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A Grant Application for the Creation of an Eating Disorders Awareness Program for High School Coaches

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In partial fulfillment of requirements for
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Iowa State University

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Introduction

Eating disorders can affect anyone and do not impact individuals across different ages, race or gender. It is estimated that nearly 20 million women and 10 million men in America will have an eating disorder (ED) at some point in their lives (National Eating Disorders Association [NEDA], 2020). Eating disorders are the third most common chronic illness among adolescents (Franco et al., 2017). However, the actual prevalence of ED is difficult to determine due to the lack of standardized assessment tools and consistent criteria for diagnosing (Coelho et al., 2014).

There is often a misperception that people choose to develop or have an ED, but in reality, ED are serious, but treatable mental and physical illnesses (NEDA, 2020). Eating disorders are linked with severe disturbances in an individual's eating behavior, associated thoughts and emotions (National Institute of Mental Health [NIMH], 2016). Often, individuals struggling with ED become pre-occupied with food and their body weight, which can severely impair physical health and psychosocial functioning (Parekh, 2017; Thompson, 2017). The *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (DSM-V) categorizes ED into three main diagnoses: binge eating disorder, anorexia nervosa, and bulimia nervosa (American Psychiatric Association [APA], 2013). Other ED included in the DSM-V criterion include pica, rumination disorder, and avoidant/ restrictive food intake (ARFID) (Thompson, 2017; Harrington et al., 2015). In addition to its physical and psychosocial impacts, ED have some of the highest mortality rates among mental illness and are often associated with other psychiatric disorders like depression, anxiety, obsessive compulsive disorders and alcohol or drug abuse (Cohelo, 2014; Parekh, 2017).

Athletes are at higher risk for experiencing ED as well as disordered eating (DE) (NEDA, n.d.). Disordered eating is a term used to describe irregular eating behaviors that may or may not meet the criteria of an ED (Anderson, 2018). Although DE may not meet ED criteria, it does encompass eating behaviors that may eventually lead into an ED (Mancine et al., 2020). Symptoms that an individual experiencing DE may exhibit include frequent dieting, anxiety associated with specific foods, weight fluctuations, feelings of guilt and shame associated with eating, preoccupation with food, and a feeling of loss or control around food (Anderson, 2018). Disordered eating patterns may include, but are not limited to restrictive eating, skipping meals,

the use of diet pills or laxatives, and binge eating followed by purging (Thein-Nissenbaum et al., 2011). Disordered eating is present when an individual engages in these behaviors on a regular basis (Howard, 2016). Up to 70% of high-school students reported DE patterns such as fasting, vomiting and the misuse of laxative or diet pills (Gonsalves et al., 2014; Mancine et al., 2020). There are two common DE patterns seen in athletes that coaches should be aware of include the female athlete triad and orthorexia. Both of these DE patterns are prevalent in female athletes and can develop into ED if not addressed with appropriate treatment provided.

The form of DE most commonly studied in female athletes is the female athlete triad, a form of DE defined as the interrelatedness of energy availability, menstrual dysfunction and low bone mineral density (De Souza, 2014). Possible indicators of the triad are amenorrhea, stress fractures, noticeable weight loss or a preoccupation with weight or body size that interferes with normal eating habits and excessive or compulsive exercise habits (De Souza, 2014). Female athletes with the triad may exhibit various DE patterns that negatively affect energy availability (Thein-Nissenbaum et al., 2011). Amenorrhea is defined as the absence of the menstrual cycle or one or more missed menstrual periods (Mayo Clinic, 2021). Amenorrhea can occur when a female engages in excessive exercise and/or restricts their food intake resulting in a lower body weight (Harcourt, 2018). Due to this lower body weight, a hormonal imbalance occurs leading to the lack of menstruation. This lack of menstruation can lead to long-lasting consequences including infertility, compromised estrogen levels, and the depletion of calcium (Harcourt, 2018). Athletes with menstrual disturbances tend to have low bone mineral density, which is a significant risk for stress fractures and injuries (De Souza, 2014).

Another area of concern is the DE pattern, orthorexia. Orthorexia is when an individual is focused on extremely healthy eating that becomes restrictive, impacting nutrition and physical health (Lyons, 2018). Orthorexia is not recognized as an ED by the DSM-V but has many similarities to the previously classified ED that are anorexia nervosa and bulimia nervosa (Chaki et al., 2013; Brytek-Matera et al., 2015). Warning signs of orthorexia include cutting out food groups (e.g., sugar, carbohydrates, dairy, etc.), an increased concern about the health of ingredients and the inability to eat anything but foods that are “healthy” (NEDA, n.d.). Often times, orthorexia initially begins by an individual wanting to improve their diet, but eventually their diet becomes the most important focus of their life, becoming very selective about food choices and the ingredients in their food (Chaki et al, 2013).

Athletes tend to be at a higher risk of orthorexia related to controlling their diets in order to maximize their athletic performance. About 31% of female athletes and 41% of male athletes have orthorexia (Farooq & Bradbury, 2016). This increased prevalence of orthorexia in athletes is likely attributable to the pressure they feel to follow a specialized diet to lower their weight or to prepare for competition (Lyons, 2018). Another reason why athletes are at an increased risk of orthorexia is they may want to earn others' respect, manage stress and improve their athletic performance through these healthy eating behaviors (Kiss-Leizeer et al., 2019, Lyons, 2018). Coaches can inadvertently increase the risk of orthorexia in athletes by encouraging eating habits and behaviors to enhance performance that athletes may then take to the extreme.

Eating disorders and DE have many similarities in regard to signs and symptoms, the significant difference between the two is whether the individual's symptoms and experiences align with the ED criteria as part of the DSM-V (Anderson, 2018). An individual with DE often engages in similar behaviors as that of an individual with an ED, but to a lower level of severity (Gottlieb, 2014). Individuals experiencing DE may be at risk for developing an ED if symptoms are not identified and treated early before they worsen (Gottlieb, 2014). Like individuals with ED, those who are struggling with DE may also be at risk for developing psychological issues including depression and/or anxiety (Gottlieb, 2014).

Influence of Gender: Gender impacts the prevalence of ED, with higher rates among females than males. The exact number is difficult to determine. Females represent approximately 90% of those who seek medical care for an ED, males are less likely to seek treatment (Joy et al., 2016). Franco et al., (2017) reports the lifetime prevalence for ED among adolescent females is 1.7% for anorexia nervosa, 0.8% for bulimia nervosa and 2.3% for binge eating disorder. Among adolescent males, the prevalence of any DSM-V ED is reported to be 1.2 to 2.9% (Franco et al., 2017; Allen, 2013). Hudson et al., (2007) reports the prevalence of ED among males is slightly lower than females at 0.3% for anorexia, 0.5% for bulimia and 2% for binge eating disorder.

Sports Participation: Participation in sports has many benefits for adolescents. It teaches teamwork, builds communication skills, may boost self-esteem, can lead to higher grades and a more positive attitude towards schooling (Stanford Children's Health, n.d.; Mancine et al., 2020). However, despite the many positives to sport participation, there are potential physical and psychological risks including ED and DE practices. Female athletes have a slightly increased risk of developing ED as compared to female non-athletes, 27 to 21% respectively (Coelho et al.,

2014). Although the ED risk for female athletes is not considerably higher than female non-athletes, about two-thirds of female athletes (62%) are affected by DE (NEDA, n.d.; Bonci et al., 2008; Carl et al., 2017). This potential ED/DE risk is a concern given Iowa's student athlete participation. Iowa is ranked within the top 20 states of participation in high school sports (National Federation of State High School Associations [NFHS], n.d.). During the 2018-2019 school year there were 138,210 Iowa high school athletes (81,863 males and 56,347 females) reported as participating in sports (NFHS, n.d.).

Athletes are at increased risk of developing DE due to the focus of performance in their sport which may include them wanting to become faster or lighter. They may believe that losing weight can help them improve in this area. This focus may foster DE thoughts and behaviors to begin, including obsession with weight and food intake, caloric restriction and body image disturbances (Lentzke, 2015). In addition, athletes are more likely to display traits of perfectionism and a need for control which includes control over their training and eating schedules (Lentzke, 2015). This need for control may lead the athletes to manipulate their diet leading to DE and ED.

Eating disorders can and do occur in all sports but are more prevalent in sports where a lean or low-body weight is seen to provide a competitive advantage. Athletes may see this advantage occurring in their performance or in the judging of an individual's performance (Thompson, 2017). Sports that tend to have higher prevalence of ED include weight-class sports (e.g., wrestling, powerlifting), aesthetic sports (e.g., gymnastics, dance, figure skating) and endurance sports (e.g., swimming, running) where up to 62% of athletes may experience DE practices (NEDA n.d.; Coelho et al., 2014; Thein-Nissenbaum et al., 2011)

Female athletes who participate in these sports are at a higher risk of ED or DE often due to utilizing weight-controlled practices to improve their performance (Pernick et al., 2006). Weight-control practices intended to help an athlete lose weight include: restricting caloric intake, dehydration techniques (e.g., fluid restriction, diuretics, enhanced sweat production), stimulant use, and purging (e.g., vomiting, laxative use) (Carl et al., 2017). Weight loss techniques are often used for those sports that emphasize a lean physique, the aesthetic or endurance sports (Carl et al., 2017). Conversely, athletes may also use unhealthy weight-controlled practices to promote weight gain such as supplement use, rapid weight gain, and use of anabolic compounds (Carl et al., 2017). Athletes who may use weight gain techniques are

likely to be in sports where higher weights are perceived as advantageous such as football, power lifting, and bodybuilding (Carl et al., 2017).

Coaches play an important role in their athletes' lives. They set the tone for their team through their interactions with their athletes. They also play an important role in the prevention and identification of DE/ED. There is room for the education of coaches regarding ED prevention and identification and there are several actions that coaches can take in an effort to create a more body-positive environment for their athletes. For the purpose of this grant, the focus will be on training coaches who work with female athletes as much of the research is focused on female athletes and female athletes are more likely to seek medical treatment.

Justification of Need

Adolescence is a key time for the development of norms related to health behaviors and body image (Mancine et al., 2020). Unfortunately, this is also the key time for developing thoughts and behaviors associated with DE (Thein-Nissenbaum et al., 2011). Adolescent athletes going through puberty may experience more body image dissatisfaction due to the changes their body is experiencing (JATA, n.d.). Body image in athletics can also be negatively influenced by sociocultural pressures to maintain a certain body shape and size as well as demands to maximize performance by being thin (JATA, n.d.).

Adolescent athletes may feel excessive pressure to perform at a certain level. Nutrition and body-image may be negatively impacted by this pressure. Energy imbalances and serious health consequences may occur even if an athlete is not intentionally limiting their caloric intake. These consequences can be caused by the lack of nutrition knowledge combined with increased training volume (Mancine et al., 2020). Eating disorders have many adverse psychological and physical health impacts consisting of but not limited to weight loss, amenorrhea, bradycardia, anxiety, electrolyte imbalance, tremors, dehydration, and osteoporosis/stress fractures (Franco et al., 2017). Consequently, due to these adverse impacts on health, athletes with ED may experience a decrease in performance resulting from the loss of fat and lean body mass, electrolyte abnormalities and dehydration (Logue et al., 2017). This decrease in performance may in turn exasperate the ED behaviors eventually leading to serious metabolic complications such as fluid and electrolyte imbalances, impaired concentration and judgement, brittle bones and injuries, and heart damage or failure (National Association of Anorexia Nervosa and

Associated Disorders [ANAD], 2020). In some cases, if these complications become severe enough, they can be life threatening.

Physical Impacts: Across all ED and DE energy classifications, availability for the body is adversely impacted, whether too much or too little. Energy availability refers to the amount of energy remaining for bodily functions, calculated as energy intake minus energy expenditure (Thein-Nissenbaum et al., 2011; Kushner & Raj, 2016). Low energy expenditure occurs when an individual has insufficient energy to support normal physiological functions (Logue et al., 2017). Prolonged low energy availability (LEA) impacts an athletes' metabolic functions and performance in their sport. Athletes are at an increased risk for low energy availability due to decreased energy intake and increased energy expenditure related to prolonged practices or exercise sessions.

Female athletes may unknowingly exhibit DE habits due to inadequate energy intake (Kushner, 2016). Adolescent females require about 1,800-2,400 calories per day (National Institute of Health [NIH], 2010). If energy availability is below a recommended level to support growth, an alteration in cellular maintenance, growth, and thermoregulation can occur (Thein-Nissenbaum et al., 2011). Due to these alterations, LEA may not provide enough caloric support for growth and repair of injured tissues leading to increased or prolonged injuries (Thein-Nissenbaum et al., 2011). Low energy availability can also impact an individual's immune response, cell metabolism, growth and normal cell response (Thein-Nissenbaum et al., 2011). Chronic LEA can result in musculoskeletal and reproductive dysfunction (Kushner & Raj, 2016).

Low energy availability may contribute toward micro-nutrient deficiencies such as vitamins A and C, riboflavin, folate, calcium and zinc, which play an essential role in metabolic functions of the body (Logue et al., 2017). These nutrient deficiencies often have associated physical signs which reflect some of the physical attributes an individual with an ED may express like dry skin and hair, brittle nails, poor wound healing, impaired immune functioning, dizziness, fine hair on the body, cold or mottled hands and feet or swelling of the feet (NEDA, n.d.).

In addition to consuming minimal intakes of micronutrients, those with DE patterns may deprive their body of water, resulting in dehydration. Excessive purging behaviors may also lead to dehydration (National Association on Mental Illness [NAMI], n.d.). Dehydration can result in long-term harm related to electrolyte imbalances one of which includes low potassium,

impacting the heart muscle or may lead to possible kidney failure (Wichman & Marshall, n.d.). Dehydration can be characterized by fatigue, muscle spasms, dizziness, heart palpitations, decreased balance and coordination, and swelling of hands and feet (Bonci et al., 2008). All of these characteristics of dehydration negatively impact an athlete's performance in their sport.

A potential long-term health impact of ED due to LEA is osteopenia or osteoporosis. Calcium depletion, the restriction of food, underweight status, and low sex hormones are known to lead to osteopenia or osteoporosis (Mayo, 2019). Osteopenia is the thinning and depletion of bone mass (Harcourt, 2018). This depletion is caused when the body is unable to maintain the levels of calcium in the bone (Harcourt, 2018). This is of particular concern for female high school athletes as 95% of a woman's total bone mineral density is developed during adolescence. If a female's body mass index remains low (below 18.5kg/m² or below the 5th percentile) for an extended period of time there may be an irreversible decrease in their bone mineral density (Mancine et al., 2020). This decrease in bone mass can cause bones to break more easily, the bones are also less likely to heal appropriately if a fracture occurs (Harcourt, 2018). For example, female, high-school athletes who report DE are eight times more likely to incur an injury than an athlete who did not report DE (NEDA, 2020). Disordered eating is also correlated with an increased risk of musculoskeletal injury with athletes being twice as likely to incur a musculoskeletal injury like spondylosis, compartment syndrome, or injury to the ligaments (Carl et al., 2017; NEDA, 2020; Thein-Nissenbaum et al., 2011). These injuries can make DE patterns worse due to the athlete not being able to participate at the level they previously were participating. The inability to participate how they would like can also take a mental toll on the athlete.

Psychological impacts: Eating disorders not only have physical implications, but also psychological implications. Individuals with an ED are more likely to experience a psychological co-condition like depression, anxiety, obsessive-compulsive disorder and substance abuse disorder (Joy et al., 2016). An ED combined with another psychological condition has the potential to increase the risk of suicide. Joy et al., (2016) reported individuals diagnosed with bulimia nervosa and another psychological condition are more likely to report suicidal ideation and a history of suicide attempts (Joy et al., 2016). This combination of psychological conditions can be detrimental to an athlete and their performance. When an athlete with an ED gets injured, in addition to longer recover times, they may also struggle with increased emotional

and mood instability (Mancine et al., 2020). With both the psychological and physical impacts of ED, athletes often experience both their physical and mental state rapidly deteriorate affecting their health as well as their performance in the sport (Joy et al., 2016). Due to the physical and psychological impacts of ED an athlete may be prone to decreased academic performance.

Academic impacts: Athletes with ED often experience difficulties with concentration, memory and information processing (American Federation for Teachers [AFT], 2015). They are also typically undernourished, meaning they are deficient of calories, protein, or specific vitamins and minerals (U.S. Department of Health and Human Services [HHS], 2005; Morley, 2020). Being undernourished can lower inquisitiveness and cognitive functioning (HHS, 2005). In addition, mineral deficiencies, such as iron, can impact memory and the ability to concentrate negatively impacting academic performance (HHS, 2005). Furthermore, being undernourished may impact their attendance due to experiencing increased fatigue and a weaker immune system leading to more illnesses and missed school days (AFT, 2015). If students are not at school or not getting the grades that they need this may affect their ability to participate in their sport.

Role of coaches in prevention and treatment: Coaches are often seen as more than a coach, but also a leader and teacher to their athletes. Coaches are in a key position to either inadvertently contribute toward or prevent DE and ED. Despite the increased risk for DE and ED in athletes, many coaches lack formal nutrition knowledge. Evidence suggests that coaches could benefit from education related to the knowledge of DE, as well as strategies to properly communicate with athletes about body weight issues (Bonci et al., 2008). It is important for high school coaches to understand the risks to their student athletes and to identify early signs. Further, it is vital that coaches understand how to create a body-positive or weight-neutral environment for their athletes. A coach can begin to create this type of environment by first understanding and exploring their own values and attitudes around weight, dieting and body-image and how these attitudes may affect their athletes. They also should understand their role in promoting positive self-image and self-esteem in their athletes (Kratina, n.d.).

Coaches often build strong relationships with their athletes, which can positively or negatively influence their athletes. Coach-athlete relationships that are more confrontational and less supportive can increase the prevalence of ED in athletes (NEDA, n.d.). Thompson (2017) reports an increased ED prevalence in athletes with coaches who create an ego or performance-centered motivational climate rather than a skills or mastery climate (Thompson, 2017). An ego

or performance centered environment is one that compares athletes and their performance to one another. This type of environment creates more competition amongst teammates, while a mastery climate focus on the development of skills and tasks necessary for the sport (Heggebo, n.d.). Another way coaches can negatively contribute to and create a negative environment is through communicating about weight and preparing the body for competition. Kroshus et al. (2014) noted that male coaches more frequently communicate with athletes about getting their body ready to participate at an ideal performance level as well as about eliminating certain foods or taking supplements (Kroshus et al., 2014). Negative talk and negative performance appraisal may predispose athletes to body dissatisfaction which promotes the development of DE attitudes and behaviors (Bonci et al., 2008).

Conversely, coaches who are more positive, person-oriented, and focus on personal successes rather than body weight or shape create an environment that may help prevent the development of ED (NEDA, n.d.). There are several actions coaches can take to create a more body positive environment for their athletes. Coaches can begin by de-emphasizing weight by not weighing athletes and eliminating comments about weight. Instead of focusing on weight, they should focus on other performance areas like physical conditioning, strength, and the mental components of performance where an athlete can improve their skills without having to change their body composition (Kratina, n.d.). Coaches should celebrate the athlete for their talents beyond their physical aspects (e.g., celebrate the development of skills and positive mental changes). They can also stop assuming that reducing weight or body fat will enhance performance in their athletes. Kratina (n.d.) reports that weight reduction may actually physically weaken the athlete.

The environment the coach creates as well as the relationships they form with their athletes influences the development and prevalence of ED. For example, female gymnasts who were told to lose weight by their coaches increasingly resorted to pathogenic methods (e.g., bingeing, excessive exercising, dieting) which are DE practices (Anderson & Petrie, 2012; Bonci et al., 2008). Similarly, among 131 lightweight football players, 42% showed evidenced of DE and reported that their coach was the individual who most encouraged dieting practices (Bonci et al., 2008). If coaches are knowledgeable about nutritional issues, they may be more likely to emphasize healthy eating habits and understand why weight is such a personal issue for many athletes, especially for females (Bonci et al., 2008; Kratina, n.d.).

Creating a more positive environment is important for the prevention of DE patterns in athletes, but it is also important that coaches are able to identify athletes at risk for ED to help them get appropriate treatment. Coaches have frequent interactions with athletes seeing them almost daily while the sport is in season. This frequent interaction places them in a position to identify ED early as they can identify signs and symptoms, such as, observing a decrease in performance, an increase in injuries, excessive exercise or rigid eating behaviors (Mancine et al., 2020; Kroshus et al., 2014). If they notice performance or behavior changes it may indicate the possibility of a health concern (Kroshus et al., 2014). Coelho (2014) recommends that ED prevention and identification be a mandatory part of the curriculum for both coaches and athletes. Early identification and treatment of ED decreases the possible medical and psychological consequences and may shorten the length of treatment (Martinesen et al., 2015). Coaches who are educated can encourage medical care and can provide reassurance to their athlete that their position on the team will not be jeopardized if they seek out the treatment they need (Bonci et al., 2008). Emphasizing that their position on the team will not be jeopardized is important as many athletes are afraid of losing what they have worked so hard to accomplish.

Most coaches have limited education regarding nutrition for their athletes but are open to learning more. Kroshus et al. (2014) reported coaches want to learn about health issues relevant to female athletes; however, many have mixed knowledge regarding the communication and management around DE. Despite their limited nutrition knowledge, the primary source of nutrition information for athletes is from athletic trainers or strength coaches (Burns et al., 2004). Lack of education around nutrition makes coaches more likely to make careless comments regarding weight or body image. They are also more likely to provide misinformation to their athletes which could jeopardize the health and safety of an athlete (Bonci et al., 2008). There are many consequences that may occur if nutrition misinformation is provided. Some of the consequences that may occur through this misinformation include the risk for nutritional deficiencies due to coaches promoting focus on a specific macronutrient (e.g., protein), the promotion of supplements or protein drinks that may have potential drug-nutrient interactions or contain toxic components or encouraging certain health behaviors that may actually be harmful to their health (American Dietetic Association, 2006; Stoll, 2018). Providing appropriate nutrition information to athletes is important for their health. Coaches should be provided with training on evidence- and research-based weight loss, nutrition and sports performance. They can

then provide athletes with accurate information thus potentially reducing misinformation and unhealthy practices (Kratina, n.d.). If a coach does not feel comfortable providing this information, they should utilize a multi-disciplinary team of dietitians, athletic trainers, school nurses, and physicians to provide accurate information (Bonci et al., 2008, NEDA, n.d.).

Education is important for coaches since many are without formal ED knowledge and if they are not educated, they may continue to spread nutrition misinformation to athletes (Coelho et al., 2014). Martinsen et al., (2015) found coaches need factual information regarding the identification of ED. This proposed training program will provide coaches with factual information as well as further resources should they need or have the desire to learn more. Eating disorder focused educational programs directed at coaches are effective in increasing ED knowledge (Joy et al., 2016). Educating coaches would be a primary prevention effort, which aims to prevent the start of an illness or disorder by influencing risk factors that contribute to the initial development of the illness or disorder (Coelho et al., 2014). In the primary prevention of ED, some important measures to include are establishing educational initiatives to discourage extreme dieting and acknowledging athletes who are talking about losing weight or changing their body composition seriously (Coelho et al., 2014). Educational programs targeting primary prevention of ED should include instruction on how to prevent extreme dieting, how to prevent ED onset, the recognition and the management of ED (Coelho et al., 2014; Joy et al., 2016).

Registered dietitian nutritionists (RDN) have a role in providing coaches with education on ED. Registered dietitian nutritionists can provide training on how to screen for ED and how to start the dialogue about feelings, eating behaviors and consequences between coaches and athletes (Joy et al., 2016). The ability to ask these questions can open up conversation and indicate possible athletes at risk. Identifying athletes at risk initiates referral to a dietitian, physician or appropriate treatment program sooner (Joy et al., 2016). In addition to educating coaches on the questions to ask to recognize an ED, RDN's also play a major role in prevention efforts. Registered dietitian nutritionists have the skills and knowledge to educate coaches on how to create an environment that prevents ED from developing amongst athletes. The development and implementation of an ED awareness training program for Iowa high-school coaches can assist in helping coaches to create a more body-positive environment, identify athletes at risk, and help athletes get treatment sooner. In doing so, coaches can help lower the rates of ED and DE among high school athletes.

Objective

The long-term goal is to lower the prevalence of ED and DE among female high school athletes in Iowa. To accomplish this long-term goal, we must increase the awareness of and knowledge about ED and DE among high school coaches. The objective of this grant application is to develop an ED and DE awareness training program, *EveryBODY is Perfect: disordered eating in sports program*, for Iowa high-school coaches.

Project Outline

Methods

Target Audience: Athletes receive their primary source of nutrition information from athletic trainers or strength coaches (Burns et al., 2004). These athletes seek nutrition advice for enhanced performance, supplement use and weight management (Burns et al., 2004). Due to this reported reliance on coaches for nutrition information, *EveryBODY is Perfect* will target Iowa coaches of sports where athletes are at an increased risk for the development of an ED including but not limited to cross-country, dance team, track, swimming and diving, and wrestling. Particular emphasis will be placed on recruiting coaches of female athletes. There are 330 school districts in Iowa and all but 27 districts have at least one high school with some larger districts having more than one (Iowa Department of Education [IDE], n.d.). It is anticipated all of these schools have at least one female sports team with at least one coach. Larger high schools likely to have more than one female team and more than one coach. Thus, the goal for this grant application is to reach 10-20% of high school coaches in Iowa ($n= 30$ to 60).

Recruitment: In Iowa, all coaches are required to have a coaching license. There are different licenses and requirements depending on whether an individual is a licensed teacher or not. Licensed teachers are required to complete five college semester hour credits in specific areas to get their coaching endorsement. Meanwhile, non-teachers, are required to obtain 55 hours of coursework to obtain their coaching authorization (Iowa Board of Educational Examiners [BOEE], n.d.). Coaches who are teachers get their coaching endorsement updated when their teaching license is renewed. Teacher license renewal occurs every five years after they have met the requirement of teaching for two years under their initial teaching license. Teacher license renewal requires the completion of 6 renewal credits and the mandatory reporter

training (BOEE, n.d.). Coaches who are not teachers are also required to renew their license every five years (BOEE, n.d.). This renewal process requires coaches to complete CPR training, concussion training, mandatory reporter, and two other renewal activities. These additional renewal activities can be any National Federation of State High School Association videos, workshops, clinics (e.g., ED and DE awareness training), online rules meetings, or online printouts from professional development providers (BOEE, n.d.). *EveryBODY is Perfect* will be offered as a renewal activity. It will be promoted through the Iowa Board of Educational Examiners website, emails to licensed coaches and high-school athletic directors using listservs, and newsletters sent out by the Iowa Girls Coaching Association. A collaboration with coaching authorization program providers (i.e. community colleges) will also be pursued.

Program Description

Behavior Change Theoretical Model: Effective nutrition education programs utilize behavior change models. Theoretical models help in designing and evaluating health behavior and promotion interventions through understanding human behavior (Rural Health, 2018). *EveryBODY is Perfect* is based on the health belief model (HBM). The HBM is commonly used in nutrition education programs and has been found to be successful in promoting behavioral change. Abood, et al (2003) found that the HBM was successfully used as a theoretical framework to encourage dietary behavior change through increasing nutrition knowledge and promoting the benefits of making dietary changes.

The HBM attempts to predict health-behaviors based on belief patterns and may provide insight into the motivation of people to make changes to health behaviors (Rural Health, 2018). The HBM suggests that for behavior change to succeed, people must feel like their current behaviors are putting them at risk or may cause negative outcomes, causing them to see the benefit of making a change as well as overcoming any challenges or barriers they are faced with in the process of making the change (Rosenstock, 1974). The HBM suggests that health decision making including health behavior, is a process through which an individual moves through a series of stages or events and at any one of these stages the probability of a response being made will either increase or decrease (Rosenstock, 1974).

The HBM is comprised of several constructs as shown in Table 1. The HBM constructs are associated with individual's decisions in the areas of health and illness behavior (Becker,

1974). Addressing all the HBM components enables an intervention to be developed that meets the needs of the patient or individual to whom they are trying to promote behavior change (Becker, 1974). The HBM addresses an individual's readiness to change, assesses the likelihood of action, and then addresses modifying factors using the following constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy (Rosenstock, 1974). These modifying factors can further be divided into three categories, individual perception, modifying factors and likelihood of action (Becker, 1974; Champion & Skinner, 2008; Rosenstock, 1988). Individual factors are the factors that affect the perception of an illness and its importance to health including perceived susceptibility and perceived severity. Next are the modifying factors which include the demographic variables and an individual perceived thought and the factor, cue to action. Lastly, is the likelihood of action, which is classified as the perceived benefit minus the perceived barriers of taking the recommended health action (Becker, 1974; Champion & Skinner, 2008; Rosenstock, 1988). Motivation is considered important to the HBM as health motivation is an organizing factor when it comes to health beliefs and intentions (Rosenstock, 1974). These constructs are useful in initiating behavior change for either the short or the long-term. The HBM and its constructs will be utilized to create an effective nutrition education for high school coaches with the long-term goal of promoting behavior change.

Table 1. HBM Overview and Proposed Program Components for Coaches

HBM CONSTRUCT	HBM CATEGORY	DEFINITION	APPLICATION	PROPOSED PROGRAM COMPONENT
<i>Individual Perceptions</i>	Perceived Susceptibility	Perception or belief of chances of getting a condition.	<ul style="list-style-type: none"> • Help an individual develop a perception of their own risk, define population at risk. 	<ul style="list-style-type: none"> • Overview of DE/ED • Risk of developing ED/DE as an adolescent athlete.
	Perceived Severity	Beliefs or feelings about the seriousness of a condition and its potential consequences.	<ul style="list-style-type: none"> • Specify consequences of a condition, encourage action. 	<ul style="list-style-type: none"> • Overview of DE/ ED-physical, psychological and academic impacts on athletes. • Video/story from athletes on how DE has impacted their athletic careers and how their coach played a role in that journey. • Coach stories of DE impacting athletes and their role.
<i>Modifying factors</i>	(A) Attributes that can't be changed	Age, Gender, Ethnicity, Personality, Socioeconomics	<ul style="list-style-type: none"> • Address how change can happen at any time 	(A) Overview of DE/ED-Who does it impact most, statistic.
	(B) Attributes that can be changed	Knowledge, self-efficacy		(B) How the environment can be changed to discourage the development of ED/DE.
	Cues to Action	Factors that promote the readiness to take action or make change occur.	<ul style="list-style-type: none"> • Provide information on how-to, promote awareness. • Motivate people to take action. 	<ul style="list-style-type: none"> • Session on how to create a body-positive environment. • Resources available to take action if DE/ED is suspected. • Empathic response training video.
Self-Efficacy	Confidence that one can execute the behavior	<ul style="list-style-type: none"> • Provide training and guidance. 	<ul style="list-style-type: none"> • Campus collaboration action planning worksheet. 	

		change to take action and produce outcomes.	<ul style="list-style-type: none"> • Successfully execute the behavior required to produce desired outcomes. 	<ul style="list-style-type: none"> • Empathic response training video.
<i>Likelihood of Action</i>	Perceived Benefits	Beliefs regarding the effectiveness of taking action to reduce the risk or disease threat.	<ul style="list-style-type: none"> • Define how to take action and explain potential positive results. 	<ul style="list-style-type: none"> • Panel of physician, nurse, dietitian and their role in DE/ED, how coaches can utilize them.
	Perceived Barriers	Beliefs about the costs (tangible or psychological) or obstacles of the perceived action.	<ul style="list-style-type: none"> • Correct misinformation, offer assistance and reassurance. 	<ul style="list-style-type: none"> • Panel can answer questions from coaches to correct any misinformation and any questions that coaches may see as a perceived barrier or that they may have as they look to implement the program.

Program Outline: EveryBODY is Perfect will be based on the National Collegiate Athletic Association (NCAA) mental health workshop planning kit (NCAA, n.d.). The workshop is designed to support schools with increasing the awareness of student-athletes mental health issues and to train coaches (NCAA, n.d.). It was developed by medical and mental health professionals as well as higher education and sports medicine organizations.

This workshop is originally designed as an in-person workshop; however, it will be revised into a virtual workshop to reach coaches across the state of Iowa. Web-based or virtual learning courses have been found to be good alternatives to traditional continuing education courses (Garrison et al., 2000). A benefit to web-based courses is the flexibility of being able to complete the course at the student's convenience without having to travel or be present in person for a course (Garrison et al., 2000). This program will follow the NCAA workshop agenda and will be a seven-hour workshop for high school coaches working with female athletes. It will be divided into two separate sessions of 3.5 to 4 hours each for a total of 7.5 to 8 hours. This is similar to the established agenda by dividing the course into two separate sections.

The National Eating Disorder (NEDA) toolkit will be utilized as a secondary resource for this course (NEDA, n.d.). This toolkit was created by the National Eating Disorder Association and is used by athletic associations nationwide. In fact, it is currently provided as a resource to coaches by the Iowa High School Athletic Association. By integrating the NCAA mental health workshop and NEDA toolkit, *EveryBODY is Perfect* will be an informative and comprehensive ED and DE awareness program.

The NCAA mental health workshop planning kit contains many resources that will be utilized and adapted for this program. The resources in this kit include a planning checklist, workshop instructions, agenda template, "Student-Athlete Mental Health Perspectives" video, supporting student-athlete mental health wellness introduction module, the "NCAA Coaches Assist for Empathic Response" training video, mental health best practices institutional self-assessment worksheet, campus collaboration action plan worksheet, workshop evaluation form and a workshop PowerPoint presentation template (NCAA, n.d.) For the purpose of this program the agenda template will only be used as a guide for developing the program as it is a virtual course. The other resources will be modified and adapted to fit the goals of this program but are useful to helping accomplish the goals of educating coaches and developing the program. The workshop planning guide is useful for those trying to create a program, as for each section, it

gives the amount of time it should take, the recommended speakers, materials that are needed, and further instructions (NCAA, n.d.).

The program curriculum will be designed to address the HBM constructs and categories (Table 1). Session 1 (~3.5 hours) will encompass an overview of ED and DE (e.g., population impact, symptoms, physical, psychological and academic impacts, etc) and the student athlete. A video of athletes talking about their ED or DE experiences and how it affected them, the impact on performance in their sport and how the coach could have helped them will be shared. This session will then move into discussing the role of coaches and their responsibility of being aware of ED symptoms and the impacts on an athlete's performance (Weltzin, n.d.). The discussion on the coach's role will also have a video from a coach who has had athletes with ED and how they played a role in helping that athlete get the treatment they need. This section will then wrap up with the empathic response training video. This video is created is by the NCAA for all mental health disorders but will be beneficial to our coaches to learn how to have meaningful conversations with student-athletes about well-being and how to support those students who are seeking help (NCAA, n.d.).

Session 2 (~3.5 hours) will begin by discussing treatment options for athletes who they identify may be at risk for DE or an ED. This will include a panel discussion with a physician, school nurse, and dietitian about each of their roles in supporting the athlete, their parents and coaches. This panel will discuss how they play a role on the treatment team and what they look for during their assessments of the athlete. Rather than a question-answer session due to being virtual the panel will be discussing commonly asked questions to help break down the potential barriers and misinformation coaches may be aware of. After the panel the next session will be about creating a positive environment. The importance of being positive role models to their athletes and creating a positive environment will be discussed. A RDN will discuss how coaches can create a body-positive environment and the importance of this in the prevention of DE/ED behaviors. Lastly, the coaches will work on an action plan regarding how they can positively impact their athletes in regard to eating patterns and how they can modify their environment to be more positive.

The coaches will be asked to utilize an evaluation form for each construct, which will be part of the program evaluation. This form will also be used to take notes about the given lessons, how a lesson is currently being implemented and ideas on how they want to work towards

implementing best practices into their program (NCAA, n.d.). Taking notes will allow them to assess current practices within their programs to help them create the campus action plan that is to be completed during session two.

Team Capacity: In order to enhance the effectiveness of *EveryBODY is Perfect* it will be reviewed and/or facilitated by an interdisciplinary team comprised of a RDN, certified sports specialist in sports dietetics dietitian, certified eating disorder registered dietitian, a school nurse, a physician and a few coaches who have had experiences with athletes with ED.

Registered dietitian nutritionists (RDN): Registered dietitians play a vital role in the diagnosis, treatment and intervention of individuals with ED. A RDN is a food and nutrition expert who has met both academic and professional requirements (Ellis, 2020). Having a RDN as part of the interdisciplinary team is crucial, especially in regard to the education of coaches. The role of the RDN is to provide practical skills and knowledge to incorporate the required competencies for ED prevention and treatment into a training program (Hackert et al., 2020). The goal of the RDN is to provide education and assistance for coaches on how to optimize nutritional status, establish safe body weight recommendations and to promote a pattern of healthful eating through meal planning involvement for their athletes (Bonci et al., 2008). The RDN will be the primary contact for this program, will serve as the individual who delivers the program and will work with a multi-disciplinary team to create the content of the program.

CSSD Dietitian: Athletes often train at a higher level and have different nutritional needs than the general population. Understanding how these nutritional needs compare in athletes from non-athletes is necessary in providing appropriate nutrition recommendations (Stewart, 2019). Athletes have different needs to fuel depending on whether it is before or after practice or a competition. This role, ideally, would be filled by a RDN who works with athletes and has their Certified Sports Specialist in Sports Dietetics (CSSD) (Stewart, 2019). This certification training enables RDNs to better understand how an athlete needs to fuel appropriately for their sport, but also to be monitor how the athlete may abuse nutrition or avoid it in the context of their sport (Stewart, 2019). However, this is not realistic for all RDNs across the state of Iowa, who work with athletes, to obtain this certification. For this proposed program, a CSSD would be consulted to review and ensure that the information provided in the training is appropriate for athletes, that the information provided is what is most important for coaches to know, and education will best help the athletes.

CEDRD: Eating disorders are challenging, complex diseases and can be very uncomfortable for those who don't work with this population regularly. Due to the increased complexities of ED, it is important for a RDN who works with patients who have ED or practice DE patterns to provide recommendations and be a part of creating the content for this program. A certified eating disorder registered dietitian (CEDRD) is a RDN who has made a commitment to learn and train about the complexities involved in the treatment of ED. A CEDRD would benefit this program through providing content on current research in ED as well as recommended treatment options (IADEP, n.d.).

School nurse: School nurses are an essential partner in addressing ED and DE among high school athletes. In Iowa, each district is required to have a school nurse, with the goal of one school nurse for every 750 students enrolled (Walker, n.d.). School nurses play a role in the management of chronic and other health conditions in schools. Nurses, like coaches, are in a position to identify symptomatic student-athletes and refer them to appropriate community resources for evaluation and treatment (Kroshus et al, 2015). School nurses are able to provide family members, athletes, and coaches with educational materials as well as potential treatment options. They will be able to assist with identifying resources available to support an athlete with DE/ED.

Physician: A physician will be on board as an individual struggling with an ED requires medical care from a physician as part of their treatment team. If suspicions of ED are confirmed than the individual should be referred to a physician to complete an assessment and determine the most appropriate treatment options (Bonci et al., 2018). Physicians will be a part of our team by providing content on the signs and symptoms they look for when completing a physical assessment of an athlete with a potential ED. They will also play a role by discussing their role on an individual's treatment team and the physical impacts that ED have on athletes.

Coaches: Although this program is for coaches, a coach will serve as a presenter to discuss their role in an athlete's ED/DE journey. A coach that has played a role in working with athletes with ED will discuss the role they played, how they changed the environment to promote body positivity and how the athlete and their performance was affected. This can be beneficial by allowing coaches to hear that they can have an impact.

Program Evaluation

The impact of the *EveryBODY is Perfect* will be evaluated using the workshop evaluation form and the self-evaluation form from the mental health workshop planning kit. The forms will be converted into online assessments for individuals to complete and for us to receive feedback from. The forms will be modified to assess the components that we are addressing through this program, with the focus of DE and ED in athletes.

The mental health best practices institutional self-assessment worksheets will be utilized for evaluation. These worksheets are associated with each session, allowing the coaches to look at each component of that lesson, complete a self-evaluation using a three-point Likert scale (1= best practice has never been implemented, 2= practice has been partially implemented, 3=best practice has not been implemented). A three-point scale is utilized rather than a five-point scale as three-point scales have been found to be less confusing for all participants, as individuals with lower education may get confused with a five-point scale and you are less likely to have respondents answer in the middle (FAO, n.d.).

There are four lessons that have self-evaluation forms. These self-evaluation forms will address several components of the HBM including perceived barriers, perceived benefits, and cues to action. There is also the workshop evaluation form which is a nine-question evaluation requesting feedback on the program. The workshop evaluation form assesses individual impact and changes in knowledge as well as obtains feedback on how the program could potentially be improved.

The evaluations will be done online due to being a virtual program in order to capture feedback and data from participants. They will be created and sent out using survey monkey, allowing for the program coordinators to obtain the feedback and results of the evaluation form. Participants will complete evaluations at the end of each session to assess their immediate impact on knowledge as well as they assessment of the training. These same evaluations will be sent again 12-months later to determine changes that have been made within the coach's program in regard to the best practices. Having a baseline evaluation and a follow-up evaluation will allow us to see the impact of the program on the coaches and their programs. The evaluations will be sent 12-months later due to the time it takes to implement new practices and to allow each coach to have a season with possible new practices in place, if they were sent within 6-months coaches of certain sports may not have had a season to implement the changes (e.g., program is

completed in May, if surveys are sent out in November coaches of sports like wrestling, basketball, dance team, etc. have not had an opportunity to complete a full season of implementing best practices for ED/DE prevention). Due to the length of time between the evaluations being completed, a modified evaluation will be sent to as a touch point to check in with our participants at 6-months. This evaluation will allow us to see where they are in their implementation process.

The workshop evaluation form will allow the program creators to determine how well the program was put on, make appropriate changes to improve it and determine if there is anything further that coaches are looking to have incorporated in the program. This feedback will further strengthen the program with the goal of continuing it and getting more coaches interested and involved. The self-evaluation forms being completed at the time of the workshop and then 12-months later will allow the program creators to assess the program effectiveness. Any feedback and evaluation is crucial to developing a strong and effective health behavior change program.

References

- Abood, D.A., Black, D.R., & Feral, D. (2003). Nutrition education worksite intervention for university staff: application of the health belief model. *Journal of Nutrition Education and Behavior*, 35(5): 260-267.
- American Dietetic Association. (2006). Position of the American Dietetic Association: Food and Nutrition Misinformation. *Journal of the American Dietetic Association*. 106(4), 601-607.
- American Federation of Teachers. (2015, February 12). *Eating Disorders*.
<https://www.aft.org/childrens-health/mental-health/eating-disorders>.
- American Psychiatric Association. (2013). *Feeding and eating disorders*. American Psychiatric Association Web Site.
https://www.psychiatry.org/File%20Library/Psychiatrists/Practice/DSM/APA_DSM-5-Eating-Disorders.pdf.
- Anderson, C., & Petrie, T.A. (2012) Prevalence of Disordered Eating and Pathogenic Weight control behaviors among NCAA division I female collegiate gymnasts and swimmers. *Research Quarterly for Exercise and Sport*, 83(1), 120-124.
- Anderson, M. (2018, October 26). *What is disordered eating?* Academy of Nutrition and Dietetics. <https://www.eatright.org/health/diseases-and-conditions/eating-disorders/what-is-disordered-eating>.
- Becker, M. (1974) The Health Belief Model and Sick Role of Behavior. *Health Education Monographs*, Winter, 409-419.
- Bonci, C.M., Bonci L.J., Granger, L.R., Johnson, C.L., Malina, R.M., Milne, L.W., Ryan, R.R., & Vanderbunt, E.M. (2008). National Athletic Trainers' Association Position Statement: Preventing, Detecting, and Managing Disordered Eating in Athletes, *Journal of Athletic Training*, 43(1):80-108.
- Brytek-Matera, A., Donini, L. M., Krupa, M., Poggiogalle, E., & Hay, P. (2015). Orthorexia nervosa and self-attitudinal aspects of body image in female and male university students. *Journal of Eating Disorders*, 3(1), 2.
- Burns, R.D., Schiller, M.R., Merrick, M.A., & Wolf, K.N. (2004). Intercollegiate student athlete use of nutritional supplements and the role of athletic trainers and dietitians in nutrition counseling. *Journal of the American Dietetic Association*, 104(2), 246-249.

- Carl, R.L., Johnson, M.D., & Martin, T.J., (2017). Promotion of Healthy Weight-Control Practices in Young Athletes. *Pediatrics. AAP Council on Sports Medicine and Fitness*. 140(3): e20171871.
- Chaki, B., Pal, S., & Bandyopadhyay, A. (2013). Exploring scientific legitimacy of orthorexia nervosa: A newly emerging eating disorder. *Journal of Human Sport & Exercise*, 8(4), 1045-1053.
- Champion, V., Skinner, CS. The Health Belief Model. In: Glanz, K.; Rimer, B.; Viswanath, K., editors. *Health behavior and health education*. 4. San Francisco, CA: Jossey-Bass; 2008. p. 45-65.
- Coelho, G.M., Gomes, A.I., Ribeiro, B.G., & Soares, E.A. (2014). Prevention of eating disorders in female athletes. *Journal of Sports Medicine*. 14(5); 105-113.
- Eating disorders and young athletes*. (n.d.). Stanford Children's Health. <https://www.stanfordchildrens.org/en/topic/default?id=eating-disorders-and-young-athletes-160-28>.
- Ellis, E. (2020). *Qualifications of a registered dietitian nutritionist*. Academy of Nutrition and Dietetics. <https://www.eatright.org/food/resources/learn-more-about-rdns/qualifications-of-a-registered-dietitian-nutritionist>.
- Farooq, A., & Bradbury, J. (2016). Orthorexia nervosa in university athletes. *The Proceedings of the Nutrition Society*, 75(OCE3).
- Franco, K.N., Sieke, E.H., Dickstein, L. & Falcone, T. (2017) *Eating Disorders*. Cleveland Clinic Web Site. www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/psychiatry-psychology/eating-disorders/.
- Garrison, J.A., Schardt, C., & Kochi, J. (2000) Web-based distance continuing education: a new way of thinking for students and instructors. *Bulletin of the Medical Library Association*, 88(3) 211-217.
- Gonsalves, D., Hawk, H., & Goodenow, C. (2014). Unhealthy weight control behaviors and related risk factors in Massachusetts middle and high school students. *Maternal and Child Health Journal*, 18(8), 1803-1813.

- Gottlieb, C. (2014, February 23). *Disordered eating or eating disorder: What's the difference?* Psychology Today. <https://www.psychologytoday.com/us/blog/contemporary-psychoanalysis-in-action/201402/disordered-eating-or-eating-disorder-what-s-the>
- Hackert, A.N., Kniskern, M.A., & Beasley, T.M. (2020) Academy of nutrition and dietetics: revised 2020 standards of practice and standards of professional performance for registered dietitian nutritionists (competent, proficient, and expert) in eating disorders. *Journal of the Academy of Nutrition and Dietetics*, 120(11), 1902-1919.
- Harcourt, J.T. (2018) *Anorexia and amenorrhea: What are the consequences?* Eating Disorder Hope. <https://www.eatingdisorderhope.com/information/anorexia/anorexia-amenorrhea>.
- Harrington, B.C., Jimerson, M., Haxton, C., & Jimerson, D.C. (2015). Initial Evaluation, Diagnosis, and Treatment of Anorexia Nervosa and Bulimia Nervosa. *American Family Physician*. 91(1):46-52.
- Heggebo, F., (n.d.). *Creating a mastery-oriented performance climate-the role of a coach.* Believe Perform. <https://believeperform.com/creating-a-mastery-oriented-performance-climate-the-role-of-a-coach/>.
- Howard, C. (2016) *Disordered eating vs. eating disorders: What is the difference?* Eating Disorder Hope. <https://www.eatingdisorderhope.com/blog/eating-disorders-disordered-eating>.
- Hudson, J., Hiripi, E., Pope H., & Kessler, R. (2007) The prevalence and correlates of eating disorders in the national comorbidity survey replication. *Biological Psychiatry*, 61, 348-358.
- Iowa Board of Educational Examiners. (n.d.). *Coaching license types.* <https://boee.iowa.gov/coaching-license-types>.
- Iowa Department of Education. (n.d.). *About the Iowa Education System.* <https://educateiowa.gov/about-iowas-education-system>.
- Joy, E., Kussman, A., & Nattiv, A. (2016) Update on eating disorders in athletes; A comprehensive narrative review with a focus on clinical assessment and management. *British Journal of Sports Medicine*, 50:154–162.
- Kiss-Leizer, M., Thoth-Kiraly, I., & Rigo, A. (2019) How the obsession to eat healthy food meets with the willingness to do sports: the motivational background of orthorexia

- nervosa. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, 24:456-472.
- Kratina, K. (n.d.) *Tips for coaches: Preventing eating disorders in athletes*. National Eating Disorders Association. <https://www.nationaleatingdisorders.org/learn/help/coaches-trainers/tips>.
- Kishner, S., Raj, M.A. (2016, Sept 19) *Low energy availability in female athletes*. Medscape. <https://emedicine.medscape.com/article/312312-overview>.
- Kroshus, E., Sherman, R.T., Thompson, R.A, Sossin, K., & Austin, S.B. (2014) Gender differences in high school coaches' knowledge, attitudes, and communication about the female athlete triad. *Eating Disorders*, 22:193-208.
- Lentzke, J. (2015, May 8). *Athletes-Symptoms, treatment and prevention strategies of eating disorders*. Eating Disorder Hope. <https://www.eatingdisorderhope.com/treatment-for-eating-disorders/special-issues/men/athletes-symptoms-treatment-and-prevention-strategies-of-eating-disorders>.
- Logue, D., Madigan, S.M., Delahunt, E., Heinen, M., Mc Donnell, S.J., & Corish, C.A. (2017) Low energy availability in athletes: A review of prevalence, dietary patterns, physiological health, and sports performance. *Sports Medicine*, 48(1):73-96.
- Lyons, L. (2018, January 24). *Orthorexia & Athletes: Why do some die from this disorder?* Eating Disorder Hope. <https://www.eatingdisorderhope.com/blog/orthorexia-athletes-die-disorder#:~:text=Orthorexia%20and%20other%20disordered%20eating%20behaviors%20are%20most,outside%20of%20training%20is%20encouraged%20for%20best%20performance>.
- Mancine, R., Kennedy, S., Stephan, P., & Ley, A.L. (2020) Disordered eating and eating disorders in adolescent athletes. *Spartan Medical Research Journal*, 4(2).
- Martinsen, M., Sherman, R.T., Thompson, R.A., & Sundgot-Borgen, J. (2015) Coaches' Knowledge and Management of Eating Disorders. *Medicine & Science in Sports & Exercise*, 47(5):1070-1078.
- Mayo Clinic. (2021, February 18). *Amenorrhea*. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/amenorrhea/symptoms-causes/syc-20369299>.

- Mayo Clinic. (2019, June 19). *Osteoporosis*. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/osteoporosis/symptoms-causes/syc-20351968>.
- Morley, J.E. (2020, Jan). *Undernutrition*. Merck Manual. <https://www.merckmanuals.com/home/disorders-of-nutrition/minerals/overview-of-minerals>.
- National Alliance on Mental Illness. (n.d.) *Eating Disorders*. NAMI. <https://www.nami.org/About-Mental-Illness/Mental-Health-Conditions/Eating-Disorders>.
- National Association of Anorexia Nervosa and Associated Disorders. (2020, March 5). *Athletes and Eating Disorders*. ANAD. www.anad.org/education-and-awareness/athletes-and-eating-disorders/.
- National Eating Disorder Association. (2020, May 8). *Statistics & Research on eating disorders*. National Eating Disorders Association Web Site. www.nationaleatingdisorders.org/statistics-research-eating-disorders.
- National Eating Disorder Association. (n.d.) *Coach and Athletic Trainer Toolkit* National Eating Disorders Association Web Site.
- National Eating Disorder Association. (n.d.) *Warning signs and symptoms*. National Eating Disorders Association Web Site. <https://www.nationaleatingdisorders.org/warning-signs-and-symptoms>.
- National Federation of State High School Associations. (2020). *2018-2019 High school athletics participation survey*. https://www.nfhs.org/media/1020412/2018-19_participation_survey.pdf.
- National Institute of Health. (2010). *Parent tips-calories needed each day*. National Heart, Lung and Blood Institute. <https://www.nhlbi.nih.gov/health/educational/wecan/downloads/calreqtips.pdf>.
- National Institute of Mental Health, U.S. Department of Health and Human Services. (2016, February) *Eating Disorders*. www.nimh.nih.gov/health/topics/eatingdisorders/index.shtml.
- Parekh R. (2017, January). *What Are Eating Disorders?* American Psychiatric Association. www.psychiatry.org/patients-families/eating-disorders/what-are-eating-disorders.

- Pernick, Y., Nichols, J.F., Rauh, M.J., Kern, M., Ji, M., Lawson, M.J., & Wilfley, D. (2006). Disordered Eating among a Multi-Racial/Ethnic Sample of Female High-School Athletes. *Journal of Adolescent Health*, 38(6):689-695.
- Rosenstock, I. (1974) The health belief model and preventive health behavior. *Health Education Monographs*. 2(4); 354-386.
- Stewart T. (2019, August 9). *Specialized Treatment for Athletes with Eating Disorders*. National Association of Anorexia Nervosa and Associated Disorders Web Site. www.anad.org/education-and-awareness/specialized-treatment-athletes/.
- Stoll, S. (2018) Common misconceptions in the nutritional management of athletes. *American Journal of Lifestyle Medicine*. 12(5); 387-390.
- Thein-Nissenbaum, J.M., Rauh, M.J., Carr, K.E., Loud, K.J., McGuine, T.A. (2011). Associations between disordered eating, menstrual dysfunction, and musculoskeletal injury among high school athletes. *Journal of Orthopaedic & Sports Physical Therapy*, 41(2):60-69.
- Tholking, M.M, Mellowspring, A.C., Eberle, S.G., Scribner, C., Sloan, R.F., & Wetherall, K.B. (2011). American dietetic association: standards of practice and standards of professional performance for registered dietitians (competent, proficient, and expert) in disordered eating and eating disorders (DE and ED). *Journal of the American Dietetic Association*. 111(8):1242-1249.
- Thompson R. (2017, November 15). *Mind, body and sport: Eating disorders*. NCAA.org - The Official Site of the NCAA, NCAA Sport Science Institute. www.ncaa.org/sport-science-institute/mind-body-and-sport-eating-disorders.
- U.S. Department of Health and Human Services. (2005). *BodyWise handbook; eating disorders information for middle school personnel*. 3rd edition. <http://purl.access.gpo.gov/GPO/LPS100469>.
- U.S. Department of Health and Human Services. (2018, April 30). *Health Promotion and Disease Prevention Theories and Models*. Rural Health Information Hub. <https://www.ruralhealthinfo.org/toolkits/health-promotion/2/theories-and-models>.
- Walker, M. (n.d.). *Iowa School Health Legal Reference Summary*. Iowa Department of Education. <https://educateiowa.gov/sites/files/ed/documents/2016-2017SchoolHealthLegalReferenceSummary.pdf>.

Wichman, M., & Marshall, L. (n.d.) *Dehydration and the treatment of eating disorders*. Eating Disorder Hope Website.
<https://www.eatingdisorderhope.com/information/bulimia/dehydration-and-the-treatment-of-eating-disorders>.