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Excessive and Compulsive Exercise in Eating Disorders: Prevalence, Associated Features, and Management

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This lesson mentions the use of the medication olanzapine, which is not approved by the FDA for the management of symptoms related to excessive and compulsive behaviors in patients with eating disorders.

Key Words: Eating disorders • Excessive and compulsive exercise • Cognitive behavior therapy

Learning Objectives:

Clinicians will consider the data on the prevalence, associated features, and treatment outcome of excessive and compulsive exercise in eating disorder. They will learn about the role of excessive and compulsive exercise in the maintenance of eating disorder psychopathology, and review procedures and strategies to address excessive and compulsive exercise.

Abstract:

Excessive and compulsive exercise is a common behavior of eating disorder patients, especially those who are underweight. It interacts with eating disorder psychopathology by maintaining the eating disorder. Moreover, it may result in over-use injuries and can potentially interfere with weight gain for underweight patients. This lesson will clinicians to make informed decisions regarding the evaluation and treatment of eating disorder patients with this distinctive clinical feature.

Editor's Note

A cardinal feature of the eating disorders is exercise. In this lesson, the author discusses excessive and compulsive exercise within the context of the eating disorders. He begins with helpful definitions of excessive and compulsive exercise. The lesson then reviews the consequences and treatment outcomes of exercise in eating disordered people. The lesson ends with a succinct summary of the salient aspects of a thorough assessment and management of excessive and compulsive exercise behavior. The procedures and strategies to manage exercise in eating disordered people as outlined are particularly helpful to clinicians. —*P.H.*

Introduction

"Excessive exercise" is defined by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV)[1] as a distinctive type of exercise adopted by a large subgroup of patients with *bulimia nervosa* (BN). The DSM-IV emphasizes the quantitative dimension of exercise, but it does not take into account exercise's compulsive feature, a qualitative dimension which is a crucial predictor of disordered eating attitudes and behaviors.[2] In the majority of patients, the quantitative and the qualitative dimensions of exercising are not disentangled. It is appropriate, therefore, to use the terms "excessive" and "compulsive" in conjunction in order to describe more accurately the unhealthy exercise practiced by some individuals with eating disorders (or eating disorder diagnoses).

The main function of excessive and compulsive exercise in eating disorder patients is an attempt to control shape and weight,[3] a dimension strongly associated with eating disorder psychopathology.[4] There is a subgroup of patients, however, in which excessive and compulsive exercise is also used to modulate mood, in particular feelings of tension and anger.[5]

Excessive and compulsive exercise precedes dieting in a large subgroup of eating disorder patients.[6] It interacts with eating disorder psychopathology in maintaining the eating disorder,[5] and it may result in over-use injuries.[7] It interferes with weight gain in underweight patients,[8] and it is a predictor of poor treatment outcome in *anorexia nervosa* (AN).[9]

Definitions and Classification

Excessive Exercise:

Exercise is defined as "excessive" when its duration, frequency, or intensity exceeds what is required for physical health and increases the risk of physical injury.[10,11] According to the 2008 Physical Activity Guidelines for Americans,[12] to improve health, aerobic, and muscle-strengthening, individuals should practice at least 150 minutes (2 hours and 30 minutes) each week of moderate-intensity aerobic activity (i.e., brisk walking) or 75 minutes (1 hour and 15 minutes) each week of vigorous-intensity aerobic activity (i.e., jogging or running) or an equivalent mix of moderate- and vigorous-intensity aerobic activity. In addition, all adults should include muscle-strengthening activities on 2 or more days a week that work all major muscle groups (e.g., legs, hips, back, abdomen, chest, shoulders, and arms). For even greater health benefits adults should increase their activity to 300 minutes (5 hours) a week of moderate-intensity aerobic activity or 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic activity or an equivalent mix of moderate- and vigorous-intensity aerobic activity.[12] Unfortunately, no agreement exists on the threshold to classify excessive exercise. The different definitions used by authors to define an exercise as excessive (e.g., more than three hours a day;[13] at least five times a week for at least one hour without stopping;[14] and at least 5 days a week over the past 3 months[15]) are open to criticism.[3] More useful indices of excessive exercise are those suggested by DSM-IV (American Psychiatric Association, 1994, p 546):[1] an exercise that "significantly interferes with important activities, occurs at inappropriate times or in inappropriate settings, or continues despite injury or other medical complications."

Practically, excessive exercise can assume a variety of forms, including:[16]

- **Excessive exercise in routine daily activities: (e.g., walking most of the hours of the day, standing rather than sitting while studying or watching television).**
- **Excessive exercise in sports activities (e.g., training above and beyond a planned schedule or going to the gym several times a day). This form of exercising can be present both in competitive and recreational sport individuals.**

- **Excessive exercise in abnormal activities (e.g., doing extreme numbers of push-ups or sit-ups at home or in unusual places such as public restrooms).**

Compulsive Exercise:

Excessive exercise is defined as "compulsive" when it is associated with a subjective sense of being driven or compelled to exercise; it has priority over other activities (e.g. school or work); it is associated with feelings of guilt and anxiety when postponed; and it might do one harm (e.g., when possibly injured).[2,12]

Excessive and Compulsive Exercise:

Excessive and compulsive exercise can be classified according to its function:[12] excessive and compulsive exercise to control shape and weight, and excessive and compulsive exercise to modulate mood.

Excessive and Compulsive Exercise to Control Shape and Weight

This is the most common function of exercise adopted by patients with eating disorders which can be divided in two categories: (1) compensatory exercise, and (2) non-compensatory exercise.

1. ***Compensatory Exercise*: A type of exercise used to compensate for excessive calorie intake (actual or perceived) after episodes of objective or subjective bulimic episodes. The distinction between "objective" and "subjective" bulimic episodes is based upon the presence or absence of two characteristics:[17] (1) loss of control (required for both types of "bulimic episode" and (2) the consumption of a "large" amount of food (required only for objective bulimic episodes).**

Some patients use exercise to burn calories in advance of eating to create a credit of calories. Others eat only if they have done some form of exercise. Compensatory exercise does not need to be directly addressed by treatment because it will decrease in frequency as the patient gains control over his or her eating habits.[16]

2. ***Non-compensatory Exercising*: A type of exercise used routinely to control shape and weight independently by the amount of food intake. This form of exercise is more like other standard forms of weight control (e.g., dieting or taking diet pills) in which there is not a close link with eating.**

Excessive and Compulsive Exercise to Modulate Mood

This form of exercise is adopted by a subgroup of eating disorder patients with "mood intolerance," an inability to cope appropriately with certain emotional states.[5] These patients, rather than accepting mood changes, use "dysfunctional mood modulatory behaviors"[5] to dissipate the mood state or to modify how they feel. Typical behaviors include self-injury (e.g., hair pulling, scratching, cutting, punching, or burning themselves),[18] taking psychoactive substances (e.g., alcohol, benzodiazepines) or,[19,20] in eating disorder patients, binge eating, self-induced vomiting and excessive and compulsive exercising.[5]

Prevalence:

The prevalence of excessive and compulsive exercise among eating disorder patients ranges from 39%[13] to 45.5%.[3] It is more commonly associated with AN than with BN[3,6,13] and eating disorders not otherwise specified (NOS).[3,13] In 165 consecutive eating disorder patients admitted at Villa Garda Hospital between November 2003 and October 2005 the highest prevalence (80%) of excessive and compulsive exercise was found in restricting type AN, the lowest (31.9%) in eating disorders NOS; the middle range of fre-

quency comprised binge/purging AN (43.3%) and in purging type BN (39.3%).[3] In a separate heterogeneous sample, the highest prevalence (55%) was observed in purging AN (54.5%).[13]

Associated Features:

Eating disorder patients inclined to excessive and compulsive exercise demonstrate:

- **Higher levels of dietary restraint, weight and shape concerns**[3]
- **A lower minimum BMI**[13]
- **Younger age**[13]
- **Higher levels of perfectionism**[13]
- **Persistence**[13]
- **Anxiety**[13,14]
- **Lower novelty seeking scores**[3,13]
- **Higher levels of obsessive-compulsive disorder symptoms and traits**[21]

By contrast, eating disorder patients without an excessive and compulsive exercise featurehave a higher prevalence of self-induced vomiting,[3,22] laxative misuse and binge eating.[22]

Some data indicate a potential association between dietary restraint and excessive and compulsive exercise. A study found that restraint score, evaluated with the *Eating Disorder Examination* (EDE) interview, an investigator based interview that assesses the frequency of key behavioral and attitudinal aspects of eating disorders during the preceding 28 days, is an important predictor of both compulsive exercising and of the amount of exercise.[3] Other researchers found an association between excessive exercise and food restriction in AN.[23] Animal studies found that rats increase running as a consequence of food deprivation,[24,25,26] and that leptin administration suppresses starvation-induced hyperactivity both before and after its onset in food-restricted rats.[24] The co-occurrence of low leptin levels and excessive exercise has been reported in a small AN sample as well;[23] the study's author(s) concluded that low serum leptin levels induced by food restriction may increase physical activity. Hypoleptinemia in laboratory animals and in humans were not associated with increased levels of physical activity.[27]

It is not yet clear if the mechanism inducing excessive and compulsive exercise is dietary restraint (i.e., cognitive attempt to restrict food intake) or dietary restriction (under-eating to affect weight loss). The fact that the EDE Restraint, as a measure of the cognitive dimension of food restriction, is a potent predictor of excessive and compulsive exercise, and that eating disorder psychopathology positively correlates with exercise in eating disorder patients, both support the hypothesis that cognitive processes involved in the control of eating, shape and weight might be more important than the biological effect of food restriction.[3]

The association of eating disorder psychopathology, and dietary restraint, with specific personality traits (e.g., low levels of novelty seeking, and perfectionism) identifying individuals slow tempered, reserved, tolerant of monotony and with the over-evalutaion of achieving and achievement in valued domain of life, could explain the tendency of a subgroup of eating disorder patients to exercise in a very systematic way and alone most of the time, and their capacity to tolerate monotonous, repetitive and intensive exercises.

Consequences

The principal negative consequences of excessive and compulsive exercise include over-use injuries, an increase risk of bone fractures,[28] cardiac complications in underweight patients,[29] and the maintenance of eating problems.

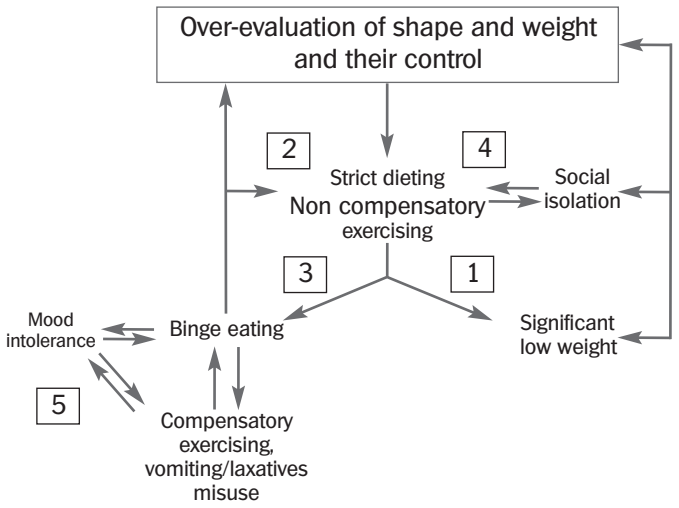
Figure 1 shows the principal maintaining mechanisms for eating disorders postulated by the transdiagnostic cognitive behavior theory of eating disorder (5) one of the most influential psychological theories in terms of treatment,[30] pointing out the specific role excessive and com-

pulsive in maintaining the eating disorder psychopathology. According to the transdiagnostic cognitive behavior of eating disorder, the over-evaluation of shape and weight and their control is central in the maintenance of all eating disorders categories (AN, BN, and eating disorders NOS). The other clinical features stem directly (e.g., strict diet, non-compensatory and compensatory weight control behaviors, low weight) or indirectly (e.g., binge eating) by this "core psychopathology." All these clinical features, in turn, maintain the over-evaluation of shape and weight through specific maintaining mechanisms. The theory proposes that in certain patients one or more of four additional maintaining processes interact with the core eating disorder psychopathology, creating an additional obstacle to change. **The four proposed adjunctive maintaining factors are: (1) clinical perfectionism, (2) core low self-esteem, (3) mood intolerance and (4) interpersonal problems.[4] Excessive and compulsive exercise reinforces eating disorder psychopathology via several mechanisms:**

Figure 1

The Mechanisms of Excessive and Compulsive Exercise in Maintaining the Eating Disorder Psychopathology According to the Transdiagnostic Cognitive Behavior

(Numbers correspond to the mechanisms described in the text).



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1. ***By contributing (through dietary restriction) to weight loss and to the maintenance of a low weight***

2. ***Maintaining the over-evaluation of shape and weight and the importance of their control.*** **The more intense and frequent the exercise to control shape and weight, the more the individual is locked into the concerns about shape and weight.**

3. ***Encouraging binge eating.*** **Many patients view exercise as an effective means of weight control and relax their control on food intake accordingly.[16]**

4. ***Promoting social isolation.*** **Many patients exercise alone and inevitably reduce the time spent with others. The resulting marginalization of social life, in turn, may increase the over-evaluation of shape and weight.[16]**

5. ***Modulating mood in a dysfunctional way.*** **This use of exercise has the immediate effect to ameliorate the adverse mood states but is unhelpful because it does not address day-to-day difficulties associated with negative emotions, and it maintains the over-evaluation of shape and weight and their control.**

Treatment Outcome:

The influence of excessive and compulsive exercise on treatment outcome has been rarely studied. The few studies available indicate that excessive and compulsive exercise is a predictor of poor treatment outcome in patients with AN. It is associated with longer inpatient treatment,[8] a quicker relapse,[9] and is a negative predictor of eating disorder psychopathology improvement.[3] These data indicate the importance of including additional strategies in traditional eating disorder treatments to address excessive and compulsive exercise.

Assessment

Observation of patients' behavior in the medical office setting is a first step toward assessing the presence of an excessive and compulsive exercise feature in eating disorder patients. Typically, patients with this feature stand and walk while in the waiting room, and sit upright on the edge of their seat during the visit. In some cases, they also insist on standing during the medical consultation and sit down reluctantly at the request of the physician.

In order to develop a more detailed understanding of patients' exercise habits and expectations, clinicians should determine:

Is it Excessive?

Utilizing the DSM-IV rubric for "excessive" (e.g., any exercise that "significantly interferes with important activities, occurs at inappropriate times or in inappropriate settings, or continues despite injury or other medical complications." It is also useful to evaluate the context of excessive exercise, i.e. in routine daily activities, sports activities or abnormal activities (e.g., extreme numbers of push-ups or sit-ups)

Is it Compulsive?

This dimension can be evaluated by asking patients if they felt compelled or obliged to exercise even when it might do one harm or if they felt guilty when they are unable to exercise for any reasons (e.g., a medical consultation, a school exam, a wedding).

What is the Function of the Exercise?

Clinicians should ask patients if they exercise in order to control or alter their shape and weight or to burn calories. Additionally, it is important to determine if the exercise has some other function (e.g., to modulate negative emotions, etc.)

Management

Little has been published on the management of excessive and compulsive exercise. *Cognitive behavior treatment* (CBT), a treatment addressing the principal behaviors and cognitions supposed to maintain eating disorder psychopathology, in its enhanced form (CBT-E),[16] addresses excessive and compulsive exercising with following procedures:

- *Monitoring exercise.* **If the clinician suspects that patient's exercise is excessive, he or she may suggest that the patient keep a real-time monitoring record of the frequency, duration and type of exercise engaged in. (see Figure 2 for an example). Equally informative is the use of a pedometer for two consecutive days; patients and therapists can develop a quantitative picture of the patient's daily exercise level quickly and unobtrusively.[31] It is common to see patients with excessive and compulsive exercise reporting clinical features record 20,000–30,000 steps a day, a level two-to-three times greater than necessary to maintain an active and healthy lifestyle.[32] Technical instruments, such as accelerometers[33] or ecological momentary assessments with hand-held computer,[34] a method by which a individual can report on symptoms, affect, behavior and cognitions close in time to experience, are not available to most clinicians and tend to be used only for research purposes.**
- *Education.* **Patients should be educated about the potential negative consequences of excessive and compulsive**

Figure 2
A Monitoring Record of an Anorexia Nervosa Patient wtih Binge Eating, Self-induced Vomiting and Excessive and Compulsive Exercise

Day: Monday **Day:** May 17th

Time	Food and Liquids Consumed	Place	*	V/L./E	Comments
7:45		Home			Body weight: 114.6 lbs./52 kg. My weight is increasing. I have to burn calories and restrict my diet.
8:00				E	I walked for three hours in the city. I feel exhausted
12:00	1 cup of salad dressed with aromatic vinegar 1/2 slice of bread 1 little pear	Dining room			I fell in control
16:00	Three cups of ice cream One box of biscuits Diet coke Ten chocolate candies	Kitchen	* * *	 V	I can't stop eating. I lost the control. I feel disgusted by myself
18:00				E	I walked for one hour
20:00	Two apples One glass of diet coke Three chocolate candies	Kitchen	*		I did not plan the chocolate candies. I feel fat and without control.
21:00				E	30 minutes of push-ups and sit-ups (now I feel better and in control)

* = any episode of eating and drinking perceived as excessive.

V = Vomiting; L = Laxative misuse; D = Diuretic misuse; E = Exercise

Modified by Fairburn CG. Cognitive Behavior Therapy and Eating Disorders. New York: Guilford Press; 2008.

exercise.[12] Points to be made should include:

- **Excessive and compulsive exercise consumes time that can be used in more positive ways (e.g., doing things with others, studying, having a hobby).[12]**
- **Excessive and compulsive exercise is an important maintaining factor for eating disorder psychopathology (see Figure 1).**
- **Excessive and compulsive exercise may lead to over-use injuries and increase the risk of fractures and cardiac complications in underweight patients.**
- **Excessive and compulsive exercise may interfere with weight gain treatments and the improvement of eating disorder psychopathology, increasing the length of treatment and the rate of relapse.**

As part of this complex of strategies and procedures, clinicians should encourage exercise which is healthy and social. Helping patients, even the underweight, to be in "good shape"

physically and psychologically is a key strategy to address excessive and compulsive exercise. Patients need to be educated how to exercise socially—social exercise can prevent the risk to engaging in excessive exercising and help to get out from the isolation, a factor implicate in the maintenance of eating disorder psychopathology, it can be used to practice body exposure, and it may help to discharge the urge to exercise and to accept weight gain with its attendant changes in shape. Therapists should be active in helping patients plan a healthy exercise regimen and find opportunities for social exercising (e.g., group tennis lessons, yoga classes, etc.).

It is also essential that patients break any link between eating and exercising and to interrupt any form of compensatory exercising (e.g, to compensate calories for excessive calorie intake, to burn calories in advance of eating).

Clinicians should also urge their patients to discontinue competitive sports. Patients should be encouraged to discontinue both practice and competition because ongoing intense exercise is a maintenance factor of eating disorders. After recovery the pro and cons to resume the agonistic sport should be considered.

Clinicians should also encourage the practice of functional mood modulatory behavior in their patients. If the exercise is used in part as a means of mood modulation, patients should be helped to explore alternate strategies (e.g., listening to calming music; personal interactions such as conversation; taking a bath or shower; going to the movies); and using problem-solving techniques to recognize and prevent episodes of mood intolerance.

Patients should also be encouraged to restrict their exercise. In patients unable to cope with the urge to exercise, clinicians should propose a few weeks of exercise restriction, until the urge to exercise is reduced. This procedure is best implemented with the consent of patients and in settings where it possible to supervise patient activity (e.g., inpatient treatment).

Inpatient CBT-E,[35] a treatment directly derived by the outpatient CBT-E that uses most of the procedure and strategies described above, was associated with a significant reduction of days and total duration of exercise in patients who completed the treatment.[3]

In patients nonrespondent to cognitive behavior procedures and strategies, clinicians should consider the prescription of olanzapine (Zyprexa; 5 mg daily). Support to its use came from a small open-label study in which olanzapine-treated AN patients showed a significant reduction of their physical activity levels, whereas their body weight and plasma leptin levels were not significantly different from medication-free AN patients.[36] The absence of differences on leptin levels among the two group of patients lead the authors to speculate that the reduction in activity levels associated with the administration of olanzapine could be an indirect result of changes in anxious behavior produced by the drug.[36]

Conclusion

Excessive and compulsive exercise is a clinical feature observed in almost 50% of eating disorder patients and its prevalence is particularly high in those with AN. It represents a challenge to clinicians in terms of assessment and management. In most of the cases it is used to control shape and weight and to burn calories, but in a subgroup of patients it also serves to modulate mood. Its assessment can be optimized with specific questions and simple instruments (e.g. monitoring record or pedometer), but little has been published on its management. At present, CBT is the best treatment available; it is well accepted by patients and reduces the frequency and duration of exercise, at least in hospitalized patients.

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Questions Based On This Lesson

To earn CME credits, answer the following questions on your quiz response form.

61. What are the main functions of excessive and compulsive exercise in eating disorder patients?

A. To control shape and weight

B. To modulate mood

C. To burn calories

D. All of the above

62. Which procedures and instruments are clinically useful to assess excessive and compulsive exercising?

A. Direct observation

B. Direct interview, monitoring record, pedometer

C. Accelerometer and ecological momentary assessments with hand-held computer

D. A and B

63. What are the indicated treatments for excessive and compulsive exercising?

A. Benzodiazepines

B. Psychoanalysis

C. CBT and olanzapine

D. Topiramate