



Original Research

Division I Female Cross-Country Runners' Perception of Eating Behaviors and Attitudes Toward Health: A Pilot Study

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ABSTRACT

International Journal of Exercise Science 11(3): 941-956, 2018. The complexity behind nutritional decisions and the impact of these decisions on overall health (both physical and emotional) in the Division I female runner is not yet well understood. Thus, the purpose of this study was to explore the perspectives of female collegiate cross-country runners from a Division I school on eating behaviors and attitudes toward health. In this qualitative study, six NCAA Division I female collegiate cross-country runners participated in individual interviews. Through qualitative analysis, three themes (Nutritional Views, Identity as a Runner, and Psychological Factors) and 11 subthemes emerged. The interactions that occurred between the subthemes and themes demonstrated that there were multiple interacting factors influencing the athletes' nutritional behaviors. Intrinsic factors consisted of maintaining self-control, perception of trust and available time. Extrinsic factors included availability of a nutritionist, family and team support, and availability of nutritious food. These findings give some insight into the nutritional decisions in female runners, but it is a complex issue. It is evident that individualized education regarding eating behavior is needed for the female athlete.

KEY WORDS: Women, diet, athlete

INTRODUCTION

The female athlete triad (triad) is a relationship between low energy availability (EA), menstrual dysfunction, and low bone mineral density (BMD) (2). EA is the difference between energy intake and expenditure of energy, and a low EA indicates an imbalance of intake and expenditure, which may or may not be caused by disordered eating. Menstrual and BMD changes may be observed when EA is below the recommended range, and or expenditure is greater than intake. The triad can negatively affect general health and athletic performance (2,5).

The prevalence of the triad has been found to be more common within lean body sports such as cross-country, diving, and swimming compared to non-lean sports such as field hockey, softball, and tennis (3, 25). A recent systematic review reported the prevalence of all three components

of the triad in female high school, collegiate, and elite athletes to be between 0 and 16%. The prevalence of one component ranged between 16 and 60% (8).

EA is thought to be at the center of the triad. Consequences of low EA include, but are not limited to the following: diminished ability to recover from injury, inability to build or maintain bone mass, impaired menstrual function and infertility, and an increased risk of cardiovascular disease (11). Treatment of the triad focuses on a multi-disciplinary approach centered (14, 15), not only around increasing EA, but also addressing environmental, social, and psychological concerns (11).

Despite the importance of EA and the additional factors mentioned above, eating behaviors and attitudes toward health in the female athlete are only marginally understood. Thus, the best way to create change in EA has yet to be identified. The association between nutritional knowledge and eating behaviors has been studied with conflicting results (1, 6, 16, 28). Zawila, Steib and Hoogenboom (29) surveyed the nutritional knowledge and attitudes of 60 female collegiate cross-country runners, including a small written qualitative portion of the survey that attempted to identify a few factors for food choices (29). Themes for food selection and choices included food preference, health indication (what the athlete believed was healthy or not), and body appearance and weight issues, but not nutritional knowledge. An initial qualitative study of Division II and NAIA runners revealed four main themes surrounding the athletes' perspectives of health and eating behaviors: health attitudes (the participant's portrayed outlook regarding health), nutritional knowledge (self-reported knowledge), internal and external factors (self-reported factors underlying the participants decision making), and health behavior (participant's expression of general health practices) (20). Also, a study of Division I athletes suggested that the primary influence of disordered eating in lean sports was external societal pressures (27).

Division I runners are of interest because the pressures may be different than Division II or III or high school runners, and they may have more access to resources such as a sports nutritionist or a sports psychologist. Reed, DeSouza, and Williams (18), suggest eating behaviors may vary in and out of season in Division I female soccer players, but they did not assess other factors. Shriver, Betts, and Wollenburg (19) reported that only 9% of Division I athletes met their energy needs. Furthermore, a case study by Busanich, McGannon, and Schinke (4) reported on a former Division I female runner with disordered eating. This case highlighted the complex interaction between social, cultural, and gender experiences on eating behaviors and self-identity.

Clearly, there are factors beyond nutritional knowledge affecting eating behaviors of female athletes. This complexity behind nutritional decisions and the impact of these decisions on overall health (both physical and emotional) in the Division I female runner is not yet well understood. Thus, the purpose of this pilot study was to explore the perspectives of female collegiate cross-country runners from a Division I school on eating behaviors and attitudes toward health. Questions addressed in this study were: 1) What is the perceived role of nutritional knowledge in health behavior? 2) Does participation in the sport impact perception

of health, both physical and emotional? 3) What intrinsic and extrinsic factors influence athletes' nutritional behaviors? 4) How does the perception of health impact nutritional decisions?

METHODS

A general inductive approach to qualitative research was used to find the core meanings evident in the text that are related to the research questions (22). This method was used as the nature of the research was exploratory with several specific research questions we sought to answer. A qualitative research design allowed the researchers to uncover a multitude of details through individual private interviews, which would not be accomplished through a quantitative or observational study that utilizes surveys (9). In addition, individual interviews decreased collaboration of options between athletes, and allowed athletes to speak freely on a potentially personal and sensitive topic. The institution's human subjects review board approved this study.

Participants

Sampling was purposive. To be included in this study, the athlete had to be a current member of a Division I women's collegiate cross-country team, and be between the ages of 18 and 25. Team members were asked to participate after the coach agreed to participation. Potential participants were excluded if they were not a current member of a Division I women's cross-country team.

Protocol

Each participant completed a demographic survey and an informed consent form prior to the interview. Individual interviews were conducted by a pair of interviewers using a semi-structured format with a flexible guide of open-ended questions (Appendix A). The guide to questions had been used in a prior published study and modified based on field notes and feedback from the prior study (21). Each interview was audio taped, and the second interviewer took extensive field notes on non-verbal behaviors and key ideas to strengthen credibility and confirmability. All interviews took place during the cross-country season.

Statistical Analysis

Each audio interview was transcribed to text and reviewed for accuracy. Three researchers, trained by an experienced qualitative researcher, independently analyzed all transcribed interviews. A general inductive approach to analysis was followed (22). After initial reading of the text, specific segments relevant to the research questions were identified. These were labeled to create themes and subthemes as patterns and relationships among codes were identified (22). Regardless of prior notions held by the researchers throughout this experience, all relevant codes during analysis were included to maintain reflexivity. The three researchers collaboratively reviewed individual interpretations, revising and collapsing concepts into broader categories that could be operationally defined. All researchers agreed upon the newly negotiated categories and a model was established (21). Dependability was enhanced by a peer audit.

RESULTS

Participant Demographics: Six female cross-country runners (average age 18.83 ± 0.69 years, range 18-20 years) from a Midwest Division I university agreed to participate in the interview process. Their class standing ranged from freshman to junior and most had been competitive runners for over five years, with one indicating that she had been a competitive runner for one to three years. Body mass index based on self-reported height and weight ranged from 19.04 to 20.9 m/kg² (mean 19.85 ± 0.83). The athletes at this university had access to a sports nutritionist.

Three main themes and 11 subthemes emerged through analysis of the transcripts of the six participants. The three main themes represent ideas about nutritional views, identity as a runner, and psychological factors related to being a runner. Supporting data and key concepts for these themes and subthemes are shared here in the results. Key concepts related to the themes and subthemes are in Table 1.

Table 1: Themes and Subthemes

THEME	SUBTHEME	KEY CONCEPTS
Nutritional views	Balance	<ul style="list-style-type: none"> • Health is all about balancing what you eat and to enjoy things in moderation.
	Food Preparation	<ul style="list-style-type: none"> • Eating food that is personally prepared is better for you. • Time management makes food prep difficult.
	Caloric energy	<ul style="list-style-type: none"> • Calorie consumption is important to give the body energy.
	Diet limitations	<ul style="list-style-type: none"> • Some believe that it is important to limit consumption of foods that are bad for you. • Others believe that they should not limit themselves and eat what they want to eat.
Identity as a runner	Running diet	<ul style="list-style-type: none"> • Runners may eat differently during training, on weekends, and during the season. • Protein is important for recovery. • Runners need to eat differently from typical adults or students in order to perform well.
	Performance	<ul style="list-style-type: none"> • Eat poorly and performance will suffer. • Food, sleep, strength and training all affect how well an athlete will perform. • Recovery after a workout is important for performance.
	Social Aspect	<ul style="list-style-type: none"> • People in the athlete’s lives affect eating habits as well as performance.

		<ul style="list-style-type: none"> • Running is a social part of life allowing people to connect with friends and family.
	Lifestyle	<ul style="list-style-type: none"> • Running, exercise, and health define who they are. • Running is a way of life.
Psychological Factors	Trustworthiness of information	<ul style="list-style-type: none"> • Reliability of nutritional information is coming from is important. • Sources of reliable information included: coaches, friends, family, running sources. • There is no consensus on nutrition, and much of the information is confusing or conflicting.
	Competition	<ul style="list-style-type: none"> • Running gives them a feeling of accomplishment. • Competition and challenge is important.
	Emotion	<ul style="list-style-type: none"> • Running and food have a psychological, and emotional component. • Gives the athletes a sense of control. • Running and food used for stress management.

Nutritional views: All of the participants had unique views about nutrition. Subthemes identified included balance, food preparation, the understanding that food is energy, and diet limitations.

Balance: Many of the participants expressed a need for balance in their diet. "Eat the Rainbow" was a common expression stated by several of the participants indicating the need for eating foods from all food groups. Some runners expressed a lack of balance in their diet and they were worried about not eating enough nutrients from all the food groups; one athlete stated, "...it's been my goal to implement more fruits and veggies in my diet..." A few participants expressed that they were aware of not being able to consume enough calories to maintain optimal health, but caloric intake was not the only concern for the runners. Some reported that they were concerned with the amount of protein, carbohydrates, and other nutrients. One runner reported the following: "I try to incorporate meat in almost all of my meals to make sure I'm getting protein, and I eat spinach a lot to make sure I get iron, and I drink milk every day to make sure I get calcium." Balance also applied to other daily habits such as sleep, hydration, and focusing on whole body health. Sleep and hydration in conjunction with nutritional aspects were reported to be a significant factor to maintaining a healthy body.

Food preparation: Food preparation refers to making or preparing food for themselves, as well as barriers that existed to preparing their own food. Several of the athletes identified that preparing their own food was an important aspect for maintaining a healthy diet. One athlete stated, "...I prepare my own food, so I tend to, I think, be healthier when I'm cooking for

myself." A few of the runners noted a preference for staying away from the food that is served in the cafeterias at the school. One athlete indicated that she thought the quality of her diet would improve in the next year when she moved off campus because she will not eat in the cafeterias as much, "I know next year I'm going to be a lot healthier living on my own than on campus."

Time management was noted as a barrier to preparing healthy meals. Many of the participants argued that they ate what was readily available, or food that can be made quickly. It was difficult for the athletes to properly prepare meals while balancing school and athletics, with one athlete stating: "...especially as an athlete time management is so hard that um there's nights where ... I don't have time to make my own dinner, I need to go to the (cafeteria or) I'm going to make the fastest thing I can, which may not always be the best choice..."

Caloric Energy: Seeing food as an energy source was indicated as an important factor when making nutritional choices. One of the runners reported, "...obviously if you increase in mileage you will be burning more calories so you need to take in more calories," indicating that she needed to eat enough calories to sustain her high activity level. Many of the athletes were concerned about getting enough calories during the day. One participant expressed: "Be sure that you have a good base, and so your muscles aren't ... weak, and you're not taking away from ... anything else like the calcium in your bones because you don't have enough (calories), ... you have to get a good base when you're not running even, to be sure that you have enough (calories) when you are going to run next."

Diet Limitations: All six of the participants identified behaviors of limiting food. Things that the participants limited within their diet included fats, extra calories, foods without nutritional value, and sugar. Some participants listed reasons for limiting foods such as the intensity of running and desire to maintain weight, with one explicitly stating, "I'm not running, so I can't, you know, I shouldn't eat all of this, because I don't want to gain weight." Some athletes reported limiting the amount of food that they consumed during times in which they were not running as much due to injury or time of year.

While all of the athletes in the study reported limiting behaviors, three of the participants were contradictory by also stating that they did not want to avoid any foods. "...being a runner you can really just eat whatever you want and it's better to eat too much than too little" was a sentiment expressed by one of the runners, demonstrating no desire to limit her diet.

Identity as a Runner: Running was seen as a way of life that affected how the athletes ate, socialized, and made diet choices. The athletes also described a strong connection between performance and food as well as how their beliefs about health connected with running, and their connection to the sport due to social constructs within their lives. The following subthemes describe the theme identity as a runner: running diet, performance, social aspect, and lifestyle.

Running diet: The participants indicated that being an athlete guided their personal decisions about food and diet. One athlete described, "Nutrition goes hand in hand with runners." Protein

was seen as an important food for the athletes to eat as well as carbohydrates, and the runners seemed to believe that they looked at food differently than a non-athlete. Some expressed that when they were running more they ate more, and if they were running less they became more conscious of their health and how much they ate. The following quote demonstrates the relationship between one runner and nutrition, "...In runners it's (nutrition) one of the biggest things you need to focus on in life... just so you can sustain yourself have the energy that you need as a distance runner."

Some athletes also described nutritional changes based on level of training as well as time of the season, while some indicated that they ate the same way year-round. One participant who saw the school nutritionist reported, "...on workout days you want to make sure you have mostly carbs and protein... on a not workout day to have carbs, protein, and like vegetables." During the season, some of the athletes refrained from eating sweets, and they were more concerned about eating a healthy diet.

Performance: The runners expressed a perceived correlation between running diet and performance, and many indicated that their diet had a significant impact on how well they performed. One runner stated, "...Eat junk (and you're) not going to feel as good, and you're not going to run as good or perform as well." The participants also expressed that protein is a good nutrient to eat to improve muscle performance, and calories are needed to support the high level of training.

Some athletes described other things other than food that may have affected their performance. The intensity of the training, conditioning and recovery with ice baths were mentioned as things that the athletes perceived to have an impact on how well they performed. Many expressed that sleep quality and the amount of sleep affected how well they ran.

Social aspect: Running seemed to be influenced by the participants' family and friends. Many of the participants reported that they either began to run because their friends were runners, and they continued running because they enjoyed being a part of a team and the support that they experienced within the team. One runner stated "I love being on the team, having that, like support crew and that team atmosphere..." Others grew up in homes with family members who ran which influenced their desire to run, with one runner describing, "My mom and I, like just kind of, you know, started running." The social aspect of running seemed to make the participants feel a sense of belonging, and at times, the sense of having people cheer for them and believe in them gave them a sense of accomplishment.

The people in the participants' lives also impacted eating behaviors and diet. Some reported that they continued to eat a similar diet as they did when they were at home living with their parents, "...implement the style you've had in the past. Because obviously if she's here, it's worked somewhat."

Lifestyle: The transcripts revealed that many of the participants' viewed running as a part of them, not simply something that they did for exercise or enjoyment. The runners' expressed that

“... running is part of my personality” and “...you find out who you are as a person.” It was apparent that the runners not only identified themselves this way but they truly enjoyed running, competition, and living healthy lives.

Psychological Factors: Running and ideals about health had a strong emotional and mental component. The participants expressed a need to trust where their information about health and nutrition comes from. Some of the runners reported strong feelings about competition, as well as the impact of life stressors on both diet and performance. The subthemes that accurately describe the theme of *Psychological Factors* are trustworthiness of information, competition, and emotion.

Trustworthiness of information: When the athletes had questions about nutrition they reported seeking information from people whom they trusted, and that they felt as if some sources were not dependable. Most of the athletes reported that they sought information about nutrition and health from their coaches first: “...the only reason I would go to the coaches first is because I trust them more than anything, but they’re not going to have all the answers and they will tell you that right away, so then they would direct me to the nutritionist.” A small group expressed that they would talk to their parents, or they would trust their own judgment on nutritional choices. Seeking information from other runners or running sources such as books and magazines were also seen as trustworthy resources.

While many athletes trusted the people involved in their lives to ask about health and nutrition, some expressed a distrust of nutritional facts and information. Evidence of distrust includes the following, “...Anybody can put anything on the internet so it’s not always 100% accurate.” There was also a belief that there is poor consensus on nutrition and information can be confusing. One athlete stated, “I don’t think anyone knows everything about nutrition, ...and I think there’s a lot of different opinions out there.” When describing if they thought their sources were reliable, one of the runners stated, “If it seems like enough sources say the same thing then it’s reliable.”

Competition: Competition and accomplishments seemed to affect the runners’ desire to run. One reported that running “...It’s your accomplishments, your weaknesses, it’s your strengths...” and many of the runners reported that they like the feeling of accomplishment after a run. They ran because they liked to compete against other people and to push themselves to improve their running. The following quote demonstrates the importance of a competition to the runner, “...I love racing, being competitive, I love that with running you can always get better, and you can compete against yourself and compete against other people...”

Emotion: Running has a significant mental and psychological impact on the runners. Many reported that they ran to relieve stress, it was good for their competitive nature, and it gave them a sense of control or structure. One runner noted, “...It (running) just means something to get up and know that you’re going to have everyday...something you can control.” Running not only impacted their mental health, but they also reported that their mood affected how well they performed. The psychological impact of running was indicated by the following remark: “...If

you're confident you'll do better." Not only is it affected by the athletes' mood, but running itself was reported as being a mental activity. One of the athletes reported, "Running is mostly mental, so I think that anything can impact how you think of yourself and how you think I can do this, I can run fast..."

Food and diet also seemed to be interrelated with stress and mood. Stress was reported to be a large part of the participants' lives with it motivating them to not only run, but also eat more or differently. One runner stated, "Running means a lot to me... it's such a good reliever of stress." One of the runners commented on the effect of emotion on her diet, "If I'm having a bad day I'll eat a bunch of cookies, but like if it's just a regular day I'm more conscious of my health." Eating was also affected by boredom with several people reporting that they ate if they were bored, studying, or if there was food readily available.

DISCUSSION

The purpose of this study was to explore the perspectives of female collegiate cross-country runners from NCAA Division I schools on eating behaviors and attitudes toward health. Three major themes emerged from the data: Nutritional Views, Identity as a Runner, and Psychological Factors. Intrinsic factors in this study consisted of maintaining self-control, perception of trust and available time. Extrinsic factors included availability of a nutritionist, family and team support, and availability of nutritious food.

The relationship between the three themes and 11 sub-themes, shown in Figure 1, highlights how the female athletes' perception of health and wellness includes multifaceted dimensions. Interactions were evident between themes and subthemes.

Nutritional Views and Identity as a Runner: The themes Nutritional Views and Identity as a Runner influenced each other, as evidenced by the athletes' responses to what impacted their performance. The athletes' looked at food as a source of energy that may positively affect performance, as well as emphasizing their increased activity level as a runner requiring more caloric intake compared to non-runners. The majority of athletes seemed to want to eat well, and knew they needed to increase their calories in correlation to their increased activity, but expressed being stymied by time and availability of nutritious foods, particularly in the cafeteria. Nutritional information about foods in the cafeteria was not available. Interestingly, a few athletes who mentioned the overall cafeteria food as unhealthy also reported that they could pick healthier options within the cafeteria, and be more aware of what they were eating. These sentiments highlight the importance of athletes being aware of the availability of quick nutritious food. The campus cafeteria may need to improve access to nutritional information on the foods they serve by making it more noticeable and more accessible.

The runners also referred to differences in eating behaviors in season versus out of season. This is in agreement with prior research on female collegiate soccer players (18). Thus, runners and all athletes may recognize that they need increased energy availability when training is at a

higher volume and may be receptive to information if it can be linked to positive improvements in performance.

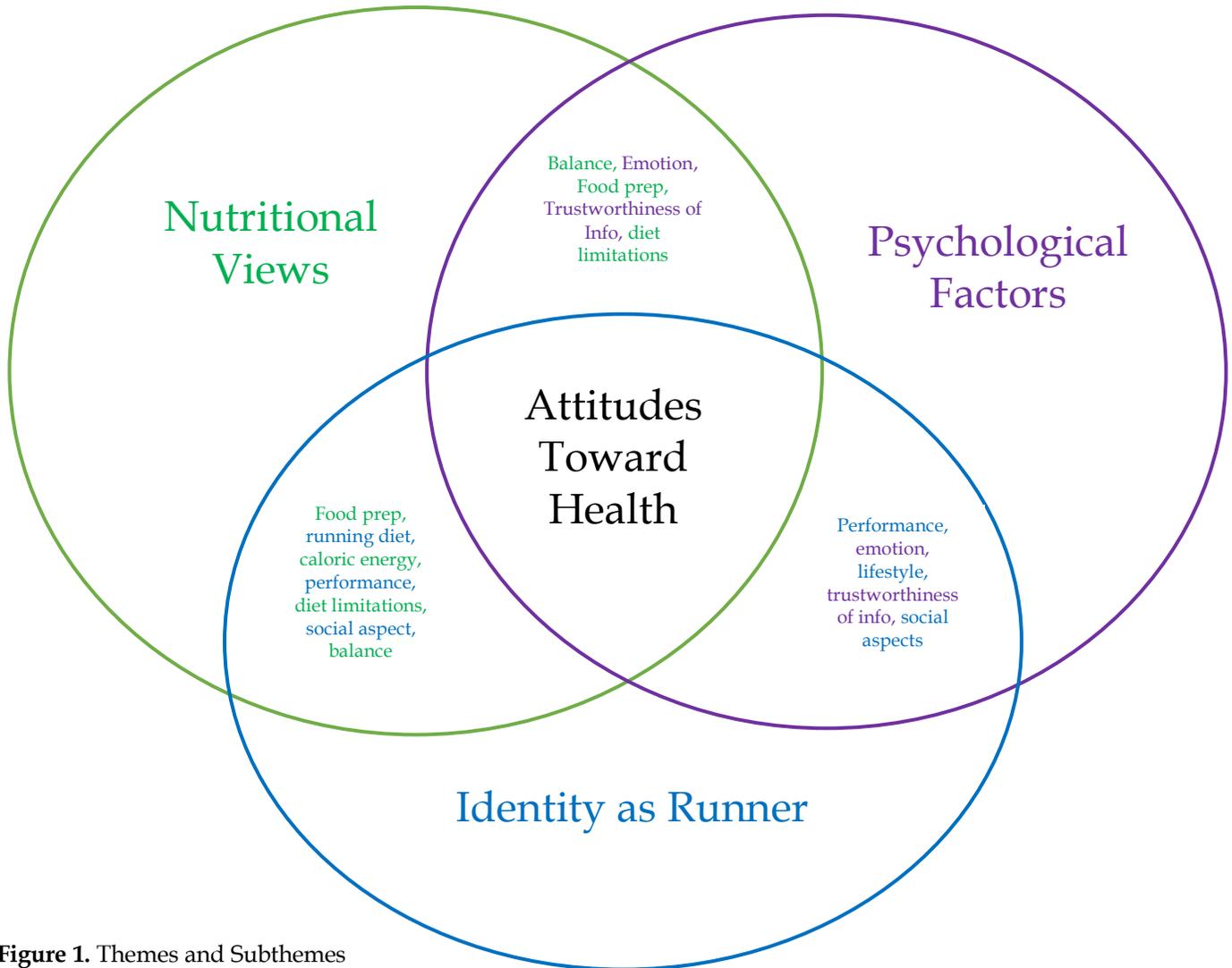


Figure 1. Themes and Subthemes

Nutritional Views, Identity as a Runner, and Psychological Factors: The themes Nutritional Views, Identity as a Runner, and Psychological Factors overlapped when considering reliable nutritional information the athletes sought and sources they used. Similar to previous studies (4, 7, 13, 21, 27), many athletes cited the influence of social aspects affecting their nutritional intake and perceptions of healthy foods. The majority of athletes chose their coach, other runners, or a nutritionist as a reliable source, without explaining why these individuals would be more trustworthy than others. A potential explanation for this phenomenon is the Social Comparison theory, where athletes are more likely to seek support from others in similar circumstances (i.e. people who use running as a self-identifier or define themselves as runners), and are therefore more likely to take advice from those specific individuals due to the ability to identify with them (13). Research performed by Elliot et al. reinforced the importance of a social group, describing the importance of peer group interaction on a team and the increased effectiveness the peer-led group had on changing habits (7). This phenomenon is a potential

drawback, as research has shown how coaches and athletes, while perceiving their personal nutritional knowledge as high, actually scored lowest on nutritional knowledge when compared to Athletic Trainers and Strength and Conditioning Specialists (24).

The concepts within the subthemes of Trustworthiness of Information, Lifestyle, and the Social Comparison theory is important to recognize as it may explain why some athletes may not consider seeking out medical advice due to the perceived lack of running knowledge and the background of the health care professional.

Psychological Factors, Identity as a Runner, and Nutritional Views also influenced each other when the athletes discussed their performance being affected by their mood and how their eating choices impacted performance. In regards to personal control and stress management, the theme of Psychological Factors appeared to align strongly with the athletes' Identity as a Runner. Both themes seemed to intertwine with athletes' perceptions of performance, and poor nutritional balance as a negative influence upon the athletes' performance. For instance, some athletes reported that when they did not have time for food preparation they ate less nutritious food, which many reported influenced their performance negatively. This finding supports the previous similar study of Division II and NAIA athletes that noted athletes stating time constraints affecting nutritional intake negatively, interfering with their regular routine (i.e. how they exert control) and increasing stress (21). This demonstrates a connection between time management and stress impacting an athlete's nutritional intake (21). The ability for athletes to plan their meals in advance or cafeterias having easily accessible nutritional information may lead to less stress over nutrition, controlling intake, possibly increasing their awareness of nutritional intake and allowing more focus on their performance.

Running Identity and Psychological Factors: The influence of Running Identity and Psychological Factors are supported by Waldrop (26) who noted that perceived performance and actual performance are important factors to consider when screening for the Triad, and by the case study by Busanich et al (4). In the current study, athletes described their performance and competitive nature as a positive factor, driving themselves to be healthier in order to perform optimally. The concepts of running competition and accomplishments played a role in the athletes' feeling that running is an integral part of who they are. A few athletes placed a large emphasis on feelings of competition or accomplishments influencing their performance and nutritional behaviors positively. While the nature of competition can be positive in making athletes more aware of their nutritional intake and health practices, it is important to note that when athletes are obsessed with performing optimally, it can become dangerous, especially if lacking knowledge relevant to safe practices (24). This was emphasized by Mottaghi, Atarodi, and Rohani (12) who noted that athletes' drive for competition can lead to severe anxiety, affecting the athlete negatively in emotional health, as well as being detrimental to their performance.

Perception of Nutritional Knowledge: The athletes in the study demonstrated some difficulty internalizing nutritional behaviors or knowledge in which they expressed. This was demonstrated by how the athletes struggled to explain or define what nutrition was or meant

to them, instead relying on the repetitive nature of the phrase “eat the rainbow” despite being asked to explain this phrase in more detail. These common phrases were a unique finding when compared to the results of this study to the initial study of Division II and NAIA runners (21), perhaps due to the influence of the nutritionist. Although the results of this study cannot be generalized, in a study by Torres-McGehee et al (24) and the prior study of Division II and NAIA runners (21), athletes were also unable to explain their nutritional knowledge further in depth, despite claiming to have high nutritional knowledge. This suggests that rating knowledge highly may not be accurate of actual nutritional knowledge.

Implications for Health Care Practice: The identification of themes relating to views of health and wellness by female athletes has important implications for health professionals who may be interacting with this patient population. Concern for caloric balance may be influenced by factors such as time management, social aspects, performance, and trustworthiness of information, demonstrating how the nutritional aspects of the Triad are multifaceted (17, 26). Although this was a pilot study, this finding is similar to previous studies by Torres-McGehee et al. (24), Elliot et al (7), and Sticker et al (21), suggesting time, psychological factors, social aspects and trustworthiness of information may increase the difficulty for the athletes to have ideal habits. Several athletes also noted some form of difficulty in determining balance between their athletic demands (i.e. practice, recovery, performance) with their outside demands (i.e. time constraints, availability of food, academic responsibilities). This makes it important to consider whether the athletes need education or specific interventions in regards to balancing internal and external pressures, versus if they require focused education on nutrition and healthy eating habits.

When screening for the Triad, the health care provider must realize that the Triad is a multifaceted issue (18, 26), which can affect each athlete differently. In relationship to eating behaviors, this was demonstrated by each athlete's unique responses, suggesting that following screening, in-depth queries into each individual's factors affecting nutritional views, in order to cater to their individual needs in prevention or treatment of the Triad. Health care professionals should consider referrals to sport-psychologists and sport-nutritionists when working with athletes who may be at risk for the Triad to address issues such as anxiety over performance, time management, inaccurate nutritional views, emotional strains, as well as nutritional knowledge specific to the athlete.

Health care providers also need to be aware of the importance of being perceived as a trustworthy source by the athletes. The sub-theme of Trustworthiness of Information was extremely strong in the interviews, suggesting that the athletes would be more likely to respond to a trusted health care source with sports knowledge than a typical appointment with a health care professional. A few athletes highlighted this in their comments that they had not asked health care providers questions regarding nutritional information, potentially indicating the perceived lack of specificity the health care professional has to the athlete's nutritional needs. As previously discussed by Nixon (13), athletes' were more likely to express health concerns to others when the individuals demonstrated sympathy to the athlete, emphasizing the need for health care professionals to identify and establish a strong care and concern for the athlete's

overall well-being. As suggested by Torres-McGehee et al (24), it is important to encourage inter-professional communication with coaches and sport-nutritionists to help promote healthy behaviors, and potentially build trust with the athletes. This collaboration becomes important when noting how many athletes reported their main nutritional information source as their coach, despite that coaches have been found to be inaccurate with nutritional knowledge (24). Thus, communication between the coaches, health care professionals, sport-psychologist and nutritionist, would help reduce errors in nutritional information, as well as promote trust between the health care professional and the athlete.

Limitations and Future Research: This study only assessed decision-making and perceptions in regards to nutrition, and not the actual caloric intake of each athlete. Therefore, this study cannot comment on the causation of nutritional perceptions affecting how the athletes make nutritional decisions. Additionally, this is a pilot study of one school and results may vary with other athletes.

Future research might address how the themes and subthemes found in this study relate to those who experience one or more parts of the triad. Furthermore, studies including runners of different ages or athletes in other sports on the perception of health and eating behaviors would be beneficial.

Conclusion: The subthemes and themes in this study demonstrated that there are multiple factors across multiple facets of health influencing the athletes' nutritional behaviors, and clearly it is a complex issue. The athletes' identity as a runner appeared to have an impact on their perception of health. While the results of this study cannot define how the role of nutritional knowledge and actual health behavior are connected, it is important to note that the athletes' expressed the need for balance between caloric intake and expenditure. However, the athletes also expressed uncertainty on how to attain nutritional balance. These factors might vary in other groups of runners, but it is appears that education on how to implement change and establishing trustworthiness may be important areas for health care professionals to address when trying to increase EA.

REFERENCES

1. Abood DA, Black DR, Birnbaum RD. Nutrition education intervention for college female athletes. *J Nutr Educ Behav* 36(3): 135-139, 2004.
2. American College of Sports Medicine. The female athlete triad: position stand. *Med Sci Sports Exerc* 39(10): 1867-1882, 2004.
3. Beals KA, Meyer NL. Female athlete triad update. *Clin Sports Med* 26: 69-89, 2007.
4. Busanich R, McGannon K, Schinke R. Comparing elite male and female distance runner's experiences of disordered eating through narrative analysis. *Psychol Sport Exerc* 15(6): 705-712, 2016.
5. De Souza MJ, Nattiv A, Joy E, et al. Female athlete triad coalition consensus statement on treatment and return to play of the female athlete triad. *Br J Sports Med* 48(4): 1-20, 2014.

6. Dunn D, Turner LW, Denny G. Nutrition knowledge and attitudes of college athletes. *Sport J* 10(4): 45-52, 2007.
7. Elliot DL, Moe EL, Goldberg L, DeFrancesco C, Durham MB, Hix-Small H. Definition and outcome of a curriculum to prevent disordered eating and body-shaping drug use. *J Sch Health* 76(2): 67-73, 2006.
8. Gibbs JC, Williams NI, De Souza MJ. Prevalence of individual and combined components of the female athlete triad. *Med Sci Sports Exerc* 45(5): 985, 2013.
9. Hesse-Biber S, Leavy P. *The practice of qualitative research*. Los Angeles, CA: Sage Publications; 2011.
10. Hoogenboom BJ, Morris J, Morris C, Schaefer K. Nutritional knowledge and eating behaviors of female, collegiate swimmers. *N Am J Sports Phys Ther* 4(3): 139-148, 2009.
11. Manore MM, Kam LC, Loucks AB, International Association of Athletics Federations. The female athlete triad: Components, nutrition issues, and health consequences. *J Sports Sci* 25(S1): S61-71, 2007.
12. Mottaghi M, Atarodi A, Rohani Z. The relationship between coaches' and athletes' competitive anxiety, and their performance. *Iran J Psychiatry Behav Sci* 7(2): 68-76, 2013.
13. Nixon HL. Social pressure, social support, and help seeking for pain and injuries in college sports networks. *J Sport Soc Issues* 18(4): 340-355, 1994.
14. Pantano KJ. Strategies used by physical therapists in the U.S. for treatment and prevention of the female athlete triad. *Phys Ther Sport* 10(1): 3-11, 2009.
15. Papanek PE. The female athlete triad: an emerging role for physical therapy. *J Orthop Sports Phys Ther* 33(10): 594-614, 2003.
16. Raymond-Barker P, Petroczi A, Quested E. Assessment of nutritional knowledge in female athletes susceptible to the Female Athlete Triad syndrome. *J Occup Med Toxicol* 2(10): 2007.
17. Reed JL, De Souza MJ, Kindler JM, Williams NI. Nutritional practices associated with low energy availability in Division I female soccer players. *J Sports Sci* 32: 1499-1509, 2014.
18. Reed JL, De Souza MJ, Williams N. Changes in eating availability across the season in Division I Female Soccer Payers. *J Sport Sci* 31(3): 314-321, 2013.
19. Shriver LH, Betts NM, Wollenberg G. Dietary intake and eating habits of college athletes: are female college athletes following current sports nutrition standards? *J Am Coll Health* 61(1): 10-16, 2013.
20. Starks H, Brown Trinidad S. Choose Your Method: A Comparison of Phenomenology, Discourse Analysis, and Grounded Theory. *Qual Health Res* 17(10): 1372-1380, 2007.
21. Stickler L, Armstrong T, Polso A, Smith M. Perspectives of female collegiate cross country runners on eating behaviors and attitudes toward health: a qualitative study. *Women Sport Phys Act J* 24: 81-90, 2016.
22. Thomas DR. A general inductive approach for analyzing qualitative evaluation data. *Am J Eval* 27(2): 237-246, 2006.
23. Thompson SH. Characteristics of the female athlete triad in collegiate cross-country runners. *J Amer Coll Health* 56(2): 129-136, 2007.

24. Torres-McGehee TM, Pritchett KL, Zippel D, Minton DM, Cellamare A, Sibia M. Sports nutrition knowledge among collegiate athletes, coaches, athletic trainers, and strength and conditioning specialists. *J Athl Train* 47(2): 205-211, 2012.
25. Torstveit MK, Rosenvinge JH, Sundgot-Borgen J. Prevalence of eating disorders and the predictive power of risk models in female elite athletes: a controlled study. *Scand J Med Sci Sports* 18(1): 108-118, 2008.
26. Waldrop J. Early identification and interventions for female athlete triad. *J Pediatr Health Care* 19(4): 213-220, 2005.
27. Wells EK, Chin AD, Tacke JA, Bunn JA. Risk of disordered eating among Division I female college athletes. *Int J Exerc Sci* 8(3): 256-264, 2015.
28. Wiita B, Stombaugh I, Buch J. Nutrition knowledge and eating practices of young female athletes. *J Phys Ed Rec Dance* 66(3): 36-42, 1995.
29. Zawila LG, Steib CM, Hoogenboom B. The female collegiate cross-country runner: nutritional knowledge and attitudes. *J Athl Train* 38(1): 67-74, 2003.

APPENDIX A

Interview Guide

- **Background**
 - Why do you like to run?
 - What does running mean to you?
 - Tell me how you became a competitive runner.
 - What factors do you believe influence how well you run?
 - Why?
- **Nutritional Knowledge**
 - How would you describe your knowledge of nutrition?
 - How has this changed in the last few years?
 - What is your preferred method to find nutritional information?
 - What types of topics do you inquire about?
 - What is your process for deciding what information to use?
 - On a scale of 1 to 10, with 1 being the lowest and 10 being the highest, do you feel your sources are reliable?
 - Why?
 - Have you ever received information from a health care provider?
 - If so, who? What kind of information?
- **Attitudes toward Health**
 - Define health. (see below)
 - If a 10 year old asked you what “healthy” means, what would your response be?
 - If you had to describe the importance of nutrition to a new teammate what would you say?
 - What factors influence your eating habits?
 - Do you feel that your attitude toward health relates to your eating habits?
 - Why/why not? In what way?
- **Perspectives on Eating Habits**
 - Describe how your knowledge of nutrition impacts how you eat.
 - Do your eating habits change throughout your training season?
 - How or why?
 - What kind of nutritional issues or practices do you see among your teammates?
 - Do you have any health or eating habits that you don't tell your coach or teammates?
 - Tell me more about that.
 - Anything that you avoid?
 - How do you think your options for food preparation impact your eating behaviors?
- **Summary**
 - Do you have any additional thoughts on health and nutrition?