

National Athletic Trainers' Association Position Statement: Preventing, Detecting, and Managing Disordered Eating in Athletes

Christine M. Bonci, MS, ATC*; Leslie J. Bonci, MPH, RD, LDN, CSSD†; Lorita R. Granger, ATC‡; Craig L. Johnson, PhD§; Robert M. Malina, PhD, FACSM*||; Leslie W. Milne, MD¶; Randa R. Ryan, PhD*; Erin M. Vanderbunt, MS, ATC#

*The University of Texas at Austin, Austin, TX; †The University of Pittsburgh Medical Center, Pittsburgh, PA; ‡University of California at Los Angeles, Los Angeles, CA; §Laureate Psychiatric Hospital, Tulsa, OK; ||Tarleton State University, Stephenville, TX; ¶Massachusetts General Hospital, Boston, MA; #Paradise Valley Community College, Phoenix, AZ

Objective: To present recommendations for the prevention, detection, and comprehensive management of disordered eating (DE) in athletes.

Background: Athletes with DE rarely self-report their symptoms. They tend to deny the condition and are often resistant to referral and treatment. Thus, screenings and interventions must be handled skillfully by knowledgeable professionals to obtain desired outcomes. Certified athletic trainers have the capacity and responsibility to play active roles as integral members of the health care team. Their frequent daily interactions with athletes help to facilitate the level of medical surveillance necessary for early detection, timely referrals, treatment follow-through, and compliance.

Recommendations: These recommendations are intended to provide certified athletic trainers and others participating in the health maintenance and performance enhancement of athletes

with specific knowledge and problem-solving skills to better prevent, detect, and manage DE. The individual biological, psychological, sociocultural, and familial factors for each athlete with DE result in widely different responses to intervention strategies, challenging the best that athletics programs have to offer in terms of resources and expertise. The complexity, time intensiveness, and expense of managing DE necessitate an interdisciplinary approach representing medicine, nutrition, mental health, athletic training, and athletics administration in order to facilitate early detection and treatment, make it easier for symptomatic athletes to ask for help, enhance the potential for full recovery, and satisfy medicolegal requirements. Of equal importance is establishing educational initiatives for preventing DE.

Key Words: eating disorders, anorexia nervosa, bulimia nervosa, subclinical eating disorders, pathogenic weight control behaviors, female athlete triad, body image

Disordered eating (DE) in athletes is characterized by a wide spectrum of maladaptive eating and weight control behaviors and attitudes. These include concerns about body weight and shape; poor nutrition or inadequate caloric intake, or both; binge eating; use of laxatives, diuretics, and diet pills; and extreme weight control methods, such as fasting, vomiting, and excessive exercise.^{1–4} Susceptibility of athletes to DE is a serious concern because of increased physiologic demands imposed by high-intensity and high-volume sport training. Although the extent of DE in athletes is unclear due to methodologic limitations of existing studies (primarily the lack of standardized assessment tools and consistent criteria for defining DE), prevalence estimates have ranged as high as 62% among female athletes and 33% among male athletes.^{5–16}

Disordered eating can lead to adverse effects on health and physical performance. In some cases, the condition can be fatal.^{17,18} Consequences of DE upon health and performance depend on the athlete's immediate health status; the demands of sport-specific training; type, severity, and duration of the pathogenic weight control or eating behaviors; the degree of nutrient deficiency;

presence of comorbid physical and mental disorders; and the timing and quality of therapeutic interventions.^{14,19,20}

PURPOSE

The purpose of this position statement is to provide recommendations to better prepare certified athletic trainers, other health care providers, sports management personnel, and coaches for the challenges of understanding and working with athletes who present with DE or who may be at risk. Special attention is given to addressing the physical and mental health needs of symptomatic and at-risk athletes through early detection and treatment, increased access to quality resources, and educational programs for prevention.

RECOMMENDATIONS

The National Athletic Trainers' Association (NATA) provides the following guidelines for creating the necessary team infrastructure, collaborative relationships, and strategies for preventing, detecting, and managing DE in athletes.

Immediate Action Items

1. Identify a team of qualified caregivers who have the requisite training for early case detection, treatment, and provision of other assistance as needed. Caregivers should represent multiple disciplines, including medicine, nutrition, mental health, and athletic training.^{21–26} They should be readily accessible, understand their roles, and promote collaboration to facilitate a seamless continuum of care.
2. Reserve a place on the health care team for an athletics administrator.^{27,28} Organizations are better prepared to handle complexities of DE management with an informed administrator who has authority to take action when unexpected events and worst-case scenarios challenge the scope of existing resources and expertise.
3. Assemble the health care team to formulate and implement a comprehensive management protocol complete with policies and procedures that facilitate early detection, accurate assessment, and treatment of athletes with DE (Figure).
4. Enlist the support and input of risk-management personnel and legal counsel in planning, developing, and implementing the management protocol. Certified athletic trainers, other caregivers, and athletics administrators should cooperate with these groups to determine what constitutes reasonable care to prevent foreseeable harm to participants and avoid potential liability for negligence.^{29,30}
5. Establish a screening approach that recognizes signs and symptoms of the full spectrum of maladaptive eating and weight loss behaviors, as well as predisposing risk factors associated with their development. This is most effectively accomplished during the preparticipation examination (PPE) by compiling a thorough medical history with attention to the assessment of DE.^{31–36}
6. Develop policies that clearly define the appropriate responses of coaches when dealing with athletes regarding body weight issues and performance. Coaches should not be allowed to disseminate improper weight loss advice, conduct mandatory weigh-ins, set target weights, or apply external pressure on athletes to lose weight.
7. Design mandatory structured educational and behavioral programs for all athletes, coaches, certified athletic trainers, administrators, and other support personnel to prevent DE.

Detecting Disordered Eating

Clinical Features and Behavioral Warning Signs

8. Early detection and treatment of DE should become a high priority for athletics programs. Disordered eating occurs along a continuum of severity. Mild symptoms that increase in frequency and severity may progress to 3 clinically diagnosable conditions identified in the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)*²⁰ as anorexia nervosa (AN),

bulimia nervosa (BN), and eating disorder not otherwise specified (EDNOS) (Tables 1, 2, and 3, respectively). Exclusive adherence to strict *DSM-IV* criteria without recognizing the subclinical precursors of eating disorders (EDs) may be a barrier to early detection and subsequently affect the timing and quality of therapeutic interventions.

9. Those supervising the health and performance of athletes should be alert to the most common behavioral and psychological characteristics that may indicate an athlete's impending lapse into a subclinical or full-syndrome ED in order to prevent or minimize problems (Table 4). The challenge is in determining whether the athlete's dietary and weight control behaviors are transient, safely managed behaviors associated with the physiologic demands of the sport or becoming increasingly unhealthy or persistent, which may signify a more serious problem.³⁷

Signs, Symptoms, and Physical Complications

10. Signs and symptoms of EDs should be recognized at their earliest onset (Table 5). Medical complications associated with malnutrition and purging can affect multiple organ systems and progress to serious health consequences, including, but not limited to, cardiovascular, reproductive, and skeletal dysfunction and, in some cases, death.¹⁷
11. Given the possibility of sudden death resulting from cardiovascular complications, pulse rate and quality, blood pressure, orthostatic measurements, and body temperature should be serially recorded.³⁸ Clinical signs indicating possible physiologic instability include bradycardia (resting heart rate <50 beats/min during the day and <45 beats/min at night), hypotension (systolic pressure <90 mm Hg), orthostatic changes in pulse (>20 beats/min) or blood pressure (>10 mm Hg), and hypothermia (body temperature <96°F [35.56°C]).^{18,39} The likelihood of cardiovascular problems depends upon the severity and/or chronicity of energy restriction, the amount, rate, and composition of weight loss, and electrolyte imbalances induced by purging.²⁷
12. Recognizing that the reproductive system of female athletes is extremely sensitive to low energy availability and consequent menstrual cycle alterations (eg, amenorrhea)^{40–42} and bone mineral disorders,^{40–45} closely monitoring physically active girls and adolescents participating in a wide variety of sports is recommended. Female athletes presenting with amenorrhea should be evaluated within the first 3 months of onset.⁴⁶ Aggressive treatment should follow to reestablish normal menses and prevent progressive bone loss. This evaluation requires examining the athlete's eating and training regimens for adequate energy availability. If deficiencies exist, an increase in dietary intake or reduction in exercise intensity (or both) should be recommended. Consideration should also be given to calcium and vitamin D supplementation to achieve and maintain the recommended

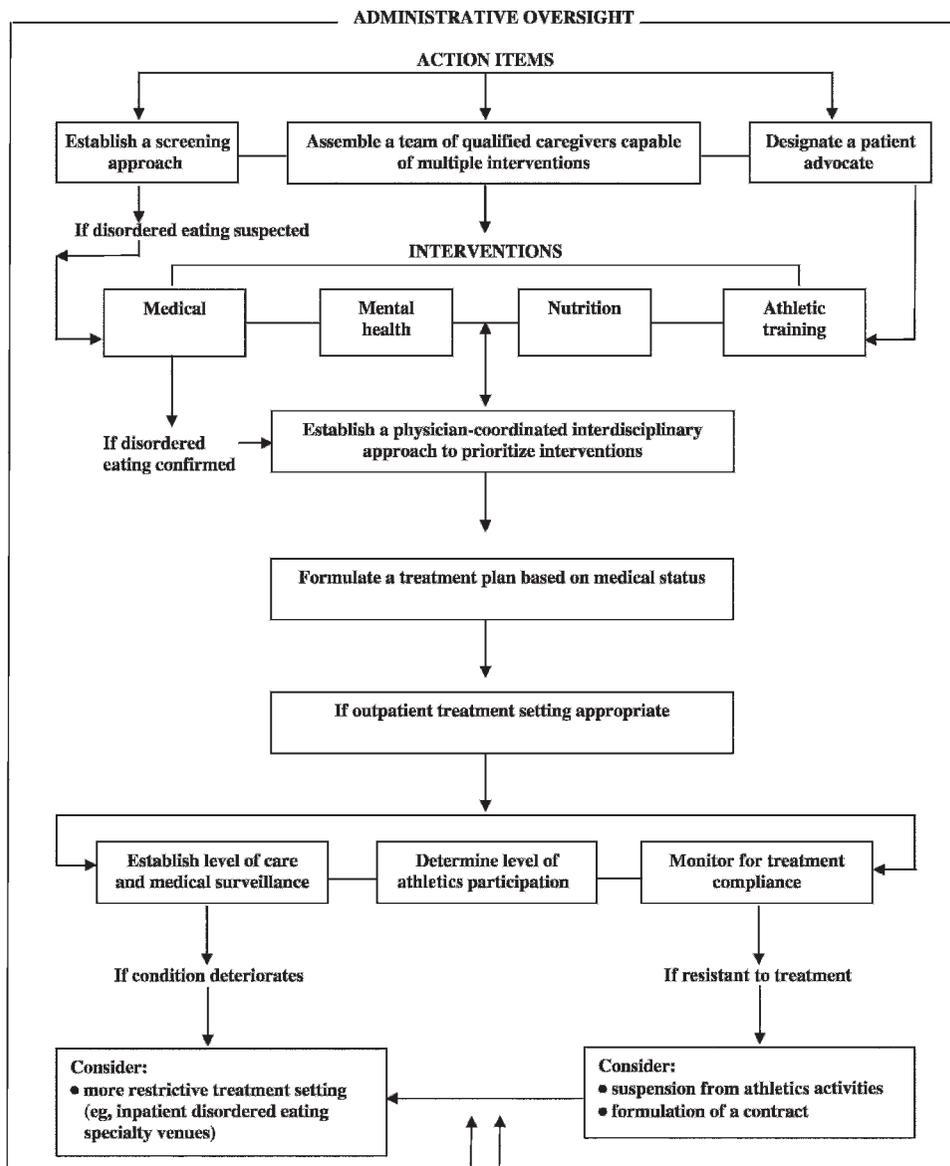


Figure. Disordered-eating management protocol: outpatient setting.

dietary intakes of 1000 to 1500 mg/d of calcium and 400 to 600 IU/d of vitamin D.^{47–51} High doses of both supplements may be necessary to prevent or treat osteoporosis and minimize fracture risk or prevent fractures, especially in individuals who do not meet recommended dietary intakes.^{45,50} Pharmacologic treatment administered in the form of hormone replacement therapy or the oral contraceptive pill^{52–54} requires careful deliberation. The results of such treatment remain inconsistent in adequately restoring bone loss or correcting the metabolic abnormalities that compromise health and performance in amenorrheic athletes.⁴⁵ The reader is referred to the American College of Sports Medicine’s revised position statement⁴⁵ on the female athlete triad for indications and contraindications for administration of these agents. In view of the potential irreversibility of bone loss despite some of these interventions,^{45,53,54} prompt identification of early-onset low bone mineral density

through use of dual-energy x-ray absorptiometry (DXA) may contribute to reducing stress fracture incidence and future morbidity resulting from osteoporosis.^{55,56}

- The sequelae of reproductive and skeletal complications require familiarity with the revised description of the female athlete triad and its interrelationships among energy availability, menstrual function, and bone mineral density.⁴⁵ These triad components are now believed to exist along a continuum model of health and disease. At the pathologic end of the spectrum lies each component’s clinical manifestations — low energy availability with or without eating disorder, functional hypothalamic amenorrhea, and osteoporosis. Although very few female athletes, whether elite, young adult, or adolescent, simultaneously possess all clinical manifestations of the triad,^{14,57–59} clinicians need to be mindful of the interrelationship of triad components with respect to

Table 1. Diagnostic and Statistical Manual of Mental Disorders (4th edition) Criteria for Anorexia Nervosa^a

Description
A. Refusal to maintain body weight at or above a minimally normal weight for age and height (eg, weight loss leading to maintenance of body weight less than 85% of that expected or failure to make expected weight gain during period of growth, leading to body weight less than 85% of that expected).
B. Intense fear of gaining weight or becoming fat, even though underweight.
C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.
D. In post-menarcheal females, amenorrhea, ie, the absence of at least three consecutive menstrual cycles. (A woman is considered to have amenorrhea if her periods occur only following hormone, eg, estrogen, administration.)

Specify Type

Restricting type: During the current episode of anorexia nervosa, the person has not regularly engaged in binge-eating or purging behavior (ie, self-induced vomiting or the misuse of laxatives, diuretics or enemas).

Binge-eating/purging: During the current episode of anorexia nervosa, the person has regularly engaged in binge-eating or purging behavior (ie, self-induced vomiting or the misuse of laxatives, diuretics or enemas).

^aReprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Text Revision. © 2000:589. American Psychiatric Association.²⁰

cause and pathogenesis. Individual disorders (alone or in combination) should be addressed as soon as they present to decrease the potential for irreversible health consequences.^{45,59-61}

14. Equal attention should be paid to male athletes who exhibit signs and symptoms of EDs. Compared with female athletes, males have no diagnostic hallmark such as amenorrhea for detecting EDs.⁶² Absent overt clinical signs coupled with the reluctance of males to openly discuss their eating problems because of feelings of shame and embarrassment over having a stereotypically “female” disorder could result in a delay in diagnosis and treatment.⁶³⁻⁶⁶
15. Because more commonalities than differences exist in the physical and psychological characteristics of EDs in young adult male and female athletes, similar strategies should be used to detect and treat the condition in both sexes.^{63,67,68}

Predisposing Risk Factors

16. All certified athletic trainers should become knowledgeable about the most common predisposing risk factors for development of DE to understand its

complex causes and to minimize the possibility of missing crucial information that may have important implications for early detection and treatment. For purposes of DE prevention and containment, the focus of attention should be on those risk factors most amenable to alteration: in particular, the pressure on athletes to manipulate eating and weight for performance and appearance thinness, as well as the sociocultural and media-driven emphasis on appearance thinness.^{27,69,70}

17. The index of suspicion for DE should be high in all types of sports. Current literature⁵⁹ challenges the perception that the prevalence of DE is greater in sports in which a low body weight or small physique is important for maximizing performance, subjective evaluation and aesthetic ideals coexist, or body weight restrictions apply.^{8,10,14,71,72} Intensified pressure to attain or maintain an ideal body weight or body fat percentage is not necessarily inherent in the activity itself but in the athlete's perception of what is required for optimizing performance. It only follows that avoiding external pressure on athletes to lose weight is essential to avert a preoccupation with

Table 2. Diagnostic and Statistical Manual of Mental Disorders (4th edition) Criteria for Bulimia Nervosa^a

Description
A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following: <ol style="list-style-type: none">1. Eating, in a discrete period of time (eg, within any two-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances.2. A sense of lack of control over eating during the episode (eg, a feeling that one cannot stop eating or control what or how much one is eating).
B. Recurrent inappropriate compensatory behavior in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas or other medications; fasting; or excessive exercise.
C. The binge eating and inappropriate compensatory behaviors both occur, on average, at least twice a week for three months.
D. Self-evaluation is unduly influenced by body shape and weight.
E. The disturbance does not occur exclusively during episodes of anorexia nervosa.

Specify Type

Purging type: During the current episode of bulimia nervosa, the person has regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics or enemas.

Non-purging type: During the current episode of bulimia nervosa, the person has used other inappropriate compensatory behaviors, such as fasting or excessive exercise, but has not regularly engaged in self-induced vomiting or the misuse of laxatives, diuretics or enemas.

^aReprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Text Revision. © 2000:594. American Psychiatric Association.²⁰

Table 3. Diagnostic and Statistical Manual of Mental Disorders (4th edition) Criteria for Eating Disorder Not Otherwise Specified^a

Description
A. For females, all of the criteria for anorexia nervosa are met except that the individual has regular menses.
B. All of the criteria for anorexia nervosa are met except that, despite significant weight loss, the individual's current weight is in the normal range.
C. All of the criteria for bulimia nervosa are met, except that the binge eating and inappropriate compensatory mechanisms occur at a frequency of less than twice a week or for a duration of less than three months.
D. The regular use of inappropriate compensatory behavior by an individual of normal body weight after eating small amounts of food (eg, self-induced vomiting after the consumption of two cookies).
E. Repeatedly chewing and spitting out, but not swallowing, large amounts of food.
F. Binge-eating disorder: recurrent episodes of binge eating in the absence of the regular use of inappropriate compensatory behaviors characteristic of bulimia nervosa.

^aReprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Text Revision. © 2000:594–595. American Psychiatric Association.²⁰

dieting, which is considered the number-one trigger for DE.^{13,73–75}

Screening Methods

18. Because athletes with DE rarely self-identify due to secrecy, shame, denial, and fear of reprisal,^{10,70,76} specific questionnaire items designed to assess DE behaviors and attitudes should be incorporated into the medical history portion of the PPE to facilitate the detection process (Tables 6a, 6b).
19. If suspicions of DE are raised from interpretation of questionnaire results, an in-depth personal interview by a member of the health care team should follow for a more accurate interpretation of circumstances.^{14,77–80}
20. Practitioners should proceed with caution when considering the use of self-report psychometric questionnaires such as the Eating Disorders Inventory (EDI),³¹ the Eating Disorders Examination (EDE-Q),⁸¹ and the Eating Attitudes Test (EAT)⁸² to screen for behavioral and cognitive characteristics of DE in athletes. Although the questionnaires have been widely used to screen

athletes for DE, they have not been specifically tested for external validity with athletic populations and, consequently, may result in inaccurate information. If additional screening measures are desired to complement the medical history portion of the PPE, consideration should be given to using instruments designed specifically for athletes, as more information becomes available on their validity with larger sample sizes and with athletes in a variety of sports and sport settings and at various levels of performance (Table 7).

21. In addition to using questionnaires and interviews, certified athletic trainers, other health care providers, and coaches should become more skilled observers of an athlete's behavior (eg, inappropriate dieting, weight loss, suboptimal weight, fatigue, performance decrement, and excessive exercise),³⁷ which may provide the quickest means of detecting DE.

Physiologic Measurements

22. Pursuit of performance and appearance thinness in sport necessitates strategies that have the potential to

Table 4. Psychological and Behavioral Characteristics of Eating-Disordered Athletes^a

Dieting (unnecessary for health, sports performance, or appearance)
Self-critical; especially concerning body weight, size and shape in addition to performance
Avoidance of eating and eating situations
Secretive eating
Ritualistic eating patterns
Claims of "feeling fat" despite being thin ^b
Resistance to weight gain or maintenance recommended by medical providers
Unusual weighing behavior (ie, excessive weighing, refusal to weigh for health or safety reasons, negative reaction to being weighed)
Compulsiveness and rigidity, especially regarding eating and exercising
Excessive or obligatory exercise beyond that recommended for training or performance
Exercising while injured despite medically prescribed activity restrictions
Restlessness; relaxing is difficult or impossible
Change in behavior from open, positive, and social to suspicious, untruthful, and sad
Social withdrawal
Depression and insomnia
Binge eating ^c
Agitation when bingeing is interrupted ^c
Evidence of vomiting unrelated to illness ^c
Excessive use of the restroom or "disappearing" after eating ^c
Use of laxatives or diuretics (or both) that is unsanctioned by medical providers ^c
Substance abuse, whether legal, illegal, prescribed, or over-the-counter drugs, medications, or other substances ^c

^aAdapted from *The Female Athlete*, Mary Lloyd Ireland and Aurelia Nattiv (eds.), Jorunn Sundgot-Borgen, *Disordered Eating*, p. 243, 2002, with permission from Elsevier Science.²⁴

^bIndicates especially for anorexia nervosa.

^cIndicates especially for bulimia nervosa.

Table 5. Physical Signs/Symptoms of Eating-Disordered Athletes^a

Cardiovascular
Bradycardia
Hypotension
Atrial and ventricular arrhythmias
Electrocardiographic abnormalities
Acrocyanosis
Endocrine
Hypoglycemia
Decreased testosterone levels in males
Low female sex hormone levels
Amenorrhea or menstrual dysfunction
Reduced bone mineral density
Stress fractures
Delayed onset of puberty ^b
Short stature/arrested skeletal growth ^b
Gastrointestinal
Constipation, bloating, postprandial distress
Abdominal pain
Bowel irregularities
Fluids and Electrolytes
Dehydration
Electrolyte abnormalities
Hypokalemia
Muscle cramps
Metabolic alkalosis
Edema
Thermoregulation
Hypothermia ^b
Hematologic
Anemia
Dermatologic
Hair loss ^b
Dry skin, brittle hair and nails ^b
Lanugo ^b
Callus or abrasion on back of hand (from inducing vomiting) ^c
Oral/facial
Dental decay
Pain in pharynx
Swollen parotid glands ^c
Others
Significant weight loss (beyond that necessary for adequate sport performance) ^b
Frequent and often extreme weight fluctuations ^c
Low weight despite eating large volumes ^c
Fatigue (beyond that normally expected in training or competition)
Muscle weakness

^aAdapted from *The Female Athlete*, Mary Lloyd Ireland and Aurelia Nattiv (eds.), Jorunn Sundgot-Borgen, *Disordered Eating*, p. 242, 2002, with permission from Elsevier Science.²⁴

^bIndicates especially for anorexia nervosa.

^cIndicates especially for bulimia.

provide essential information for nutritional support and training status of athletes over and above the use of scale weight.^{27,86} Consideration should be given to assessing body composition, with special reference to gradual changes in fat mass and fat-free mass and, if possible, the amount and quality of lean muscle mass instead of percentage of body fat. Calculating the body mass index (BMI) should also be considered to monitor

appropriateness of weight for height, which varies by age and sex.

a. **Assessing Body Composition.** Body composition should be monitored only under the following conditions: (1) A qualified individual, who is appropriately trained and proficient in assessing and interpreting results, has been designated to handle the process, (2) The same individual is available for serial measurements to minimize variation among assessments and technicians, and (3) A registered dietitian is available if results call for nutritional support. Additionally, the measurement process and data exchange should be handled in a manner that protects the privacy, confidentiality, and self-esteem of athletes. The following procedures will facilitate the process:

- Deemphasize the importance of an ideal body weight or body fat percentage. Individual differences in body weight and composition are considerable, so a range of normal variation among athletes in a given sport or event should be recognized.
- Emphasize changes in estimated fat mass or lean muscle mass in individual athletes during the season. Absolute estimates of fat mass or percentage of body fat have limited utility given the wide range of individual differences and potential measurement variability.
- Avoid public discussion of the results. Data should be confidential and shared only with the athlete in a private setting. Coaches should not be present during the measurement process or the data exchange. Depending on the health and training status of the athlete, it may be necessary to share results with coaches or close significant others (CSOs). This should be determined on an individual basis and only after receiving disclosure permission from the athlete.
- Establish an interval of at least 2 to 3 months between serial measurements, so that short-term fluctuations in body weight do not confound assessments or decisions.

b. **Calculating the Body Mass Index.** The body mass index (BMI) should be used as a screening tool to determine the appropriateness of an athlete's body weight for height, which varies with age and sex. For the measurement of height, the athlete should not be wearing shoes. Weight should be measured with the athlete wearing minimal clothing (shorts, T-shirt) and using a regularly calibrated scale. Accuracy of measurement is essential.

- A BMI <18.5 kg/m² has been recommended by the World Health Organization (1998) as indicative of being underweight in adults (≥18 years of age).⁸⁷ Although this level may

Table 6a. Medical History Review — Disordered Eating Questionnaire Items^a

- Are you currently, or have you in the past year, followed a particular “diet”? ___Yes ___ No
- How many meals (ie, breakfast, lunch, dinner) do you eat each day? _____ How many snacks? _____
- Are there certain food groups that you refuse to eat (meat, breads, etc?) _____
- Do you ever limit food intake to control weight? ___Yes ___ No
If yes, do you (circle below)...
Decrease the amount of food you eat during the day / skip meals /
limit carbohydrate intake / limit fat intake / cut out snack items /
Other _____
- Do you ever feel out of control when eating or feel that you cannot stop eating? ___Yes ___ No
- Do you take vitamin supplements? ___Yes ___ No
If yes, what type? _____ How often (daily, a few times a week)? _____
- Do you take nutritional supplements? ___Yes ___ No
If yes, what type? _____ How often (daily, a few times a week)? _____
- What do you currently weigh? _____ Are you happy with this weight? ___Yes ___ No
If not, what would you like to weigh? _____
- What was the most you’ve weighed in the past year? _____
- What was the least you’ve weighed in the past year? _____
- Do you gain or lose weight regularly to meet demands of your sport? ___Yes ___ No
- Has anyone recommended that you change your weight or eating habits? ___Yes ___ No
If yes, specify (coach, parent, friend) _____
- Has anyone ever set a target weight for you or subjected you to routine weigh-ins? ___Yes ___ No
- Have you ever tried to lose weight by using any of the following methods? (circle below)
Vomiting / laxatives / diuretics / diet pills / exercise
- Do you regularly exercise outside of your normal practice schedule? ___Yes ___ No
If yes, describe your activities. _____
- Have you ever been diagnosed with an eating disorder? ___ Yes ___ No
- Do you think that you might have an eating disorder? ___Yes ___ No
- Have you ever been treated for a stress fracture? ___Yes ___ No
If yes, how many have you had? ____ What body part(s) was involved? ____ When did the injury occur? ____
How was the diagnosis made (X-ray, bone scan, MRI, CT)? _____

^aSample questionnaire items for recognition of disordered eating. Adapted from Agostini R et al: *Medical and Orthopedic Issues of Active and Athletic Women*. © 1994:39, with permission from Elsevier.

be somewhat arbitrary, it is widely used internationally and should be considered in context with other health indicators and history.

- No agreed-upon cut-off points exist for individuals <18 years of age. When evaluating the BMI of

an adolescent athlete of high school age (approximately 14 to 18 years) in the context of being underweight, the 5th percentile of the Centers for Disease Control and Prevention growth charts (2002) may be used (<http://www.cdc.gov/>

Table 6b. Menstrual History Review — Sample Questionnaire Items^a

- Have you ever had a menstrual period? ___Yes ___ No
If yes –
 - How old were you when you had your first menstrual period? _____
 - When was your last period? _____
 - How many days are there between your periods from the first day of your menstrual cycle to the first day of your next cycle?
_____ 3 days _____ more than 3 – 10 days _____ more than 10 days
 - How many periods have you had in the past 12 months? _____ In the past 6 months? _____
 - Have you ever missed 3 or more consecutive months of your menstrual periods? ___Yes ___ No
If yes, how many consecutive months have you missed your period? _____
 - Does your menstrual cycle change with a change in the intensity, frequency or duration of training?
___ Yes ___ No
If yes, does it become (circle below)...
Lighter / Heavier / Shorter / Longer / Disappear
 - Do you ever have trouble with heavy bleeding? ___ Yes ___ No
 - Do you ever experience cramps during your period? ___ Yes ___ No
If yes, how do you treat them? _____
 - Are you on birth control pills or hormones? ___ Yes ___ No
If yes, were they prescribed for (circle below)...
Irregular periods / No periods / Painful periods / Birth control
 - When was your last pelvic examination? _____
 - Have you ever had an abnormal Pap smear? ___Yes ___ No
 - Have you ever been treated for anemia (low hemoglobin or iron)? ___Yes ___ No
 - Is there any history of osteoporosis (thinning of the bones) in your family? ___Yes ___ No

^aAdapted from Agostini R et al: *Medical and Orthopedic Issues of Active and Athletic Women*. © 1994:39, with permission from Elsevier.

Table 7. Representative Screening Instruments for Assessment of Disordered Eating in Athletes

Instrument	Description
Survey of Eating Disorders among Athletes (SEDA) ⁹	Self-report: a 33-item questionnaire for identifying eating abnormalities in addition to factors specific to the athletics environment that may contribute to the onset or development of disordered eating. These factors include whether weight loss was required for performance thinness, appearance thinness, or to meet a lower weight classification, and/or triggered by comments or instructions by coaches or other athletics support personnel. It also examines whether the athlete was subjected to public weigh-ins and/or public scrutiny of the results.
Athletic Milieu Direct Questionnaire (AMDQ) ⁸³	Self-report: a 19-item screening instrument for identification of eating disorders/disordered eating in National Collegiate Athletic Association Division I female athletes. A variety of response categories are used, including a 4- to 6-point Likert scale as well as multiple and dichotomous responses.
Female Athlete Screening Tool (FAST) ⁸⁴	Self-report: a 33-item screening instrument that examines atypical exercise and eating behaviors in female athletes. Respondents rate each item on a 4-point Likert scale.
College Health Related Information Survey (CHRIS) ⁸⁵	Self-report: a 32-item screening test designed to ascertain information relevant to college athletes in 4 areas – mental health problems, eating problems, risk behaviors, and performance pressure. The screen is appropriate for both male and female athletes.
The Physiologic Screening Test (PST) ⁷⁹	Self-report combined with physiologic measurements: An 18-item screening test consisting of 14 items that require self-report responses based on physiologic factors (instead of eating behaviors) and 4 items based on physiologic measurements. The following variables are assessed: standing diastolic blood pressure, waist:hip ratio, percentage of body fat, parotid gland enlargement, menstrual history and frequency, weight history and perceptions of body weight, exercise habits after practice, frequency of bowel movements and normalcy of stools, pain and bloating in the abdomen, and dizziness when rising quickly.
The Health, Weight, Dieting, and Menstrual History Questionnaire ⁵⁹	Self-report: a 53-item questionnaire divided into 4 categories for the assessment of disordered eating — general health (including menstrual function and bone health), body weight (including abnormally high or low body weight and/or weight fluctuations), dieting behaviors (including energy restriction, bingeing, and/or purging), and body image (including global and specific body part satisfaction/dissatisfaction). The questions were derived from 2 existing eating-disorder screening tools along with information gleaned from an extensive review of the literature pertaining to disordered eating in female athletes.

growthcharts/). An athlete with a BMI less than the sex-specific and age-specific 5th percentile may be underweight (allowing for individual differences in maturity status and, in particular, the timing and tempo of the adolescent growth spurt).

- A young adult athlete with a BMI <18.5 kg/m² or an adolescent athlete with a BMI less than the age-specific and sex-specific cut-off who experiences a decline in BMI should be monitored for a reasonable period and evaluated for eating behaviors, training practices, and potential stressors (eg, pressure from coaches). In the case of the adolescent athlete, the evaluation may require an assessment of maturity status.
- An interval of at least 2 to 3 months should be established between serial measurements of height and weight to evaluate short-term fluctuations in the BMI.
- An athlete with a persistently low or a declining BMI should be referred for medical evaluation.
- Preadolescent and early-adolescent athletes (generally <12 years of age) should not have the BMI evaluated routinely. Instead, attention should be focused on monitoring growth in height and weight, assessing maturity status if necessary, improving nutrition and physical activity behaviors, promoting self-acceptance, and developing attitudes related to healthy lifestyles.

Managing Athletes with Disordered Eating

Initial Contact

23. If DE is suspected, the initial intervention should be facilitated by an authority figure who has the best rapport with the athlete. The facilitator should be prepared to (1) approach the athlete with sensitivity and respect while adhering to disclosure regulations regarding patient confidentiality; (2) indicate specific observations of concern; (3) expect denial, anger, and/or resistance; and (4) have expertise readily accessible for consultation and/or timely referral.⁸⁸
24. If suspicions of DE are confirmed, the athlete should be referred to the supervising physician for an initial evaluation, beginning with a thorough medical history review and physical examination (Table 8). Based on the findings of the evaluation, laboratory studies and electrocardiography may also be indicated to obtain a more accurate representation of the seriousness of the problem. Collaboration among all members of the health care team should follow to determine the most appropriate setting for treatment and to prioritize interventions.

Treatment Settings

25. Outpatient treatment settings should suffice for most athletes who have mild symptoms of brief duration; stable weight, cardiac, and metabolic function; absence of comorbid conditions; and cooperative fami-

lies.^{24,25,27,76} Development of a treatment plan that includes medical surveillance, timely nutritional intervention, and a supportive environment may be all that is necessary to contain incipient problems and promote recovery.^{18,76} More established cases require psychotherapy.^{22,28,89} Although athletes undergoing outpatient treatment can remain in their homes or in residential campus settings, attend school, and participate in athletics, these advantages must be balanced against the risks of failure to progress in recovery.

26. More restrictive and intensive treatment settings, including inpatient hospitalization, residential centers specializing in EDs, or partial hospitalization, should be considered if weight, cardiac, and metabolic status destabilize or outpatient treatment is unsuccessful.^{17,24,89}

Therapeutic Interventions

27. In an outpatient treatment setting, physician-coordinated interventions should first be aimed at enlisting the expertise of a registered dietitian to optimize calorie and nutrient intakes for energy homeostasis and, in more serious cases, to design and implement medical nutrition therapy protocols that address the biological and psychological effects of severe caloric deprivation.⁹⁰⁻⁹² Enlisting the services of a clinical psychologist may be necessary simultaneously to help interrupt pathogenic behaviors and resolve psychological, familial, social, and environmental issues contributing to their development and perpetuation.^{22,89,93,94} Pharmacologic treatment may also be helpful, especially in patients with significant symptoms of depression, anxiety, or obsessions.^{76,89}
28. All certified athletic trainers should be prepared to assume the role of informed patient advocates in the management of athletes with DE. Because of their frequent daily interactions with athletes and familiarity with their immediate and long-term health care needs, athletic trainers are in a unique position to assist with or supervise the myriad of anticipated tasks described in Table 9.
29. Certified athletic trainers should be mindful of their scope of practice limitations. Although they have the clinical knowledge and skills to identify signs and symptoms that indicate risk, confront athletes with suspicious behaviors, and provide assistance as needed to facilitate timely referrals and treatment compliance, diagnosis and treatment can only be managed by physicians and psychotherapists who specialize in EDs.²³
30. Certified athletic trainers should resist pleas from athletes with DE to work individually with them in a subconscious attempt to avoid referral and comprehensive treatment.²³ The therapeutic alliance that often develops makes it tempting to accommodate the request.
31. Certified athletic trainers should be prepared to enforce limitations of physical workouts based on recommendations of caregivers and to intervene when

training expectations are potentially dangerous or detrimental.

32. Certified athletic trainers should have knowledge of the psychotropic medications commonly prescribed to treat symptoms that accompany EDs, including their potential side effects. They should also be able to recognize symptoms of missed doses or overdose. The supervising physician, other caregivers, and family members should be contacted immediately if behavioral warning signs such as agitation, irritability, suicidal tendency, or unusual changes in behavior are observed.
33. Certified athletic trainers should work closely with athletics administrators, legal counsel, and coaches when handling health, safety, ethical, and procedural questions related to managing athletes with DE. Successful outcomes are highly dependent on skillful handling of issues that arise after DE identification and during the course of treatment and follow-up care.

Issues in Treatment and Follow-Up Care

34. It is reasonable for an athlete with DE to continue sport participation only if health risks are determined to be minimal and the athlete complies with all treatment components and training modifications, has a genuine interest in competing, and realizes treatment must always take precedence over sport participation.⁶⁹
35. Consequences for athletes who are noncompliant with treatment recommendations should be appropriate. When treatment is resisted, suspending participation should be considered by the health care team until compliance is established.^{25,69} However, caregivers should be mindful that suspension could result in potentially harmful consequences, as it represents a major setback in the athlete's ability to achieve training and competitive goals.²⁸
36. A written contract, agreed upon and signed by the athlete and health care team coordinator or designate, may be helpful in some circumstances to promote treatment compliance.^{27,93} Table 10 provides an example of a contract that can be easily modified to meet the situational needs of an athlete who is in the active phase of an ED.
37. At the outset, parental support should be obtained within disclosure regulations when discussing and implementing management strategies for symptomatic athletes. Engaging parents and CSOs early in the process helps to facilitate cooperation with the treatment protocol and acceptance of any changes in treatment settings or strategies that may be required if health destabilizes.
38. If an outpatient treatment setting is unsuccessful, caregivers should be prepared to handle issues that surface when transitioning the athlete's care to a more

Table 8. Components of the Initial Medical Evaluation**Medical History^a**

- Symptoms and screening results related to the diagnosis of disordered eating
- Eating patterns, weight history (lowest, highest, recent changes), and nutritional status with special reference to dietary and fluid restraint; growth and development in children and adolescents
- Details of previous and current treatment programs for disordered eating (ie, medications, psychological and nutritional interventions)
- Exercise/sports training history: duration and frequency of training per week; aerobic and anaerobic training volumes; time spent exercising outside of normal training regimen (eg, cycling, jogging, calisthenics)
- Prior or current bone stress injuries/reactions and chronic musculoskeletal injuries
- History and treatment of other conditions, including endocrine disorders, infections, chronic diseases, previous surgeries, and medications
- Family history, including weight history, disordered eating, and osteoporosis among family members and ages at menarche and menstrual problems of mothers and sisters
- Brief psycho-social history: life stressors (eg, social, academic, sports, family, or economic); conflict and support systems at home, at school, in social environment; coping skills and methods; history of depressive symptoms; physical or sexual abuse; general mood, body image satisfaction; and sources of self esteem
- Use of alcohol, tobacco, and/or controlled substances

Physical Examination^a

- General physical examination: age (decimal age: date of measurement minus date of birth); height, weight, BMI; comparison with age- and sex-specific references for children and adolescents (<http://www.cdc.gov/growthcharts/>); note change/rate of change from prior measurements.
- Stage of sexual maturation (breasts, pubic hair in girls; genitals, pubic hair in boys — if appropriate to examine at the time); age at menarche
- Evaluation of vital signs; pulse by palpation, blood pressure with auscultation in both supine and standing, and temperature
- Cardiac examination
- Oral, salivary gland, and thyroid examination
- Skin, hand, and finger examination
- Consider pelvic examination in female athletes presenting with irregular or absent menses
- Consider differential diagnoses for an eating disorder: metabolic disease, malignancy, inflammatory bowel disease, achalasia (difficulty swallowing), infection

Laboratory Assessments^b

- Basic Analyses: Consider for all patients.
 - Complex metabolic profile (CMP): electrolytes, blood urea nitrogen (BUN) level; creatinine level; liver function studies, glucose, calcium
 - Thyroid function (free T4, TSH)
 - Complete blood count (CBC)
 - Urinalysis (evaluate for pH, specific gravity, signs of infection)
- Additional Analyses: Consider for undernourished and severely symptomatic patients
 - Magnesium, phosphorus levels
- Osteopenia and Osteoporosis Assessments: Consider for patients underweight more than 6 months or amenorrheic for more than 3 months
 - Dual-energy X-ray absorptiometry (DXA)
 - Estradiol level in females; Testosterone level in males
- Nonroutine Assessments: Consider for specific unusual indications
 - Luteinizing hormone (LH) and follicle-stimulating hormone (FSH) levels: For persistent amenorrhea at normal weight
 - Brain magnetic resonance imaging (MRI) and computerized tomography (CT): For ventricular enlargement correlated with degree of undernutrition
 - Stool: For blood
 - Chest X-ray

Electrocardiography^a

- Appropriate if resting, supine pulse is <50 beats/min, electrolyte abnormality is present, or if there is frequent purging, dehydration, or prolonged caloric restriction
- Note for findings of bradycardia, low voltage, low or inverted T-waves, QT dispersion, or prolonged QT interval

^aAdapted from Agostini R et al: *Medical and Orthopaedic Issues of Active and Athletic Women*. © 1994:147, with permission from Elsevier.

^bAdapted, by permission, from the American Psychiatric Association. Practice guideline for the treatment of patients with eating disorders (revision). *Am J Psychiatry*. 2000;157(suppl 1):1–39.

restrictive setting. Caregivers should continue to advocate for the athlete by facilitating referrals; maintaining open lines of communication with providers and CSOs to keep abreast of the patient's progress; and preparing the athlete and CSOs for the possibility that access to appropriate care may be delayed due to waiting lists or constrained by monetary or insurance difficulties.^{95–97}

39. If the athlete responds favorably to outside treatment and is medically cleared to reengage in the previous environment with the goal of sport reentry, the organization's resources should be assessed for adequacy in handling the full complement of maintenance

care required to prevent potential relapse. The ultimate responsibility should rest with the organization's supervising physician, in consultation with other members of the DE health care team, after careful review of all pertinent medical records and completion of a comprehensive physical examination.

The Uniqueness of Adolescence: Special Considerations

40. Given the biological and behavioral changes occurring during adolescence and, importantly, their interactions, certified athletic trainers who work with adolescent athletes should have a firm understanding of the basic principles of physical growth (specifically

Table 9. Anticipated Responsibilities of the Certified Athletic Trainer

- Intervene if an athlete is suspected of having disordered eating and make appropriate referrals when warranted;
- Prepare the athlete for referral and address any questions or concerns relevant to the referral;
- Arrange for treatment according to the caregivers' directives;
- Maintain open lines of communication on a regular basis with and among caregivers as individual treatment plans are formulated for the patient;
- Ensure that all caregivers are aware of the treatment plan in its entirety;
- Provide feedback to caregivers regarding the athlete's progress relative to training and performance, interpersonal issues, academics, and family factors;
- Assist in the coordination of ongoing medical surveillance plans characterized by periodic check-ups and serial health testing that helps caregivers monitor the progress of athletes and determine if treatment plans are in line with meeting their special medical needs;
- Monitor the athlete's compliance with the treatment plan by maintaining records of scheduled appointments, noting missed appointments, and charting changes in body weight, body composition, and sport-specific measures; share noncompliance issues with all caregivers;
- Assume the role as liaison among coaches and caregivers in circumstances where athletics participation may have to be modified or discontinued due to energy deficits, injury, or treatment noncompliance;
- Enforce limitations of workouts based on recommendations of caregivers and intervene when training expectations are potentially dangerous or detrimental;
- Intervene in a crisis situation when the immediate welfare and safety of the athlete is in jeopardy (eg, impending relapse, athlete is acutely suicidal) and arrange for appropriate referral;
- Field questions, concerns, observations, and criticisms from the athlete as well as coaches, teammates, parents, and close significant others (the latter group of individuals should be encouraged to share observations and concerns with the certified athletic trainer and other caregivers, being mindful of the patient's right to privacy);
- Remain sensitive to the athlete's preferences for staying connected with teammates in an effort to help ease the feelings of loneliness and alienation that are associated with participation restrictions;
- Adhere to disclosure regulations regarding patient confidentiality;
- Ensure that matters relative to insurance and expense coverage have been discussed and that the financial aspects of the treatment plan are manageable for the athlete and his/her family;
- Consult with athletics administrators on issues that can complicate care, in particular, coaches and support staff who trigger or perpetuate the problems and ignore suspicious behaviors, athletes who are resistant to referral or noncompliant with the treatment process; and parents or close significant others who are uncooperative.

Table 10. Sample Contractual Agreement for Continued Athletic Participation in the Active Phase of an Eating Disorder (Noncompliance)^a

Dear _____

As a representative of your health care team, I am pleased to inform you that your physical condition presently suggests no immediate health risk. However, it has been brought to my attention that you have not been complying fully with the treatment plan that has been formulated for you. I want to remind you how important it is to take the appropriate steps to care for yourself. Our health care team will do everything possible to assist you in this effort. To ensure that your health remains stable, your current athletics participation status for the remainder of the school year will be contingent on your compliance with the following:

1. Receive individual psychotherapy from _____ once a week so that you can address all issues and find healthy ways to cope with them;
2. See Dr. _____ for medical evaluation of your health status, including lab tests if necessary, every other week to ensure your physical well-being;
3. Participate in nutritional counseling sessions according to a schedule recommended by our registered dietitian, _____;
4. Maintain your body weight over _____ pounds (if applicable). Anticipate weekly monitoring of your weight if it falls below this level.
5. Sign and leave on file a release of information with _____ permitting our health care professionals to communicate openly and freely with each other, members of the coaching staff, your parents, and your caregivers at home.
6. See your home-based physician and therapist during the winter and summer breaks. Prior to your return to campus, your attending physician and therapist must send Dr. _____ a letter indicating the following: (a) you are ready to return to school; (b) you have been in treatment; (c) you are ready to take on the academic, training, performance, and social challenges for the semester; and (d) you are taking any medication recommended and prescribed by your psychotherapist. This letter should be in the possession of Dr. _____ prior to your arrival on campus in _____. Additionally, we would like you to talk with Dr. _____ in person or by phone to discuss your plans for the semester and confirm your ability to return. Upon your return to campus, you should anticipate meeting with Dr. _____ for a re-entry evaluation so that your medical status can be assessed, activity status determined, and further treatment options explored, if necessary.
7. Check-in routinely with your certified athletic trainer, _____, who will be available to assist you.

(Athlete's Name), I am confident that you have the ability and support to address the health concerns that you are currently facing. It is our every expectation that you will comply with all necessary medical and personal advice to advance your recovery so that you can continue to flourish in this environment.

Please sign below verifying that you are prepared to comply with the stipulations outlined above.

Athlete's Signature _____ Date _____

Sincerely,
(Athletics Administrator or Supervising Physician)

^aSample contractual disordered-eating agreement. Adapted with permission of author, D.C. Wood, J.D. (debra.wood@scrippscollege.edu, email), April 21, 2006.

- the growth spurt), biological maturation (sexual, skeletal, and somatic), and behavioral development occurring at this critical stage in the life cycle.
41. Changes in size, physique, and body composition during adolescence may influence perceptions of self and specifically appearance. Some adolescent athletes may display dissatisfaction with, and anxiety over, body weight, size, and shape.^{98–101} Certified athletic trainers should be aware of potential changes in self-perceptions and concerns for appearance, especially in aesthetic sports (eg, gymnastics, diving, figure skating) in which physical appearance may be a part of the judging process.
 42. Potential biomedical complications of DE during adolescence, specifically prolonged energy deficiency, altered menstrual function, and impaired bone mineral accretion during this period of rapid physical growth and attainment of biological maturity, can have long-term effects.¹⁸ In this context, the threshold for potential intervention with adolescent athletes at risk should be lower than that for adult athletes.¹⁸
 43. Certified athletic trainers who work with adolescent athletes should be aware of the need for regular monitoring and recognition of potential problems in this age group and for prompt referral to medical staff as required.
 44. Many athletics programs for adolescents have limited resources and may not have access to essential support staff when potential problems with athletes arise. In addition to the certified athletic trainer, it is essential that the family and relevant school authorities (eg, school nurses, guidance counselors) be involved in the process. It is also important to identify resources in the community such as psychotherapists and registered dietitians in anticipation of the need for additional assistance.
 47. Female athletes should be educated on the health and performance consequences of menstrual irregularities and the importance of seeking timely medical intervention at the first sign of abnormalities.
 48. The educational program should be evaluated routinely to determine its effectiveness in changing the knowledge level, attitudes, and behaviors of athletes as well as those participating in their health maintenance and performance enhancement to better minimize, contain, manage, and prevent problems.
 49. Certified athletic trainers should be familiar with reputable Web sites of organizations that provide factual information on DE, healthy eating, and safe weight-regulation practices (Table 11).
 50. Certified athletic trainers should also be familiar with disreputable Web sites, such as pro-ana (anorexia) and pro-mia (bulimia), consisting of harmful information devoted to the continuation, promotion, and support of EDs that glamorize the deadly disorders.¹⁸

BACKGROUND AND LITERATURE REVIEW

Definitions and Diagnostic Criteria

Disordered eating is best conceptualized along a continuum of pathogenic eating and weight control behaviors encompassing a full spectrum of clinical and subclinical classifications.^{1–4} For purposes of this discussion, *DE* is preferred when reference is made to the entire spectrum of abnormal behaviors, whereas *ED* is preferred when a definite clinical classification of abnormal behaviors is discussed. Classifications of particular importance include AN, BN, and EDNOS.

Anorexia and Bulimia Nervosa. Clinical or full-syndrome EDs are characterized by strict diagnostic criteria established by the American Psychiatric Association and identified in the *DSM-IV*.²⁰ The 2 most identifiable clinical EDs are AN and BN, which are complicated by dysfunction of multiple physiologic systems, nutritional deficiencies, and psychiatric diagnoses.¹⁰²

Anorexia nervosa is distinguished as the extreme of restricting behavior and is manifested as a refusal to maintain normal body weight for age and height, whereas BN refers to a cycle of food restriction or fasting followed by bingeing and purging.²⁰ Although the disorders have typical clinical features for establishing the diagnoses (Tables 1 and 2),²⁰ both are characterized by body weight preoccupation, excessive self-evaluation of weight and shape, and an illusion of control gained by manipulating weight and dietary intake. These commonalities clarify why up to 50% of patients with AN develop bulimic symptoms and some patients who are initially bulimic develop anorexic symptoms.¹⁰³

In the United States, it is estimated that AN and BN affect nearly 10 million females and 1 million males, primarily adolescents and young adults.^{104,105} Although clinical EDs are more common in females than males, they have similar incidences of comorbid psychopathology and similar levels of core behaviors and attitudes when matched for current age, ED subtypes, and age at onset of the ED.⁶³ In adolescents, the incidence of clinical EDs has increased

Preventing Disordered Eating

45. Mandatory educational programs for athletes, coaches, certified athletic trainers, and other athletics staff members should be implemented on an annual basis. Information focused on the most commonly asked questions about DE should be disseminated: Who is at risk? What are the barriers to identifying problems at an early stage? What are the signs, symptoms, and medical complications? What are the medical and performance consequences? What resources are available to help symptomatic athletes? How is treatment accessed? How should certified athletic trainers, coaches, teammates, and CSOs respond to an athlete suspected of having DE? What are the best preventive measures?
46. All athletes should be educated on the importance of optimal nutrition practices to reduce the risk of medical and performance problems associated with prolonged energy and nutrient deprivation.

Table 11. Useful Resources**Web Sites**

- Academy of Eating Disorders (www.aedweb.org)
 National Eating Disorders Association
 (www.nationaleatingdisorders.org)
 International Association of Eating Disorder Professionals
 (www.iaedp.com)
 National Association of Anorexia Nervosa and Associated Disorders
 (www.anad.org)
 Sports, Cardiovascular and Wellness Nutritionists (www.scandpg.org)
 National Collegiate Athletic Association Web site on nutrition and
 performance
 (http://www1.ncaa.org/membership/ed_outreach/nutrition-performance/index.html)
 Bloomington Center for Counseling and Human Development
 (www.bloomington-eating-disorders.com)

Position Statements

- American Academy of Pediatrics (www.aap.org)
 (<http://aappolicy.aappublications.org/cgi/content/full/pediatrics;111/1/204>)
 Society for Adolescent Medicine (www.adolescenthealth.org)
 (http://www.adolescenthealth.org/PositionPaper_Eating_Disorders_in_Adolescents.pdf)
 American Psychiatric Association (www.psych.org)
 (http://www.psych.org/psych_pract/treatg/pg/EatingDisorders3ePG_04-28-06.pdf)
 American College of Sports Medicine (www.acsm.org)
 (<http://www.acsm-msse.org/pt/pt-core/template-journal/msse/media/0597.pdf>)
 American Dietetic Association (www.eatright.org)
 (<http://www.eatright.org/cps/rde/xchg/ada/hs.xsl/index.html>,
<http://www.eatright.org/ada/files/EDNP.pdf>)
 Female athlete triad (www.femaleathletetriad.org)
 International Olympic Committee position stand on the female athlete triad
 (http://multimedia.olympic.org/pdf/en_report_917.pdf)

at an alarming rate over the past few decades; AN represents the third most common chronic illness among adolescent girls.¹⁰⁶ Its true prevalence may be even higher because it is undiagnosed in up to 50% of cases.¹⁰⁷

Eating Disorders Not Otherwise Specified. Individuals who present with all but a few of the diagnostic criteria that distinguish AN or BN are classified as having atypical EDs defined by *DSM-IV*²⁰ criteria as EDNOS (Table 3). Nearly 50% of patients in the general population with EDs who present to tertiary care programs are diagnosed with EDNOS; moreover, the subsyndrome appears to be particularly common among adolescents.⁸⁹

Subclinical Syndromes

The *DSM-IV*²⁰ clinical criteria for diagnosis of AN, BN, and EDNOS were developed for nonathletes and are distinguished by significant psychiatric morbidity. Athletes are more likely to present with less extreme behavioral indicators and psychological symptoms that represent subclinical variants of AN, BN, and EDNOS.^{6,12-15,27,108-111} Maladaptive behaviors may begin simply as a means of enhancing performance by losing weight or, perhaps inadvertently, by failing to maintain adequate energy availability during high-intensity or high-volume sport training and not necessarily from psychopathology.^{110,112} Athletes may also show evidence of some common psychological traits associated with clinical EDs, such as high achievement orientation, self-motivation, rigid self-discipline, and perfec-

tionism.^{6,22,113-115} However, these traits also correlate with success in athletics and are important determinants in the drive for performance excellence.

Athletes comprise a unique population.¹³ They are widely regarded as a special subgroup of healthy individuals with physically demanding lifestyles who are seemingly invincible and are often capable of extraordinary athletic feats.¹¹⁶ Determining when behaviors and attitudes specific to diet and exercise are progressing to pathogenic levels consistent with EDs is challenging due to the influence of performance expectations, training demands, energy requirements, and personality characteristics.^{10,89,117} Awareness of behavioral and psychological indicators of athletes with EDs may be helpful in determining an athlete's risk potential (Table 4).

Physical Signs, Symptoms, and Medical Complications

Recognizing physical signs and symptoms associated with EDs is critical to prevention and early treatment of a wide range of medical complications secondary to malnutrition or purging (Table 5). Some complications are relatively benign, whereas others are potentially life threatening. In some cases, the athlete may only present with vague medical complaints, generalized muscle fatigue, or dehydration.^{14,19} The fact that ED behaviors are well concealed further complicates the scenario in terms of recognition. Therefore, the degree of physiologic compromise is best understood with an examination of signs, symptoms, and potentially serious complications that can manifest with full-syndrome EDs.

Anorexia nervosa has the highest mortality rate of any psychiatric illness, estimated at 10% within 10 years of diagnosis.¹¹⁸ Death is secondary to cardiac arrest, starvation, other medical complications, and suicide.⁸⁹ The mortality rate in BN is lower, approximately 1% within 10 years of diagnosis.¹¹⁹ However, these figures may be deceiving,¹⁰² as patients frequently move between diagnostic categories over the course of their illness. As previously mentioned, up to 50% of patients with AN develop bulimic symptoms¹⁰³ but still carry the primary diagnosis of AN.

Physiologic effects of EDs are widespread, and no organ system is spared.¹⁷ Malnutrition decreases metabolic rate and causes abnormalities in the cardiovascular, reproductive, skeletal, thermoregulatory, gastrointestinal, and other systems. The resultant abnormalities can be particularly dangerous and especially problematic for athletes who continue to train intensively in an energy-deficient or nutrient-deficient state.

Cardiovascular complications include sudden cardiac death due to arrhythmias, electrolyte abnormalities, and ipecac-induced cardiomyopathy.¹²⁰⁻¹²² The signs of cardiovascular abnormalities secondary to chronic caloric and fluid deprivation can include severe sinus bradycardia (resting heart rate <50 beats/min during the day and <45 beats/min at night), hypotension (<80/50 mm Hg), orthostatic changes in pulse (>20 beats/min) or blood pressure (>10 mm Hg), decreased myocardial contractility, valvular dysfunction, impaired left ventricular function, delayed capillary refill, and acrocyanosis (bluish color of the distal extremities or lips).^{17,18,120,123-125} Electrocardiographic changes can be present¹²⁶ and manifest as

ventricular arrhythmias¹²⁴ and abnormal QT intervals.^{127,128} A prolonged QT interval is associated with sudden death and may be aggravated by bradycardia or electrolyte disturbance but can also occur in the presence of normal serum electrolytes.^{127,128}

Bradycardia (resting heart rate between 40 and 60 beats/min)¹²⁹ is not only a clinical feature of individuals with AN but also of healthy, well-conditioned athletes who participate in dynamic physical activities such as distance running, cycling, swimming, or rowing.¹¹⁶ Quite often, athletes with bradycardia are considered to have athletic heart syndrome. This benign syndrome is characterized by an increase in cardiac mass and represents normal adaptations to exercise in the anatomy and physiology of the cardiovascular system.¹¹⁶ As a result of the cardiac changes, resting heart rates as low as 45 beats/min have been reported.¹³⁰ In a study of 1299 athletes representing endurance events, ball games, strength sports, and gymnastics, average heart rates were 62.5 ± 12.5 beats/min in males and 65.2 ± 12.7 beats/min in females.¹³¹ Heart rates of less than 50 beats/min were reported in 18.7% of athletic males and 10.2% of athletic females. Therefore, in bradycardic athletes, resting heart rates of less than 50 beats/min during the day and less than 45 beats/min at night may not always indicate cardiac fitness and may instead represent physiologic instability in athletes with EDs.¹⁸

Reproductive complications in female athletes, characterized by menstrual cycle alterations (particularly amenorrhea) merit special attention. Amenorrhea is a clinical feature of AN and of exercise training.³⁷ The cause of amenorrhea in athletes has been theorized as low energy availability resulting from a decrease in caloric intake either to lose weight or maintain a low body weight, an increase in exercise volume without a concomitant increase in consumption of calories, or a combination of both.^{40,45} Because amenorrhea is common in female athletes,³⁷ it is all too often characterized and unfortunately disregarded as a convenient byproduct of intense physical exercise. Ascribing menstrual cycle variations to exercise without proper clinical evaluation to rule out other medical problems underlying cessation of menses is a dangerous practice.¹³² The onset of amenorrhea is accompanied by rapid bone loss,^{21,37,133,134} and timely interventions are necessary to prevent low bone mass^{43,135–137} and increased susceptibility to stress fractures.^{44,45,138,139} Considering that it is statistically uncommon for girls and adolescents to remain amenorrheic for more than 90 days between periods, evaluation within the first 3 months of onset may be beneficial.⁴⁶

The consequences of bone loss are considerable, and many different treatment strategies have been recommended to minimize their severity. These include maximizing energy availability, defined as the amount of dietary energy remaining for other body functions after exercise training.⁴⁵ To address low energy availability, the mainstays of treatment are increasing the athlete's caloric intake to meet exercise energy requirements or reducing exercise training volume and intensity (or both).^{40–42,45} Another important treatment strategy is the administration of bone building nutrients, such as calcium and vitamin D, to maximize skeletal health.^{49–51} However, it has been estimated that only about 25% of boys and 10% of girls

ages 9 to 17 years meet the recommended dietary intake of calcium at 1300 mg/d.⁵¹ It is estimated that 50% to 60% of adults meet the recommended calcium intake at 1000 to 1500 mg/d.⁵¹ Adequate intake of vitamin D is estimated at 400 to 600 IU/d; however, this amount may represent the minimum.^{50,51} Insufficient vitamin D prevents children from attaining genetically programmed peak bone mass and contributes to osteoporosis in adults.⁵⁰ In individuals who fail to meet dietary intakes, restrict calories, show signs of bone loss, or are osteoporotic, the dosages for both supplements may need to be higher.^{45,50,41} From the standpoint of calcium supplementation and stress fracture prevention, a recent study conducted on female navy recruits during 8 weeks of basic training showed that taking 2000 mg/d of calcium and 800 IU of vitamin D supplements significantly reduced stress fracture incidence compared with those receiving placebo pills.¹⁴⁰ As further investigations confirm the findings of this promising research, future consideration may be given to increasing dosages of these supplements, especially in physically active individuals. The last treatment strategy focuses on the administration of hormone replacement therapy or the oral contraceptive pill.^{37,52–54} However, these pharmacologic agents have not been sufficient in reversing loss of bone mineral density or correcting the metabolic abnormalities that lead to deterioration in health and performance of amenorrheic athletes with or without eating disorders.⁴⁵

The aforementioned reproductive and skeletal complications were introduced in the scientific literature in 1997 as 3 interrelated medical conditions — DE, amenorrhea, and osteoporosis — referred to collectively as the *female athlete triad*.²¹ Severe physiologic and psychological consequences were theorized to result from the synergistic effect of all 3 components. Over the past decade, scientific investigations into the prevalence, causes, prevention, and treatment of the triad have led to a revised description. The female athlete triad now refers to the interrelationships among energy availability, menstrual function, and bone mineral density.⁴⁵ Compared with the original description, low energy availability is the key disorder underlying the other components of the triad. Additionally, a spectrum of severity exists for each of the components, ranging from health to disease. Low energy availability with or without an ED, functional hypothalamic amenorrhea, and osteoporosis now represent the pathologic end of the spectrum and not the focal point of the triad. The first study to directly examine the combined prevalence of the triad components in a heterogeneous sample of United States collegiate athletes was published in 2006.⁵⁹ A study of high school athletes followed shortly thereafter.⁵⁸ In both studies, the number of athletes reported to suffer from all 3 clinical conditions was small. However, a significant number suffered from individual disorders (eg, DE or amenorrhea, or both), underscoring the need to recognize and treat each individual component as it presents, so that potentially irreversible consequences are prevented.^{45,59}

From a general perspective, researchers have emphasized that more similarities than differences exist between young adult males and females in the signs and symptoms⁶⁷ and medical complications¹⁴¹ characterizing AN. Of the noted differences, attention has focused on the severity of medical complications in males compared with their female counterparts due to delays in diagnosis and treatment.^{64,65}

Additionally, males have no overt signs of malnutrition, such as amenorrhea, which serves as a recognizable clinical feature for diagnosis of EDs in females.⁶²

These known medical consequences have been examined and reviewed primarily from the perspective of adult-onset AN. Generalizations to adolescents are limited by the range of variation among individuals in the timing and tempo of the growth spurt, sexual (pubertal) maturation, and associated hormonal changes.^{86,107} Chronic maladaptive eating and weight control behaviors during adolescence may be associated with linear growth retardation (if the behaviors persist before closure of the epiphyseal growth plates) and arrested sexual maturation; impaired acquisition of peak bone mass, which may increase fracture risk; severe bradycardia, with heart rates as low as 40 beats/min; and blood pressure changes.¹⁸

Physical complications associated with BN are less extensive than those of AN. Unfortunately, physical indicators of BN are not easily recognized, and early intervention strategies to prevent potential medical complications and facilitate eventual recovery are often delayed.⁸⁹ Delay in referral and subsequent treatment is due in part to the near normalcy of body weight evidenced. Bulimic patients often recognize their disorder, yet pursuit of early treatment is frequently overridden by shame and guilt.

The binge-eating aspect of bulimia rarely causes significant physical problems with the uncommon exception of gastric rupture.¹⁴² Most serious medical complications stem from self-induced vomiting, which is the most common form of purging, reported in more than 75% of patients with BN.^{143,144} This form of purging is also found in patients with AN and EDNOS.

Frequent vomiting can cause swelling of the parotid glands, lacerations of the mouth and throat stemming from the use of foreign objects to induce regurgitation, calluses on the dorsum of the hand (Russell sign), irritation of the esophagus or pharynx, and dental erosion due to contact of the teeth with gastric acids.^{17,89} Other complaints include constipation or diarrhea, menstrual irregularities, sore throat, chest pain, and facial edema.¹⁷

Excessive loss of fluids during vomiting can disrupt the electrolyte and acid-base balance of the body, leading to depletions in hydrogen chloride, potassium, sodium, and magnesium, which are all necessary for nerve and muscle function.¹⁷ Effects of dehydration and electrolyte imbalances may be experienced for as long as 1 week after an episode of binge-purge behavior.¹⁴⁵ Frequent binge-purge episodes may result in transient periods of dehydration characterized by fatigue, irritability, muscle spasms, dizziness or even fainting, generalized bloating, swelling of hands and feet, heart palpitations, and a decrease in balance and coordination. More severe complications such as paresthesia, tetany, seizures, and cardiac arrhythmias may result and warrant immediate referral and care.¹⁴² It is important for clinicians to be mindful of maladaptive purging behaviors other than vomiting, such as ipecac abuse, which can cause irreversible cardiac abnormalities and fatal cardiomyopathies due to its accumulation in cardiac tissue.¹²³

Although adolescent male and female patients with BN reportedly have similar physical signs such as dental enamel erosion, parotid gland swelling, esophagitis, and electrolyte disturbances, a significant delay between the

onset of symptoms and the age of first treatment has been described in males but not in females.⁶⁶ It has been suggested that the lag time may result from reluctance of males to openly discuss their eating problems because of feelings of shame and embarrassment in having a stereotypically “female” disorder.⁶⁶

Risk Factors

Several non-sport-related risk factors that are biopsychosocial in nature have consistently been associated with DE development in adolescents and young adults. These include biological factors such as pubertal status, pubertal timing, and the BMI^{142–148}; psychological factors such as body image dissatisfaction,^{73,149,150} negative affect (mood states such as depression, stress, shame, inadequacy, guilt, and helplessness),¹⁵¹ low self-esteem,^{152,153} and perfectionism^{115,154,155}; and sociocultural factors such as perceived pressure to conform to an unrealistic standard of thinness.^{156,157} Athletes are vulnerable to these factors and to others that are sport specific.

Type of Sport Participation. Athletes participating in sports that emphasize appearance, a thin body build, or low body weight or that require weight classifications have historically displayed a significantly higher prevalence of subclinical and clinically diagnosed EDs than athletes in other sports.^{12,14,73} However, the perception and association of DE primarily with lean-build sports is slowly diminishing. Authors⁵⁹ of a recent investigation of the prevalence of DE in collegiate female athletes participating in lean-build and non-lean-build sports found they were susceptible to DE, regardless of the type of sport participation.

Susceptibility of male athletes to DE has garnered much interest, particularly those participating in sports such as distance running,¹⁵⁸ wrestling,^{15,73,159,160} body building,^{161,162} lightweight football,¹⁶³ horseracing,¹⁶⁴ rowing,¹⁵ and ski jumping.¹⁶⁵ Moreover, authors⁷² of a meta-analysis of 17 studies involving adolescent and adult male athletes reported more DE than comparison groups across all categories of sport but particularly among aesthetic and weight class-dependent sports.

Serious competitors in aesthetic sports often begin intensive training at relatively early ages, usually before puberty. Puberty is characterized by major changes in hormonal levels and other physiologic indicators; body size, proportion, and composition; and behaviors.^{86,166} A primary concern is often the increase in absolute and relative fat mass associated with puberty, which may negatively influence performance.^{167–169} From early to late adolescence, about 11 to 18 years, girls gain an estimated 17.3 kg (38.1 lb) in fat-free mass and 7.1 kg (15.7 lb) in fat mass, while boys gain an estimated 32.5 kg (71.6 lb) in fat-free mass and 3.2 kg (7.1 lb) in fat mass.⁸⁶ The weight gain in boys is predominantly due to an increase in lean tissue, specifically muscle, whereas about one third of the gain in girls is fat tissue.¹⁷⁰ Consequently, young girls may struggle more than boys in adapting to physical changes of puberty and may try to prevent or counter normal changes associated with growth and maturation through the use of maladaptive eating behaviors.¹⁶⁷

Increasing preoccupation with meeting unrealistic body weight goals for performance enhancement is also evident in endurance sports such as distance running, swimming, and

cross-country skiing. Elite endurance athletes are reportedly able to maintain a high level of performance with exceptionally low energy expenditure due to increased metabolic efficiency.^{40,171} As fitness improves with training, metabolism becomes more efficient, so fewer calories are needed to accomplish the same amount of work. If the energy cost of training exceeds caloric intake, an energy deficit results. In female athletes, biochemical consequences of chronic caloric (energy) deprivation are theorized to induce menstrual cycle alterations (eg, amenorrhea).⁴⁰⁻⁴² Researchers^{171,172} of the metabolic, hormonal, and body composition status of distance runners concluded that amenorrheic runners maintained body weight on substantially fewer calories, about 60% to 70%, of expected. These results suggest that an athlete's ability to perform at a high level despite chronic undernutrition presents a challenging scenario for clinicians from the standpoint of early identification of DE in athletes. If the imbalance between caloric intake and energy expenditure goes unrecognized, severe and/or chronic energy deficit may result and play an important role in the pathogenesis of an ED.

In sports requiring weight restrictions, athletes routinely experience frequent periods of restrictive dieting or weight cycling. Wrestling is the extreme and drew considerable national attention in the fall of 1997, when 3 collegiate wrestlers died within 33 days from intentionally using extreme and unsafe methods to rapidly "cut" weight to gain a competitive advantage.¹⁷³ Shortly after these deaths, the National Collegiate Athletic Association (NCAA) established new rules and procedures that appear promising in minimizing potentially life-threatening practices.¹⁷⁴

Body Image Dissatisfaction. A positive body image is often associated with physical activity.¹⁷⁵ However, subgroups of physically active people have been targeted as possessing body image concerns and DE.^{73,175-180} The issue of body image in athletes is not only negatively influenced by socioculturally driven pressures to achieve and maintain an unrealistic body shape and size but also by demands to be thin for maximizing performance.^{10,13,75,181} Although female athletes face stronger sociocultural pressure to be thin, male athletes may be subject to pressure from within their sport to conform to an ideal body shape or weight for performance and aesthetic reasons. Thus, male athletes may be more susceptible to DE than previously believed.^{15,72} Sociocultural pressure to be thin, coupled with performance anxiety or negative performance appraisal, may predispose athletes to body dissatisfaction, which often mediates the development of DE attitudes and behaviors.^{69,74,182,183}

Attitudes reflecting dissatisfaction and anxiety with body size, shape, and weight are common concerns for children and adolescents^{4,98-101} and are connected with puberty and the growth spurt.^{184,185} At this time, the degree of satisfaction with one's own body is a significant predictor of eating disturbances,¹⁸⁶ self-esteem,¹⁸⁷ and depression.^{184,188} Additionally, recurrent peer, parental, and media messages that equate desirability with appearance thinness play a central role in creating and intensifying the phenomenon of body dissatisfaction.^{150,189-191} The indoctrination for appearance thinness begins as early as 6 years of age^{192,193} and can trigger unhealthy body image attitudes and associated eating concerns that can become established and difficult to reverse by 11 to 14 years of age.¹⁰¹

Internalization of the thin ideal and body dissatisfaction is more of a problem with adolescent girls than boys.^{101,147,194,195} In boys, body dissatisfaction is more likely to be associated with pursuit of muscularity.¹⁹⁶ Some boys long for a larger and more muscular physique, whereas others express a desire to lose body fat and develop a leaner and more muscular body.¹⁹⁷ It has been suggested that several risk factors and underlying mechanisms that may lead adolescent boys to pursue muscularity are similar to those that trigger development of DE.^{63,71}

Detection

The National Institute of Clinical Excellence,¹⁹⁸ the American Academy of Pediatrics,³⁹ the Society for Adolescent Medicine,¹⁸ the American Psychiatric Association,²⁰ the American College of Sports Medicine,²¹ and the NCAA,¹⁰ among others, have stressed the importance of early recognition in the management of DE. Because DE self-reporting is rare among athletes due to secrecy, shame, denial, and fear of reprisal,^{10,70,76} early detection requires the development and implementation of a confidential and accessible screening program. Some screening methods, including the PPE, standardized self-report psychometric questionnaires, individual interviews, and direct observation are more useful than others in identifying athletes in need of treatment and those who would benefit from preventive strategies.

Preparticipation Physical Examination. The PPE affords clinicians an ideal opportunity to screen for eating and body weight disturbances. The most sensitive and productive screening component is the medical history questionnaire. Compiling a useful medical history for both male and female athletes depends on the inclusion of specific questionnaire items that solicit information on dietary restraint, body weight fluctuations, weight control behaviors, body weight and shape satisfaction or dissatisfaction, nutritional beliefs and practices, typical eating patterns, exercise habits, and musculoskeletal injuries with special reference to bone stress injuries.^{32-34,77} In female athletes, ancillary questions are necessary to screen for menstrual dysfunction.^{32,35,36,134} A comprehensive menstrual history survey includes questions pertaining to age of menarche, length and frequency (number of cycles per year) of periods, regularity of periods since menarche, date of last menstrual period, amount of flow, frequency and duration of amenorrhea, and oral contraceptive use and its purpose.^{32,35,36,134} Specific questionnaire items to screen for DE and menstrual dysfunction are listed in Table 6a and 6b.

Although experts have recommended use of the PPE to screen for DE, such an approach is underutilized.^{77,90-92,199} A survey of the nature, scope, and perceived effectiveness of screening in select Division I schools for DE in addition to menstrual dysfunction in female athletes indicated major shortcomings.⁷⁷ Screening for DE during the PPE was reported by 60% of the schools. Self-developed questionnaires or more indirect measures of assessing eating disturbances (eg, weight-for-height standards, weight-loss history, and excessive injuries) were used. Fewer than 6% of the schools used standardized, self-report psychometric questionnaires to screen for DE. However, questionnaires of this nature are not entirely satisfactory when used in an

athletic population, and clinicians must be mindful of factors that can compromise their effectiveness. These factors will be discussed in the next section.

Of schools that incorporated specific questions to screen for menstrual dysfunction, only 24% reported using a comprehensive menstrual history survey. The screening consisted of only 1 or 2 questions, which would not have provided sufficient information for most experts.^{32,35,61}

Screening for DE and menstrual dysfunction in high school athletes is essential, particularly because adolescence is a vulnerable time for development of DE and a critical period for optimizing bone mineral accrual.⁵⁸ However, many PPEs are reported to be inadequate due to lack of a comprehensive medical history questionnaire.²⁰⁰ A survey completed at the high school level involving 34 athletics programs demonstrated the lack of effectiveness of the medical history questionnaire in screening for DE and menstrual dysfunction.²⁰⁰ A total of 22% of schools reported screening female athletes for DE via weight-for-height measurements, weight loss history, or reports from coaches and teammates. Screening for menstrual dysfunction was reported by 33% of the schools; however, the questionnaires were inadequate for soliciting useful information.

Unfortunately, even if the medical history questionnaire is adequate for gathering concise information, clinicians rarely take advantage of the information as a means of health maintenance and optimization.³³ This omission is particularly damaging to some adolescent athletes, whose only opportunity for routine health care may be the annual PPE.²⁰¹ Therefore, the adequacy of the PPE, particularly in terms of the medical history review, cannot be underestimated as a preventive approach in identifying high-risk athletes in this age group.²⁰²

Standardized, Self-Report Screening Questionnaires. The most widely used standardized, self-report screening questionnaires in athletes include the Eating Disorders Inventory (EDI),³¹ the Eating Disorder Examination (EDE-Q),⁸¹ and the Eating Attitudes Test (EAT).⁸² Although these psychometric instruments have been validated in the general population, they have not been specifically tested for sensitivity or validity with athletes. Hence, the resultant information may not be accurate.^{78,203,204} If identified as having DE, athletes are often fearful that their positions on the team will be jeopardized or their careers will suffer adverse consequences. Even when anonymity is assured, some athletes fear their coaches will be able to distinguish individual responses. A fake profile may emerge that results in underreporting DE.^{6,8,10,13,205} In addition to incongruities noted between an athlete's reported and actual behavior, some instruments are fairly intrusive or time consuming. The utility of screening large numbers of athletes with lengthy surveys that often require psychometric expertise for administration and data interpretation is seldom practical in most athletics settings.⁸⁰

The need for psychometrically valid and clinically useful instruments for screening for eating and weight disturbances in athletes has provided the impetus for further study. As a result, numerous screening instruments have been designed specifically for athletes: the Survey of Eating Disorders among Athletes (SEDA),⁹ the Athletic Milieu Direct Questionnaire (AMDQ),⁸³ the Female Athlete Screening Tool (FAST),⁸⁴ the College Health Related Information Survey (CHRIS-73),⁸⁵ the Physiological Screening Test,⁷⁹

and the Health, Weight, Dieting, and Menstrual History Questionnaire.⁵⁹ Table 7 describes these instruments.

As a group, the screening instruments developed for athletes have shown promise in initial applications. Their concurrent validity has been established with other standardized psychometric instruments developed for the general population. As more investigations surface on internal validity, content and criterion validity, and response bias with larger sample sizes and with athletes in a variety of sports and sport settings and at various performance levels, the generalizability of screening measures will increase.^{79,80}

In-Depth Personal Interviews. Self-report questionnaires should be complemented with other information-gathering tools. One option that has the potential to provide a more accurate representation of the problem is in-depth personal interviews.^{14,77-80} Personal interviews allow athletes to converse about their thoughts and feelings without judgment from coaches or teammates. Accuracy of the information exchange depends upon how comfortable the athlete feels in providing candid and unsolicited comments regarding concerns about body weight, shape, and appearance. Accuracy also depends on how secure the athlete feels about divulging information on whether he or she has been subjected to public weigh-ins, public scrutiny of results, remarks concerning the need for weight loss, or coercion to lose weight in accordance with the desired ideal of a coach or CSO.⁸⁰ Therefore, the individual who facilitates the interview must have professional and personal qualities that promote a secure and nonthreatening environment; otherwise, fear of reprisal, shame, and denial and secrecy associated with the disorders will continue as barriers to identification. The facilitator should be knowledgeable of DE, understand the language and demands of sport, emanate confidence in handling the information exchange, display excellent listening skills, possess the ability to remain objective, and refrain from disapproval or criticism.⁷⁰

Despite the use of self-report questionnaires and personal interviews, information obtained simply from observing the behavior of individual athletes cannot be underestimated.⁷⁰ A knowledgeable observer of the team, such as a certified athletic trainer, coach, teammate, or other athletic staff member, often provides the quickest means of identifying a problem.

Physiologic Measurements. Athletes need specialized guidance to attain and maintain reasonable body weight goals, regardless of whether weight reduction is motivated by physiologic or aesthetic reasons or out of necessity to compete in weight-class events. However, pursuit of a reasonable weight is often complicated by an erroneous and overemphasized belief held by coaches and athletes that an ideal body weight or body fat percentage exists for optimal performance in a given sport. An ideal target weight or percentage of body fat is very difficult to define and even harder for an athlete to achieve without triggering harmful weight loss practices.^{6,70} Moreover, weight loss recommendations without proper guidance, particularly from coaches, have been reported as a risk factor for development of maladaptive weight loss behaviors.^{13,206}

Many coaches lack the formal education necessary to properly supervise athletes during periods of weight loss.^{13,207,208} An assessment of the mental health of elite female student-athletes on a university campus revealed

that they were particularly disturbed about how their coaches handled body weight issues.²⁸ Athlete concerns were triggered and perpetuated by mandatory weekly weigh-ins, assignment of target weights, perceived subtle psychological pressure to lose weight, and feelings that their coaches were generally uncomfortable about issues pertaining to body weight and eating. Undue emphasis on appearance and performance thinness necessitates methods to monitor the nutritional and training status of the athlete over and above the measurement of scale weight. Assessing body composition is one option.

Assessing Body Composition. Body composition pertains to the amount and distribution of fat mass, as well as lean (fat-free) body mass. Studies of body composition attempt to partition body mass into its major components. The component of body composition that has generally received most attention is relative fatness, expressed as percentage of body fat.¹⁶⁰ Diet and physical activity habits readily influence fat mass. Increases in fat mass and percentage of body fat are generally perceived as having a negative influence on functional performance capacity and detracting from appearance in aesthetic sports.¹⁶⁷ In young athletes, body composition is influenced by both growth and individual differences in the timing and tempo of the adolescent growth spurt and sexual maturation.⁸⁶

Athletes often increase muscle mass and decrease fat mass during intensive training, especially during preseason conditioning and resistance training. They feel leaner and stronger, and their clothes fit more loosely. Yet they are confused as to why the scale frequently indicates an increase in body weight. Muscle tissue, which produces the force necessary for performance, is denser, takes up less space, and weighs more than fat tissue. Without access to an accurate estimate of body composition, athletes may not understand how training influences these changes and, more importantly, which ranges of values are acceptable from a health and safety standpoint.

Body composition can be estimated through measurement of skinfold thicknesses, hydrostatic weighing, air displacement plethysmography (BOD POD; Life Measurement, Inc, Concord, CA), bioelectric impedance, and DXA, among others.⁸⁶ With the exception of DXA, most methods provide a 2-component model of assessing body composition (ie, fat mass and fat-free mass). The DXA is based on a 3-component model (fat mass, fat-free mass, and bone) derived from different X-ray attenuation properties of soft tissue and bone mineral.^{55,56} The DXA is advantageous in not only providing a precise measurement of body composition but also in evaluating bone density, which is an invaluable tool in determining stress fracture susceptibility in female athletes.^{55,56} However, the instrument is costly and requires skilled technicians to administer the scan and interpret the data output.²⁰⁹

In general, all techniques provide estimates of body composition and all have potential sources of error. The techniques are based upon different theoretic models and assumptions for estimating body composition; consequently, values derived from the different methods are not directly comparable. Therefore, methodologic issues and assumptions underlying each technique and associated errors of estimation should be recognized and appreciated, so the risk

of misinterpretation is minimized, especially in the hands of relative novices in the field.

Problems associated with the assessment of body composition and interpretation of data may trigger DE.^{21,210} In response to this scenario, one organization, The Canadian Academy of Sport Medicine has recommended eliminating body composition assessment to reduce DE risk potential.²¹¹ However, this approach may not be reasonable in many sport settings.^{27,86} Changes in body composition may reflect subtle alterations in energy balance not readily apparent in scale weight and may provide essential information for the nutritional support and training status of the athlete.^{27,86} Serial measurements of body composition can assist in determining the efficacy of a given training program, identifying unhealthy weight fluctuations, and evaluating whether a particular course of remedial action (eg, dietary recommendations) is in line with meeting the athlete's special health care needs.²⁷ In young athletes, it can be an important complement to the evaluation of physical growth and maturity status,^{167,212} especially when changes in size, physique, and muscle mass are anticipated in the transition from childhood to adolescence and from adolescence to young adulthood (ie, from high school into college).^{86,167}

Calculating the Body Mass Index. Appropriateness of body weight for height at a given age in either sex varies considerably. It can be assessed by calculating the BMI.¹⁷ The BMI is used internationally as a simple indicator of heaviness and lightness, specifically at the extremes of the distribution: that is, overweight/obesity and underweight. The BMI expresses weight for height: $BMI = \text{weight} / \text{height}^2$, where weight is in kilograms and height is in meters squared (kg/m^2).⁸⁰ Therefore, accurate measurements of height and weight are essential. The BMI is correlated with total body fat and percentage of fat in heterogeneous samples but is also related to fat-free mass; thus, it has limitations.²¹² Correlations between BMI and fat and lean components of body composition, respectively, vary among children, adolescents, and young adults, and at many ages, correlations between BMI and fat mass and fat-free mass are reasonably similar.²¹³⁻²¹⁶ Moreover, caution is advised in interpreting estimates of normal weight and overweight based on the BMI in both athletes and nonathletes.²¹⁷

Associations between the BMI and components of body composition in several samples indicate a wide range of variability. Individuals with the same BMI can differ considerably in percentage of fat and fat mass, which limits use of the BMI as an indicator of fatness. Interpreting the BMI calls for consideration of both fat and lean components of body composition.

Interpretation of the BMI in adolescents and young adults, and especially active individuals, as an indicator of fatness needs to be addressed carefully. It is more appropriately an index of heaviness and not necessarily fatness. As a group, athletes tend to be leaner and have less fat than nonathletes, so a higher BMI is more likely indicative of the greater muscle development in active athletes.^{218,219} Nevertheless, concern for a low BMI in some athletes may be necessary. The World Health Organization⁸⁷ classifies individuals 18 years of age or older (adults) with a BMI less than $18.5 \text{ kg}/\text{m}^2$ as underweight. For individuals younger than 18 years of age, no agreed cut-offs exist. However, a BMI that is less

than the age-specific and sex-specific 5th percentile of a nationally representative sample of United States children and adolescents derived from the Centers for Disease Control and Prevention growth charts (2002) can be used as an indicator of being underweight. These growth charts can be accessed at <http://www.cdc.gov/growthcharts/>. Note, however, that the BMI of children and adolescents is influenced by individual differences in growth and maturity status, especially the timing and tempo of the adolescent growth spurt and sexual maturation.⁸⁶

Management

Repeatedly cited in the literature is the statement that athletes with DE require medical care from a physician-coordinated team of experts representing nutrition, mental health, and athletic training.^{21–26} Because the similarities between males and females with DE are more notable than the differences in terms of clinical features,^{64,220,221} similar strategies for identification and treatment are recommended for both sexes.⁶³

If DE is suspected, the initial contact has been recommended to come from an authority figure — one whom the athlete knows and trusts to ensure that the intervention is facilitated with sensitivity and compassion.^{88,113,222} The initial conversation should be straightforward, disclosing evidence of DE and balancing concerns for the athlete's health and well being.^{88,113} There should be no hint of disapproval or criticism.

If DE suspicions are confirmed after the initial confrontation, the most pressing referral is to the supervising physician for a detailed medical history review and physical examination.^{89,93} A positive evaluation requires classifying the athlete, detecting the presence or absence of physical complications, formulating an interdisciplinary management plan, providing for continuing care and surveillance,²²³ and determining the extent of sport or exercise participation.⁹³ If the diagnosis has already been established, the evaluation should review the past and present degree of symptoms, assess the athlete's degree of compliance with past and current treatment protocols, and ascertain an anticipated level of continued care and athletic participation. Laboratory tests and an electrocardiographic evaluation may be required^{89,93}; the comprehensiveness of the tests will be dictated by symptoms and clinical findings.

The components of the initial evaluation, including the medical history review, physical examination, laboratory studies, and electrocardiography, are described in Table 8. A focus on these components will assist the health care team in determining the appropriate setting for treatment and ensure optimal management of the athlete from an interdisciplinary standpoint.

Treatment Settings. Accurate assessment of health risks is essential to determine the appropriate setting for treatment, which may include hospitalization, intensive inpatient specialty venues or residential programs, partial hospitalization, and various levels of outpatient care. Outpatient treatment settings suffice for most athletes^{24,25} who are carefully monitored and have a high level of motivation to comply with treatment recommendations, cooperative families, brief symptom duration, and stable weight, cardiac, and metabolic status.⁸⁹ A more restrictive setting is

necessary with a rapid or persistent decline in oral food intake, rapid weight loss despite nutritional intervention, severe electrolyte imbalances, severe or intractable purging, cardiac arrhythmias, comorbid psychiatric problems, unresponsiveness to adequate outpatient care, and environmental considerations no longer conducive to healing.^{17,24,89}

Therapeutic Interventions. The desired goals of intervention strategies include (1) the athlete's acceptance of the problem; (2) modifying maladaptive thoughts, attitudes, feelings, and habits that perpetuate the condition; (3) identifying and resolving psychosocial triggers; (4) stabilizing medical conditions; (5) reestablishing healthy eating patterns; (6) enlisting family support when appropriate; and (7) preventing relapse.^{17,22,25} Because of the complexity of issues involved in working with athletes who present with DE, optimal management requires an organized, systematic approach to the development and implementation of interventions specific to nutrition, mental health, and athletic training. Administrative support is also necessary to define what constitutes reasonable care within the confines of the organization's resources and budgetary considerations.

Nutrition. The main goal of dietary counseling and management is to help athletes maintain adequate energy availability.²²⁴ In more severe cases of persistent energy drain and marked weight loss, the primary focus is reestablishment of healthy target weights. Achieving this goal is essential for patients who present with reproductive and endocrine abnormalities, specifically female patients with irregular menses and abnormal ovulation, male patients with abnormal hormonal levels, and children and adolescents with abnormal patterns of physical and sexual growth and maturation.⁸⁹ Even if weight is within the normal range, as in most cases of BN, nutritional counseling is important to monitor binge eating and purging behaviors and address nutritional deficiencies.

The individual most qualified to provide this type of nutritional counseling is a registered dietitian, credentialed by the American Dietetic Association, who is knowledgeable in DE and understands the demands of sport. The American Dietetic Association has exceptional educational resources targeted to enhance the nutritional management of patients with EDs. These include a position statement entitled "Nutrition Intervention in the Treatment of Anorexia Nervosa, Bulimia Nervosa, and Eating Disorders Not Otherwise Specified"²²⁵ as well as medical nutrition therapy (MNT) protocols that provide the framework for identifying appropriate interventions and expected outcomes.^{90,91}

The role of the registered dietitian is to optimize nutritional status through the use of MNT protocols. The following treatment components are included in MNT: (1) a nutrition assessment to evaluate the athlete's food intake, metabolic status, lifestyle, and readiness to make changes; (2) dietary instruction and evaluation; (3) nutrition protocols for weight management; and (4) goal setting.²²³ The registered dietitian is also instrumental in determining safe body weight and composition values in addition to helping the athlete establish and maintain a pattern of regular and healthful eating by involving caregivers, parents, and CSOs in meal planning.

The use of MNT protocols with athletes was first documented in 2001.⁹² As more information becomes available, the protocols will serve to delineate both specific

nutritional interventions and outcomes to advance the recovery of athletes with EDs and the most effective methods to reach those goals.

Mental Health. At least at the university level, athletes have been reported to underutilize mental health services.^{28,226} Many athletes are also particularly sensitive to, and fearful of, psychological evaluation and treatment. Possible explanations include reluctance to admit personal weakness, desire to maintain autonomy, receipt of social support from teammates, and fear of derogation.^{227,228} Consequently, athletes who present for therapy show a continuum of readiness. Some will be determined to change, whereas others will be reluctant or even hostile.⁷⁶ Regardless of where they fall along the continuum, motivation is essential to effect behavior change. It is the role of the therapist to assess and enhance the athlete's level of motivation for change and to identify the best treatment approach for meeting the following desired goals: (1) increasing the athlete's motivation to participate in treatment and enhancing cooperation to restore healthy eating patterns; (2) correcting core maladaptive thoughts, attitudes, and feelings related to DE, particularly how an athlete's chosen sport or athletic participation may be contributing to perpetuating the condition; (3) addressing themes that may underlie DE, such as developmental issues, identity formation, body image concern, and self-esteem; (4) identifying and addressing additional stressors, both in and out of sport, including academic pressure, relationships with teammates and coaches, social contacts, and family; (5) treating associated comorbid conditions, particularly mood disorders that can manifest as a decrease in energy, motivation, and arousal and depression, increased perception of effort, suicidal ideation, and impaired cognitive function; (6) encouraging the athlete to be open and to ask for support from family, friends, coaches, and teammates; (7) enlisting family support and providing counseling to immediate family members and CSOs when appropriate; and (8) preventing relapse.^{22,89,93,94} The format for attaining these goals can include individual, group, and family counseling.^{27,229}

The success of mental health interventions is highly dependent on identifying an appropriate psychotherapist. A licensed clinical psychologist or other licensed mental health professional who has an understanding of sport culture and expertise in treating DE is the clinician of choice to manage psychopathological conditions and to promote the healthy coping behaviors, self-esteem, and assertiveness skills necessary for athletes to achieve desired treatment goals.²³⁰ Athletes are often referred to performance enhancement psychologists to deal with the complexity of issues associated with DE. However, it is important to recognize that performance enhancement psychologists generally lack the background and requisite training to address the needs of athletes who present with psychopathologic conditions.²³⁰

Pharmacologic agents may be necessary to treat patients.⁸⁹ Psychotropic medications such as the selective serotonin reuptake inhibitors (eg, fluoxetine, sertraline, citalopram, paroxetine) are commonly used in patients with BN to alleviate symptoms of depression.^{76,89} It is important to note that presently only fluoxetine has Food and Drug Administration approval for treatment of BN. Although there are presently no Food and Drug Admin-

istration-approved medications for AN, some evidence suggests that a variety of medications, including antidepressants, anticonvulsants, mood stabilizers, lithium, and antipsychotics, have shown promise in treating some anorexic patients with anxiety, obsessions, and psychosis.^{89,231} The use of any of these classes of medications for treatment of symptoms that accompany EDs is not without side effects. Therefore, caregivers and others serving in a supervisory capacity should be educated accordingly.

Certified Athletic Trainers. Certified athletic trainers, by virtue of their close working relationships with athletes, are in the best position to detect DE. They also have the capability and generally the responsibility to intervene and establish their role as integral members of the health care team.^{29,232,233}

Certified athletic trainers are often considered informed patient advocates in the management of DE cases. Generally, the athletic trainer's duties include confronting an athlete who is suspected of DE and assisting with the logistics involved in referral and treatment follow-through as well as issues related to communication, confidentiality, health status, athletic participation status, treatment non-compliance, and billing and insurance (Table 9). Although certified athletic trainers have the necessary background and education to assist in the care of athletes with DE, they must be cognizant of their scope of practice limitations with regard to diagnosis and treatment. These aspects of case management must be relegated to physicians and psychotherapists who specialize in DE.²³ Substandard conduct of certified athletic trainers in managing athletes with DE can result in liability exposure for themselves and subject employers to legal ramifications.^{29,232,233}

Issues in Treatment and Follow-Up Care

Treatment Noncompliance. Although one of the most challenging issues at the outset is persuading an ambivalent athlete to undergo an initial medical evaluation,⁹³ an even greater challenge may be convincing the athlete to follow through with treatment recommendations.²³⁴ Resistance to treatment has been reported among athletes with DE^{25,69} and is no less a problem with individuals presenting with DE in the general population.¹⁹⁹

One of the objectives of the first National Eating Disorders Screening Program (NEDSP)¹⁹⁹ held on collegiate campuses was to assess the level of an individual's adherence in following through on treatment recommendations. Although the subjects reported an increased awareness of the dangers of EDs and the availability of treatment, enhanced knowledge in these areas did not greatly affect the actual number of participants who sought treatment. Furthermore, nonpursuit of treatment was marked in a group of respondents who had been sufficiently motivated to attend an educational and screening program, presumably had access to health care services, and reported enhanced awareness of the need for treatment and the availability of treatment resources. These findings underscore the level of vigilance required on the part of caregivers to convince patients of the necessity for treatment follow-through and compliance.

In an athletic population, resistance to consultation or treatment is a challenging problem and may necessitate restricting training and competition until compliance is

established.^{25,69} When an athlete has been cleared to train and compete while undergoing treatment, suspension may be necessary with signs of continual weight loss, non-compliance with treatment recommendations, and manifestation of resistant behaviors within treatment sessions, such as interrupting, arguing, sidetracking, and defensiveness. Although suspension is advantageous in such circumstances, it may result in several potentially harmful consequences, as it represents a major setback in achieving athletic goals.^{25,69}

Stress induced by curtailing participation may become an unmanageable situation for athletes whose identity is based on receiving recognition for participation and success in sport.²⁸ The athlete's identity may be thrown into chaos, and self-esteem and self-acceptance may deteriorate further. The process is compounded by feelings of loneliness and alienation as coaches and teammates are no longer readily available for support. The athlete may resort to fewer coping mechanisms, which may worsen an already volatile situation. Moreover, with the sport connection severed, no other outlet may be available for physical and emotional release, and the athlete may continue to train on his or her own. This is a dangerous scenario, as it becomes more difficult to maintain the level of medical surveillance appropriate to safeguard the athlete's health and safety. However, suspension may not be needed if health risks are determined to be minimal based on the severity and chronicity of the problem, type of sport, training schedule and conditions, immediate health status, presence of complications or other medical conditions, and eating patterns.⁹⁴

A written contract, agreed upon and signed by the athlete and the health care team's coordinator or designate, may be necessary to promote patient compliance with the recommended treatment protocol.^{27,93} Under such a contractual agreement, the patient is expected to meet certain health maintenance criteria to continue athletic participation or resume participation after suspension (Table 10). The contract should include information that details the type, frequency, and location of treatments; the caregivers who will be supervising the various treatment components, their contact information and procedures for after-hour emergencies; the type and level of training permitted with special reference to intensity, duration and frequency of workouts; and body weight allowances with emphasis on expected rates of controlled weight gain, if applicable. If any condition of the contract is breached, the consequences must be explicitly spelled out. Any changes to the initial contract in terms of expectations must be documented accordingly.

The confidential handling of an athlete's medical information, according to disclosure regulations mandated by the Family Equal Rights and Privacy Act²¹⁵ and/or the Health Insurance, Portability, and Accountability Act²³⁵ is crucial to fostering a caregiver-patient relationship based on trust and mutual respect. To communicate appropriately, guard against a breach in confidentiality, and comply with disclosure regulations, the health care team's coordinator or designate must obtain written authorization from the patient indicating who will have access to the medical information and to what extent the information may be disclosed.

Maintaining confidentiality can be difficult. The team environment fosters close working relationships among

teammates, coaches, certified athletic trainers, and other sport management personnel. Most athletes will agree to share medical information with their coaches or CSOs on a limited basis as long as it focuses on treatment progress rather than on personal issues relating to their medical condition.⁷⁰

Transitional Care. If athletes with DE are in their early stages and maladaptive behaviors occur less frequently than with full-syndrome disorders, an ongoing medical surveillance plan and nutritional education may be the only intervention needed to keep the athletes emotionally stable and physically capable of functioning at a high level.⁷⁶ However, more severe and long-standing cases have the potential to drain existing resources and manpower, resulting in compromised treatment effectiveness. Recovery is further jeopardized when the environment is no longer conducive to healing.

Athletes typically function in an environment beset with stressors related to performance, rigors of academic coursework, personal development, and social adjustment.⁷⁶ The physical and emotional consequences of EDs superimposed on these stressors may complicate recovery. Also, the pathogenic eating and weight loss behaviors associated with the condition can cause stress and anxiety, as well as discomfort for teammates, coaches, and others who come in close contact with the symptomatic athlete.^{70,236} This situation is especially problematic when the athlete is clearly underweight, restricting dietary intake, or vomiting frequently.²³⁶ Caregivers may have no recourse but to curtail athletic participation, remove the athlete from persons and circumstances aggravating the condition, and consider a more restrictive setting for treatment. For young adult athletes who reside in residential campus settings, this action often requires a shift in the supervision of care from the organization to parents or guardians.

The transition of care from organizational to parental accountability must be approached with forethought. Many parents, guardians, or CSOs may not have an adequate level of understanding about the seriousness of the conditions to make medically responsible decisions. Even with adequate information, the emotional and financial repercussions can be overwhelming and present obstacles to accessing quality care.⁹⁵⁻⁹⁷

Access to appropriate care may be constrained by monetary or insurance difficulties.⁹⁵ Out-of-pocket expenses for care are often high, but insurance benefits can be the equalizer. However, many companies do not provide benefits for mental health care and those that do often exclude treatment for EDs.⁹⁶ For patients who have coverage, a limit to the type and extent of resources available exists. For example, if hospitalization or residential treatment is required, the allowable length of stay is often too short to prevent relapse. Before managed care contracts proliferated, patients in 1 residential facility solely dedicated to the treatment of EDs had an average length of stay of 50 days, with a return rate of under 10%.⁹⁷ Now, the average stay is closer to 15 days, with a return rate of 33%.⁹⁷ Additionally, insurance companies may restrict the number of outpatient visits per year, establish lifetime caps on coverage, and preclude payment to some medical practitioners.¹⁸ Accessing the appropriate care for adolescents may also have challenges. Adolescents may not satisfy the age requirements at treatment institutions able to provide

the most appropriate care.¹⁸ Moreover, qualified professionals may not be available to care for teenagers and young adults with EDs because of low reimbursement rates for psychosocial services common among insurers.¹⁸

Administrative Support. As a general rule, an organization must take reasonable care in administering its athletic program to prevent foreseeable harm to its participants and avoid potential liability for negligence.^{30,232} This includes optimizing sports medicine services to adequately protect the health and safety of athletes. The NATA²³⁷ and the NCAA²³⁸ have established health and safety initiatives and guidelines to assist organizations in identifying practices to potentially reduce individual risk and institutional liability. However, lacking are specific legal standards on what is obligatory, particularly in non-emergent situations.³⁰ Therefore, organizations must thoroughly examine both the benefits to their athletes and the financial implications to their sports medicine programs in ascertaining how to satisfy the legal duty of reasonable care.^{29,30} An appropriate response plan must start at the top, with administrators sending clear signals about what must be done and to what extent to prevent, minimize, contain, and manage problems.

Prevention

The design and implementation of mandatory, structured educational and behavioral programs for all athletes, coaches, certified athletic trainers, administrators, and other support staff are key to preventing DE in athletic settings.^{21,23,69,74,77,182,239–242} However, fewer than 41% of Division I athletics programs make such education a requirement.⁷⁷ Similarly, a study conducted at the high school level revealed that 33% of schools provided educational programs; however, fewer than 9% required student attendance and only 15% of the schools made education a requirement for coaches.²⁴³

Educational programs have been recommended by The American College of Sports Medicine²¹ and the NCAA.²⁴⁴ Additionally, a number of unique educational initiatives have been developed and implemented by national governing bodies of sports and high school associations in response to the need to limit the seriousness of DE or, preferably, prevent its development.^{245–247}

Seminars, guest speakers, written material, audiovisual presentations, and use of the Internet are all viable options for disseminating educational information. The content of information exchange varies depending on the needs of the targeted population and anticipated outcomes.

Athletes. First and foremost, athletes require information that destigmatizes DE through open, truthful, and factual discussions. Fear associated with talking about the condition must be allayed as well as the social stigma, shame, and guilt that prevent athletes from seeking help.⁷⁰ Accomplishing this goal requires increased awareness of EDs as conditions for which treatment is available and effective.¹⁹⁹ This helps break down presumed barriers to accessing care that stem from lack of information relative to the seriousness of the disorders, referral resources, and treatment options.¹⁹⁹

Second, athletes should be educated on the harmful effects of pathogenic weight control methods, which some players consider necessary for performance.^{88,206,248} This

factor alone underscores the necessity for athletes to receive quality information from knowledgeable professionals and other reputable sources. The Internet is one information source that can be helpful (Table 11).^{249,250} However, those who supervise athletes should also be alert to the existence of harmful Internet sites, such as pro-ana (anorexia) and pro-mia (bulimia) sites, devoted to the continuance, promotion, and support of EDs and glamorizing the unhealthy behaviors.^{18,251} Although these Web sites have been in existence for quite some time, they are becoming more prevalent on social networking sites.²⁵² This is a disturbing trend considering that the information is presently reaching a much wider audience.

Third, it is important that athletes become knowledgeable about sound nutritional practices so they are better equipped to scrutinize their eating habits to a level that ensures adequate energy availability. It is a challenge for most athletes to maintain a positive energy balance over long periods of training with adequate amounts of food and nutrients, particularly with a coexisting goal of body weight control.⁴¹ For example, the daily energy intake reported by many female athletes is often below the estimated energy expenditure of their training regimens,^{41,42,250} particularly some endurance-based programs that have a predicted energy expenditure of 700 to 1000 kcal/d.⁴¹ Athletes participating in less aerobically demanding sports such as gymnastics and figure skating have reduced total energy requirements and may increase dependency on energy deprivation to control or manipulate body weight.²⁵⁴ To prevent an imbalance between energy expenditure and dietary intake, athletes must make appropriate food choices that will provide adequate macronutrients and micronutrients so that metabolic fuels are readily available. Athletes with more nutrition knowledge are inclined to make better food choices, resulting in improved health status and enhanced athletic performance.^{254–256} However, numerous investigators have identified problems and deficiencies in the athlete's diet, especially as it relates to adequate consumption of macronutrients^{257–260} and micronutrients.²⁶¹

Lastly, although educating young adults about DE and related nutritional problems has been effective in prevention, an important question is whether this educational approach works for children.²⁶² From a general perspective, researchers and organizations have emphasized the need for developing and implementing educational programs that challenge the definition of thinness and promote self-acceptance, healthy eating, and reasonable physical activity among children and youth.^{98,263} In a study of 222 boys and girls in the 4th and 6th grades, short-term outcomes of a school-based curriculum program for developing healthy body image and preventing DE resulted in increased knowledge, positive attitudes, and healthful intentions related to body image, hazards of weight loss dieting, and unrealistic media-driven messages.⁹⁸

Coaches. Coaches are in a unique position to denounce unhealthy attitudes and behaviors that may trigger DE. However, they also juggle a combination of role demands and conflicts that are not always consistent with making decisions in the best interest of their athletes' health.^{264–266} Good decision making is further complicated by the fact that many coaches lack formal training in sport science

disciplines known to favorably affect health and performance, specifically sports psychology, physiology of exercise, nutrition, and sports medicine.^{264,267} When demands and stressors of coaching combine with less-than-adequate educational preparation, coaches are more vulnerable to careless comments, misinformation, and inappropriate actions that may jeopardize the health and safety of their athletes and constitute a liability exposure for themselves and their employers.^{268,269}

Evidence suggests that collegiate coaches could benefit from comprehensive education in all domains related to knowledge of DE,²⁴¹ as well as strategies to properly communicate with their athletes about body weight issues.⁷⁰ For example, competitive female gymnasts who were told by their coaches to lose weight resorted to pathogenic weight control methods.^{206,270} Among 131 lightweight football players, 42% showed evidence of DE and reported that their “teacher/coach” was perceived to be the individual who most encouraged dieting practices.¹⁶³

The more enlightened coaches are about nutritional issues, the more apt they are to follow nutritional guidelines, emphasize healthy eating habits rather than weight standards, and have a better understanding of why weight is such a sensitive and personal issue for athletes, particularly women.²⁷¹ Similarly, educated coaches also realize the best way to interact with symptomatic athletes is to be specific about their suspicions, encourage medical care, and reassure the athlete that his or her position on the team will not be jeopardized.⁹⁴ Only through mandatory, formal education programs can coaches promote healthy exercise and nutrition alternatives that have the potential to counteract development of DE.

Certified Athletic Trainers. Unlike coaches, certified athletic trainers have clearly defined, standardized educational competencies established by the NATA that can help guide their work with athletes in the areas of DE, nutrition, and weight management.²⁷² The knowledge gleaned from mastering the educational competencies coupled with exposure in working with athletes who present with DE increases the certified athletic trainer’s overall effectiveness and confidence in dealing with the complexities of this condition.

In one survey of head certified athletic trainers at NCAA Division IA and IAA institutions, most felt their role was to identify (78%) and help (97%) athletes with EDs, but only 27% felt confident in their ability to identify an athlete with an ED, and only 38% felt confident confronting an athlete suspected of having an ED.²⁷³ Among certified athletic trainers, females felt significantly more confident than males in identifying athletes with the conditions. Access to ongoing educational preservice and inservice programs is critical to enhancing knowledge and awareness of EDs among all certified athletic trainers. Similarly, developing a management protocol to handle problems should they occur is essential to improving confidence levels.²³ However, few schools have established a formal treatment protocol.^{77,273} For example, 1 in 4 certified athletic trainers (25%) reportedly worked at collegiate institutions that did not have a management protocol in place.²⁷⁴ In a survey completed in 2005 at the high school level, only 18% of schools reported having a standard treatment protocol for confirmed cases of EDs.²⁰⁰

CONCLUSIONS

A comprehensive array of interventions and educational strategies is imperative to meet the challenges in understanding and working with athletes who present with DE or may be at risk. The key is to establish a network of qualified and knowledgeable professionals who can skillfully handle interventions, provide a seamless continuum of care, institute screening measures for early detection, and develop educational initiatives for prevention. The management of athletes is complex and requires interdisciplinary collaboration among physicians, dietitians, psychotherapists, certified athletic trainers, administrators, coaches, and CSOs to obtain desired outcomes. The certified athletic trainer is in a unique position to play a significant role as a caregiver, informed patient advocate, and educator and should be prepared to act accordingly.

ACKNOWLEDGMENTS

We gratefully acknowledge the efforts of Michael E. Brunet II, PhD, ATC; Edward P. Tyson, MD; Jayd M. Grossman, MEd, ATC; Jeanne F. Nichols, PhD, FACSM; and the Pronouncements Committee in the preparation of this document.

DISCLAIMER

The NATA publishes its position statements as a service to promote the awareness of certain issues to its members. The information contained in the position statement is neither exhaustive nor exclusive to all circumstances or individuals. Variables such as institutional human resource guidelines, state or federal statutes, rules, or regulations, as well as regional environmental conditions, may impact the relevance and implementation of these recommendations. The NATA advises its members and others to carefully and independently consider each of the recommendations (including the applicability of same to any particular circumstance or individual). The position statement should not be relied upon as an independent basis for care but rather as a resource available to NATA members or others. Moreover, no opinion is expressed herein regarding the quality of care that adheres to or differs from NATA’s position statements. The NATA reserves the right to rescind or modify its position statements at any time.

REFERENCES

1. Dancyger IF, Garfinkel PE. The relationship of partial syndrome eating disorders to anorexia nervosa and bulimia nervosa. *Psychol Med.* 1995;25(5):1019–1025.
2. Johnson CL, Stuckey MK, Lewis LD, Schwartz DM. Bulimia: a descriptive survey of 316 cases. *Int J Eat Disord.* 1982;2(1):3–16.
3. Lowe MR, Gleaves DH, DiSimone-Weiss RT, et al. Restraint, dieting, and the continuum model of bulimia nervosa. *J Abnorm Psychol.* 1996;105(4):508–517.
4. Shisslak CM, Crago M, Estes LS. The spectrum of eating disturbances. *Int J Eat Disord.* 1995;18(3):209–219.
5. Byrne S, McLean N. Eating disorders in athletes: a review of the literature. *J Sci Med Sport.* 2001;4(2):145–159.
6. Wilmore JH. Eating and weight disorders in the female athlete. *Int J Sport Nutr.* 1991;1(2):104–117.
7. Beals KA, Manore MM. The prevalence and consequences of subclinical eating disorders in female athletes. *Int J Sport Nutr.* 1994;4(2):175–195.

8. Brownell KD, Rodin J. Prevalence of eating disorders in athletes. In: Brownell KD, Rodin J, Wilmore JH, eds. *Eating, Body Weight, and Performance in Athletes: Disorders of Modern Society*. Philadelphia, PA: Lea & Febiger; 1992:128–143.
9. Guthrie SR. Prevalence of eating disorders among intercollegiate athletes: contributing factors and preventive measures. In: Black DR, ed. *Eating Disorders Among Athletes: Theory, Issues, and Research*. Reston, VA: Association for Girls and Women in Sport, Associations for Health, Physical Education, Recreation, and Dance; 1991:43–66.
10. Johnson C, Powers PS, Dick R. Athletes and eating disorders: the National Collegiate Athletic Association study. *Int J Eat Disord*. 1999;26(2):179–188.
11. Reinking MF, Alexander LE. Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. *J Athl Train*. 2005;40(1):47–51.
12. Smolack L, Murnen SK, Ruble AE. Female athletes and eating problems: a meta-analysis. *Int J Eat Disord*. 2000;27(4):371–380.
13. Sundgot-Borgen J. Risk and trigger factors for the development of eating disorders in female elite athletes. *Med Sci Sports Exerc*. 1994;26(4):414–419.
14. Sundgot-Borgen J, Torstveit MK. Prevalence of eating disorders in elite athletes is higher than in the general population. *Clin J Sport Med*. 2004;14(1):25–32.
15. Thiel A, Gottfried H, Hesse FW. Subclinical eating disorders in male athletes: a study of the low weight category in rowers and wrestlers. *Acta Psychiatr Scand*. 1993;88(4):259–265.
16. Warren BJ, Stanton AL, Blessing DL. Disordered eating patterns in competitive female athletes. *Int J Eat Disord*. 1990;9(4):565–569.
17. Becker AE, Grinspoon SK, Klibanski A, Herzog DB. Eating disorders. *N Engl J Med*. 1999;340(14):1092–1098.
18. Golden NH, Katzman DK, Kreipe RE, et al. Eating disorders in adolescents: position paper of the Society for Adolescent Medicine. *J Adolesc Health*. 2003;33(6):496–503.
19. Stephenson JD. Medical consequences and complications of anorexia nervosa and bulimia nervosa in female athletes. *Athl Train J Natl Athl Train Assoc*. 1991;26(2):130–135.
20. American Psychiatric Association. *Eating Disorders*. In: *Diagnostic and Statistical Manual of Mental Disorders*. 4th ed, Text Revision. Washington, DC: American Psychiatric Association; 2000:583–595.
21. Otis CL, Drinkwater B, Johnson M, Loucks A, Wilmore J. American College of Sports Medicine position stand: the female athlete triad. *Med Sci Sports Exerc*. 1997;29(5):i–ix.
22. Johnson C, Tobin DL. The diagnosis and treatment of anorexia nervosa and bulimia among athletes. *Athl Train J Natl Athl Train Assoc*. 1991;26(2):119–128.
23. Grandjean AC. Eating disorders: the role of the athletic trainer. *Athl Train, J Natl Athl Train Assoc*. 1991;26(2):105–112.
24. Nattiv A, Callahan LR, Kelman-Sherstinsky A. The female athlete triad. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:223–235.
25. Sundgot-Borgen J. Disordered eating. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:237–247.
26. Tobin D, Johnson C, Franke K. Clinical treatment of eating disorders. In: Brownell KD, Rodin J, Wilmore JH, eds. *Eating, Body Weight, and Performance in Athletes: Disorders of Modern Society*. Philadelphia, PA: Lea & Febiger; 1992:330–343.
27. Beals KA. *Disordered Eating Among Athletes: A Comprehensive Guide for Health Professionals*. Champaign, IL: Human Kinetics; 2004:87, 97–98, 105–109, 133–141, 167–173.
28. Ryan R, Lopiano D, Tharinger D, Starke K. *The Mental Health of Female College Student-Athletes: Research and Interventions on a University Campus: A Report to the Hogg Foundation for Mental Health and RGK Foundation*. Austin, TX: Intercollegiate Athletics, Department of Academics and Student Affairs, The University of Texas at Austin; 1994:13–18, 56–60, 74–80, 120–121, 132–133.
29. West SA, Ciccolella ME. Issues in the standard of care for certified athletic trainers. *J Leg Aspects Sport*. 2004;14(1):63–74.
30. Mitten MJ. Medical care guidelines not legally bound. 2000. The NCAA News Comment. http://www.ncaa.org/wps/portal/newsdetail?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/NCAA/NCAA+News/NCAA+News+Online/2000/Editorial/Medical+care+guidelines+not+legally+bound++8-28-00. Accessed November 12, 2005.
31. Garner DM, Olmsted MP, Polivy J. *The Eating Disorders Inventory: A Measure of Cognitive-Behavioral Dimensions of Anorexia Nervosa and Bulimia. Anorexia Nervosa: Recent Developments in Research*. New York, NY: Alan R. Liss; 1983:173–184.
32. Johnson MD. Tailoring the preparticipation exam to female athletes. *Physician Sportsmed*. 1992;20(7):61–72.
33. Peltz JE, Haskell WL, Matheson GO. A comprehensive and cost-effective preparticipation exam implemented on the World Wide Web. *Med Sci Sports Exerc*. 1999;31(12):1727–1740.
34. Walsh JM, Wheat ME, Freund K. Detection, evaluation, and treatment of eating disorders the role of the primary care physician. *J Gen Intern Med*. 2000;15(8):577–590.
35. American Academy of Pediatrics. Committee on Sports Medicine and Fitness. Medical concerns in the female athlete. *Pediatrics*. 2000;106(3):610–613.
36. Tanner SM. Preparticipation examination targeted for the female athlete. *Clin Sports Med*. 1994;13(2):337–353.
37. Drinkwater BL, Loucks A, Sherman RT, Sundgot-Borgen J, Thompson RA. International Olympic Committee (IOC) consensus statement on the female athlete triad. 2005. http://multimedia.olympic.org/pdf/en_report_917.pdf. Accessed November 14, 2005.
38. Silber TJ. Anorexia nervosa among children and adolescents. *Adv Pediatr*. 2005;52:49–76.
39. American Academy of Pediatrics. Committee on Adolescence. Identifying and treating eating disorders. *Pediatrics*. 2003;111(1):204–211.
40. Loucks AB, Mortola JF, Girton L, Yen SS. Alterations in the hypothalamic-pituitary-ovarian and the hypothalamic-pituitary-adrenal axes in athletic women. *J Clin Endocrinol Metab*. 1989;68(2):402–411.
41. Harber VJ. Menstrual dysfunction in athletes: an energetic challenge. *Exerc Sport Sci Rev*. 2000;28(1):19–23.
42. Dueck CA, Manore MM, Matt KS. Role of energy balance in athletic menstrual dysfunction. *Int J Sport Nutr*. 1996;6(2):165–190.
43. Drinkwater BL, Bruemner B, Chesnut CH III. Menstrual history as a determinant of current bone density in young athletes. *JAMA*. 1990;263(4):545–548.
44. Myburgh KH, Hutchins J, Fataar AB, Hough SF, Noakes TD. Low bone density is an etiologic factor for stress fractures in athletes. *Ann Intern Med*. 1990;113(10):754–759.
45. Nattiv A, Loucks AB, Manore MM, Sanborn CF, Sundgot-Borgen J, Warren MP. Position stand: the female athlete triad. *Med Sci Sports Exerc*. 2007;39(10):1–9.
46. American Academy of Pediatrics Committee on Adolescence, American College of Obstetricians and Gynecologists Committee on Adolescent Health Care, Diaz A, Laufer MR, Breech LL. Menstruation in girls and adolescents: using the menstrual cycle as a vital sign. *Pediatrics*. 2006;118(5):2245–2250.
47. United States Food and Drug Administration Web site. Reference daily intakes, recommended dietary allowances. <http://www.fda.gov/fdac>. Accessed March 22, 2007.
48. Opinion on the tolerable upper intake level of Vitamin D. Scientific Committee on Food. <http://www.imace.org/nutrition/pdf/poster.pdf>. Accessed March 22, 2007.
49. Greer FR, Krebs NF. Optimizing bone health and calcium intakes of infants, children, and adolescents. *Pediatrics*. 2006;117(2):578–585.
50. Holick MF. High prevalence of vitamin D inadequacy and implications for health. *Mayo Clin Proc*. 2006;81(3):353–373.
51. National Institutes of Health Consensus Development Panel. Osteoporosis prevention, diagnosis, and therapy. *JAMA*. 2001;285(6):785–795.
52. Akin JW. Hormonal disorders. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:141–147.
53. Warren MP, Shantha S. The female athlete. *Baillieres Best Pract Res Clin Endocrinol Metab*. 2000;14(1):37–53.

54. Weaver CM, Teegarden D, Lyle RM, et al. Impact of exercise on bone health and contraindication of oral contraceptive use in young women. *Med Sci Sports Exerc.* 2001;33(6):873–880.
55. Marx RG, Saint-Phard D, Callahan LR, Chu J, Hannafin JA. Stress fracture sites related to underlying bone health in athletic females. *Clin J Sport Med.* 2001;11(2):73–76.
56. Lukaski HC. Soft tissue composition and bone mineral status: evaluation by dual-energy X-ray absorptiometry. *J Nutr.* 1993; 123(suppl 2):438–443.
57. Torstveit MK, Sundgot-Borgen J. The female athlete triad exists in both elite athletes and controls. *Med Sci Sports Exerc.* 2005;37(9): 1449–1459.
58. Nichols JF, Rauh MJ, Lawson MJ, Ji M, Barkai HS. Prevalence of the female athlete triad syndrome among high school athletes. *Arch Pediatr Adolesc Med.* 2006;160(2):137–142.
59. Beals KA, Hill AK. The prevalence of disordered eating, menstrual dysfunction, and low bone mineral density among US collegiate athletes. *Int J Sport Nutr Exerc Metab.* 2006;16(1):1–23.
60. Beals KA, Manore MM. Disorders of the female athlete triad among collegiate athletes. *Int J Sport Nutr Exerc Metab.* 2002;12(3): 281–293.
61. Nattiv A, Lynch L. The female athlete triad: managing an acute risk to long-term health. *Physician Sportsmed.* 1994;22(1):60–68.
62. Farrow JA. The adolescent male with an eating disorder. *Pediatr Ann.* 1992;21(11):769–774.
63. Braun DL, Sunday SR, Huang A, Halimi KA. More males seek treatment for eating disorders. *Int J Eat Disord.* 1999;25(4):415–424.
64. Andersen AE, Holman JE. Males with eating disorders: challenges for treatment and research. *Psychopharmacol Bull.* 1997;33(3):391–397.
65. Siegel JH, Hardoff D, Golden NH, Shenker IR. Medical complications in male adolescents with anorexia nervosa. *J Adolesc Health.* 1995;16(6):448–453.
66. Carlat DJ, Camargo CA Jr, Herzog DB. Eating disorders in males: a report on 135 patients. *Am J Psychiatry.* 1997;154(8):1127–1132.
67. Kreipe RE, Birndorf SA. Eating disorders in adolescents and young adults. *Med Clin North Am.* 2000;84(4):1027–1049, viii–ix.
68. Woodside DB, Garfinkel PE, Lin E, et al. Comparisons of men with full or partial eating disorders, men without eating disorders, and women with eating disorders in the community. *Am J Psychiatry.* 2001;158(4):570–574.
69. Thompson RA, Sherman RT. *Helping Athletes with Eating Disorders.* Champaign, IL: Human Kinetics; 1993:123–146.
70. Ryan R. Management of eating problems in athletic settings. In: Brownell KD, Rodin J, Wilmore JH, eds. *Eating, Body Weight, and Performance in Athletes: Disorders of Modern Society.* Philadelphia, PA: Lea & Febiger; 1992:344–362.
71. Ricciardelli LA, McCabe MP. A biopsychosocial model of disordered eating and the pursuit of muscularity in adolescent boys. *Psychol Bull.* 2004;130(2):179–205.
72. Hausenblas HA, Carron AV. Eating disorder indices and athletes: an integration. *J Sport Exerc Psychol.* 1999;21(3):230–258.
73. Engel SG, Johnson C, Powers PS, et al. Predictors of disordered eating in a sample of elite Division I college athletes. *Eat Behav.* 2003;4(4):333–343.
74. Powers P, Johnson C. Small victories: prevention of eating disorders among elite athletes. *Eat Disord.* 1996;4(4):364–377.
75. Byrne S, McLean N. Elite athletes: effects of the pressure to be thin. *J Sci Med Sport.* 2002;5(2):80–94.
76. Currie A, Morse ED. Eating disorders in athletes: managing the risks. *Clin Sports Med.* 2005;24(4):871–883,ix.
77. Beals KA. Eating disorder and menstrual dysfunction screening, education, and treatment programs: survey results from NCAA Division I schools. *Physician Sportsmed.* 2003;31(7):33–38.
78. Fairburn CG, Beglin SJ. Assessment of eating disorders: interview or self-report questionnaire? *Int J Eat Disord.* 1994;16(4):363–370.
79. Black DR, Larkin LJ, Coster DC, Leverenz LJ, Abood DA. Physiologic screening test for eating disorders/disordered eating among female collegiate athletes. *J Athl Train.* 2003;38(4):286–297.
80. DePalma MT, Koszewski WM, Romani W, Case JG, Zuiderhof NJ, McCoy PM. Identifying college athletes at risk for pathogenic eating. *Br J Sports Med.* 2002;36(1):45–50.
81. Fairburn CG, Cooper Z. The eating disorder examination. In: Fairburn CG, Wilson GT, eds. *Binge Eating: Nature, Assessment, and Treatment.* New York, NY: Guilford Press; 1993:317–360.
82. Garner DM, Garfinkel PE. The eating attitudes test: an index of the symptoms of anorexia nervosa. *Psychol Med.* 1979;9(2):273–279.
83. Nagel DL, Black DR, Leverenz LJ, Coster DC. Evaluation of a screening test for female college athletes with eating disorders and disordered eating. *J Athl Train.* 2000;35(4):431–440.
84. McNulty KY, Adams CH, Anderson JM, Affenito SG. Development and validation of a screening tool to identify eating disorders in female athletes. *J Am Diet Assoc.* 2001;101(8):886–892.
85. Steiner H, Pyle RP, Brassington GS, Matheson G, King M. The College Health Related Information Survey (C.H.R.I.S.-73): a screen for college student athletes. *Child Psychiatry Hum Dev.* 2003;34(2): 97–109.
86. Malina RM, Bouchard C, Bar-Or O. *Growth, Maturation, and Physical Activity.* 2nd ed. Champaign, IL: Human Kinetics; 1994.
87. World Health Organization. *Obesity: Preventing and Managing the Global Epidemic. Report of a WHO Consultation on Obesity.* Geneva, Switzerland: World Health Organization; 1998.
88. Rosen LW, McKeag DB, Hough DO, Curley V. Pathogenic weight-control behavior in female athletes. *Physician Sportsmed.* 1986; 14(1):79–86.
89. American Psychiatric Association. Practice guideline for the treatment of patients with eating disorders. 3rd ed. American Psychiatric Association Work Group on Eating Disorders. *Am J Psychiatry.* 2006;163(suppl 7):4–54.
90. American Dietetic Association. *Medical Nutrition Therapy Across the Continuum of Care. Anorexia and Bulimia Nervosa (Pediatric, Adolescent, and Adult).* Chicago, IL: American Dietetic Association and Morrison Healthcare; 1998:(suppl 1):1–16.
91. American Dietetic Association. Medical nutrition therapy protocols: an introduction. *J Am Diet Assoc.* 1999;99(3):351.
92. Skinner P, Kopecky L, Seburg S, Roth T, Eich J, Lewis NM. Development of a medical nutrition therapy protocol for female collegiate athletes. *J Am Diet Assoc.* 2001;101(8):914–917.
93. Johnson MD. Disordered eating. In: Agostini R, Titus S, eds. *Medical and Orthopedic Issues of Active and Athletic Women.* Philadelphia, PA: Hanley & Belfus, Inc; 1994:141–151.
94. Sundgot-Borgen J, Bahr R. Eating disorders in athletes. In: Harries M, Williams C, Stanish WD, Micheli LJ, eds. *Oxford Textbook of Sports Medicine.* New York, NY: Oxford University Press; 1998: 138–152.
95. Eating Disorders Coalition for Research, Policy & Action. Policy Recommendations. <http://www.eatingdisorderscoalition.org/reports/policyrecs.html>. Accessed April 13, 2005.
96. Herzog D, Smeltzer D, Smeltzer T, Honan D, Weinstein M, Menaged S. The dangers of eating disorders and the need for health care reform. Briefing presented at: the House of Representatives; April 24 2001; Washington, D.C. <http://www.eatingdisorderscoalition.org/congbriefings/042401/housebriefing042401.html#herzog>. Accessed August 13, 2005.
97. Herzog D, Smeltzer D, Smeltzer T, Honan D, Weinstein M, Menaged S. Removing the obstacles to accessing care. Briefing presented at: the House of Representatives; April 24 2001; Washington, D.C. <http://www.eatingdisorderscoalition.org/congbriefings/042401/housebriefing042401.html#menaged>. Accessed August 13, 2005.
98. Kater KJ, Rohwer J, Levine MP. An elementary school project for developing healthy body image and reducing risk factors for unhealthy and disordered eating. *J Treat Prev Eating Disord.* 2000(1);8:3–16.
99. Kostanski M, Gullone E. Dieting and body image in the child's world: conceptualization and behavior. *J Genet Psychol.* 1999; 160(4):488–499.
100. Smolack L, Levine MP. Adolescent transitions and the development of eating problems. In: Smolack L, Levine MP, Striegel-Moore R,

- eds. *The Developmental Psychopathology of Eating Disorders*. Mahwah, NJ: Lawrence Erlbaum; 1996:207–234.
101. Thelen M, Powell A, Lawrence C, Kuhnert M. Eating and body image concerns among children. *J Clin Child Psychol*. 1992;21(1):41–46.
 102. Patrick L. Eating disorders: a review of the literature with emphasis on medical complications and clinical nutrition. *Altern Med Rev*. 2002;7(3):184–202.
 103. Bulik CM, Sullivan PF, Fear J, Pickering A. Predictors of the development of bulimia nervosa in women with anorexia nervosa. *J Nerv Ment Dis*. 1997;185(11):704–707.
 104. Fairburn CG, Hay PJ, Welch SL. Binge eating and bulimia nervosa: distribution and determinants. In: Fairburn CG, Wilson GT, eds. *Binge Eating: Nature, Assessment, and Treatment*. New York: Guilford; 1993:123–143.
 105. Hoek HW. The distribution of eating disorders. In: Brownell KD, Fairburn CG, eds. *Eating Disorders and Obesity: A Comprehensive Handbook*. New York, NY: Guilford; 1995:207–211.
 106. Lucas AR, Beard CM, O'Fallon WM, Kurland LT. 50-Year trends in the incidence of anorexia nervosa in Rochester, Minn.: a population-based study *Am J Psychiatry*. 1991;148(7):917–922.
 107. Misra M, Aggarwal A, Miller KK, et al. Effects of anorexia nervosa on clinical, hematologic, biochemical, and bone density parameters in community-dwelling adolescent girls. *Pediatrics*. 2004;114(6):1574–1583.
 108. Sudi K, Otlk K, Payerl D, Baumgartl P, Tauschmann K, Muller W. Anorexia athletica. *Nutrition*. 2004;20(7–8):657–661.
 109. DiGiacchino DeBate R, Wethington H, Sargent R. Sub-clinical eating disorder characteristics among male and female triathletes. *Eat Weight Disord*. 2002;7(3):210–220.
 110. Smith NJ. Excessive weight loss and food aversion in athletes simulating anorexia nervosa. *Pediatrics*. 1980;66(1):139–142.
 111. Sundgot-Borgen J. Prevalence of eating disorders in elite female athletes. *Int J Sport Nutr*. 1993;3(1):29–40.
 112. Rumball JS, Lebrun CM. Preparticipation physical examination: selected issues for the female athlete. *Clin J Sport Med*. 2004;14(3):153–160.
 113. Johnson MD. Disordered eating in active and athletic women. *Clin Sports Med*. 1994;13(2):355–369.
 114. Fulkerson JA, Keel PK, Leon GR, Dorr T. Eating-disordered behaviors and personality characteristics of high school athletes and nonathletes. *Int J Eat Disord*. 1999;26(1):73–79.
 115. Hopkinson RA, Lock J. Athletics, perfectionism, and disordered eating. *Eat Weight Disord*. 2004;9(2):99–106.
 116. Maron BJ, Pelliccia A. The heart of trained athletes: cardiac remodeling and the risks of sports, including sudden death. *Circulation*. 2006;114(15):1633–1644.
 117. Hadigan CM, Anderson EJ, Miller KK, et al. Assessment of macronutrient and micronutrient intake in women with anorexia nervosa. *Int J Eat Disord*. 2000;28(3):284–292.
 118. Sullivan P. Course and outcome of anorexia nervosa and bulimia nervosa. In: Fairburn CG, Brownell KD, eds. *Eating Disorders and Obesity*. New York, NY: Guilford; 2002:226–232.
 119. Sullivan PF. Mortality in anorexia nervosa. *Am J Psychiatry*. 1995;152(7):1073–1074.
 120. Garcia-Rubira JC, Hidalgo R, Gomez-Barrado JJ, Romero D, Cruz Fernandez JM. Anorexia nervosa and myocardial infarction. *Int J Cardiol*. 1994;45(2):138–140.
 121. Isner JM, Roberts WC, Heymsfield SB, Yager J. Anorexia nervosa and sudden death. *Ann Intern Med*. 1985;102(1):49–52.
 122. Joy E. Cardiac concerns. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:271–281.
 123. Pomeroy C, Mitchell J. Medical issues in eating disorders. In: Brownell K, Rodin J, Wilmore JH, eds. *Eating, Body Weight, and Performance in Athletes*. Philadelphia, PA: Lea & Febiger; 1992:202–221.
 124. de Simone G, Scalfi L, Galderisi M, et al. Cardiac abnormalities in young women with anorexia nervosa. *Br Heart J*. 1994;71(3):287–292.
 125. Kreipe RE, Harris JP. Myocardial impairment resulting from eating disorders. *Pediatr Ann*. 1992;21(11):760–768.
 126. Harris RT. Bulimarexia and related serious eating disorders with medical complications. *Ann Intern Med*. 1983;99(6):800–807.
 127. Cooke RA, Chambers JB, Singh R, et al. QT interval in anorexia nervosa. *Br Heart J*. 1994;72(1):69–73.
 128. Galetta F, Franzoni F, Cupisti A, Belliti D, Prattichizzo F, Rolla M. QT interval dispersion in young women with anorexia nervosa. *J Pediatr*. 2002;140(4):456–460.
 129. Rich BS, Havens SA. The athletic heart syndrome. *Curr Sports Med Rep*. 2004;3(2):84–88.
 130. Abdulla A. The athletic heart syndrome: when, why and how? *Perspect Cardiol*. 2005;22(10):29–31.
 131. Bjornstad H, Storstein L, Dyrre Meen H, Hals O. Electrocardiographic findings according to level of fitness and sport activity. *Cardiology*. 1993;83(1):268–279.
 132. Apgar B. Diagnosis and management of amenorrhea. *Clin Fam Pract*. 2002;4(3):643.
 133. Otis CL. Exercise-associated amenorrhea. *Clin Sports Med*. 1992;11(2):351–362.
 134. Shangold M, Rebar RW, Wentz AC, Schiff I. Evaluation and management of menstrual dysfunction in athletes. *JAMA*. 1990;263(12):1665–1669.
 135. Drinkwater BL, Nilson K, Chesnut CH III, Bremner WJ, Shainholtz S, Southworth MB. Bone mineral content of amenorrheic and eumenorrheic athletes. *N Engl J Med*. 1984;311(5):277–281.
 136. Lindberg JS, Fears WB, Hunt MM, Powell MR, Boll D, Wade CE. Exercise-induced amenorrhea and bone density. *Ann Intern Med*. 1984;101(5):647–648.
 137. Marcus R, Cann C, Madvig P, et al. Menstrual function and bone mass in elite women distance runners: endocrine and metabolic features. *Ann Intern Med*. 1985;102(2):158–163.
 138. Nattiv A. Stress fractures and bone health in track and field athletes. *J Sci Med Sport*. 2000;3(3):268–279.
 139. Nattiv A, Puffer JC, Casper J, et al. Stress fracture risk factors, incidence and distribution: a 3-year prospective study in collegiate runners. *Med Sci Sports Exerc*. 2000;32(suppl 5):S347.
 140. Cullen D, Becker R, Thompson K, Ahif R. Calcium and vitamin D supplements reduce stress fractures in Navy recruits. Paper presented at: 53rd Annual Orthopaedic Research Society meeting; February 11, 2007; San Diego, CA.
 141. Fisher M, Golden NH, Katzman DK, et al. Eating disorders in adolescents: a background paper. *J Adolesc Health*. 1995;16(6):420–437.
 142. Sansone RA, Sansone LA. Bulimia nervosa: medical complications. In: Alexander-Mott L, Lumsden DB, eds. *Understanding Eating Disorders: Anorexia Nervosa, Bulimia Nervosa, and Obesity*. Washington, DC: Taylor & Francis; 1994:181–201.
 143. Fairburn CG. *Overcoming Binge Eating*. New York, NY: Guilford; 1995:48–52.
 144. Mcgilly BM, Pryor TL. Assessment and treatment of bulimia nervosa. *Am Fam Physician*. 1998;57(11):2743–2750.
 145. Otis C, Goldingay R. *Campus Health Guide: The College Student's Handbook for Healthy Living*. New York, NY: College Board; 1989.
 146. Rodriguez-Tome H, Bariaud F, Zardi MF, Delmas C, Jeanvoine B, Szlyagyi P. The effects of pubertal changes on body image and relations with peers of the opposite sex in adolescence. *J Adolesc*. 1993;16(4):421–438.
 147. Stice E. Risk and maintenance factors for eating pathology: a meta-analytic review. *Psychol Bull*. 2002;128(5):825–848.
 148. Yates A. Biologic considerations in the etiology of eating disorders. *Pediatr Ann*. 1992;21(11):739–744.
 149. Furnham A, Badmin N, Sneade I. Body image dissatisfaction: gender differences in eating attitudes, self-esteem, and reasons for exercise. *J Psychol*. 2002;136(6):581–596.
 150. Presnell K, Bearman SK, Stice E. Risk factors for body dissatisfaction in adolescent boys and girls: a prospective study. *Int J Eat Disord*. 2004;36(4):389–401.
 151. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol*. 1988;54(6):1063–1070.

152. Cooper PJ. Eating disorders and their relationship to mood and anxiety disorders. In: Brownell KD, Fairburn CG, eds. *Eating Disorders and Obesity: A Comprehensive Handbook*. New York, NY: Guilford; 1995:159–164.
153. Johnson C, Maddi KL. The etiology of bulimia nervosa: biopsychosocial perspectives. *Adolesc Psychiatry*. 1986;13:253–273.
154. Chang EC. Perfectionism as a predictor of positive and negative psychological outcomes: examining a mediation model in younger and older adults. *J Couns Psychol*. 2000;47(1):18–26.
155. Halmi KA, Sunday SR, Strober M, et al. Perfectionism in anorexia nervosa: variation by clinical subtype, obsessiveness, and pathological eating behavior. *Am J Psychiatry*. 2000;157(11):1799–1805.
156. Brownell KD. Dieting and the search for the perfect body: where physiology and culture collide. *Behav Ther*. 1991(1) 22:1–12.
157. Killen JD, Taylor CB, Hayward C, et al. Pursuit of thinness and onset of eating disorder symptoms in a community sample of adolescent girls: a three-year prospective analysis. *Int J Eat Disord*. 1994;16(3):227–238.
158. Parks PS, Read MH. Adolescent male athletes: body image, diet, and exercise. *Adolescence*. 1997;32(127):593–602.
159. Kiningham RB, Gorenflo DW. Weight loss methods of high school wrestlers. *Med Sci Sports Exerc*. 2001;33(5):810–813.
160. Oppliger RA, Landry GL, Foster SW, Lambrecht AC. Bulimic behaviors among interscholastic wrestlers: a statewide survey. *Pediatrics*. 1993;91(4):826–831.
161. Andersen RE, Barlett SJ, Morgan GD, Brownell KD. Weight loss, psychological, and nutritional patterns in competitive male body builders. *Int J Eat Disord*. 1995;18(1):49–57.
162. Blouin AG, Goldfield GS. Body image and steroid use in male bodybuilders. *Int J Eat Disord*. 1995;18(2):159–165.
163. DePalma MT, Koszewski WM, Case JG, Barile RJ, DePalma BF, Oliaro SM. Weight control practices of lightweight football players. *Med Sci Sports Exerc*. 1993;25(6):694–701.
164. King MB, Mezey G. Eating behaviour of male racing jockeys. *Psychol Med*. 1987;17(1):249–253.
165. Rankinen T, Lyytikainen S, Vanninen E, Penttila I, Rauramaa R, Uusitupa M. Nutritional status of the Finnish elite ski jumpers. *Med Sci Sports Exerc*. 1998;30(11):1592–1597.
166. Yu L, Smith AD. Figure skating. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:653.
167. Malina RM. Performance in the context of growth and maturation. In: Ireland ML, Nattiv A, eds. *The Female Athlete*. Philadelphia, PA: WB Saunders; 2002:48–65.
168. Slaughter MH, Lohman TG, Misner JE. Relationship of somatotype and body composition to physical performance in 7- to 12-year-old boys. *Res Q*. 1977;48(4):159–168.
169. Slaughter MH, Lohman TG, Misner JE. Association of somatotype and body composition to physical performance in 7–12 year-old-girls. *J Sports Med Phys Fitness*. 1980;20(2):189–198.
170. Rodin J. *Body Traps: Breaking the Binds that Keep You from Feeling Good About Your Body*. New York, NY: William Morrow & Co; 1992:58–65.
171. Brownell KD, Steen SN, Wilmore JH. Weight regulation practices in athletes: analysis of metabolic and health effects. *Med Sci Sports Exerc*. 1987;19(6):546–556.
172. Wilmore JH, Wambgsang KC, Brenner M, et al. Is there energy conservation in amenorrheic compared with eumenorrheic distance runners? *J Appl Physiol*. 1992;72(1):15–22.
173. Centers for Disease Control and Prevention. Hyperthermia and dehydration-related death associated with intentional rapid weight loss in three collegiate wrestlers: North Carolina, Wisconsin, and Michigan, November–December 1997. *JAMA*. 1998;279(11):824–825.
174. Oppliger RA, Utter AC, Scott JR, Dick RW, Klossner D. NCAA rule change improves weight loss among national championship wrestlers. *Med Sci Sports Exerc*. 2006;38(5):963–970.
175. Sonstroem RJ. Physical self-concept: assessment and external validity. *Exerc Sport Sci Rev*. 1998;26(1):133–164.
176. Davis C, Kennedy SH, Ravelski E, Dionne M. The role of physical activity in the development and maintenance of eating disorders. *Psychol Med*. 1994;24(4):957–967.
177. Johnson C, Crosby R, Engel S, et al. Gender, ethnicity, self-esteem and disordered eating among college athletes. *Eat Behav*. 2004; 5(2):147–156.
178. Pasman L, Thompson JK. Body image and eating disturbance in obligatory runners, obligatory weightlifters and sedentary individuals. *Int J Eat Disord*. 1988;7(6):759–769.
179. Rodin J. Cultural and psychosocial determinants of weight concerns. *Ann Intern Med*. 1993;119(7 part 2):643–645.
180. Rucinski A. Relationship of body image and dietary intake of competitive ice skaters. *J Am Diet Assoc*. 1989;89(1):98–100.
181. Rodin J, Larson L. Social factors and the ideal body shape. In: Brownell KD, Rodin J, Wilmore JH, eds. *Eating, Body Weight, and Performance in Athletes: Disorders of Modern Society*. Philadelphia, PA: Lea & Febiger; 1992:146–158.
182. Sanborn CF, Horea M, Siemers BJ, Dieringer KI. Disordered eating and the female athlete triad. *Clin Sports Med*. 2000;19(2):199–213.
183. Williamson DA, Netemeyer RG, Jackman LP, Anderson DA, Funch CL, Rabalais JY. Structural equation modeling of risk factors for the development of eating disorder symptoms in female athletes. *Int J Eat Disord*. 1995;17(4):387–393.
184. Fabian LJ, Thompson JK. Body image and eating disturbance in young females. *Int J Eat Disord*. 1989;8:63–74.
185. Faust J. Correlates of the drive for thinness in young female adolescents. *J Clin Child Psychol*. 1987;16:313–319.
186. Cattarin J, Thompson JK. A three year longitudinal study of body image and eating disturbance in adolescent females. *Eating Disord*. 1999;2:114–125.
187. Verkuyten M. Self-esteem and the evaluation of ethnic identity among Turkish and Dutch adolescents in the Netherlands. *J Soc Psychol*. 1990;130(3):285–297.
188. Rierdan J, Koff E, Stubbs ML. Gender, depression, and body image in early adolescents. *J Early Adolesc*. 1988;8:109–117.
189. Anderson A, DiDeomenico L. Diet vs. shape content of popular male and female magazines: a dose-response relationship to the incidence of eating disorders? *Int J Eat Disord*. 1992;11: 283–287.
190. Field AE, Camargo CA Jr, Taylor CB, Berkey CS, Roberts SB, Colditz GA. Peer, parent, and media influences on the development of weight concerns and frequent dieting among preadolescent and adolescent girls and boys. *Pediatrics*. 2001;107(1):54–60.
191. Morris AM, Katzman DK. The impact of the media on eating disorders in children and adolescents. *J Paediatr Child Health*. 2003;8:287–289.
192. Lerner RM, Gellert E. Body build identification, preference, and aversion in kindergarten children. *Dev Psychol*. 1969;5:456–462.
193. Thelen MH, Lawrence CM, Powell AL. Body image, weight control, and eating disorders among children. In: Crowther JH, Tennenbaum DL, Hobfoll SE, Stephens MAP, eds. *The Etiology of Bulimia Nervosa: The Individual and Familial Context*. Washington, DC: Hemisphere Publishing Corp; 1992:81–101.
194. Mendelson BK, White DR. Relation between body-esteem and self-esteem of obese and normal children. *Percept Mot Skills*. 1982;54(3):899–905.
195. Rolland K, Farnill D, Griffiths RA. Children's perceptions of their current and ideal body sizes and body mass index. *Percept Mot Skills*. 1996;82(2):651–656.
196. McCabe MP, Ricciardelli LA. Body image dissatisfaction among males across the lifespan: a review of past literature. *J Psychosom Res*. 2004;56(6):675–685.
197. Middleman AB, Vazquez I, Durant RH. Eating patterns, physical activity, and attempts to change weight among adolescents. *J Adolesc Health*. 1998;22(1):37–42.
198. *Eating Disorders: Core Interventions in the Treatment and Management of Anorexia Nervosa, Bulimia Nervosa, and Related Eating Disorders*. London, United Kingdom: National Institute for Clinical Excellence; 2004.

199. Becker AE, Franko DL, Nussbaum K, Herzog DB. Secondary prevention for eating disorders: the impact of education, screening, and referral in a college-based screening program. *Int J Eat Disord.* 2004;36(2):157–162.
200. De La Torre DM, Snell BJ. Use of the preparticipation physical exam in screening for the female athlete triad among high school athletes. *J Sch Nurs.* 2005;21(6):340–345.
201. Athletic preparticipation examinations for adolescents: report of the Board of Trustees. Group on Science and Technology, American Medical Association. *Arch Pediatr Adolesc Med.* 1994;148(1):93–98.
202. Nichols JF, Rauh MJ, Lawson MJ, Ji M, Barkai HS. Prevalence of the female athlete triad syndrome among high school athletes. *Arch Pediatr Adolesc Med.* 2006;160(2):137–142.
203. Kashubeck-West S, Mintz LB, Saundersm KJ. Assessment of eating disorders in women. *Counsel Psychol.* 2002;29:662–694.
204. Lindeman AK. Self-esteem: its application to eating disorders and athletes. *Int J Sport Nutr.* 1994;4(3):237–252.
205. O'Connor PJ, Lewis RD, Kirchner EM. Eating disorder symptoms in female college gymnasts. *Med Sci Sports Exerc.* 1995;27(4):550–555.
206. Rosen LW, Hough DO. Pathogenic weight-control behaviors female college gymnasts. *Physician Sportsmed.* 1988;16(9):141–144.
207. Sundgot-Borgen J. Nutrient intake of female elite athletes suffering from eating disorders. *Int J Sport Nutr.* 1993;3(4):431–442.
208. Parr RB, Porter MA, Hodgson SC. Nutrient knowledge and practice of coaches, trainers, and athletes. *Physician Sportsmed.* 1984;12(3):127–138.
209. Modlesky CM, Lewis RD. Assessment of body size and composition. In: Rosenbloom CA, ed. *Sports Nutrition: A Guide for the Professional Working with Active People.* Chicago, IL: The American Dietetic Association; 2000:185–222.
210. Skinner R, Grooms A. Body composition assessment: a tool for use not abuse. *SCAN's PULSE.* 2002;21:9–11.
211. Carson JD, Bridges E, Canadian Academy of Sport Medicine. Abandoning routine body composition assessment: a strategy to reduce disordered eating among female athletes and dancers. *Clin J Sport Med.* 2001;11(4):280.
212. Goran MI, Allison DB, Poehlman ET. Issues relating to normalization of body fat content in men and women. *Int J Obes Relat Metab Disord.* 1995;19(9):638–643.
213. Wellens RI, Roche AF, Khamis HJ, Jackson AS, Pollock ML, Siervogel RM. Relationships between the body mass index and body composition. *Obes Res.* 1996;4(1):35–44.
214. Maynard LM, Wisemandle W, Roche AF, Chumlea WC, Guo SS, Siervogel RM. Childhood body composition in relation to body mass index. *Pediatrics.* 2001;107(2):344–350.
215. Pietrobelli A, Faith MS, Allison DB, Gallagher D, Chiumello G, Heymsfield SB. Body mass index as a measure of adiposity among children and adolescents: a validation study. *J Pediatr.* 1998;132(2):204–210.
216. Malina RM, Katzmarzyk PT. Validity of the body mass index as an indicator of the risk and presence of overweight in adolescents. *Am J Clin Nutr.* 1999;70(1):131S–136S.
217. Ode J, Pivarnik JM, Reeves MJ, Knous JL. Body mass index as a predictor of percent fat in college athletes and nonathletes. *Med Sci Sports Exerc.* 2007;39(3):403–409.
218. Wilmore JH. Body composition and sports medicine: research considerations. In: Roche AF, ed. *Body Composition Assessments in Youth and Adults.* Columbus, OH: Ross Laboratories; 1985:78–82.
219. Sinning WE. Body composition in athletes. In: Roche AF, Heymsfield SB, Lohman TG, eds. *Human Body Composition.* Champaign, IL: Human Kinetics; 1996:257–273.
220. Crisp AH, Burns T, Bhat AV. Primary anorexia nervosa in the male and female: a comparison of clinical features and prognosis. *Br J Med Psychol.* 1986;59(part 2):123–132.
221. Geist R, Heinmaa M, Katzman D, Stephens D. A comparison of male and female adolescents referred to an eating disorder program. *Can J Psychiatry.* 1999;44(4):374–378.
222. Garner DM, Rosen LW, Barry D. Eating disorders among athletes: research and recommendations. *Child Adolesc Psychiatr Clin N Am.* 1998;7(4):839–857.
223. American Diabetes Association. Standards of medical care for patients with diabetes mellitus. *Diabetes Care.* 2003;26(suppl 1):S33–S50.
224. Manore M, Thompson J. Nutrition and the active female. *Sport Nutrition for Health and Performance.* Champaign, IL: Human Kinetics; 2000:409–435.
225. Position of the American Dietetic Association. Nutrition intervention in the treatment of anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (EDNOS). *J Am Diet Assoc.* 2001;101(7):810–819.
226. Bergandi T, Witting A. Availability of and attitudes toward counseling services for the collegiate athlete. *J Coll Stud Personnel.* 1984;25:557–558.
227. Linder DE, Brewer BW, Van Raalte JL, DeLange N. A negative halo for athletes who consult sport psychologists: replication and extension. *J Sport Exerc Psychol.* 1991;13(2):133–148.
228. Pinkerton RS, Hinz LD, Barrow JC. The college student-athlete: psychological considerations and interventions. *J Am Coll Health.* 1989;37(5):218–226.
229. Sim LA, Sadowski CM, Whiteside SP, Wells LA. Family-based therapy for adolescents with anorexia nervosa. *Mayo Clin Proc.* 2004;79(10):1305–1308.
230. Andersen MB, Denson EL, Brewer BW, Van Raalte JL. Disorders of personality and mood in athletes: recognition and referral. *J Appl Sport Psychol.* 1994;6(2):168–184.
231. Muscari M. Effective management of adolescents with anorexia and bulimia. *J Psychosoc Nurs Ment Health Serv.* 2002;40(2):22–31.
232. Bickford B. The legal duty of a college athletics department to athletes with eating disorder: a risk management perspective. *Marquette Sports Law Rev.* 1999;10(1):87–116.
233. National Athletic Trainers' Association. Code of ethics. <http://www.nata.org/codeofethics/index.htm>. Accessed November 14, 2005.
234. Clark N. How to help the athlete with bulimia: practical tips and a case study. *Int J Sport Nutr.* 1993;3(4):450–460.
235. Bates CR. Information systems security and privacy: regulatory and contractual privacy and security compliance obligations, resources, and insurance information. In: The wired university: legal issues at the copyright, computer law and Internet intersection. National Association of College and University Attorneys: Arlington, VA. <http://www.nacua.org/meetings/virtualeminars/march2006/Documents/03%20Bates.doc>. Accessed October 9, 2006.
236. Sherman R, Thompson R. *Managing the Female Athlete Triad: NCAA Coaches Handbook.* Indianapolis, IN: National Collegiate Athletic Association; 2005:21–26.
237. The National Athletic Trainers' Association support statement: recommendations and guidelines for appropriate medical coverage of intercollegiate athletics (AMCIA). <http://www.NATA.org/employers/ss/AMCIARecs%20andguidesrevised.pdf>. Accessed October 31, 2005.
238. The National Collegiate Athletic Association. Sports medicine handbook, 2005–2006. <http://www.ncaa.org/health-safety>. Accessed November 4, 2005.
239. Baer JT, Walker WF, Grossman JM. A disordered eating response team's effect on nutrition practices in college athletes. *J Athl Train.* 1995;30(4):315–317.
240. Sundgot-Borgen J. Eating disorders in female athletes. *Sports Med.* 1994;17(3):176–188.
241. Turk JC, Prentice WE, Chapell S, Shields EW. Collegiate coaches' knowledge of eating disorders. *J Athl Train.* 1999;34(1):19–24.
242. Yeager KK, Agostini R, Nattiv A, Drinkwater B. The female athlete triad: disordered eating, amenorrhea, osteoporosis. *Med Sci Sports Exerc.* 1993;25(7):775–777.
243. De La Torre DM, Snell BJ. Use of the preparticipation physical exam in screening for the female athlete triad among high school athletes. *J Sch Nurs.* 2005;21(6):340–345.

244. Dick RW. Eating disorders in NCAA athletic programs: Replication study of a 1990 study. *NCAA Sport Sciences Education Newsletter*. April 1993(suppl 1):3,4.
245. Sundgot-Borgen J, Klungland M. The female athlete triad and the effect of preventative work. *Med Sci Sports Exerc*. 1998;30(suppl 5):S181.
246. The National Wrestling Coaches Association. Optimal performance calculator. <http://www.nwcaonline.com>. Accessed November 4, 2005.
247. Elliot DL, Goldberg L, Moe EL, DeFrancesco CA, Durham MB, Hix-Small H. Preventing substance use and disordered eating: initial outcomes of the ATHENA (Athletes Targeting Healthy Exercise and Nutrition Alternatives) program. *Arch Pediatr Adolesc Med*. 2004;158(11):1043–1049.
248. Martin M, Schlabach G, Shibinski K. The use of nonprescription weight loss products among female basketball, softball, and volleyball athletes from NCAA Division I institutions: issues and concerns. *J Athl Train*. 1998;33(1):41–44.
249. National Collegiate Athletic Association. Nutrition and performance. http://www1.ncaa.org/membership/ed_outreach/nutrition-performance/index.html. Accessed December 9, 2005.
250. Sports, Cardiovascular and Wellness Nutritionists (SCAN). www.scandpg.org. Accessed December 9, 2005.
251. Boyles S. Internet: a refuge for those with eating disorders. WebMD Medical News. http://www.webmd.com/content/article/34/1728_85382.htm. Accessed March, 2002.
252. Head J. Seeking 'thinspiration.' http://news.bbc.co.uk/1/hi/uk_news/magazine/6935768.stm. Accessed August 10, 2007.
253. Houtkooper LB. Exercise and eating disorders. In: Lamb DR, Murray R, eds. *Perspectives in Exercise Science and Sports Medicine*. Carmel, IN: Cooper Publishing Group; 1998:151–197.
254. Grandjean AC. Diets of elite athletes: has the discipline of sports nutrition made an impact? *J Nutr*. 1997;127(suppl 5):874S–877S.
255. Werblow JA, Fox HM, Henneman A. Nutritional knowledge, attitudes, and food patterns of women athletes. *J Am Diet Assoc*. 1978;73(3):242–245.
256. Wiita BG, Stombaugh IA. Nutrition knowledge, eating practices, and health of adolescent female runners: a 3-year longitudinal study. *Int J Sport Nutr*. 1996;6(4):414–425.
257. Cole CR, Salvaterra GF, Davis JE Jr, et al. Evaluation of dietary practices of National Collegiate Athletic Association Division I football players. *J Strength Cond Res*. 2005;19(3):490–494.
258. Jacobson BH, Gemmell HA. Nutrition information sources of college varsity athletes. *J Appl Sport Sci Res*. 1991;5(4):204–207.
259. Jonnalagadda SS, Rosenbloom CA, Skinner R. Dietary practices, attitudes, and physiological status of collegiate freshman football players. *J Strength Cond Res*. 2001;15(4):507–513.
260. McMurray RG. Laboratory methods for determining energy expenditure of athletes. In: Driskell JA, Wolinsky I, eds. *Nutritional Assessment of Athletes*. Boca Raton, FL: CRC Press; 2002:203–224.
261. Beals KA, Manore MM. Nutritional status of female athletes with subclinical eating disorders. *J Am Diet Assoc*. 1998;98(4):419–425.
262. Rosenvinge JH, Gresko RB. Do we need a prevention model for eating disorders? Recent developments in the Norwegian school-based prevention model. *Eat Disord J Treatm Prevent*. 1997;5(2):110–118.
263. Killen JD. Development and evaluation of a school-based eating disorder symptoms prevention program. In: Smolak L, Levine MP, Striegel-Moore RH, eds. *The Developmental Psychopathology of Eating Disorders: Implications of Research, Prevention, and Treatment*. Mahwah, NJ: Lawrence Erlbaum Assoc; 1996:313–339.
264. Clark M. Who's coaching the coaches? In: Gerdy J, ed. *Sports in School: The Future of an Institution*. New York, NY: Teachers College Press; 2000:55–61.
265. Stapleton KL, Tomlinson CM, Shepard KF, Coon VA. High school coaches' perceptions of their responsibilities in managing their athletes' injuries. *J Orthop Sports Phys Ther*. 1984;5:253–260.
266. Vergeer I, Hogg JM. Coaches' decision policies about the participation of injured athletes in competition. *Sport Psychol*. 1990;13(1):42–56.
267. Stewart CC, Sweet L. Professional preparation of high school coaches: the problem continues. *J Phys Educ Recr Dance*. 1992;63(6):75–79.
268. Knorr J. The need to rethink coaching certification. *Scholastic Coach Athl Director*. 1996;65(1):4–6.
269. Mills BD, Dunleavy SM. Coaching certification: what's out there and what needs to be done? *Int J Phys Educ*. 1997;34(1):17–26.
270. Harris MB, Greco DO. Weight control and weight concern in competitive female gymnasts. *J Sport Exerc Psychol*. 1990;12(4):427–433.
271. Gill DL. Psychological, sociological and cultural issues concerning the athletic female. In: Pearl AJ, ed. *The Athletic Female*. Champaign, IL: Human Kinetics; 1993:19–40.
272. National Athletic Trainers' Association. *Athletic Training Educational Competencies*. Dallas, TX: National Athletic Trainers' Association; 2006.
273. Vaughan JL, King KA, Cottrell RR. Collegiate athletic trainers' confidence in helping female athletes with eating disorders. *J Athl Train*. 2004;39(1):71–76.

Christine M. Bonci, MS, ATC; Leslie J. Bonci, MPH, RD; Lorita Granger, ATC; Craig Johnson, PhD; Robert M. Malina, PhD, FACSM; Leslie W. Milne, MD; Randa R. Ryan, PhD; and Erin Vanderbunt, MS, ATC, contributed to conception and design; acquisition and analysis and interpretation of the data; and drafting, critical revision, and final approval of the article.

Address correspondence to National Athletic Trainers' Association, Communications Department, 2952 Stemmons Freeway, Dallas, TX 75247.