Subthemes**

**Accessibility**

Accessibility to proper nutrition plays a large role in determining student-athletes food choices. Students define accessibility in different ways but the overall impact of access to proper nutrition can positively or negatively affect what students believe.

**Campus resources.** As college students, many students do not have access to kitchens or the ability to cook and store meals for themselves. They rely on the campus resources and dining hall facilities. 80% of the student-athletes interviewed stated that they eat their primary meals in the dining hall (Sparkys) while the other 20% was broken down between students who live at home or off campus. The participants highlighted the benefits of eating in the dining hall as always having consistency for nutrition. When asked about daily meals, J7 mentioned that he knows “there is always at least salad, chicken and that is always a good go to option...” while R2 stated that “(Sparkys) is really good about always having some of the basics so I know I can always get yogurt or take a banana or apple with me.” K1 was an outlier in this theme:

For a lot of people, going to the dining hall is easy. I wish I had a kitchen. When people who have a kitchen are like ‘oh I don’t want to cook every night’, I wish I did because I would make my own food and like that rather than go (to Sparkys) and have pasta again.

However while there is benefits to the dining hall, students also feel limited by the choices offered on campus. As R2 later emphasized, “it is usually always the same thing...salad bar, chicken, salad bar, chicken. Like, do I really want that again? Sometimes it is just a bin of apples and I want more variety...” While many of the students discussed the availability of some healthy choices, the lack of variety was prevalent. Furthermore, the availability of unhealthy options was also discussed during the interviews “being here (at school), we don’t have that many options. We have to resort to something else that is unhealthy to get a change” A3 noted.

**Traveling.** Regardless of sport, student-athletes spend a great deal of time traveling on the road for practices, games and meets. They do not have a consistent living schedule on campus each day. Athletes emphasized the impact that traveling can have on their daily nutritional schedule. As L6 stated, “for away games we’ll get meal money and we’ll stop after the game. A lot of times we don’t stop at the healthiest places which kind of sucks but we try to

do the best.” Similarly, C5 emphasized “when we have meets that are further away, it is even harder to stay in your routine.” C5 went on to describe the challenge of traveling in relation to campus resources:

When we go to meets, they let us fill the green box but it’s the night before and it has to be refrigerated. So it’s nasty because it’s sitting all day. Freshman year my coach used to buy deli meet and bread so we’d have that. Then the last two years, Sparkys would make sandwiches for us but they’d put oreos and chips in the bag with an apple. And I was like all I’m eating is deli meet and an apple, it’s a waste.

S8 further elaborated on the modification of meals while on the road stating “it becomes a real challenge to follow a specific diet in season when we are traveling at least two or three times a week. I just kind of have to make due...” This concept of traveling and inconsistencies alters the student-athletes’ perception of accessibility.

**Costs.** The expense related to healthy foods was also discussed by participants both on the road, with limited meal money, and as college students. When asked about where they ate the majority of their meals, several athletes discussed a desire to eat healthier or grocery shop but were limited by cost. As a senior, S8 has had more experiences off campus but shared that the benefit outweighs the cost in her mind:

Prices really deter people because healthy stuff is more expensive. Type of mindset I take is you have your car even to get around. You have options to get around that are cheaper but you chose your car no matter what gas prices are. So it’s like you have your body for your whole life. There are cheaper options to eat but what are you going to do for you that’s best in the long run. So this will cost me a pretty penny to eat but what will help me in the long run. I see my body as a vehicle in life. Like even when gas prices go up, we still drive so even with food that’s how I see it too.

T4 acknowledged that cost factor and the benefit of living off campus emphasizing that by living at home she could use more quality ingredients and was not working on a “college food budget” whereas her teammate C5 in contrast notes that she “splurges once a week eating off campus to get more protein.”

## **Knowledge**

Nutritional knowledge is a second factor that plays a large impact on food choices and how students feel about nutrition. Each of the participants believed they had some form of nutritional knowledge. Some went as far as to indicate that they were still learning. R9 mentioned, “as the new guy on the team I pick up a lot from the older guys, kind of following their habits and I’m learning more than I knew before coming to school.” R2 acknowledged “I’ve definitely come a long way since high school but I know there is much more to know about what I should be eating.” The interviews resulted in a clear distinction and common misalignment between the understanding and the utilization of nutritional knowledge.

**Understanding.** Levels of athletes’ understanding of nutrition varied from participant to participant. Some athletes discussed what they knew about proper nutrition as well as sports nutrition directly while others alluded to their knowledge through describing their daily diet and if they feel it is balanced. J5 used nutritional language such as calories, supplementation and associating carbohydrates with energy from the beginning of the interview. When asked about his knowledge, he replied:

I know the basics because I’ve worked with nutritionist...I know if I don’t eat enough or put enough into my body and get the necessary nutrients, one I’m going to lose some weight and two I’m not going to feel as healthy and two I’m going to lose some weight. I think it’s important to know your body, knowing how much you need to maintain and know your body to feel healthy.

Influences of family life and habits were common among students. J7 later when on to state that “...My dad was a college athlete. He is a similar build to me, a little bulkier but similar. He had an idea of, he played basketball so a little different, but between running, lifting, time commitment the overall there isn’t always enough time.” Family influences on knowledge were prevalent in 70% of the conversations and were brought up by students when asked the initial

question of “Is nutrition something that you think about in relation to your overall health?” S8 really pinpointed the relationship between nutritional knowledge and overall health in referencing her own family health issues “its one of those things that could have been prevented if we were more educated on the food choices and what we put into our bodies every day. I feel like it starts young in developing your habits, your kids habits and your kids habits.”

Other influences and sources of nutritional knowledge discussed were coaches, both directly and inadvertently, teammates and the internet. When asked about obtaining nutritional information, S8 who is a vegan athlete said “The internet. For sure. I have other friends who have gone vegan as well so like they send me stuff, I follow instagrams, I have a protein chart that highlights which plants I should highlight every day” Several athletes shared that they believed they had a good understanding of nutrition but went on to discuss imbalanced daily diets for example, although discussing following a vegan diet and placing emphasis on eating healthy, S8 described her daily meals with substantially low amounts of protein. R2 noted early in the interview that she believed eating a balance of carbohydrates, proteins and fats was important and that she “definitely worked to follow.” Yet later went on to discuss her daily diet, citing “(only) apples at times for breakfast and then pre-race usually have apples followed by granola for protein” which do not align as strong nutrition choices for her needs.

**Utilization.** While there were misconceptions about what constitutes as a healthy diet present in the interview results, the data also found that students did acknowledge using that nutrition knowledge. Several students emphasized “junk foods” and “cheat” or “reward” foods while others discussed the importance of using nutrition to their advantage. For C5 who has seen incredible athletic gains throughout her college career and hopes to one day run professionally, the education and using that knowledge helps her gain an edge:

Really didn't think about (nutrition) until second semester of sophomore year. My coaches brought it up and said maybe you should eat better. I started to do my own research on things going in my own body. Just started to change from there. I want to be healthy and feel good. Once I started changing, I felt better. Better at practice and better overall...my performance improved so much...now for the past three years I've kept it very consistent on what I eat..." going on to state that "I know I have goals and that keeps me going.

### **Time**

Time was relative to almost every athlete both in the emphasis of time management and the timing of meals. A3 mentioned that "lunch is hard because the middle of my day is lacrosse" and teammate K1 noted time as the largest challenge of eating in the dining hall:

...biggest thing is the times when they do have food at the dining hall based on when your practices are. If we have 5-7 practice, they put food out at 4:30 for dinner and at that point not even everything is out yet. You have to give yourself enough time to eat and then not throw it right up after and that is probably the biggest challenge.

L6 on the other hand related time and nutrition to snacking time management, "it's obviously a tough thing. Being on a balanced schedule for eating, especially with games and practices. A lot of times it has to be quick. Stuff like that." R9 went on to elaborate that "when I eat has been one of the largest adjustments coming to school and playing Division I hockey. You really have to focus on when you are going to eat and what your meals will be based on practice, games or whatever else we're doing." Time emerged as one of the most common discussion points in students' perception of overall nutrition.

### **Physical Feeling**

Athletes categorized nutrition into two classifications, eating out of hunger and eating for performance. While correlations are drawn between the two, there were varying opinions and attitudes toward meals, timing and overall nutrition.

**Hunger Effects.** “I am always hungry” or “I can eat or snack at any time” were common statements throughout the interviews with participants acknowledging how important planning out their meals were. A3 joked several times about having a snack at any point during the day. R2 mentioned that after a race, she is “so hungry that I just eats anything to fill back up.” Similarly, K1 said that protein helps to curb hunger “It definitely helps from a hunger standpoint. After I work out, I’m starving. Like after two hour practice I’m starving. The other night I went back to room, Saturday after the scrimmage my parents took me out to dinner at Bertuccis so the other night I had left over pizza and a protein shake for dinner instead of going to Sparkys and that was good.” While these athletes emphasized planning their nutrition around being hungry, they also noted how the food impacts their body. R2 discussed this in relation to eating unhealthy. “When I was younger I used to eat so much junk food and I never had as much energy as I have now. When I eat a lot of junk food now, I can feel it.”

**Performance Effects.** It was evident that the more seasoned or experienced athletes made direct correlations to nutrition and performance. As L6 acknowledged, “you’re always lifting or at practice. It’s really hard for nutrition to not be a part of that because of the way you live. What you’re doing.” C5 made a conscious decision to start eating healthy for performance, “I want to be healthy and feel good. Once I started changing, I felt better.” She attributes nutrition directly to her success. “It gives me and edge over other people. Because a lot of people have more natural talent than me but it puts me over the edge that much more....when I step up on the line sometimes in a race, I’m like I know that I did more than you and diet is a part of that.”

Furthermore the timing of the nutrition impact on performance effects was also present. As T4 discussed, “I only started caring recently because I got injured and was out the whole year

last year and it was mainly a result of overtraining and overuse. I needed to start maintaining my body and caring more.” Taking ownership and considering nutrition as an important factor in overall health was a reoccurring theme with athletes. Yet there are challenges associated with this. As A3 stated, “I am my own motivator to choose a better balance diet and good nutrition as much as my knowledge can give me. But also being college I know I don’t have access to the things I want or I know I need.”

### **Discussion**

Student-athletes feel strongly that nutrition is important for their overall health and wellbeing. They believe it can have positive or adverse effects on their performance however they do not always have the tools or proper resources to eat a well-balanced diet. Furthermore, nutritional decision making factors or their motivation to eat healthier is influenced by a variety of factors and in college has the risk of being negatively swayed. The variances in their perception about the effect on performance aligns with the guidelines produced by the Dietitians of Canada, the Academy of Nutrition and Dietetics and the American College of Sports Medicine (2016) and Nancy Clark’s recommendations (2013), emphasizing individualistic needs and requirements.

### **Accessibility**

Accessibility is a major theme for student-athletes, mirroring the challenges of healthy eating as a college student (Kicklighter et al., 2010). Access to healthy, whole foods and a well-balanced diet is a problem on college campuses with the lack of kitchens, dependency on dining hall food and hours and cost. This becomes a barrier of limitation for students (Karpinski & Milliner, 2016) with the perception that eating healthy foods can sometimes fall beyond their control. Students feel strongly that nutrition is important but they cannot always get what they

need. While students expressed their desire to eat healthy, this was often difficult to accomplish. This perceived barrier of control translates into two implications. The first is the necessity to physically provide access to healthy foods or healthy food options for students. Through the means of dining hall variety, meal times or increased travel meal budgets. The second is the demonstrated need for overall education. Providing students with opportunities to learn how to compose healthier meals in the dining hall where foods are accessible or how to maximize the use of their kitchen or storage space at home. Removing this barrier of perceived control and educating athletes on healthier could reduce negative beliefs about the dining hall food and their lack of ability to consume proper nutrition.

### **Knowledge**

Consistent with the themes identified by Torres et al. (2012) and Long et al. (2011), student-athletes are under educated about proper nutrition, making healthy choices and how nutrition impacts their performance. References to nutritional supplementation and well-balanced meals demonstrated this gap in the knowledge. It was interesting to note that many of the student-athletes did not actually site coaches, athletic trainers or strength and conditioning coaches as a source of credible information and knowledge generation. While some sports were stronger than others and later sited they obtained information from coaches, when first discussed this group was not identified by students as an information source. In fact, several participants noted they would never think to ask these resources. Instead, there were more references made to family values, internet and teammates. While contrasting to the literature, both concepts illustrate a further need for proper education around nutrition. Coaches were not included in this study however if they do in fact have a greater baseline knowledge, student-athletes not only need to know they can and should utilize their coaches as resources but coaches need to emphasize how

they can help. This open line of communication could amount to healthier athletes, increased physical improvement and overall team strength.

In addition to the source of information, the utilization of nutritional knowledge varies. It was not surprising to see how many students made references to poor nutritional choices, identifying foods they considered “junk” or “bad”. This categorization demonstrates an understanding of nutritional knowledge as a comparison to making food choices based on psychological, anthropological, sociological and physiological factors (Ono et al., 2012 and Adams et al., 2015). While there are certainly foods that could be and often are actually defined by these terms, this categorization process has the risk to become more dangerous and lead to disordered eating patterns (Academy of Nutrition and Dietetics, 2015 and Birkenhead & Slater, 2015 and Buckton, et al., 2015). When food becomes socialized, especially in team settings (Elliot et al., 2006) it can lead to adverse risks for students emphasizing the need for further guidance and specific education for this population.

The more experienced or competitive athletes have a likelihood of utilizing their knowledge to make proper choices and therefore see results. (Ono et al., 2012 and Long et al., 2011). This was evident in the conversations with both C5 and J7 who clearly identify that what and how they eat makes a significant difference in how they look, feel and perform in their respective sports. It was interesting to note that these student-athletes acknowledged nutrition as a key component of their athletic success and simultaneously have seen performance gains. In the case of C5, over the course of the last three years when she began to monitor and focus on nutrition, her 400m time has improved by close to 20%, a significant decrease for a sprinter resulting in one of the fastest times in the US. While it is likely that a combination of other

training aspects may also attribute to this success, more experienced athletes identify nutrition as being a key training component to successful performance.

### **Time**

Tied closely to accessibility, time is considered a major challenge for athletes. The schedule of any college student is challenging to manage classes, activities, social aspects, volunteering or work. Balancing a full practice and game schedule on top of those daily undertakings can add immense stress and the necessity for careful navigation of time management. In relation to nutrition as S8 stated “even finding the time to obtain and digest a meal without getting sick running off to the next event is difficult.” Facing this challenge impacts food choices and behavior patterns of healthy eating. As Kicklighter et al. (2010) found, food selections are often based on time and establishing a routine is critical. While athletes identify time as a significant challenge, references to routine and maintaining consistency prove that it is not a challenge that cannot be overcome. Practice, games, lifting and classes cannot be eliminated or lessened in most cases. Instead the focus must be placed on creating consistency for athletes and how to link time and accessibility. Increased education in this area from coaches, administration and teammates is important.

### **Physical Feeling**

Athletes’ motivations for eating healthy are not uncommon from the literature which discusses personal goals, physique goals and lifestyle factors (Birkenhead & Slater, 2015). It is however interesting that the athletes motivations fall into the two categories of eating out of hunger and eating for performance. This hunger component was not looked at in any of the literature found yet it is a basic and common assumption. Nancy Clark (2013) and Moran et al.

(2013) do discuss why eating patterns and requirements for athletes are necessary but separate these two ideas apart from one another. Considering the physical feelings of the impact food can have on the body was not one of the components identified by Kicklighter et al. (2010) and Long et al. (2011) in the food decision influences. This differentiation between eating for hunger and eating for performance is important in identifying how to education student-athletes on proper nutrition and making healthy choices around food consumption, quality and quantity. It is clear that athletes can identify different physical feelings and this therefore translates into performance effects.

As the demands on college athletes continue to rise and the landscape becomes more competitive, how athletes perform is even more critical. No longer just based on talent, in order to participate on college teams, remain free of injury and healthy and see time on the field, court or ice, student-athletes must look to a variety of areas to be the best they can be. Sports nutrition is a major component in maintaining overall health and achieving performance goals physiologically. While student-athletes identify that nutrition is important, the lack of accessibility, knowledge, time and how nutrition makes them feel hinders their ability to maximize the nutritional benefits on performance. In order to further education student-athletes on both short term and sustainable long term nutritional habits, additional education and guidance is needed on campus in the form of sports nutritionists, facilitated sessions with educators or coaches or an emphasis on the importance of proper nutrition.

### **Limitations**

This study explored only a small sample of the student-athlete population utilizing subjects from one school. Interviewing students-athletes who all share the same facilities and similar resources

(Hockey is Division I) may have limited the results with regards to challenges. Furthermore, despite the fact that a diverse range of sports and gender diversity was substantial, the participant pool did not reach data saturation. The questions in this study were specifically geared only toward student-athletes and their perceptions. Future research may provide expanded findings by analytically comparing physical performance standards or athletic achievements to the perceptions and attitudes of nutrition. Additionally, including coaches, athletic trainers or strength and conditioning coaches in future research could allow for important developments in the area of sports nutrition for college athletes.

### **Conclusion**

Student-athletes believe nutrition is an essential part of their overall health. Their desire to perform better or improve physical feelings can influence how they make nutritional decisions. It is evident that there are perceived challenges of both accessibility and time in making proper nutritional decisions which could be identified independently or linked with one another. The physical feeling that athletes receive from food and as a result of eating food weighs into their decisions and beliefs. The theme of knowledge is quite possibly the most important theme that emerged from this study in the comparison to existing literature. There are significant gaps in both the nutritional knowledge of student-athletes and coaches but also gaps in how they apply the knowledge that does exist to positively impact performance.

The findings from this study highlight the need to further educate this population on developing healthy, sustainable and positive eating habits to improve individual and team performance. Resources should be invested both in the education setting for student-athletes from sports dietetics professionals as well as from an administrative perspective.

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**Appendix A**

Draft Recruitment Email

Good Afternoon Coaches,

As part of my graduate work at Merrimack I will be looking at nutrition and student-athlete perceptions. Thank you in advance for forwarding the email below to your student-athletes.

Warmly,  
Sarah Sceery

Hello Student-Athletes,

I am reaching out to request your participation in a research study. As part of my capstone for the MS in Health and Wellness Management program, I will be conducting a study on Merrimack student-athlete's perception of nutrition and their attitudes about how nutrition impacts performance.

In order to gather the data, I will be doing 30-45 minutes interviews with student-athletes focused on nutritional knowledge, perceptions about nutrition and attitudes toward the impact it can have on performance.

This study may be of no direct benefit to you, but it will improve our knowledge of how student-athletes perceive nutrition and the impact it can have on performance. The interviews will be recorded for data accuracy but if you prefer to only do the interview with written notes, we can accommodate. The interview may help you to be more aware of your nutritional habits, knowledge and resources on campus. There are no inherent physical risks in the procedures themselves, and it is not anticipated that you will experience risks in completing the interview. Participants will not be exposed to any more risk of harm or discomfort than those ordinarily encountered in daily life. If you are not comfortable answering any of the questions, you are free to discontinue the interview at any time. A decision not to participate or discontinue will not adversely affect any interactions with the investigator or any representative/employee of Merrimack College or impact your standing on your current team. Information will be used for research purposes only and responses will be kept confidential. In addition, your name will not be used in any reports or publications of this study.

If you would like to participate, please contact me directly to set up the interviews at [sceerys@merrimack.edu](mailto:sceerys@merrimack.edu) or 978-837-5554. We can set up an in person interview on campus or phone call based on your availability.

By responding to this email and scheduling an interview, you are agreeing to the procedures outlined above. Thank you in advance for your support and assistance!

Warmly,  
Sarah

## **Appendix B**

### **Guided Interview Questions**

Male/Female

Sport:

Class Year:

1. Is nutrition something that you think about in relation to your overall health?
2. Do you feel nutrition is important? Why or Why not?
3. Do you think you eat a balanced diet? What does your diet on a normal day look like?
4. Do you feel you know the difference between proteins, carbohydrates and fats?
5. Do you use any nutritional supplements or vitamins? What do you know about them?
6. What influences your nutritional decisions?
  - a. For example timing of meals, teammates, schedules
7. Does what you know about nutrition impact what you actually eat?
8. What do you normally eat before a game or practice? How about after? Do you notice if you feel differently during practice or a game based on what you eat?
  - a. For example, do you have more energy or feel sluggish?
9. What foods or nutritional categories do you feel have an effect on your performance?
  - a. How do those things (i.e. protein, carbs, fat) factor into your own routine?
10. Where would you go if you needed nutrition information? Why?
11. Do you have challenges related to your diet as an athlete?
12. Where do you typically eat your meals?
  - a. In the dining hall
  - b. At an on campus dining location (such as The Den, Zekes, MAC)
  - c. At apartment/house
  - d. As a restaurant/take out