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Chapter 2

EATING DISORDERS IN ATHLETES

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INTRODUCTION

Eating disorders are considered serious psychiatric disorders that remain difficult to treat. They also have a significant impact on the health and performance of athletes. The most extreme manifestations of eating disorders, such as Anorexia Nervosa and Bulimia Nervosa, are very often associated with factors such as diet and/or obsession with food (orthorexia), dissatisfaction with body image and preoccupation with body weight (Stice et al., 2011).

There is an increased prevalence of eating disorders among athletes as compared to the general population (Sundgot-Borgen, Skarderud, & Rodgers, 2003). This may not come as a surprise if we take into consideration that within sports, there is a greater focus on body, food and performance (Sundgot-Borgen, Skarderud, & Rodgers, 2003). According to Sundgot-Borgen, Skarderud, and Rodgers (2003), within athletes, there is an encouragement for control through bodily techniques and a culture of "pushing your boundaries." Furthermore, in regards to dieting behaviour, there is a lack of norms for what is "normal."

It is widely known that participation in sport activities, contributes positively to the improvement of physical fitness, increases self-esteem and generally gives a more positive body image. However, in competitive sports, the large amount of training, unusual dietary practices and reduced food intake could contribute to the development of eating disorders and/or disordered eating. In sports such as rhythmic and artistic gymnastics, martial arts, weightlifting, etc., where the criteria of weight control are strict, the probability of disordered eating and/or eating disorders developing is much higher (Sundgot-Borgen, Skarderud, & Rodgers, 2003). It has been claimed that female athletes are at increased risk for developing eating disorders due to the focus upon low body weight as a performance enhancer, comments from coaches or important others, and the pressure to perform (Otis et al., 1997; Sundgot-Borgen, 1994; Wilmore, 1991).

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The current chapter focuses on a review of available research concerning eating disorders in athletes. Specifically, the chapter reviews the definitions, diagnostic criteria, prevalence and risk factors for the development of eating disorders in sports/athletes. Practical implications for the identification and treatment of eating disorders in athletes are also discussed.

DEFINITIONS

The diagnostic criteria for eating disorders are well explained in the Diagnostic and Statistical Manual of Mental Disorders (APA, 2013). The chapter on Feeding and Eating Disorders in the fifth edition of the DSM (DSM-V) includes several changes to better represent the symptoms and behaviors of patients dealing with these conditions across the lifespan (American Psychiatric Association, 2013).

The changes in the DSM-V were planned to reduce the number of diagnoses which fell into the EDNOS (Eating Disorder – Not Otherwise Specified) category (or its renamed counterpart), by accommodating more precise descriptions of patient symptoms as well as newer research on eating disorders. Since the changes were implemenmeted, several studies have shown reductions in EDNOS diagnoses rates using the DSM-V criteria (Machado, et al., 2013; Nakai, et al., 2013).

The diagnosis of Anorexia Nervosa has undergone the greatest number of changes. Until the publication of the fifth edition of the DSM, individuals were required to have a weight less than 85% of "normal." This has been updated to state that significantly low weight is "less than minimally normal weight in adults or less than expected weight in children and adolescents." Moreover, patients no longer need to explicitly endorse a fear of weight gain; this can now be inferred from the patient's behaviors. This change is expected to be particularly beneficial in the athlete population, because athletes may refuse, or even ignore symptoms in an effort to continue competing. Finally, amenorrhoea has been discarded as a diagnostic criterion for Anorexia Nervosa. Studies found that women who otherwise met the criteria of Anorexia with or without regular menses did not differ clinically from women with similar symptoms plus amenorrhoea (Call et al., 2013). By excluding amenorrhoea as a diagnostic requirement enables also the diagnosis of Anorexia in men, postmenopausal women and adolescents with delayed menarche (Joy et al., 2016).

The new definition for Bulimia Nervosa in the DSM-V reduced the required frequency of binge episodes and reparative behaviors from twice per week to an average of once per week over a period of three (3) months. This modification was necessary for two reasons: a) the frequency of binge episodes did not significantly impact prognosis or treatment and b) the frequency caused more EDNOS diagnoses (Wilson & Sysko, 2009).

DSM-V also created a new formal diagnosis that had previously fallen under EDNOS – that is, Binge Eating Disorder. Finally, the assorted category previously called EDNOS has been changed into two categories—'Other Specified Feeding or Eating Disorder,' and 'Unspecified Feeding or Eating Disorder.' The first category is used for individuals who, due to specific reasons, do not meet any criteria of the above types of eating disorders. For example, despite significant weight loss, the patient may remain within the normal weight range, independently meeting all the other criteria for Anorexia Nervosa. The second category

is used in situations where the clinician cannot or does not clarify the reasons why the patient fails to meet full criteria for an eating disorder (Joy et al., 2016).

PREVALENCE OF EATING DISORDERS

There is an increased prevalence of eating disorders among athletes as compared to the general population (Sundgot-Borgen & Torstveit, 2004). This may not come as a surprise if we take into a consideration that within sports, there is a greater focus on body, food and performance (Sundgot-Borgen, Skarderud, & Rodgers, 2003).

Data on the prevalence of eating disorders in athletic populations are limited and equivocal. Despite the fact that the majority of studies investigate prevalence in female athletes, the studies that *did* assess male subjects showed that the prevalence is lower among male athletes as compared to female athletes (Byrne & McLean, 2002; Greenleaf, Petrie, Carter, & Reel, 2009; Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010; Petrie, Greenleaf, Reel, & Carter, 2008; Schaal et al., 2011; Sundgot-Borgen & Torstveit, 2004).

Possibly due to the methodological weaknesses of studies conducted such as small sample size, lack of definition of the competitive level and/or type of sport(s) and lack of definition on the data-collection method used, estimates of the prevalence of the symptoms among female athletes range from less than 1% to as high as 75%! (Burckes-Miller & Black, 1988; Gadpalle et al., 1987; Sundgot-Borgen, 1994; Warren et al., 1990). The frequency of eating disturbances and pathological dieting practices of male athletes varies from none to 57%, depending on the definition used and the population studied (Burckes-Miller & Black, 1988; Dummer et al., 1987; Rosen & Hough, 1988; Rucinski, 1989).

The prevalence of eating disorders also seems to be dependent upon the type of sport. In sports with weight-classes (such as rowing), aesthetic sports (such as gymnastics or figure skating) and sports where having a low body mass is seen as advantageous (such as cross-country or cycling), the rates of eating disorders have generally been higher (Joy et al., 2016). A study among female athletes supported these conclusions showing that rates of eating disorders in aesthetic sports and weight-depended sports were 25%, as compared to 12% in other types of sports (Sundgot-Borgen, 1993). Likewise, in a more recent study by Thiemann et al. (2015), 108 German professional female athletes were age-matched with 108 non-athlete controls. Results of this study indicated that the rates of eating disorders reached 17% in aesthetic sports, whereas in ball sports the prevalence was 2%. The prevalence in the non-athlete sample was also 2% (Thiemann et al., 2015).

The trend seen in elite female athletes in lean sports is very similar to that of male athletes. Specifically, they are both more likely to suffer from an eating disorder as compared to athletes in other sports. Sundgot-Borgen and Torstveit (2004) showed that rates of eating disorders in male athletes in antigravitation sports were 22%, as compared to 9% in endurance sports and 5% in ballgame sports (Sundgot-Borgen & Torstveit, 2004). These findings were also further supported by Rosendahl et al. (2009), who indicated that the prevalence of eating disorders among male athletes in lean-type sports was 10% in endurance sports, 17% in weight-class sports and 42% in antigravitation sports (Rosendahl et al., 2009).

A major problem in detecting eating disorders in athletes has always been the research tools used. The Eating Disorders Inventory (EDI; Garner & Olmstead, 1984), the Eating

Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994) and the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), which have been used, were designed for the general population and were never authorized for use with athletes. Therefore, researchers tried to develop tools specific to athletes. The first tool for the assessment of eating disorders, the Female Athlete Screening Tool (FAST; McNulty, Adams, Anderson, & Affenito, 2001) was developed especially for use with female athletes. Correlation analyses showed that the FAST was significantly and strongly correlated to the EDE-Q (0.60) and the EDI (0.89) (McNulty, Adams, Anderson, & Affenito, 2001). The Contextual Body Image Questionnaire for Athletes (CBIQA; de Bruin et al., 2011) was the second instrument developed to measure multidimensional body image in daily life and sport. The internal validity of this measure was determined using a general, heterogeneous sample of female sport participants and exercisers (Bruin et al., 2011). It is worth noting that even the two athlete-specific questionnaires mentioned above, were developed only for female athletes. Therefore, it is evident that assessment tools concerning eating disorders with male athletes are of great need.

EATING DISORDERS AMONG ATHLETES

Disordered eating is more prevalent among athletes than non-athletes (Glazer, 2008) illustrating the relative importance of this problem in the athletic community. Most studies have looked at symptoms of eating disorders such as preoccupation with food and weight, disturbed body image, or the use of pathogenic weight-control methods.

The majority of the studies investigate the prevalence of eating disorders in female athletes. As stated above, among female athletes, the rates of eating disorders vary by sport and have generally been higher in sports with weight-classes (such as rowing), aesthetic sports (such as gymnastics or figure skating) and sports where having a low body mass is seen as advantageous (such as cross-country or cycling) (Sundgot-Borgen, 1993; Thiemann et al., 2015).

Additional studies suggest that the prevalence of disordered eating behaviors (such as binging, taking laxatives or diuretics, self-induced vomiting, etc.) is higher in the college-aged population, even in the absence of a formal eating disorder diagnosis (Striegel et al., 1989). In some studies, as much as 70% of athletes in weight-class sports were dieting or exhibiting abnormal eating behaviors to reduce their weight before competition (Sundgot-Borgen & Torstveit, 2010).

An increasingly large body of research also indicates that eating disorders and disordered eating are significant problems among male athletes as well (Chatterton & Petrie, 2013; Dolan et al., 2011; Glazer, 2008; Lingor & Olson, 2010; Sundgot-Borgen & Torstveit, 2004). In general, male athletes have a lower prevalence of eating disorders than female athletes, but a higher prevalence than male non-athletes (Sundgot-Borgen & Torstveit, 2004).

In further support of the similarity between male and female athletes in lean sports mentioned previously in the chapter, Chatterton and Petrie (2013) found that male athletes who participated in weight-class sports were more likely to engage in pathological eating and weight control behaviors and be more symptomatic as compared to male athletes in endurance sports or ballgame athletes (Chatterton & Petrie, 2013).

RISK FACTORS FOR THE DEVELOPMENT OF EATING DISORDERS

It is difficult to determine 'true' risk factors, which contribute to the manifestation of eating disorders in general or the athletic population in particular. However, the relational factors that have been reported in the literature are mentioned below.

Nattiv et al. (2007) indicated that risk factors are rather multifactorial. In their report, Nattiv et al. (2007) classified risk factors into "predisposing factors," "trigger factors" and "perpetuating factors." Predisposing factors include biological (e.g., genetics), psychological (e.g., body dissatisfaction, low self-esteem and personality traits such as perfectionism) and sociocultural factors (e.g., peer pressure, media influence and history of bullying) (Mazzeo & Bulik, 2009; Stice, 2002; Stice, Marti, & Durant, 2011). The trigger factors are typically negative comments regarding body weight and/or shape, traumatic experiences, etc. (Stice, 2002). The eating disorders are maintained by perpetuating factors such as approval by the coach or significant others and the physiological consequences of starvation or initial success (Drinkwater et al., 2005).

Smolak, Murnen, and Ruble (2000) and Sundgot-Borgen (1994) generally suggested that sport-specific risk factors include: 1) frequent weight regulation 2) dieting and experienced pressure to lose weight 3) personality traits 4) early start of sport-specific training 5) injuries and symptoms of overtraining 6) impression motivation 7) threat perception and 8) the impact of coaching behaviour. Furthermore, Currie (2010) supported that the sport environment can make athletes even more vulnerable to the above mentioned risk factors as compared to non-athletes (Currie, 2010).

For athletes in sports which emphasize leanness, reduction in body mass or body fat can, in many cases, enhance their performance (Currie, 2010). However, when an initial loss of weight leads to a better performance, this could in turn "force" the athlete to continue dieting to lose weight and unknowingly "slip" into an eating disorder (Rodriguez, Di Marco, & Langley, 2009).

Another important sport-specific risk factor is personality. Thompson and Sherman (1999) suggested that some traits desired by coaches in their athletes, are very similar to traits found in individuals with eating disorders such as excessive exercise, perfectionism, and (over) compliance. In further support of Thompson and Sherman's (1999) claims, a recent review by Forsberg and Lock (2006) suggested perfectionism as a central confounding factor in the relationship between athletes and eating disorders (Forsberg & Lock, 2006).

In regards to age, Sundgot-Borgen (1994) supported that a major problem early-on in one's sport-specific training, is that the athlete may choose a sport that could be inappropriate for his/her body type. Moreover, being highly involved with weight-preoccupied sports such as weight-class sports at an early and vulnerable age has also been suggested as an increased risk factor for developing eating disorders (Currie, 2010).

Additionally, psychological traits related to anxiety (i.e., perfectionism) and several traumatic events related to injuries have also been suggested as additional risk factors among athletes. More specifically, injured athletes regularly experience an undesired weight gain, which is often combined with the inability to train and/or to participate/compete in championships (Sundgot-Borgen, 1994). Consequently, the athlete attempts to maintain his/her weight by using other (unhealthy) methods, such as disordered eating.

Another important athlete-specific risk factor is coaching behaviour. Coaches can have a decisive role in the development (or not) of eating disorders in athletes (Currie, 2010). Biesecker and Martz (1999) found that a coaching style that is more performance-related and body-weight-preoccupied increases body image anxiety, dieting and fear of fatness in athletes. In the same way, a supportive and caring coaching style may reduce the risk of eating disorders (Biesecker & Martz, 1999; Currie, 2010).

In different types of sports which emphasize leanness such as aesthetic, endurance and weight-class sports, athletes are evaluated on both technical skills and execution/artist effects. Therefore, such aesthetical evaluation creates 'body paradigms' in these types of sports. Body paradigms, rules and norms in the specific sports can make athletes more prone to eating disorders, but can also make it a challenge for professionals to identify at-risk athletes (Currie, 2010).

Based on the above, one can conclude that there are several risk-factors that have been reported that seem to be specific to athletes. However, more meta-analyses are needed in order to assess for the effect sizes of these factors, as this may tailor prevention efforts to be more specifically designed and implemented.

MEDICAL ISSUES

Eating disorders have a wide range of health consequences, including one of the highest mortality rates of any mental health condition (American Psychiatric Association, 2013; Harris & Barraclough, 1998; Mehler & Brown, 2015).

Arcelus et al. (2011) and Crow et al. (2009) reported that death is most often caused by suicide or cardiac arrhythmia; suicide accounts also for 20% of deaths among patients with Anorexia Nervosa, and 23% among patients with Bulimia Nervosa (Arcelus et al., 2011; Crow et al., 2009). These numbers are also supported by Smith et al. (2013), who found that among individuals with an eating disorder, over-exercise (also common among competitive athletes) is among the commoner disordered eating behaviors highly associated with suicidal behaviour (Smith et al., 2013).

Among others, electrolyte disturbances associated with self-induced vomiting, laxative abuse and diuretic use, especially among those with extremely low body weight, can cause cardiac arrhythmia and eventually death (Joy et al., 2016).

A commonly recognized medical consequence among female athletes is the Female Athlete Triad (FAT). The FAT is a specific medical condition characterized by three distinct, however, inter-related conditions; 1) low energy availability, 2) menstrual dysfunctions and 3) low bone mineral density (De Souza et al., 2013; Nattiv et al., 2007; Winstead & Willard, 2006).

Concerning male athletes, there has been evidence of similar trends to female athletes on two of three related to males FAT components (i.e., low energy availability (Johnson et al., 1999; Lingor & Olson, 2010; Reinking & Alexander, 2005; Sundgot-Borgen, 2004; Sykora et al., 1993; Thiel et al., 1993) and low bone mineral density (Hetland, 1993; Hind, 2006; Nattiv et al., 2013; Papageorgiou & Elliott-Sale, 2015). As with female athletes, low energy availability (with or without disordered eating) may be a predisposing factor to stress fractures and bone stress injuries for male athletes as well (Nattiv et al., 2013; Papageorgiou

& Elliott-Sale, 2015; Smathers et al., 2009; Stewart & Hannan, 2000; Tenforde et al., 2015; Tenforde et al., 2013). As reported previously in the chapter concerning the lack of assessment tools of male athletes, the clear need for further research on the medical issues with male athletes is once again evident.

IDENTIFYING ATHLETES WITH EATING DISORDERS

Most of the athletes with eating disorders do not realize that they have a problem, therefore, they do not usually seek treatment on their own. In most cases, a self-concern emerges only when the first symptoms of performance deterioration appear (Sundgot-Borgen, Skarderud, & Rodgers, 2003).

Physicians, athletic trainers, sport psychologists, sport dieticians and physical therapists who usually interact with athletes and active persons, have a very important role in evaluating disordered eating early-on and referring the athlete for further evaluation of a possible eating disorder. Early identification and early intervention are both associated with better treatment outcomes (Fisher, 2006; Rosen, 2010).

Eating disorders are complex and should not be determined simply based upon an athlete's physique or appearance. Athletes with and without eating disorders can be underweight, normal weight or overweight and can represent all different body types. Furthermore, it is important for coaches to observe other signals that may indicate a possible problem. Below, we present a short list of signs and symptoms for eating disorders as described by Selby and Reel (2011):

1. Changes in mood, personality or other behaviors.
2. Emphasis on body image.
3. Focus on food and eating that is different from others.
4. Extremes in eating.
5. Strong need to feel in control.
6. Additional stressors.

An important role of a coach or a trainer is to recognize, or at least to suspect, the initial symptoms resulting from unhealthy eating behaviors of the athletes they train. Afterwards, the coach or trainer must refer the athlete to the appropriate specialist for a professional evaluation and management of the problem. Since eating disorders can cause irreversible damage and can be fatal, it is important for those closest to the athlete to remain open to signs and symptoms that are consistent with the presence of an eating disorder and to get the athlete referred to a licensed mental health or medical professional as soon as possible. Ignoring a hunch and not getting an athlete appropriately referred could mean that the athlete does not get the help they need quickly enough (Selby & Reel, 2011).

TREATMENT

Before any treatment recommendations are presented, we cannot stress enough the importance of early detection of eating disorders in athletes, as this will aid the treatment process significantly (Bonci et al., 2008).

Both the diagnosis and treatment of eating disorders need to be carried out by a knowledgeable and experienced multidisciplinary team of healthcare professionals. Team members often consist of a physician, a sports dietician, a mental health professional and an athletic trainer. The systematic communication between the team members is critically important, thus the team should be in contact and collaboration quite often. As some aspects of their specialty coincide, it is crucial that they are systematic and consistent in the information they provide to the athlete. Ideally, these individuals should also be familiar with the sport/athletic environment, as well as the specific sport of the athlete (Ghoch et al., 2013).

Furthermore, even though each treatment team member may be involved with many different tasks, it is imperative that they all coordinate in order to achieve the desired results with their athlete/patient. At times, and for the purpose of achieving a more positive prognosis, additional health specialists may serve as consultants to the treatment team offering their own expertise in the care of the athlete affected by an eating disorder. These specialists/consultants may be psychiatrists, internal medicine doctors or gastroenterologists (Joy et al., 2016).

Moreover, when it comes to athletes who continue to live with their parents and/or guardians, the engagement and alignment of the treatment team with them is critically important. A chaotic or disruptive family situation (such as divorcing parents) can contribute to the development and/or sustainability of an eating disorder. Therefore, it is imperative for the multidisciplinary treatment team to understand the environment in which the athlete lives, and take that into account when developing and implementing treatment plans (Rosen, 2010).

According to Joy et al. (2016), the role of the physician in the multidisciplinary team is extremely important. Specifically, Joy et al. (2016) claim that the physician should be the first to address any eating disordered behaviors and possible health consequences. In addition, the physician should support and reinforce the treatment plans of the dietician, the mental health professional as well as any other professionals involved in the athlete's care (Joy et al., 2016).

The Norwegian Olympic Training Centre developed a successful treatment program for the treatment of eating disorders in athletes (Sundgot-Borgen, Skarderud, & Rodgers, 2003). The Center takes into consideration that fact that the athletes with an eating-disorder are more likely to accept the idea of going for a single consultation rather than committing themselves to prolonged treatment. Therefore, the Center attempts to engage the patient athlete from the first session enough to have a second session. Specifically, they work to build a trusting relationship between the physician and the athlete, avoiding any physical examinations, blood tests, or nutritional evaluations. A strong therapeutic relationship is often accomplished by respecting the athlete's desire to be lean for athletic performance. The physician also expresses a willingness to work with the eating-disordered athlete to become lean and healthy, within of course, the frames of a healthy body, like regular menstruation (Sundgot-Borgen, Skarderud, & Rodgers, 2003).

The Center does not believe that the coach's role is to diagnose or treat eating disorders. They believe it is very important to: 1) educate coaches about the signs and symptoms of

eating disorders 2) be specific about any suspicions they may have about an athlete 3) develop strategies for supporting the eating-disordered athlete, 4) encourage medical evaluation and 5) support the athlete during treatment (Sundgot-Borgen, Skarderud, & Rodgers, 2003).

Another approach to the assessment and management of medical care of athletes with an eating disorder has been proposed by Joy and her colleagues (2016). They suggested that the clinical assessment and management of medical care of athletes with eating disorders should focus on the following areas:

- **Function** — assessing day-to-day functioning
  - How have you been doing since your last visit?
  - Is there a time of day that your behaviors are better or worse?
  - What helps you succeed (with changing behaviors, with treatment, etc.)?
  - Are you taking your medications as prescribed?
  - Additional questions to develop rapport and further assess patient functioning (e.g., 'How is school? Practice? Work? Family/Friends?').
- **Physical health discussion** — discussing health-related topics, such as:
  - A targeted symptom review: sleep, bowel habits, energy, urination, palpitations, syncope/near-syncope, menstruation, other issues or concerns
  - Eating behaviors—restriction, binging, purging, etc
  - Exercise and training behaviors—healthy and unhealthy; issues related to clearance and return to play
- **Mental status** — assessing the patient's mental health with a standard mental status examination (MSE) and discussion of various topics, such as body image, stressors, and mental health issues.
- **Physical health examination** — checking and recording the following:
  - Vital signs—blinded weight, height, BMI, blood pressure, heart rate, temperature
- **Change in weight since last visit**
  - Physical examination if necessary—throat, heart, lungs, extremities, etc.
  - Repeated tests/examination items from diagnosis as necessary
- **Medications**—Prescribing and managing medications as needed.
- **Other health negating disorders as necessary**—Reviewing menstrual function, digestive issues, bone health, endocrinology manifestations, etc. (Joy et al., 2016).

Other important areas of concern for the multidisciplinary team involve the decision-making process regarding the clearance of the athlete to return to their sport. For female athletes, De Souza and his colleagues (2013) suggest a guide *(Female Athlete Triad Cumulative Risk Assessment)* for physicians, which will aid their decision-making process on whether a female athlete is ready to return to her sport. The risk assessment tool takes into account: dietary restriction, BMI, menstrual history (delayed menarche, oligomenorrhoea, and amenorrhoea), bone mineral density and history of stress reaction or fracture. Each risk factor carries a point value, and the numeric score suggests whether an athlete should receive full clearance, provisional/limited clearance or restriction from participation (De Souza et al., 2013). The above risk assessment tool must be combined with the clinical decision-making skills of the multidisciplinary team in order to make the most appropriate decision (Joy et al, 2016).

Despite the fact that a similar evidence-based scoring system with related clearance recommendations has not yet been established for male athletes, the International Olympic Committee has proposed a "return to play model" based on a red light (high risk), yellow light (moderate risk), green light (low risk) system (Mountjoy et al., 2014 for further reading).

PREVENTION OF EATING DISORDERS

Since the exact causes of eating disorders are unclear and complex, the preparation of any preventive strategies of eating disorders is very difficult, especially in the development of preventive strategies that would address all possible risk factors. However, for better results, we know that it is beneficial for coaches, trainers and parents to be educated in order to recognize signs and symptoms of eating disorders as early as possible. Primary prevention must focus on healthy eating, pathological eating behaviors and their consequences and what should be done in case one thinks they may have an eating disorder (Coelho et al., 2014; Nattiv et al., 2007).

Furthermore, athletes should be educated that dietary restriction and/or purging behaviour in pursuit of optimal weight and body composition will negatively impact sport performance and result in adverse health consequences (Becker, et al., 2012).

Moreover, coaches or other individuals involved with athletes should not comment on an individual's body size, or require weight loss in young and still-growing athletes, as this may "force" them to diet using unhealthy eating behaviors, increasing the risk for eating disorders (Eisemman et al., 1990).

Additionally, De Souza et al. (2013), referring to the Female Athletes Triad, report that athletes, coaches and parents should learn that loss of menstruation is not a positive adaptation to high-intensity training and sport participation, and symbolizes a state of low energy availability, resulting from either intentional or unintentional dietary restriction (De Souza, et al., 2013).

As a general conclusion, educational programmes directed at coaches, athletes and parents, should be successful in increasing their knowledge about eating disorders, including recognition and management (Martinsen et al., 2015).

It is widely accepted that prevention efforts can be very effective with eating disorders. Therefore, the National Collegiate Athletic Association (NCAA) has developed educational materials specifically for coaches, athletic administrators and athletes (NCAA Resources Related to Disordered Eating, 2015). In this material, the developing team identified 10 strategies for coaches and administrators, which aim to reduce the possibility of disordered eating and eating disorders among their athletes (Kroshus, 2015). These 10 strategies are:

1. Be aware of the symptoms of disordered eating.
2. Consult a registered dietician who specializes in sport, particularly a Board Certified Specialist in Sports Dietetics (CSSD) to prescribe appropriate nutrition for optimal sport performance.
3. De-emphasise weight: Be aware of how you are communicating to athletes about weight and performance. Focus on ways for athletes to enhance their performance that do not involve weight.

4. Keep an open dialogue with athletes about the importance of nutrition and staying injury-free for optimal athletic performance.
5. Recognise that the body composition and training required for optimal health and performance are not identical for all athletes.
6. Screen student-athletes before the start of the season for risk factors of disordered eating using a validated screening instrument.
7. Ensure that all stakeholders (coaches, strength and conditioning coaches, athletic trainers, student-athletes, student-athlete affairs administrators and athletics department staff) are educated about the factors that put athletes at risk for disordered eating.
8. Understand your institution's referral protocol for student-athletes who are in need of assistance with nutrition or disordered eating issues.
9. Encourage help-seeking for all mental health concerns, including disordered eating.
10. Develop a plan with other stakeholders (such as university counselling services or a sports registered dietitian) for how to identify and treat student-athletes with eating disorders.

CONCLUSION

It is clear in the literature by now that the prevalence of eating disorders among athletes is significantly higher than the general population. This is more evident in some types of sports than others. It is also evident that eating disorders can be easily missed, as athletes would rarely ask for help. As described above, this is more evident with male athletes since there are no valid assessment tools for recognition of eating disorders in males, nor conceptualization models. There is a high need for the development of such tools and conceptualization models. However, if eating disorders remain untreated, they can have long-lasting psychological and physiological effects which at times, can be fatal. From the chapter, one can also conclude that several meta-analyses are needed in order to strengthen the power of certain risk factors, especially in male athletes.

Prevention efforts are very important as well as several risk factors are well-known and should include the involvement of the athletes, the coaches and the parents/guardians. Therapeutically, a multidisciplinary team of professionals (physician, dietician, mental health professional, and other relevant professionals) should conduct assessment and treatment planning based on the individual needs of athletes. Last but not least, the coaches and parents/guardians of the athletes should be part of the treatment process.

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