Disordered Eating Behaviors Amongst Student Athletes

Sarah Wensink

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Abstract
This research study investigated the prevalence of disordered eating behaviors amongst collegiate athletes as well as factors that increase one's susceptibility to partake in disordered eating behaviors. The participants were 380 collegiate athletes from a small midwestern university. The participants were student athletes from a variety of different sports. Athletes were requested to complete a 26-item questionnaire that assessed their eating behaviors, perfectionist tendencies, health knowledge, and feelings surrounding body image and satisfaction. This research study explored the relationship between these factors. The results of this study found that female athletes may be more prone to report disordered eating behavior than males. Females are also more likely to be dissatisfied with their body image and are more likely to compare themselves to others and society's ideals. Females, more so than males, also believe that they would be more successful in their sport if they were thinner. This research study confirmed that those with perfectionistic tendencies may be more likely to partake in disordered eating habits. Contrary to prior research, this study found that athletes whose coaches talk about the importance of good nutrition and creating healthy eating habits appear more likely to participate in disordered eating behaviors. Disordered eating is apparently prevalent amongst collegiate athletes even at a small midwestern university, however there are things that coaches can do to prevent disordered eating behaviors.

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Disordered Eating Behaviors Amongst Student Athletes

By
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B. A. Dordt University, 2019

Thesis
Submitted in Partial Fulfillment
of the Requirements for the
Degree of Master of Education

Department of Education
Dordt University
Sioux Center, Iowa
(December 2020)
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Abstract
This research study investigated the prevalence of disordered eating behaviors amongst collegiate athletes as well as factors that increase one’s susceptibility to partake in disordered eating behaviors. The participants were 380 collegiate athletes from a small midwestern university. The participants were student athletes from a variety of different sports. Athletes were requested to complete a 26-item questionnaire that assessed their eating behaviors, perfectionist tendencies, health knowledge, and feelings surrounding body image and satisfaction. This research study explored the relationship between these factors. The results of this study found that female athletes may be more prone to report disordered eating behavior than males. Females are also more likely to be dissatisfied with their body image and are more likely to compare themselves to others and society’s ideals. Females, more so than males, also believe that they would be more successful in their sport if they were thinner. This research study confirmed that those with perfectionistic tendencies may be more likely to partake in disordered eating habits. Contrary to prior research, this study found that athletes whose coaches talk about the importance of good nutrition and creating healthy eating habits appear more likely to participate in disordered eating behaviors. Disordered eating is apparently prevalent amongst collegiate athletes even at a small midwestern university, however there are things that coaches can do to prevent disordered eating behaviors.
There has been more and more research coming out on the topic of eating disorders in athletes over the past decade, but most of the results have been inconclusive or unclear. Some themes in the research on collegiate athletes and disordered eating include gender, weight-sensitive sports, and mental health or perfectionistic tendencies. Much of the research on disordered eating has focused on one specific sport or on a particular gender. There are few studies which seek to discover the prevalence of eating disorders across different genders and sports at a four-year university. There has also been little research to determine whether an athlete’s health knowledge and health education can prevent eating disorders. This research study seeks to identify the prevalence of disordered eating amongst collegiate athletes as well characteristics that may predispose or make an individual more susceptible to disordered eating behaviors.

**Purpose of Study**

The purpose of this study was to examine the prevalence of disordered eating behaviors and identify which athletes may be most at risk amongst student athletes. This study sought to answer the following questions:

1. Does an athlete’s health knowledge and health education help to prevent disordered eating behaviors?
2. Does an athlete’s gender influence any specific disordered eating behaviors?
3. Are those that have a perfectionist personality more likely to participate in disordered eating behaviors?
4. Are students who participate in weight-sensitive sports such as track and field, cross country, and dance more likely to partake in disordered eating behaviors compared to those who participate in basketball, softball/baseball, football, hockey, soccer, volleyball, and golf?
Definitions

For the purpose of this study, the following definitions will be used throughout. The definitions are the author’s own unless otherwise indicated.

Amenorrhea: The absence of a menstrual cycle.

Anorexia nervosa: The persistent restriction of energy intake, intense fear of gaining weight and disturbance in self-perceived weight or shape. Individuals may control food and weight as a means of controlling areas of life that feel out of control, or as a way of expressing complex or concerning emotions. (National Eating Disorders Collaboration, n.d.)

Binge eating disorder: Regular episodes of binge eating accompanied by feelings of loss of control, and in many cases, guilt, embarrassment, and disgust. (National Eating Disorders Collaboration, n.d.)

Bulimia nervosa: Repeated episodes of binge eating followed by compensatory behaviors. People with bulimia nervosa often place an excessive emphasis on body shape or weight in their self-evaluation. (National Eating Disorders Collaboration, n.d.)

Disordered eating: Disordered eating can include behaviors that reflect many but not all of the symptoms of feeding and eating disorders such as anorexia nervosa, bulimia nervosa, binge eating disorder or other specified feeding and eating disorders (OSFED). (National Eating Disorders Collaboration, n.d.) Disordered eating is also referred to as subclinical eating disorders.

Eating Disorder: Psychiatric disorders that affect individuals’ psychological, physical, nutritional, interpersonal, and emotional functioning and are characterized by dysfunctional eating patterns and disturbances or distortions about body size and shape (Ray, R. & Wise-Bjornstal, D.M., 1999). (Zeigler, 2020) Clinical eating disorders typically fall into three distinct diagnoses which include: anorexia nervosa, bulimia nervosa, and binge eating disorder.
Eating Disorders Not Otherwise Specified (EDNOS): A person with EDNOS may present many of the symptoms of other eating disorders such as anorexia nervosa, bulimia nervosa or binge eating disorder but will not meet the full criteria for diagnosis of these disorders. (National Eating Disorders Collaboration, n.d.)

Female Athlete Triad: The interrelationships among energy availability, menstrual function, and bone mineral density, which may have clinical manifestations including eating disorders, functional hypothalamic amenorrhea, and osteoporosis. (Nattiv, Loucks, Manore, Sanborn, Sundgot-Borgen, Warren, 2007)

Muscle Dysmorphia: The belief that one’s body is not muscular enough.

Osteoporosis: A condition in which the body loses bone mass and density resulting in weak and brittle bones.

Perfectionism: A network of cognitions, including expectations and interpretations of events and evaluations of oneself and others, characterized by the setting of unrealistic standards, rigid and indiscriminate adherence to these, and the equating of self-worth and performance (McLester, Hardin, Hoppe, 2014).

Relative Energy Deficiency in Sport (RED-S): Impaired physiological functioning caused by relative energy deficiency and includes, but is not limited to, impairments of metabolic rate, menstrual function, bone health, immunity, protein synthesis, and cardiovascular health. The etiological factor of this syndrome is low energy availability (LEA) (Mountjoy, M., Sundgot-Borgen, J. K., Burke L. 2018).

Stress Fracture: A small fracture in a bone caused by overuse and repetitive force.

Subclinical eating disorders: Individuals with considerable eating behavior pathology, but who do not meet the clinical criteria for the three identified clinical eating disorders. These conditions may include
individuals with considerable unhealthy eating behaviors and body weight concerns, but who may not manifest all of the clinical criteria. (Zeigler, 2020)

*Weight-Sensitive Sport:* A sport that emphasizes leanness or thinness as an important performance variable. Weight-sensitive sports may include endurance events, dancers, wrestlers, and jumpers.

**Review of Literature**

Athletes have received considerable attention for being at risk for eating disorders. Reasons for susceptibility of eating disorders may vary. The National Institute of Mental Health defines eating disorders as, “serious and often fatal illnesses that are associated with severe disturbances in people’s eating behaviors and related thoughts and emotions. Preoccupation with food, body weight, and shape may also signal an eating disorder.” Those that struggle with eating disorders are typically diagnosed with anorexia nervosa, bulimia nervosa, or binge-eating disorders. Eating Disorders Not Otherwise Specified (EDNOS), or subclinical eating disorders, account for about 50% of all eating disorders. Thompson (2007) explains that, those with EDNOS are “preoccupied with eating, engage in excessive exercise, and may experience some depression and low-self-esteem.” Disordered eating behaviors are eating behaviors that center around anxieties of body image. Some common symptoms of disordered eating may include a preoccupation with food, weight, and body image. Someone displaying disordered eating habits may restrict calories or restrict the types of food that they are “allowed” to eat. Other signs of disordered eating may be fatigue or weakness, weight fluctuations, gastrointestinal problems, missed menstrual cycles, and low libido. Over time individuals who partake in disordered eating habits can develop eating disorders. One study found that, “disordered eating behaviors can become so ingrained that they will develop into a diagnosable eating disorder among both female and male athletes” (Van Niekerk, Card, 2018).
Factors involved with Eating Disorders

Eating disorders and disordered eating are multifaceted issues. One’s culture, family background, relationships, and genetic make-up play a role in the susceptibility to an eating disorder. In athletes, several factors may predict an eating disorder including the pressure to perform at a high level, high training intensities, injuries, teammates practicing disordered eating behaviors, and a desire to hit a certain goal weight. Evidence for the prevalence of disordered eating behaviors in athletes has been suggested; however, most evidence has been inconclusive. An individual’s self-concept and personality may also affect one’s susceptibility to disordered eating. In the article, “Susceptibility to Eating Disorders Among Collegiate Female Student–Athletes,” researchers McLester, Hardin, and Hoppe describe the wide range of research on unhealthy eating behaviors amongst athletes, saying that “studies have reported prevalence rates of developing an eating disorder as high as 39.2% (Burkes-Miller and Black, 1988) and as low as 4% (Petrie and Stoever, 1993)” (McLester, Hardin, Hoppe, 2014). Thompson (2007) explains that there have been “reported increases in subclinical eating disorders among active women with rates that may exceed that of clinical eating disorders.” Researchers Van Niekerk and Card (2018) sought to determine disordered eating behaviors among amateur athletes to identify athletes at risk of developing an eating disorder. Researchers sampled 278 amateur athletes in Gauteng, South Africa. Participants were asked to complete an Eating Attitudes test and a Sport Competition Anxiety test. The researchers found that 14.7% of athletes were at risk of developing an eating disorder while others engaged in extreme weight control behaviors. Although active women with subclinical eating disorders might not suffer the life-threatening medical complications of those with clinical eating disorders, they still have poor nutritional status and health. Poor nutrition and inadequate caloric intake can lead to both short term and long-term complications.
Low Energy Availability and Risks

Restrictive patterns in diet and inadequate caloric intake can cause low energy availability which can disrupt an athlete’s well-being and performance in their sport. Restrictive diet patterns may result in a reduction in both muscle mass and strength and can also disrupt endocrine function and cause fluctuations in mood. An athlete experiencing a decline in performance may be experiencing Relative Energy Deficiency in Sport (RED-S). RED-S occurs in both males and females, although it is more prevalent in females.

The syndrome of RED-S refers to impaired physiological functioning caused by relative energy deficiency and includes, but is not limited to, impairments of metabolic rate, menstrual function, bone health, immunity, protein synthesis and cardiovascular health.

The etiological factor of this syndrome is low energy availability (LEA). (IOC, 2018)

Low energy availability (LEA) is hard to quantify or determine. There is no set of guidelines to determine energy availability as energy input and energy output along with effort levels are difficult to measure. A set guideline would certainly have poor reliability and validity scores as energy availability is multifaceted. The best way to attain data on an athlete’s energy availability may be to check in with athletes. Athletes know their bodies best and if they are in tune with their bodies, they will be able to sense when they are feeling depleted.

When an athlete is restricting their diet or struggling with an eating disorder, they will likely have low energy. RED-S can affect bone health, menstrual function, hormonal changes, metabolic function, hemoglobin levels, growth and development, psychological well-being, the immune system, and the gastrointestinal system. Performance consequences of low energy availability may include impaired recovery which could lead to a premature reduction in physical, psychological, and mental capacity as well as an impairment in both muscle mass and function. The IOC concludes that, “achieving
an idealized body weight or body composition through severe and persistent energy restriction is likely to negatively affect performance and health” (IOC, 2018). These complications can affect athletes and their current performance as well as everyday living later in life. A female athlete with disordered eating habits may find herself feeling burnt out or injured due to a decrease in bone mass density, which may lead to a stress fracture. Not only does this put the athlete at risk for fractures now, but it also puts her at risk for osteoporosis later in life. When females reach their late 20s their bones have reached their peak or maximum strength and density. If a young female student athlete is struggling with disordered eating or an eating disorder, they risk harming their bone structure during those foundational years.

Research has shown that, “poor nutrition from disordered eating and menstrual dysfunction negatively affects the skeletal system. Adequate calcium and vitamin D intake, along with balanced nutrition, are recommended as part of the preventive guidelines against osteoporosis” (Thompson, 2007).

The female athlete triad fits within RED-S and is defined by the American College of Sports Medicine as a, “life-threatening syndrome that is defined by disordered eating, amenorrhea, and osteoporosis.” Thompson, (2007) explains that, “Female athletes at the elite level, those involved in appearance or endurance sports, and those with a low body weight are particularly susceptible to developing the triad” (Thompson, 2007). However, research is needed to improve prevention. Sport and exercise have many benefits, however too much exercise along with diet restriction can cause harm to an athlete. It can cause hormonal changes, harm to the reproductive system (menstrual dysfunction), as well as causing an athlete to become amenorrheic if they lose their period for three to six consecutive cycles. Thompson (2007) explains that, “menstrual dysfunction is more prevalent among female athletes than it is among nonathletes and is especially common among women who participate in sports where a thin build may improve performance.”

Disordered eating behaviors can lead to low energy availability. A reason for low energy availability is poor nutritional choices. Cotugna, Vickery, McBee (2005) explain that fueling for athletic
performance is important regardless of the age of athletes: “Athletes have unique needs that include sufficient caloric intake for sport, adequate hydration, and timing of meals for peak performance; however, they often are misinformed or have misconceptions about these topics” (Cotugna, Vickery, McBee, 2005). Often those that interact with athletes are misinformed when it comes to proper nutritional guidance. Many athletes display a high interest in nutrition, but they do not demonstrate knowledge of nutrition for their performance needs. Cotugna, Vickery, McBee (2005) explain that "knowledge of protein needs, vitamin and mineral needs, and fluid needs has been shown to be lacking among athletes.” Another problem when it comes to young athletes and nutrition is that many use ergogenic aids and supplements without really knowing why they should use them. Weight control is another problem when it comes to athletes and nutrition. Football players or weightlifters may seek to increase their weight and dancers and wrestlers may seek to lose weight. Calorie manipulation or calorie counting is an area of concern and can jeopardize typical growth patterns especially for athletes who are still developing.

Weight-Sensitive Sports

Research shows evidence that disordered eating is consistent in sports that put emphasis on thinness. The IOC found that “disordered eating and eating disorders are more prevalent among both female and male athletes in weight-sensitive sports in comparison to athletes representing sports in which leanness is a less important performance variable” (IOC, 2018). Individuals who participate in these sports generally have a higher drive for thinness, are more concerned with their weight, and may be dissatisfied with their body in comparison to those who do not participate in a sport that emphasizes leanness. In many sports, weight does contribute to performance. For example, in endurance running, the leaner one is the less weight they must carry around a track or a racecourse. Thompson (2007) researched the perceptions of student’s eating disorders among female collegiate cross-country runners and found that 13% of female runners were underweight and 19.3% of athletes when asked, “Have you
ever perceived or been told that you have an eating disorder?” answered “yes.” Nearly one fifth of the
surveyed 300 athletes currently have or have had an eating disorder in the past. The results from this
research show that cross country athletes may be more susceptible to eating disorders due to the fact
that their sport requires them to maintain low body fat.

Research has found that those who participate in a sport have been found to be more
susceptible to developing disordered eating habits. However, this may not always be the case, the IOC
describes a Norwegian study of elite adolescent male and female athletes and found that individuals not
involved in sport had a higher prevalence of disordered eating than the athletes. However, the opposite
was shown when participants took part in a clinical interview. This study that the IOC describes shows
that the way that data is collected may cause differences in the results. Their findings also suggested
that personal interviews may be a more accurate way to diagnose eating disorders.

Perception of Body and Mental Health

High levels of competitiveness, self-control, and perfectionist tendencies may be a predictor of
eating disorders. McLester, Hardin, and Hoppe (2014) explain, “athletes and eating disordered patients
may share many psychological factors. These factors include high levels of competitiveness (Borgen and
Corbin, 1987); high emphasis on control (Slade, Newton, Butler and Murphy, 1991); and perfectionist
tendencies” (McLester, Hardin, Hoppe, 2014). McLester, Hardin, and Hoppe introduced a study by
Clough and Wilson (1993) in which they discovered a strong correlation between unhealthy
perfectionism and disordered eating behaviors in a group of dancers. In this context researchers define
perfectionism using Bums’ (1983) definition: perfectionism is “a network of cognitions, including
expectations and interpretations of events and evaluations of oneself and others, characterized by the
setting of unrealistic standards, rigid and indiscriminate adherence to these, and the equating of self-
worth and performance” (McLester, Hardin, Hoppe, 2014). Perfectionism can be perceived as both a
negative or positive trait as one can have positive/healthy perfectionism and negative/unhealthy perfectionism. Those that are perfectionists may set unrealistic standards for themselves, be critical towards themselves, and obsess over mistakes and overemphasize organization. Those that struggle with perfectionism may negatively evaluate or critique their body and compare themselves against society’s ideals of beauty.

In the article, “Perfectionism and Eating Attitudes in Competitive Rowers: Moderating Effects of Body Mass, Weight Classification and Gender,” (Haase, Prapavessis, and Owens, 1999) sought to determine the relationship between perfectionism and eating attitudes among elite rowers from New Zealand and Australia. Their research found that unhealthy perfectionism was positively correlated to disordered eating attitude scores. They also found that healthy levels of perfectionism scores were not related to disordered eating attitude scores and explained that their results are consistent with similar studies. The secondary purpose of the study was to determine if body mass, weight classification, and gender influenced an athlete’s perfectionism and disordered eating attitudes. Their finding on their secondary purpose was found to be non-significant.

However, in another study Petrie, Greenleaf, Reel, and Carter (2009) looked at four key personality and psychological constructs in relation to disordered eating behaviors in female athletes. The constructs observed included: perfectionism, psychological well-being, reasons for exercising and appearance orientation. Based on their questionnaires they found that 25.5% of female athletes had symptoms of disordered eating and 2% appeared to have an eating disorder. They found that there was no strong evidence that there is a relationship between perfectionism and disordered eating. Although they did find that with those that did not have symptoms of disordered eating reported higher levels of self-esteem than those that did have symptoms. The most common reason for exercising was to improve health and fitness. These individuals were motivated mainly by intrinsic factors. Nevertheless, “symptomatic female athletes reported stronger motivations to exercise to socialize/improve mood and
to improve appearance/attractiveness than did those who were asymptomatic” (Petrie, Greenleaf, Reel, Carter, 2009). In all, this study found that using exercise to control weight and alter appearance predicted higher EAT-26 (Eating Attitudes Test) scores and greater body dissatisfaction.

The IOC explains that, “Disordered eating seems to be influenced by perfectionism, competitiveness, pain tolerance, and the perceived performance advantage of weight loss. These suggested risk factors need to be validated to demonstrate a causal relationship” (IOC, 2018). These characteristics of body image and perfectionism may aid in screening for eating disorder risk. It may be especially helpful to screen athletes who experience pressures to perform, increased training intensities, injuries, teammates practicing disordered eating behaviors, and a desire to hit a certain goal weight.

Disordered Eating in Males vs. Females

Female athletes are not the only ones who struggle with low energy availability and disordered eating. Low energy availability has been suggested to be higher in females, but the exact differences between the genders are unknown. There is growing evidence that shows that males also struggle with low energy availability and disordered eating, especially those participating in weight-sensitive sports. It is also important to note that athletes may not have the resources needed to keep up with the demands of their sport. The IOC has found that, “Inadequate food availability, including food insecurity from cultural practices or lack of financial resources may also contribute risk for LEA in some male athletes” (IOC, 2018). There has been an increase in research on RED-S in male athletes, but health risks and long-term consequences are still mainly unknown. IOC explains that “despite the improvement in the knowledge base of RED-S in male athletes, there remains a gap in our understanding of RED-S in specific sports with differing energy demands, performance criteria, ethnicities and cultural perspectives” (IOC, 2018).
Researchers Carter and Rudd (2005) shed light on gender differences in eating problems, especially men’s body image concerns centering around muscularity. This study showed that males may be concerned with gaining muscularity rather than losing weight. One fifth of men in the sample did not feel that their bodies were sufficiently lean and muscular. This suggests that women might be more concerned with thinness, while males are more concerned with their musculature. Rudd and Carter explain that by “expanding the definition and measurement of unhealthy body image and eating behaviors to include obsession with musculature, supplement use, and over-exercise, it appears that male athletes also are at risk” (Rudd, Cater 2005). These findings seem to align with society’s norms and ideals for men’s and women’s bodies, respectively.

Athletes receive societal messages from the media, family, and friends on the ideals for the size, weight, shape, and appearance of their bodies. Athletes also may receive pressure from their coaches, trainers, and teammates about the functionality or efficiency of their body in sport. Researchers, Chatterton, and Petrie (2013) studied the prevalence of disordered eating and disordered weight control behaviors in male collegiate athletes. Athletes “receive the message that their bodies must not only be aligned perfectly with the societal ideal, but also should be highly functional so they can excel athletically. Thus, athletes face different types of pressures that, singly or in combination, may increase body dissatisfaction” (Chatterton, Petrie, 2013). There is a lack of research on disordered eating and eating disorders amongst males, although males do experience disordered eating. Chatterton and Petre (2013) explain that male athletes also experience eating disorders and at higher percentages than females in subclinical disorders as well as pathogenic weight control behaviors. Chatterton and Petre (2013) explain that certain male athletes may have higher rates of disordered eating due to a heightened focus on their body in sport. The prevalence of clinical eating disorders is low according to Chatterton and Pierre, even though male athletes do engage in some weight control behaviors.
Cater and Rudd sought to address difficulties with estimating the prevalence of disordered eating behaviors amongst both males and females. They did this by administering a questionnaire over the course of two years. Based on the results of the questionnaire the prevalence of eating disorders in both males and females was less than 2%. However, athletes did report higher levels of subclinical eating disorders, which was between 12-15% of all athletes. Cater and Rudd also determined that, “There were higher subclinical prevalence rates for female athletes (17-19%) than for male athletes (9-11%), but it appeared that more male athletes fit a diagnosis of the proposed body image disorder of Muscle Dysmorphia” (Carter, Rudd, 2005). In addition to this they found that those in weight-sensitive sports reported higher subclinical rates than did athletes that were not involved in a weight-sensitive sport.

Education and Prevention

Education may help to prevent the prevalence of disordered eating behaviors. Researchers Black and Abood in *Health Education prevention for Eating Disorders among College Female Athletes* attempted to decrease risk factors of eating disorders among female college athletes through an 8-week health education intervention. After the 8-week intervention course Black and Abood found that the women in the intervention groups had lower drive for thinness as well as higher body satisfaction, showing that the educational intervention may help female athletes at risk of eating disorders. Due to the risks involved with disordered eating, prevention of eating disorders is needed amongst athletes. In addition, it is important for athletes to know the repercussions and risks involved with disordered eating. Coaches, physicians, physiotherapists, and athletic trainers need to be aware of the risks and warning signs of disordered eating. However, many professionals working with athletes are not aware of the risks or warning signs. The IOC explains that "only 50% of physicians, coaches, physiotherapists and athletic trainers could identify the triad components (LEA with or without an eating disorder, menstrual dysfunction and low BMD (IOC, 2018)."
Education and awareness are important tools that can help prevent unwanted and dangerous eating behaviors. Education and awareness of disordered eating behaviors may have the potential to protect the physical, psychological, and emotional health of young athletes. An athlete’s education and awareness of negative eating behaviors as well as access to counseling programs may help athletes avoid disordered eating patterns. In addition, “it is also necessary to study the relationship among self-esteem, body image, and competition level in male collegiate athletes to identify the appropriate prevention programs for these athletes that will help protect them from developing an eating disorder” (McLester, Hardin, Hoppe, 2014).

Those working with athletes need to be aware of the health and well-being of their athletes. McLester, Hardin, and Hoppe (2014) explain, “health care professionals and athletic departments must remain vigilant in identifying student–athletes who may be at risk for an eating disorder” (McLester, Hardin, Hoppe, 2014). Coaches and athletic directors need to have the capability to identify those that may have disordered eating habits and then intervene and help the athlete avoid the risks and consequences involved in disordered eating. Screening for susceptibility to eating disorders is important as they are associated with RED-S along with mood and anxiety disorders. Using nutrition and health education as a preventive measure against eating disorders may help to reduce the prevalence of disordered eating habits amongst athletes. “Effective eating disorder prevention programs should be multimodal, interactive and target athletes and coaching staff” (IOC, 2018). There needs to be an increased awareness amongst medical professionals and coaches on eating disorders. In addition, future investigations should examine the relationship of specific sports and susceptibility to eating disorders.

Conclusion

Most of the research on eating disorders in collegiate athletes has been found to be inconclusive or contradictory. However, there are many themes in research within disordered eating. Disordered eating is associated with RED-S which explains why athletes may have low energy or may be struggling
to make gains or perform well in their sport. Perfectionist tendencies and mental health may or may not influence an athlete’s susceptibility to disordered eating habits. Research has also found that females are generally more preoccupied with thinness and body image which can lead to disordered eating. However, growing research indicates that males also struggle with body image relating to their musculature. Athlete’s feelings of discontentment with their bodies can lead to disordered eating, which can lead to short term frustrations, but also have lifelong implications.

Research has also found that athletes may be more susceptible to disordered eating than the general population due to the pressure to perform at a high level. Individuals who participate in a weight-sensitive sport such as cross country, dance, or wrestling may be more susceptible to eating disorders than those who do not participate in a weight-sensitive sport. Education may help to prevent disordered eating behaviors amongst male and female athletes. However, due to the lack of research and the complexities of disordered eating, it may be difficult to determine whether education or intervention decreases susceptibility to disordered eating or helps to prevent disordered eating behaviors.

**Methods**

Participants:

For this study, a total of 584 athletes from the same institution were asked to participate. Of the 584 athletes, 566 were student athletes attending a university in the Midwest, 18 of the 584 athletes were male club athletes from the same institution. The student athletes attending the researched institution account for approximately 35% of the university’s student population. Of the 566 athletes, 233 were females and 333 were males. The researcher selected the athletes at this particular university as they were available to the researcher. Most of the researched student athletes are from the United States with the majority of athletes from Midwest states, and a small percentage of them are from outside the
United States. The study focused on eight women’s sports and eight men’s sports along with one men’s club sport. The race of the students is predominantly white, although much of the university’s student diversity comes from individuals on athletic teams. All athletic team offerings at the university were given the questionnaire to complete.

The numbers of athletes in each sport (keeping in mind that some athletes play multiple sports) are as follows:

- **Men’s Sports:**
  - Baseball: 56
  - Basketball: 35
  - Cross Country: 29
  - Football: 120
  - Golf: 21
  - Hockey: 18
  - Soccer: 40
  - Track and Field: 29
  - Volleyball: 20

- **Women’s Sports:**
  - Basketball: 29
  - Cross Country: 33
  - Dance Team: 14
  - Golf: 8
  - Softball: 35
  - Soccer: 42
  - Track and Field: 33
  - Volleyball: 35

**Materials:**

A survey questionnaire was developed on the online survey software Google Forms. The questionnaire contained 26 questions. The questionnaire assessed demographics, sport involvement, perfectionist tendencies, eating-related behaviors, and attitudes toward body image and satisfaction. This research study was designed to determine the prevalence of disordered eating behaviors amongst collegiate student athletes along with several other research questions. Of the 26 questions, 3 were demographic questions, 2 were sport involvement questions, 3 dealt with perfectionistic tendencies, 8 questions were on eating habits and behaviors, 4 questions dealt with health education, and the final 6 questions pertained to attitudes toward body image and satisfaction.

The questionnaire was developed by the researcher and was pilot tested to ensure that questions were clear and useable. Before the pilot study was conducted, feedback on the questionnaire
was requested from the athletic director and several coaches from the researched institution to ensure that all questions were appropriate and clear. For the pilot study, several assistant coaches were asked to complete the survey as if they were an athlete in the sport they coached.

Fifteen subjects were asked to complete the pilot study and twelve responded. From those responses it was decided that the question, “At which level (varsity, JV, etc.) do you play that sport?” was removed since responses from this small sample varied and the question was not needed to answer the research questions. Another question was changed after the pilot study; the question, “Do you compare yourself to others and to society's ideals of appearance and success?” was broken up into two questions resulting in the following two questions, “Do you compare yourself to society's ideals of appearance and success often?” and “Do you compare yourself to others often?” This was done mainly because it seemed to be a double-barreled question and would be better suited as two separate questions. The remaining questions stayed the same.

Design:

The 26-question survey assessed demographics, sport involvement, perfectionist tendencies, eating-related behaviors, and attitude toward body image and satisfaction. The questions asked in the questionnaire can be found in Appendix D. The questions on perfectionism were developed through looking at characteristics of negative perfectionism and forming questions around those characteristics. Those with a negative perfectionism tend to lack confidence in their decision making, are hard on themselves when things do not go as planned and obsess over those mistakes.

Questions gauging eating behaviors were developed based on characteristics of eating disorders and disordered eating behaviors. Those that show signs of disordered eating may feel guilty when they feel they have eaten too much. They may arbitrarily limit or restrict the amount of foods they are “allowed” to eat and spend a lot of time thinking about food and counting calories. Those who have
disordered eating tendencies may cut themselves off after they believe they have eaten too much. Athletes with disordered eating tendencies may also compensate by eating less or exercising more when organized practices are not as intense or long as they typically are. Individuals may also feel a loss of control when they begin eating and find themselves unable to stop; this would be a symptom of binge eating disorder. Those intentionally skipping meals or avoiding eating would be showing characteristics of anorexia nervosa. Signs of an eating disorder may also include a strict routine surrounding food and exercise as well as tendencies to use exercise, fasting, and food restrictions to make up for “bad” food choices.

The health knowledge and education questions were developed to determine how competent athletes perceived themselves to be in their health and nutrition knowledge. In addition, participants were asked how often their coaches talked about the importance of good nutrition and creating healthy eating habits. This question was asked to determine if coaches influenced athletes’ eating behaviors in a positive way. Questions on body satisfaction and body image were asked at the end of the survey to determine if these factors influenced disordered eating and if there were differences between genders.

Once the survey was closed, all responses from the questionnaire were aggregated into a spreadsheet. Responses were anonymous even though student athletes were automatically signed into their Google account associated with their school email address. This was only to ensure that the survey was completed only one time by each individual. Their Google account information was not recorded. All subjects participated voluntarily in this study.

The survey was live for two weeks beginning on Tuesday, October 20, 2020. On the first day the survey was live, coaches were asked to send out the consent statement and the link to the survey to their athletes using email. A week later, on Tuesday, October 27, a reminder was sent out to the athletes to encourage them to complete the survey. On November 3, two weeks after the survey was live, the
survey was closed, and responses were then analyzed. A week after the survey was closed a debriefing statement (Appendix C) was sent to coaches to forward on to their athletes.

Procedure:

Approval to send the questionnaire to the researched institution’s athletes was granted from the universities’ athletic director. Upon receiving institutional review board approval, an email was distributed to the head coaches of each athletic team informing the coaches about the study and the questionnaire. A copy of this email can be found in Appendix A.

In the email, the head coaches of each sports team were asked to forward the consent statement as well as the link to the questionnaire on the first day the survey was live. The consent statement can be found in Appendix B. The surveyed questions and the response options can be found in Appendix D.

When coaches sent out the consent statement and survey, the athletes filled out the questionnaire and their responses were automatically converted into a spreadsheet where they were pooled with the rest of the responses. After two weeks, the survey was closed and the spreadsheet with the responses was analyzed to determine if there were correlations between students’ reported eating behaviors and their gender, sport played, perfectionistic tendencies, and health knowledge.

Of the 584 athletes at the university, 380 or 65% of all athletes voluntarily completed the questionnaire. After the survey closed a debriefing statement was sent to all of the athletes. The debriefing statement can be found in Appendix C. A combination of quantitative methods and qualitative methods were used to analyze the answers to the research questions.
Results

JASP, a free and open-source graphical program for statistical analysis, was used for the statistical analysis of this research project. The program has several statistical tests, but only three main functions were utilized in this project.

First, the “descriptive statistics” function was used for basic summary and summation of the data. For any given variable or question, the descriptive statistics function provided a summary of the results including number of responses, mean, standard deviation, minimum, and maximum, while also producing some helpful charts and graphs.

Second, independent sample t-tests were run on data that could be split up into two distinct groups (i.e. males and females). The independent sample t-test determines if there is a statistically significant difference in means between groups at a given confidence level ($\alpha=0.05$). The test produces a p-value that could be interpreted as the likelihood that the means of the two groups were in fact equal. Thus, a low p-value ($<0.05$) indicates a statistically significant difference in group means. Descriptive plots were produced to visually display the difference in the means between the two groups and their respective 95% confidence intervals.

Finally, correlation tests were run to determine if there was a relationship between two or more variables. For example, a correlation test could help determine whether individuals who responded with higher scores to a certain question would also be more likely to respond with higher scores to another question (positive correlation). In some cases, the test was simply testing for whether correlation existed between two variables, while other times it was testing specifically for either positive or negative correlation depending on the research question posed. Scatter plots with a line of best fit were used to display the data from these tests. The p-value from these tests indicated the likelihood that the slope of the line of best fit was equal to 0 (indicating no correlation). A low p-value ($<0.05$) indicates that
the slope of the line is statistically significantly different from 0, and therefore the two variables were correlated (either positively or negatively).

The tables below describe the outcomes of the survey:

<table>
<thead>
<tr>
<th>Table 1.a. Gender</th>
<th>Number of Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>235</td>
<td>61.8%</td>
</tr>
<tr>
<td>Female</td>
<td>145</td>
<td>38.2%</td>
</tr>
<tr>
<td><strong>Total Responses:</strong></td>
<td><strong>380</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1.b. Race</th>
<th>Number of Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>355</td>
<td>93.4%</td>
</tr>
<tr>
<td>Black</td>
<td>5</td>
<td>1.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9</td>
<td>2.4%</td>
</tr>
<tr>
<td>Native American</td>
<td>2</td>
<td>0.5%</td>
</tr>
<tr>
<td>Asian</td>
<td>3</td>
<td>0.8%</td>
</tr>
<tr>
<td>Mixed</td>
<td>6</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1.c. Academic Year</th>
<th>Number of Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>148</td>
<td>38.9%</td>
</tr>
<tr>
<td>2</td>
<td>90</td>
<td>23.7%</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>19.7%</td>
</tr>
<tr>
<td>4+</td>
<td>67</td>
<td>17.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1.d. Sport Played</th>
<th>Number of Responses</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football</td>
<td>72</td>
<td>18.95%</td>
</tr>
<tr>
<td>Men’s Baseball</td>
<td>46</td>
<td>12.11%</td>
</tr>
<tr>
<td>Women’s Volleyball</td>
<td>30</td>
<td>7.89%</td>
</tr>
<tr>
<td>Men’s Soccer</td>
<td>28</td>
<td>7.37%</td>
</tr>
<tr>
<td>Women’s Soccer</td>
<td>24</td>
<td>6.32%</td>
</tr>
<tr>
<td>Women’s Cross Country</td>
<td>23</td>
<td>6.05%</td>
</tr>
<tr>
<td>Softball</td>
<td>22</td>
<td>5.79%</td>
</tr>
<tr>
<td>Men’s Basketball</td>
<td>18</td>
<td>4.74%</td>
</tr>
<tr>
<td>Men’s Cross Country</td>
<td>18</td>
<td>4.74%</td>
</tr>
<tr>
<td>Women’s Track and Field</td>
<td>18</td>
<td>4.74%</td>
</tr>
<tr>
<td>Hockey</td>
<td>17</td>
<td>4.47%</td>
</tr>
<tr>
<td>Women’s Basketball</td>
<td>15</td>
<td>3.95%</td>
</tr>
<tr>
<td>Men’s Volleyball</td>
<td>15</td>
<td>3.95%</td>
</tr>
<tr>
<td>Men’s Track and Field</td>
<td>12</td>
<td>3.16%</td>
</tr>
</tbody>
</table>
Average Response and Standard Deviation:

The responses to the questionnaire were divided into sections: perfectionism, disordered eating, health knowledge, and concern for thinness/muscularity and body image. Composite scores were given for some sections to better sort through the data. In the section of disordered eating behaviors, eight questions were asked and for each question students selected one response (Always= 5, Sometimes=4, Often=3, Rarely=2, Never=1). Composite scores for athletes ranged from 40 as the highest possible score to 8 as the lowest possible score. The perfectionistic tendency responses were also given a composite score. In this section, three questions were asked to determine if students displayed perfectionistic tendencies. Again, for these questions below, students selected one response (Always=5, Sometimes=4, Often=3, Rarely=2, Never=1). Composite scores for athletes ranged from 15 as the highest possible score to 5 as the lowest possible score. For the questions below, average responses and the standard deviation for each question are listed.

<table>
<thead>
<tr>
<th>Question</th>
<th>Average response:</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>When my performance in my sport falls short of what I know I am capable of, I get upset with myself</td>
<td>4.188</td>
<td>0.777</td>
</tr>
<tr>
<td>Do you doubt the choices that you make?</td>
<td>2.864</td>
<td>0.769</td>
</tr>
<tr>
<td>Would you consider yourself a perfectionist? (A perfectionist may set high standards for themselves, be critical towards themselves and obsess over mistakes and overemphasize organization)</td>
<td>3.729</td>
<td>0.985</td>
</tr>
<tr>
<td>When practice is shorter or less intense than usual, I will compensate either by exercising on my own or by eating less</td>
<td>2.532</td>
<td>1.099</td>
</tr>
<tr>
<td>Do you feel a loss of control when you begin to eat which results in consuming an abnormally large amount of food?</td>
<td>1.868</td>
<td>1.016</td>
</tr>
<tr>
<td>Do you have regimented routine surrounding food and exercise?</td>
<td>3.007</td>
<td>1.155</td>
</tr>
<tr>
<td>Do you use exercise, food restriction, fasting or purging to &quot;make up for bad foods&quot; consumed?</td>
<td>2.022</td>
<td>1.070</td>
</tr>
<tr>
<td>Are you confident in your knowledge in health and nutrition?</td>
<td>3.623</td>
<td>0.804</td>
</tr>
</tbody>
</table>
How confident are you in abilities to identify healthy and nutritious foods grocery store or in the dining hall that will help you to become a better athlete? 3.907 0.837
Do your coaches talk about the importance of good nutrition and creating healthy eating habits? 3.034 1.015
Are you satisfied with how muscular you are? 3.034 0.953
Are you satisfied with how thin/lean you are? 3.047 1.124

For the questions below student athletes responded with answers on a 5-point scale ranging from -2 to 2. They were given the options strongly agree, agree, neutral, disagree, and strongly disagree. Their responses were then given a score (2=Strongly Agree, 1=Agree, 0=neutral, 1=disagree, and -2=strongly disagree.) Below are the average responses and the standard deviation for each question.

Table 2.b.

<table>
<thead>
<tr>
<th>Question</th>
<th>Average response</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you agree with the following statement: I am more knowledgeable in health and nutrition than my peers.</td>
<td>0.255</td>
<td>0.782</td>
</tr>
<tr>
<td>Do you agree with the following statement: I would be more successful in my sport if I was more muscular.</td>
<td>0.634</td>
<td>0.974</td>
</tr>
<tr>
<td>Do you agree with the following statement: I would be more successful in my sport if I was more lean/thin.</td>
<td>-0.215</td>
<td>1.155</td>
</tr>
<tr>
<td>Do you compare yourself to others often?</td>
<td>0.7</td>
<td>0.935</td>
</tr>
<tr>
<td>Do you compare yourself to society’s ideals of appearance and success often?</td>
<td>0.35</td>
<td>1.073</td>
</tr>
</tbody>
</table>

Of the 380 responses 15 had errors. A reason for this may be that student athletes did not fully understand the question. Some individuals responded by clicking two options rather than one. For example, for the question, “Do you have a regimented routine surrounding food and exercise?” some individuals chose the response “sometimes” and “often” rather than choosing one option. In cases like this where the two answers were right next to each other on the scoring scale the score assigned was in between the two scores (2.5 assigned for someone who answered with a 2 and a 3). For responses that answered with three different responses, such as often, sometimes, and rarely or where responses that
were far apart, for example “always” and “rarely,” these responses were discarded for the specific question. In total there were only two responses that needed to be discarded due to these errors.

Findings

**Health Knowledge/Education:**

Figure 1.a. 
*CORRELATION (HEALTH EDUCATION AND DISORDERED EATING TENDENCIES)*

<table>
<thead>
<tr>
<th>Pearson’s Correlations</th>
<th>n</th>
<th>Pearson’s r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Health Education - Composite Score: Disordered Eating Tendencies</td>
<td>380</td>
<td>0.116</td>
<td>0.012</td>
</tr>
</tbody>
</table>

*Note:* All tests one-tailed, for positive correlation

Figure 1.b. 
*SCATTER PLOT - COMPOSITE SCORE: HEALTH EDUCATION VS. DISORDERED EATING TENDENCIES*

The table and dot plot above are testing for correlation between individuals’ composite scores on health education and disordered eating tendencies. Based on the results of the test, there seems to be a positive correlation between those that display disordered eating behaviors and those that claim to have a better knowledge of health and nutrition. In other words, those that believe they have a better
knowledge of health and nutrition actually show more signs of disordered eating than those who believe they know less. The p-value on the test was 0.012, which is statistically significant at a significance level of $\alpha=0.05$. Though this finding was not a part of the original hypothesis (in fact, it was the opposite), perhaps it still suggests an interesting relationship.

**Figure 1.c.**
**Descriptive Statistics (Health Education Composite Scores Among Sports)**

<table>
<thead>
<tr>
<th>Composite Score: Health Education</th>
<th>Baseball</th>
<th>Dance</th>
<th>Football</th>
<th>Hockey</th>
<th>Men’s Basketball</th>
<th>Men’s Cross Country</th>
<th>Men’s Golf</th>
<th>Men’s Soccer</th>
<th>Men’s Track &amp; Field</th>
<th>Men’s Volleyball</th>
<th>Softball</th>
<th>Women’s Basketball</th>
<th>Women’s Cross Country</th>
<th>Women’s Golf</th>
<th>Women’s Soccer</th>
<th>Women’s Track &amp; Field</th>
<th>Women’s Volleyball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>46</td>
<td>11</td>
<td>72</td>
<td>17</td>
<td>18</td>
<td>18</td>
<td>9</td>
<td>28</td>
<td>12</td>
<td>15</td>
<td>22</td>
<td>15</td>
<td>23</td>
<td>2</td>
<td>24</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Minimum</td>
<td>3.000</td>
<td>4.000</td>
<td>5.000</td>
<td>7.000</td>
<td>6.000</td>
<td>8.000</td>
<td>2.000</td>
<td>5.000</td>
<td>3.000</td>
<td>9.000</td>
<td>3.000</td>
<td>7.000</td>
<td>7.000</td>
<td>5.000</td>
<td>3.000</td>
<td>5.000</td>
<td>6.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>15.000</td>
<td>14.000</td>
<td>16.000</td>
<td>13.000</td>
<td>14.000</td>
<td>15.000</td>
<td>12.000</td>
<td>17.000</td>
<td>14.000</td>
<td>15.000</td>
<td>15.000</td>
<td>14.000</td>
<td>16.000</td>
<td>15.000</td>
<td>14.000</td>
<td>14.000</td>
<td>15.000</td>
</tr>
</tbody>
</table>

This table shows a summary of the data for the composite scores for the health knowledge. The teams that scored the highest was the Women’s Cross Country team (12.696) followed by the Men’s Cross Country team (11.944). The teams that scored the team that scored the lowest was Men’s Golf (9.611).

**Figure 1.d.**
**Correlation (Coaches Discussing Nutrition and Disordered Eating)**

**Pearson’s Correlations**

<table>
<thead>
<tr>
<th></th>
<th>Pearson’s r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do your coaches talk about the importance of good nutrition and creating healthy eating habits?</td>
<td>0.118</td>
<td>0.011</td>
</tr>
</tbody>
</table>

**Composite Score:** Disordered Eating Tendencies
Figure 1.e. Scatter Plot- “Do your coaches talk about the importance of good nutrition and creating healthy eating habits?” Vs. Compositive Score: Disordered Eating Tendencies

The plot and chart above show the relationship between athletes’ reporting a likelihood to participate in disordered eating behaviors and the likelihood of coaches talking about the importance of eating well. This evidence would suggest that when coaches talk about the importance of eating well, athletes are more likely to participate in disordered eating behaviors. The above scatter plot shows a correlation between coaches that talk about eating well and a higher composite score on disordered eating. On the chart above “1” represents “never” and “5” represents “frequently.” The p-value on this test was 0.011, which is a statistically significant observation.

Figure 1.f. Descriptive Statistics (Coaches Discussion among Sports)
This table shows a summary of the data for the composite scores for coaches input on healthy eating.

The teams that scored the highest was the Women’s Cross Country team (4.304) followed by the Men’s Cross country team (3.556). The teams that scored the lowest was Men’s Golf (1.556).

**Gender Differences:**

Figure 2.a.  
*Independent Samples T-Test (Disordered Eating Tendencies between Genders)*

<table>
<thead>
<tr>
<th>Group Descriptive</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>4.846</td>
<td>378</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* Student's t-test.

**Descriptives**

<table>
<thead>
<tr>
<th>Group Descriptive</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>Female</td>
<td>145</td>
<td>20.234</td>
<td>6.366</td>
<td>0.529</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>17.347</td>
<td>5.147</td>
<td>0.336</td>
</tr>
</tbody>
</table>

Figure 2.b.  
*Descriptive Plots- Composite Score: Disordered Eating Tendencies*

Figure 2.c.  
*Descriptive Plots- Composite Score: “I feel guilty when I think I have eaten too much.”*
The tables above result from testing for a difference between males and females’ responses to the questions about disordered eating behaviors. The p-value on the test was less than 0.001 suggesting that there is a statistically significant difference between the genders. The composite score is a sum of the scores on eight different questions related to disordered eating habits. Each question was scored on a scale of 1 (never) to 5 (always), so the minimum score would be 8 and the maximum score would be 40. There is significant evidence that shows that female student athletes are more likely to report disordered eating behaviors.

**Figure 2.d.**

*Independent Samples T-test (Guilt when Overeating)*

<table>
<thead>
<tr>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.231</td>
<td>378</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note: Student’s t-test.*

**Descriptives**

<table>
<thead>
<tr>
<th>Group Descriptives</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel guilty when I think I have eaten too much.</td>
<td>Female</td>
<td>145</td>
<td>3.355</td>
<td>1.099</td>
<td>0.091</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>2.170</td>
<td>1.095</td>
<td>0.071</td>
</tr>
</tbody>
</table>

The disordered eating habit that stood out the most when both genders were compared was the statement, “I feel guilty when I think I have eaten too much.” The tables above show that females scored significantly higher than males. The p-value of <0.001 indicates strong evidence for a statistically significant difference between the genders in their response to this question.
Independent Sample T-Test (Body Satisfaction among Genders)

<table>
<thead>
<tr>
<th>Independent Samples T-Test</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with how thin/lean you are?</td>
<td>-3.910</td>
<td>378</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Are you satisfied with how muscular you are?</td>
<td>1.223</td>
<td>378</td>
<td>0.222</td>
</tr>
</tbody>
</table>

*Note.* Student's t-test.

### Descriptives

**Group Descriptives**

<table>
<thead>
<tr>
<th>Are you satisfied with how thin/lean you are?</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>145</td>
<td>2.766</td>
<td>1.074</td>
<td>0.089</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>235</td>
<td>3.221</td>
<td>1.122</td>
<td>0.073</td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with how muscular you are?</td>
<td>Female</td>
<td>145</td>
<td>3.110</td>
<td>0.944</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>2.987</td>
<td>0.958</td>
<td>0.063</td>
</tr>
</tbody>
</table>

The tables above result from testing for a relationship between body image and gender. Based on a p-value of <0.001 female athletes seem more concerned with thinness and leanness than their male peers. This suggests a very strong relationship between gender and satisfaction with thinness and leanness. Contrary to what was originally hypothesized females actually appeared slightly more concerned with the muscularity of their bodies. However, with a p-value of 0.222, this conclusion is not significant at a significance level of α=0.05.

**Perfectionism:**

Figure 3.a.

*Descriptive Statistics (Perfectionist Composite Scores among Sports)*

<table>
<thead>
<tr>
<th>Composite Score: Perfectionist Tendencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseball Dance</td>
</tr>
<tr>
<td>Valid</td>
</tr>
<tr>
<td>Missing</td>
</tr>
<tr>
<td>Std.</td>
</tr>
<tr>
<td>Minimum</td>
</tr>
<tr>
<td>Maximum</td>
</tr>
</tbody>
</table>
This table shows a summary of the data for the composite scores for perfectionist tendencies. The sports that scored the highest composite score in perfectionists’ tendencies were the Women’s Basketball team (11.7) and Women’s Volleyball team (11.65). The overall sample mean was 10.782. The teams that scored the lowest were Men’s Cross Country team (9.75) and Men’s Volleyball team (9.933).

Correlation (Perfectionist Tendencies vs. Disordered Eating Tendencies)

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Pearson's r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Perfectorist Tendencies</td>
<td>380</td>
<td>0.313</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. All tests one-tailed, for positive correlation.
The table and dot plot above are testing for positive correlation between individuals’ composite scores on perfectionist tendencies and disordered eating tendencies. The test indicates that there is a strong positive correlation between those that display disordered eating behaviors and those that have perfectionist tendencies. The p-value on the test was less than 0.001 suggesting a very strong relationship between the two variables.

**Weight-Sensitive Sports:**

**Figure 4.a.**  
*Descriptive Statistics (Disordered Eating Composite Scores among Sports)*

<table>
<thead>
<tr>
<th>Composite Score: Disordered Eating Tendencies</th>
<th>BasebaIl</th>
<th>Dance</th>
<th>Football</th>
<th>Hockey</th>
<th>Men's Basketball</th>
<th>Men's Cooking</th>
<th>Men's Golf</th>
<th>Men's Soccer</th>
<th>Men's Track &amp; Field</th>
<th>Men's Volleyball</th>
<th>Softball</th>
<th>Women's Basketball</th>
<th>Women's Cooking</th>
<th>Women's Golf</th>
<th>Women's Soccer</th>
<th>Women's Track &amp; Field</th>
<th>Women's Volleyball</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid</td>
<td>46</td>
<td>11</td>
<td>72</td>
<td>17</td>
<td>18</td>
<td>18</td>
<td>9</td>
<td>28</td>
<td>12</td>
<td>15</td>
<td>22</td>
<td>15</td>
<td>23</td>
<td>2</td>
<td>24</td>
<td>18</td>
<td>30</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Minimum</td>
<td>8.000</td>
<td>8.000</td>
<td>8.000</td>
<td>8.000</td>
<td>8.000</td>
<td>11.000</td>
<td>8.500</td>
<td>8.000</td>
<td>10.000</td>
<td>12.000</td>
<td>11.000</td>
<td>13.000</td>
<td>10.000</td>
<td>8.000</td>
<td>8.000</td>
<td>8.000</td>
<td>9.000</td>
</tr>
<tr>
<td>Maximum</td>
<td>30.000</td>
<td>40.000</td>
<td>33.000</td>
<td>28.000</td>
<td>34.000</td>
<td>24.000</td>
<td>21.500</td>
<td>27.500</td>
<td>29.000</td>
<td>23.000</td>
<td>30.000</td>
<td>34.500</td>
<td>33.000</td>
<td>25.000</td>
<td>29.000</td>
<td>35.000</td>
<td>35.000</td>
</tr>
</tbody>
</table>
This table shows a summary of the data for the composite scores for disordered eating tendencies. The teams that scored highest for disordered eating were Softball with a score of 21.432 followed by Women’s Volleyball with a score of 21.217. The teams with the lowest scores were Men’s Cross Country and (15.306) and Men’s Golf (13.833).

Figure 4.b.
*Independent Samples T-Test (Weight-sensitive Sports and Disordered Eating Tendencies)*

<table>
<thead>
<tr>
<th>Independent Samples T-Test</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>0.962</td>
<td>378</td>
<td>0.337</td>
</tr>
</tbody>
</table>

*Note:* Student's t-test.

**Descriptives**

<table>
<thead>
<tr>
<th>Group Descriptives</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>not weight-sensitive</td>
<td>296</td>
<td>18.601</td>
<td>5.553</td>
<td>0.323</td>
</tr>
<tr>
<td></td>
<td>weight-sensitive</td>
<td>84</td>
<td>17.911</td>
<td>6.636</td>
<td>0.724</td>
</tr>
</tbody>
</table>

Figure 4.c.
*Descriptive Plots- Composite Score: Disordered Eating Tendencies*
The table and graph above are testing whether athletes in weight-sensitive sports score differently on the questions related to disordered eating tendencies than athletes in non-weight-sensitive sports. Athletes in non-weight-sensitive sports showed slightly higher signs of disordered eating tendencies; however, the p-value on the test was 0.337, which is not significant at a significance level of $\alpha=0.05$. The plots seem to indicate that those that are in a weight-sensitive sport (track field, cross country, and dance) are less likely to display signs of disordered eating. Those that are in a non-weight-sensitive sport (basketball, softball/baseball, football, soccer, hockey, volleyball, and golf) are slightly more likely to show signs of disordered eating.

**Body image:**

Figure 5.a. 
Correlation (Disordered Eating Tendencies and Success in Sport if Lean/Thin)

<table>
<thead>
<tr>
<th>Pearson's Correlations</th>
<th>n</th>
<th>Pearson's r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>380</td>
<td>0.401</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>I would be more successful in my sport if I was more lean/thin</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.b. 
Scatter Plot-Composite Score: Disordered Eating Tendencies vs. “I would be more successful in my sport if I was more lean/thin”
This test indicates that there is a strong positive correlation between an individual’s composite score on disordered eating tendencies and their likelihood to say that they would be more successful in their sport if they were more lean/thin. The p-value on this test was less than 0.001 indicating a very strong relationship between the two variables.

**Figure 5.c.**
*Correlation (Body Satisfaction and Disordered Eating)*

<table>
<thead>
<tr>
<th>Pearson’s Correlations</th>
<th>Pearson’s r</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you satisfied with how thin/lean you are?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with how thin/lean you are?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with how muscular you are?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with how muscular you are?</td>
<td>-0.068</td>
<td>0.187</td>
</tr>
<tr>
<td>Are you satisfied with how muscular you are?</td>
<td>-0.398</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>0.377</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.d.**
*Scatter plot: “Are you satisfied with how thin/lean you are?” vs. Composite Score: Disordered Eating Tendencies*

**Figure 5.e.**
*Scatter plot: “Are you satisfied with how muscular you are?” vs. Composite Score: Disordered Eating Tendencies*

In the scatterplots above “1” represents very dissatisfied and “5” represents very satisfied. The descriptive table and plots above show a correlation between individuals that are dissatisfied with their leanness/thinness and those that scored highly on the disordered eating composite (p=0.023). There is also a slight correlation between those that are dissatisfied with their musculature and disordered
eating habits. The negative correlation on both tests indicates that those who were less satisfied with their bodies, tended to have higher disordered eating scores.

**Figure 5.f.**
*Correlation (Disordered Eating and Comparison to Others)*

<table>
<thead>
<tr>
<th>Pearson's Correlations</th>
<th>Pearson's r</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>Do you compare yourself to society’s ideals of appearance and success often?</td>
<td>0.303</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>Do you compare yourself to others often?</td>
<td>0.310</td>
</tr>
<tr>
<td>Do you compare yourself to society’s ideals of appearance and success often?</td>
<td>Do you compare yourself to others often?</td>
<td>0.712</td>
</tr>
</tbody>
</table>

**Figure 5.g.**
*Composite Score: Disordered Eating Tendencies vs. “Do you compare yourself to society’s ideals of appearance and success often?”*

The above table and plot show the relationship between disordered eating tendencies and responses to the question, “Do you compare yourself to society’s ideals of appearance?” The plot above shows strong correlation (p<0.001) that individuals who compare themselves to ideals in society often are likely to participate in disordered eating tendencies.
Figure 5.h. 
Composite Score: Disordered Eating Tendencies vs. “Do you compare yourself to others often?”

The above table and plot show the relationship between disordered eating tendencies and responses to the question, “Do you compare yourself to others often?” The plot above shows strong correlation (p<0.001) that individuals who compare themselves to others often are likely to participate in disordered eating tendencies.

Figure 5.i.
Independent Samples T-Test (Comparison to Others Amongst Genders)

<table>
<thead>
<tr>
<th></th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you compare yourself to society's ideals of appearance and success often?</td>
<td>5.990</td>
<td>378</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Do you compare yourself to others often?</td>
<td>4.452</td>
<td>378</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>4.846</td>
<td>378</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

*Note.* Student's t-test.

Descriptives

<table>
<thead>
<tr>
<th>Group Descriptives</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you compare yourself to society's ideals of appearance and success often?</td>
<td>Female</td>
<td>145</td>
<td>0.752</td>
<td>1.017</td>
<td>0.084</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>0.102</td>
<td>1.033</td>
<td>0.067</td>
</tr>
<tr>
<td>Do you compare yourself to others often?</td>
<td>Female</td>
<td>145</td>
<td>0.966</td>
<td>0.869</td>
<td>0.072</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>0.536</td>
<td>0.939</td>
<td>0.061</td>
</tr>
<tr>
<td>Composite Score: Disordered Eating Tendencies</td>
<td>Female</td>
<td>145</td>
<td>20.234</td>
<td>6.366</td>
<td>0.529</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>235</td>
<td>17.347</td>
<td>5.147</td>
<td>0.336</td>
</tr>
</tbody>
</table>
The above plots show that the gender differences in responses to the questions, “Do you compare yourself to others often?” and “Do you compare yourself to society’s ideals of appearance and success?” With both questions, females were more likely to compare themselves to others and to societies’ ideals of appearance and success. Both the p-values on these tests were below 0.001, indicating a strong relationship.
Discussion

A major focus of this study was to investigate which athletes may be susceptible to disordered eating behaviors. Disordered eating behaviors in athletes can disrupt how athletes go about their day to day lives and their athletic performance. Disordered eating behaviors can lead to low energy availability (LEA), RED-S (relative energy deficiency in sport), as well as eating disorders. These consequences can lead to negative short-term and long-term effects. Knowing which factors influence disordered eating behaviors can help individuals avoid harmful eating behaviors. This study sought to determine if gender, the type of sport played, prevalence of perfectionistic tendencies, or health knowledge influenced or affected eating behaviors.

Health Knowledge/Education:

The research question, “Does an athlete’s health knowledge and health education help to prevent disordered eating behaviors?” was answered by comparing composite scores of the responses pertaining to disordered eating behaviors and composite scores of responses pertaining to health knowledge/education. In doing so a positive correlation was found between health education and eating tendencies, which can be seen in figure 1.b. Based on the results of the test, there seems to be a positive correlation between those that display disordered eating behaviors and those that claim to have a better knowledge of health and nutrition. This is contrary to what was hypothesized. It was hypothesized that those with less health knowledge would present more disordered eating behaviors. The reason for this result may be that individuals who claim to be knowledgeable in health and nutrition have been given misleading information through social media or other sources. This may also be due to the fact that some athletes with disordered eating behaviors who claim to be knowledgeable in nutrition are anxious about food, think about food often, are interested but fixated on food, and/or are unaware about their disordered behaviors. Norton explains this phenomenon, “Athletes reported that
confrontation about a potential ED only lead them to become defensive and entrenched in their denial, and educational materials were not as effective because athletes did not apply signs of ED to themselves” (Norton, 2020). Cotugna, Vickery, McBee (2005) also explain that athletes may display a high interest in nutrition but are misinformed or do not know how to fuel to best support their performance.

Contrary to the relationship found between health knowledge and disordered eating behaviors the Men’s and Women’s Cross Country teams were found to be outliers in this portion of the study. The cross country teams had the top two composite scores on the health knowledge portion, while both scored very low on the disordered eating composite score. This is displayed in figure 1.c. By simply looking at the relationship between the scores of the cross country team’s health knowledge/education and disordered eating tendencies, it seems that education can positively influence eating behaviors. However, the results from the rest of the respondents would suggest otherwise, and more research would need to be done to get a better idea of how an individual’s health knowledge affects eating behaviors. An assessment addressing athletes’ health and nutrition knowledge may be a more accurate way to evaluate the level of nutritional knowledge rather than using a questionnaire simply asking how confident athletes are in their knowledge or how knowledgeable they believe that they are.

A positive correlation was found between composite disordered eating scores and the frequency of coaches talking about the importance of eating well, which can be seen in figure 1.e. For the question, “Do your coaches talk about the importance of good nutrition and creating healthy eating habits?” the Women’s Cross Country team scored highest followed by the Men’s Cross Country team. Again, when looking at disordered eating tendencies the Women’s Cross Country team had the second lowest score out of the eight women’s sports. The men’s team had the second lowest score out of nine men’s teams. This is shown in figure 1.f.
Athletes who have coaches talking to them about eating well and forming positive eating habits may be more likely to participate in disordered eating behaviors. This particular question asked athletes how often coaches discussed nutrition and eating habits with their athletes, not the quality of the information. It is difficult to know if coaches are giving their athletes accurate and helpful information. This information is valuable to note. Coaches have the ability to influence their athletes whether it is in a positive way or a negative way. Coaches are in a position of authority and often athletes are very trusting towards their coaches. Coaches need to know the signs and symptoms of eating disorders and they need to know how nutrition and eating behaviors influence performance and their athlete’s overall health.

Academic Year:

When comparing academic year and health knowledge, upperclassmen scored higher on health knowledge, and lower on disordered eating, but both tests were statistically insignificant. Part of the reason the test was not significant is that the sample of upperclassmen was about 100 fewer than the underclassmen participants, making the confidence interval much wider for upperclassmen.

Gender Differences:

In comparing gender differences, it was determined that females are more likely to show signs of disordered eating than males. This was done by comparing male and female composite scores. The composite score is a sum of the scores on eight different questions related to disordered eating habits. Each question was scored on a scale of 1 (never) to 5 (always), so the minimum scores a participant received would be an 8 and the maximum score would be 40. This is shown in figure 2.b. entitled, “Descriptive Plots- Composite Score: Disordered Eating Tendencies.” It shows the difference between the means of males and females on their disordered eating composite scores. There is significant evidence that female student athletes are more likely to partake in disordered eating behaviors. This is
consistent with prior research which has found that females are more likely to partake in disordered eating behaviors and be diagnosed with an eating disorder.

One question where females scored significantly higher than males was, “I feel guilty when I think I have eaten too much.” The mean of male participants was 2.17 (rarely), and females scored 3.35 (sometimes/often). This is shown in figures 2.c and 2.d. This research found that males rarely feel guilty about consuming what they believe is too much food, whereas females sometimes or often feel guilty when they feel they have overeaten. Female athlete’s feelings around guilt and food are concerning as guilt and shameful feelings with food can be indicators of eating disorders. A follow up study to determine the reason female athletes feel guilt surrounding food would be a worthwhile investigation.

One reason females partake in disordered eating behaviors more than males may be due to the pressures of social media and other media and the expectations they set for women’s appearance. How an athlete responds to social media and how confident an individual is in their own body may influence eating behaviors more than the particular sport an athlete plays. The questions, “Do you compare yourself to others often?” and “Do you compare yourself to society’s ideals of appearance and success?” were found to have a strong positive correlation with disordered eating tendencies. Females in particular find themselves comparing themselves to others and society’s ideals more so than males. Figures 5.g., 5.h., 5.i, and 5.j. display these findings.

Body Image:

It was also found that female athletes as a whole are more concerned with their body image and are less satisfied with their bodies than male athletes. It was found that females are typically more dissatisfied with their thinness than males, which is what was hypothesized. It was hypothesized that male athletes would be more dissatisfied with their musculature than females. However, women were found to be more dissatisfied than males with their musculature, although the test was not statistically
significant. Females were found to be more concerned with their thinness and muscularity more so than males. Those that believe that they would be more successful in their sport if they were leaner or thinner were more likely to show signs of disordered eating. These findings can be seen in figure 5.c and 5.d. which shows a strong positive correlation between respondent’s composite score on disordered eating tendencies and their belief that they would be more successful in their sport if they were more lean/thin. These findings are slightly concerning as there are many factors that influence performance other than just body weight. This tendency may be a key piece as to why females are at a greater risk of disordered eating. However, more research would need to be done in this area to confirm this correlation. Norton explains that “Athletes are more at risk for disordered eating if they believe it is possible to enhance their sports performance through weight regulations” (Norton, 2020). Having a lower body weight will not always improve performance in sport especially if the athlete has RED-s of LEA. It is important for individuals working with athletes to rethink their ideas of weight optimization, as many factors other than body weight influence wellbeing and performance. In addition, how a collegiate student athlete views themselves and others around them may be more of a predictor than the type of sport an athlete plays and the demand the sport has on their body.

Perfectionism:

This research study also found those with a perfectionist personality are more likely to participate in disordered eating behaviors. This is consistent with the hypothesis and prior research. Figure 3.d. and 3.e. shows a strong positive correlation between those that display disordered eating behaviors and those that have perfectionist tendencies. The p-value on the test was less than 0.001 suggesting a very strong relationship between the two variables.

The teams that scored the highest in perfectionistic tendencies were the Women’s Basketball team followed by the Women’s Volleyball team. The teams with the lowest scores were the Men’s Cross
Country team and Men’s Volleyball team. When looking at these teams’ disordered eating scores, Men’s Golf and Men’s Cross Country scored the lowest. The Women’s Basketball team was the third highest score out of all genders and Women’s Volleyball scored the second highest. These scores can be seen in figures 3.a. and 2.b. Looking at these specific sports and the relationship between perfectionistic tendencies and disordered eating tendencies is consistent with figure 3.d. which compares perfectionist tendencies and disordered eating tendencies.

Collegiate athletes tend to be hard working and disciplined. Many athletes might even consider themselves to be perfectionists. Perfectionism is not necessarily a totally negative quality, but it can be harmful when taken to an extreme. When athletes are hard on themselves or doubt the choices that they make, they may be more inclined to establish harmful eating behaviors and restrict foods. The sports that had the highest composite score in perfectionist tendencies were the Women’s Basketball team (11.7) and Women’s Volleyball team (11.65). The overall sample mean was 10.782. The teams that scored the lowest were the Men’s Cross Country team (9.75) and Men’s Volleyball team (9.933). Those that had the highest composite score for disordered eating was Softball with a score of 21.432 followed by Women’s Volleyball with a score of 21.217. Women’s Basketball had the third highest score with a score of 20.633. This can be seen in figures 4.a. and 4.b which show disordered eating composite scores among sports.

Weight-Sensitive Sports:

It was hypothesized that weight-sensitive sports would show more symptoms of disordered eating than those in non-weight-sensitive sports. However, Women’s Softball, Women’s Basketball, and Women’s Volleyball are non-weight-sensitive sports, and these three sports had the highest disordered eating composite scores. An independent sample t-test on the data found that students who participate in weight-sensitive sports such as track and field, cross country, and dance were actually slightly less
likely to partake in disordered eating behaviors compared to those who participate in basketball, softball/baseball, football, soccer, hockey, volleyball, and golf. The results of this test can be found on figure 4.b. According to these results, those in non-weight-sensitive sports might actually be more likely to participate in disordered eating habits. However, the results were not statistically significant. The non-weight-sensitive sports showed slightly higher signs of disordered eating tendencies; this is contrary to prior studies focused on weight-sensitive sports and eating disorders. This result suggests that more research on the differences between weight-sensitive sports and disordered eating may need to be done.

Role of Coaches:

Since disordered eating is a complex, serious, and prevalent issue, coaches of teams at the researched institution were notified as to how their team scored if they scored high. The top 5% of disordered eating composite scores were examined to see which athletes presented the most signs of disordered eating. Individuals with high scores were not identified, just the score and the sport they played were looked at. Those in the top 5% of the population were flagged due to an ethical concern. Coaches were notified so that they could be aware that there may be athletes on their team that may be struggling with an eating disorder or disordered eating behaviors.

Disordered eating is an issue amongst female collegiate athletes which is consistent with prior research on collegiate athletes. Coaches from the researched institution were notified of their team’s composite scores in relation to the entire population and if there were any athletes who scored in the top 5% of composite scores for disordered eating tendencies. The softball coach, women's volleyball coach, and women’s basketball coach were notified that their team scored highest in disordered eating tendencies and if they had athletes in the top 5% of composite scores. In all three of these conversations, most were aware that body image and disordered eating tendencies were prevalent and
an issue on the team. It was also discussed that the issue of disordered eating and negative body image/perception needs to be addressed in all women’s sports at the institution. The coaches agreed that nutrition and women’s health in sport is an area that is lacking at the institution. Ways to combat this crisis and better support female athletes were brainstormed. Through the individual conversations it was concluded that an educational presentation or conversation was needed to address nutritional needs, eating behaviors, and body image of female athletes at the researched institution.

Limitations of the Study:

The survey was distributed over email to each sports’ head coach who then forwarded the email containing the consent statement and the survey to the athletes. Athletes may have filled out the survey in any given environment which may have influenced their responses. Although coaches were asked to forward the email to their athletes as soon as possible, several coaches were slow to do so. The delay of the survey being sent out could have negatively impacted the response rate. A week after the consent statement and the survey were sent out, an email reminding students to voluntarily complete the survey was sent to coaches to forward to their athletes. Some coaches may have failed to do so, which could have reduced the number of participants. When the survey closed 380 athletes or 65% of athletes voluntarily completed the survey, but completion rates varied by team. The large number of participants helps to increase the validity of the study, but timeliness could have improved the response rate and quality of the responses.

It is important to note that there were a higher percentage of lowerclassmen compared to upperclassman who participated in this study. The imbalances of responses by academic year could have influenced the data. The data would have been strengthened if there were an equivalent number of upperclassmen and underclassmen. In addition, the number of athletes in each sport varied. For example, 11 dance team members participated which accounted for 2.9% of total responses’, and 72
football players participated which accounted for 18.9% of responses. The broad range of different athletes and sports could have influenced or altered the results. Future researchers may want to consider researching a single sport or a more specific population.

This study mainly used quantitative data which allowed for statistically significant inferences to be drawn. However, a qualitative study, such as one focused on interviews, could be helpful to get a holistic view of the student athletes, their individual eating habits, and the reasons behind those behaviors.

Conclusion:

This research shows that disordered eating behaviors can be an important issue in athletics and there is evidence of disordered eating at the collegiate level in multiple sports. Female athletes in particular appear to be at a greater risk for developing an eating disorder. Female athletes may have low body satisfaction or low body image, and those that consider themselves to be perfectionists may be at higher risk of participating in disordered eating behaviors. These disordered behaviors can lead to eating disorders and a host of other repercussions if they are not recognized by athletes or coaches.

Coaches and those working closely with student athletes need to know what makes an individual more susceptible to disordered eating behaviors and how to intervene and educate athletes. Professionals who work with athletes need to be familiar with factors that influence unhealthy eating behaviors to help prevent eating disorders, RED-S, and LEA. Individuals who partake in harmful eating behaviors may feel shame or embarrassment and attempt to conceal their behaviors, whereas others may be in denial that they are struggling with disordered eating.

Coaches are in a unique position because of how often they are able to interact with their athletes. Coaches need to be equipped with the ability to identify the signs of disordered eating behaviors and knowledge to intervene when an athlete is struggling. Coaches also need to be aware of athletes who may be susceptible to eating disorders such as those who are concerned with how lean...
they are, those who are perfectionists, and those who have poor body image. Coaches have a responsibility to notice these signs and help prevent disordered eating. Coaches help to prevent disordered eating by creating a team culture where fueling one’s body appropriately is encouraged and where weight and performance are not closely tied together. Coaches have the power to help break down athlete’s negative thoughts and habits surrounding food. Coaches can create a culture where good habits are encouraged, and athletes are urged to fuel their bodies sufficiently without feelings of guilt. Coaches can do this by talking to their athletes about the importance of creating good eating habits and the importance of giving their bodies what they need in order to recover from training and competition. Coaches need to be careful that the information that they are giving to their athletes is relevant and accurate.
References


Appendix A

Coaches Email

Survey for your athletes

Hi Coaches,

My name is Sarah Wensink I am a graduate assistant coach for the track and cross-country teams at Dordt. I am currently doing research on the prevalence of disordered eating habits and behaviors among collegiate athletes. The Faculty Advisor for this study is Dr. Steve Holtrop, who is part of the Education Department at Dordt. I have created a survey that I am using to collect information and data. I am hopeful that I can get as many athletes as possible to complete the survey. In order to do this, I will need your help.

I am sending another email that contains the consent statement and the link to the survey for your athletes to complete. I am requesting that you forward that email to your athletes and encourage them to fill it out if they are willing. Please forward that email out to your team as soon as you can. It should take approximately 5 minutes for the athletes to complete. If you coach both men’s and women’s teams, please send it out to both of your roasters.

If you are curious what questions your athletes are being asked you can view a copy of the survey:

Link to Copy of the Questionnaire.

Also, these are the research questions I am seeking to uncover:

1. Does an athlete’s health knowledge and health education help to prevent disordered eating behaviors?
2. Does an athlete’s gender influence any specific disordered eating behaviors?
3. Are those that have a perfectionist personality more likely to participate in disordered eating behaviors?
4. Are students who participate in weight-sensitive sports such as track, field, cross country, and dance more likely to partake in disordered eating behaviors compared to those who participate in basketball, softball/baseball, football, hockey, volleyball, and golf.

If I find anything statistically significant information that pertains to the health of your team, I will be sure to let you know.

If you are interested in the results of the study, reach out near the end of December and I will let you know what I find!

Thank you in advance for doing this. If you have any questions about the survey or my research, please reach out.
Appendix B

Consent Statement:

I am asking you to participate in a research study titled *Eating Behaviors and Attitudes in Collegiate Athletes*. I will describe this study to you and answer any of your questions. This study is being led by myself, Sarah Wensink, a graduate student, and assistant coach at Dordt University. The Faculty Advisor for this study is Dr. Steve Holtrop, who is part of the Education Department at Dordt University.

Purpose of this study:

The purpose of this research is to examine eating behaviors, attitudes, and habits among college athletes.

What we will ask you to do:

All I ask of you is to complete the below survey by clicking on the link. You may be asked to log into your Google account to complete the questionnaire. This is only to ensure that the survey is completed only one time by each individual; your Google account information will not be recorded. If you do not already have access to Google apps, you can log in to Google with your Dordt username followed by "@dordt.edu" and your Dordt password. For more information click on this link: https://u.dordt.edu/dordt/computer-services/help-guides/google-apps. The questionnaire should take approximately five minutes. Your responses are anonymous and will be pooled with the other responses and used for research purposes only. Please follow the instructions of the survey, answer all the questions honestly, and remember to press submit when you are finished.

Risks and Discomforts:

Please note that the survey is being collected online on Google Forms, a company not affiliated with Dordt and with its own privacy and security policies that you can find at its website. We anticipate that your participation in this survey presents no greater risk than everyday use of the Internet.
Please be aware that some individuals could experience emotional effects such as sadness or anxiety.

Benefits:

There may be possible indirect benefits from completing this research questionnaire such as reflecting on your own individual eating habits and seeking to better them. In addition, others may benefit from the findings of this research study.

 Compensation: Participants will not receive any compensation.

Privacy/Confidentiality/Data Security:

I will not be collecting any identifying information; your responses are anonymous and will be used as combined data for research purposes only. In addition, the answers to the questionnaires will be kept secure in an electronic environment protected by a password.

Please note that email communication is neither private nor secure. Though I am taking precautions to protect your privacy, you should be aware that information sent through e-mail could be read by a third party.

Taking Part in this Study:

If you feel uncomfortable with these conditions you may choose not to participate. Participation is voluntary, refusal to participate will involve no penalty or loss of benefits to which the subject is otherwise entitled, and the subject may discontinue participation at any time without penalty or loss of benefits to which the subject is otherwise entitled.

Please click on the link below to go to the survey. Completion of the survey is an indication of your willingness to participate in the study.
Link to the Questionnaire

If you have any questions or concerns:

The main researcher conducting this study is Sarah Wensink, an assistant coach and graduate student at Dordt University. If you have questions, you may contact Sarah Wensink at sarah.wensink@dordt.edu or at 920-489-56-46 or my faculty advisor for this study, Dr. Steve Holtrop, at steve.holtrop@dordt.edu or at 712-722-6214. If you have any questions or concerns regarding your rights as a participant in this study, you may contact the Chair of the Institutional Review Board (IRB), Dr. Luralyn Helming at irb@dordt.edu or 712.722.6038.

Thank you,

Sarah Wensink
Appendix C

Debriefing Statement:

Thank you for your participation in this research study on eating behaviors and attitudes in collegiate athletes. Your data was collected through the completion of the questionnaire through Google Forms and then was converted into a spreadsheet. Analysis will be run to determine the answers to the research questions. Again, your answers to the questions are anonymous and data is confidential.

The purpose of this study is to examine the prevalence of disordered eating behaviors and identify which athletes appear most at risk amongst student athletes. This study seeks to answer the following questions:

1. Does an athlete’s health knowledge and health education help to prevent disordered eating behaviors?
2. Does an athlete’s gender influence specific disordered eating behaviors?
3. Are those that have a perfectionist personality more likely to participate in disordered eating behaviors?
4. Are students who participate in weight-sensitive sports such as track field, cross country, and dance more likely to partake in disordered eating behaviors compared to those who participate in basketball, softball/baseball, football, hockey, soccer, volleyball, and golf.

If you feel you need assistance navigating disordered eating behaviors and habits, please reach out to Dordt’s counseling services. You can find more information on Dordt’s website: COUNSELING SERVICES. If you wish to learn more about disordered eating, I suggest visiting nationaleatingdisorders.org/ for more information and referral services.

It was hypothesized that females would participate in disordered eating behaviors more frequently than males. However, while males would be more concerned with their musculature, females would be
more concerned with being thin or lean. We also hypothesized that those with increased confidence and knowledge in health and nutrition would be less likely to show signs of disordered eating behaviors. Those that had perfectionist tendencies would be more likely to show signs of disordered eating. We also hypothesized that those who participated in weight-sensitive sports such as track field, cross country, and dance could more likely to participate in disordered eating behaviors compared to those who participate basketball, softball/baseball, football, hockey, volleyball, and golf.

The main researcher conducting this study is Sarah Wensink, an assistant coach and graduate student at Dordt University. If you have any questions about the study, or if you would like to know the results of the study, you may contact Sarah Wensink at sarah.wensink@dordt.edu or at 920-489-56-46 or my faculty advisor for this study, Dr. Steve Holtrop, at steve.holtrop@dordt.edu or at 712-722-6214. Final results will be available by December 14, 2020. If you have any questions or concerns regarding your rights as a participant in this study, you may contact the Chair of the Institutional Review Board (IRB), Dr. Luralyn Helming at irb@dordt.edu or 712.722.6038.

Thank you again for your participation in this study.

Sarah Wensink
Appendix D

Eating Habits Questionnaire

Please answer each question honestly. Every submission is anonymous.

* Required

What is your gender? *

- Female
- Male

How would you describe your race? *

- Asian
- Black
- Hispanic
- Native American
- White
- Other:
Select the year of University are you in: *

- 1
- 2
- 3
- 4+

Select the sport(s) you participate in: *

- Baseball
- Basketball
- Cross Country
- Dance
- Football
- Golf
- Hockey
- Soccer
- Softball
- Track & Field
- Volleyball
<table>
<thead>
<tr>
<th>Question</th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is your sport in season?</td>
<td></td>
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<tr>
<td>When my performance in my sport falls short of what I know I am capable of, I get upset with myself.</td>
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<tr>
<td>Do you doubt the choices that you make?</td>
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<tr>
<td>Would you consider yourself a perfectionist? (A perfectionist may set high standards for themselves, be critical towards themselves and obsess over mistakes and overemphasize organization.)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Please respond to each question (one answer per row). *

<table>
<thead>
<tr>
<th></th>
<th>Always</th>
<th>Often</th>
<th>Sometimes</th>
<th>Rarely</th>
<th>Never</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel guilty when I think I have eaten too much.</td>
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<tr>
<td>Do you limit foods you are “allowed to eat,” count calories, spend a lot of time thinking about food?</td>
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<tr>
<td>Do you stop eating even though you find yourself hungry?</td>
<td></td>
<td></td>
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<tr>
<td>When practice is shorter or less intense than usual, I will compensate either by exercising on my own or by eating less.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes</td>
<td>No</td>
<td>Maybe</td>
<td>Somewhat Yes</td>
<td>Somewhat No</td>
</tr>
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<td>-------------------------------------------------------------------------</td>
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<tr>
<td>Do you feel a loss of control when you begin to eat which results in consuming an abnormally large amount of food?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Do you skip meals or fast to avoid eating?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Do you have regimented routine surrounding food and exercise?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Do you use exercise, food restriction, fasting or purging to &quot;make up for bad foods&quot; consumed?</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Are you confident in your knowledge in health and nutrition? *

1 2 3 4 5

Not Confident at all  ○ ○ ○ ○ ○ Very Confident

How confident are you in abilities to identify healthy and nutritious foods grocery store or in the dining hall that will help you to become a better athlete? *

1 2 3 4 5

Not Confident at all  ○ ○ ○ ○ ○ Very Confident

Do your coaches talk about the importance of good nutrition and creating healthy eating habits?

○ Frequently

○ Often

○ Sometimes

○ Rarely

○ Never
Do you agree with the following statement: I am more knowledgeable in health and nutrition than my peers. *

- Strongly disagree
- Disagree
- Neutral
- Agree
- Strongly agree

Are you satisfied with how muscular you are? *

1 2 3 4 5

Not satisfied at all Very satisfied

Are you satisfied with how thin/lean you are? *

1 2 3 4 5

Not satisfied at all Very satisfied