



## Defining features of unhealthy exercise associated with disordered eating and eating disorder diagnoses<sup>☆,☆☆</sup>



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### ABSTRACT

**Objectives:** The current study sought to compare different features of unhealthy exercise on associations with disordered eating and their ability to identify individuals with eating disorders. A secondary aim of the study was to compare prevalence and overlap of different aspects of unhealthy exercise and potential differences in their gender distribution.

**Design:** Cross-sectional epidemiological study.

**Methods:** A community-based sample of men ( $n = 592$ ) and women ( $n = 1468$ ) completed surveys of health and eating patterns, including questions regarding exercise habits and eating disorder symptoms. **Results:** Compulsive and compensatory features of exercise were the best predictors of disordered eating and eating disorder diagnoses compared to exercise that was excessive in quantity. Further, compulsive and compensatory aspects of unhealthy exercise represented overlapping, yet distinct qualities in both men and women.

**Conclusions:** Including the compulsive quality among the defining features of unhealthy exercise may improve identification of eating disorders, particularly in men. Results suggest that the compensatory aspect of unhealthy exercise is not adequately captured by the compulsive aspect of unhealthy exercise. Thus, interventions that target unhealthy exercise behaviors among high-risk individuals, such as athletes, may benefit from addressing both the compulsive and compensatory aspects of unhealthy exercise. Future prospective longitudinal studies will aid in determining the direction of the association between these features of unhealthy exercise and the onset of eating pathology.

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### Introduction

Exercise is an important component of a healthy lifestyle. However, when associated with a maladaptive body image, exercise can become an unhealthy behavioral feature of eating disorders (Brehm & Steffen, 1998; Lipsey, Barton, Hulley, & Hill, 2006; Meyer, Taranis, Goodwin, & Haycraft, 2011; Vartanian, Wharton, & Green, 2012). Problematic exercise is common in eating disorders, occurring in approximately 80% of anorexia nervosa (AN) patients and 55% of bulimia nervosa (BN) patients in the acute phase of the disorders (Davis et al., 1997). Thus, a comprehensive understanding

of the construct of unhealthy exercise is necessary for its assessment as well as eating disorder prevention and intervention.

Past research provides strong support that the construct of unhealthy exercise is multifaceted (e.g., Steffen & Brehm, 1999; Taranis & Meyer, 2011), such that both quantitative and qualitative aspects of exercise contribute to its pathological nature. Specifically, a multi-dimensional conceptualization of unhealthy exercise encompasses quantitative aspects, such as frequency and intensity of exercise (e.g., Davis & Kaptein, 2006) as well as qualitative aspects of unhealthy exercise, such as exercise preoccupation, compulsivity, and weight and shape regulation (e.g., Adkins & Keel, 2005; LePage, Crowther, Harrington, & Engler, 2008; Meyer & Taranis, 2011; Polivy, 1994; Thome & Espelage, 2004).

The terms used to describe unhealthy exercise can be grouped into three domains: “excessive” – exercise characterized by excessive frequency, duration, and intensity (Davis & Fox, 1993); “compulsive” – exercise to prevent or reduce feelings of distress, exercise despite illness or injury, and preoccupation with exercise (also termed “obligatory” or “exercise addiction” in some papers) (Adkins & Keel, 2005; Meyer & Taranis, 2011; Mond, Hay, Rodgers,

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Owen, & Beumont, 2004; Monok et al., 2012); and “compensatory” – exercise to compensate for the effects of food intake on weight or shape (APA, 1994; LePage et al., 2008).

While researchers agree that excessive, compulsive, and compensatory forms of exercise are unhealthy, there remains ambiguity regarding the extent to which each of these aspects impact eating pathology. Seigel and Hetta (2001) found that high levels of exercise were associated with compulsive exercise, but only compulsive attitudes toward exercise were associated with significant body image and eating disturbances in a community sample of young-adult women. In a larger community-based sample of women, Mond and colleagues (Mond, Hay, Rodgers, & Owen, 2006; Mond et al., 2004) reported that feelings of guilt following the postponement of exercise was significantly associated with elevated levels of eating pathology and reduced quality of life whereas frequency of exercise was not. Similarly, Taranis and Meyer (2011) found no significant associations between exercise frequency and EDE-Q scores in young women. Adkins and Keel (2005) examined whether excessive or compulsive is a better descriptor of unhealthy exercise in both college men and women. Results from their investigation indicated that among individuals exercising to influence their appearance, compulsive exercise was a significant positive predictor of disordered eating, whereas duration of exercise was a significant negative predictor in multivariate models. Thus, previous studies that have investigated both the excessive and compulsive aspect of unhealthy exercise have consistently indicated that although these aspects are related, the compulsive quality of exercise, rather than excessive quantity, may be a better predictor of eating pathology.

Although several studies have examined the compulsive aspect of exercise, relatively few have specifically examined exercise that is compensatory in nature. Further, to our knowledge, no studies have examined if the compensatory aspect of exercise is distinct from the compulsive aspect of exercise. LePage et al. (2008) examined associations between individuals who used vigorous exercise to control weight or shape or to counteract the effects of eating and/or fasted to influence their weight or shape with eating pathology in undergraduate women. Findings indicated that individuals who endorsed vigorous exercise reported significantly greater body dissatisfaction and dietary restraint than the control group. While this study did show associations between exercise as a compensatory behavior and disordered eating, it did not examine other aspects of unhealthy exercise. Thus, it is unclear whether the compensatory aspect of unhealthy exercise is distinct from the compulsive aspect of unhealthy exercise. Additionally, Taranis, Touyz, and Meyer (2011) posited that negative emotion when one is unable to exercise, exercise for weight or shape reasons, and rigidity of one's exercise routine are defining components of compulsive exercise. These authors found that among the hypothesized primary factors to maintain unhealthy exercise, weight control exercise (e.g., exercise for weight or shape reasons) consistently showed the strongest associations with eating pathology. Importantly, this definition does not specifically address whether exercise is used to compensate for food intake. Similarly, Mond et al. (2004, 2006) and Adkins and Keel (2005) did not directly examine the compensatory aspect of exercise. Thus, little attention has been directed to the compensatory aspect of unhealthy exercise despite description of exercise as an inappropriate compensatory behavior in BN since the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV; APA, 1994).

One might argue that the compensatory quality of exercise described in the DSM-IV-TR (APA, 2000) is captured by examinations of its compulsive quality. In the context of an individual who binges but fears weight gain, unhealthy exercise may reflect a compulsion to reduce anxiety about the effects of binge-eating and

to prevent dreaded weight gain. However, unhealthy exercise is not limited to those with BN, as it is a feature of AN without binge-eating and can occur in eating disorder not otherwise specified (EDNOS) in the absence of binge-eating episodes. The latter example may be particularly true for men who are more likely to be diagnosed with EDNOS than with AN or BN. In these instances, unhealthy exercise may be used to reduce anxiety, consistent with the definition of compulsions in the DSM-IV-TR, without being used to compensate for specific food intake. In addition, exercise could be compulsive without being related to the effects of exercise on weight or shape as supported in analyses by Adkins and Keel (2005) and Mond et al. (2006). Thus, “compulsive” exercise may capture aspects of “compensatory” exercise without being synonymous.

Importantly, previously reported findings on the quantitative and qualitative features of unhealthy exercise come from studies that predominantly examined women. Given that men are more likely to use exercise to control weight than other means, such as dieting, purging, or fasting, it is important to extend the examination of these different aspects of unhealthy exercise to men (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). In addition, previous studies have focused on continuous measures of disordered eating rather than examining the ability of different forms of unhealthy exercise to predict eating disorder diagnoses. To date, no study has adequately examined the unique contributions of excessive, compulsive, and compensatory aspects of unhealthy exercise for predicting disordered eating and eating disorder diagnoses using multivariate analyses in community-based samples of both men and women. Finally, previous studies have not examined the overall prevalence and gender distribution of different aspects of unhealthy exercise in a large community sample of men and women.

Thus, the purpose of the current study was to compare different aspects of unhealthy exercise (excessive, compulsive, and compensatory) on associations with disordered eating and to examine which aspect of unhealthy exercise best discriminates individuals with eating disorder diagnoses from non-eating disorder controls in a large community sample of men and women. Based on prior findings (Adkins & Keel, 2005; Mond et al., 2004, 2006; Seigel & Hetta, 2001; Taranis & Meyer, 2011), we predicted that compulsive exercise would demonstrate greater associations with disordered eating than excessive exercise. Given that compensatory exercise is contingent upon concerns about the effects of eating on weight, we further predicted that compensatory exercise would be more closely associated with elevated bulimia scores compared to excessive and compulsive exercise. Finally, we predicted that participants engaging in compulsive and/or compensatory exercise would be more likely to meet criteria for an eating disorder diagnosis than participants engaging in excessive exercise or no aspect of unhealthy exercise. A secondary aim of the study was to compare different aspects of unhealthy exercise on prevalence, overlap, and gender distribution.

## Methods

### Participants

Data were drawn from a previously established epidemiological study in a sample of three cohorts of men ( $n = 592$ ) and women ( $n = 1468$ ) originally selected at random from the same college population in the springs of 1982, 1992, and 2002 (see Keel, Heatherton, Dorer, Joiner, & Zalta, 2006; Keel & Heatherton, 2010; Keel, Heatherton, Baxter, & Joiner, 2007 for details, respectively). Participants completed a survey of health and eating behaviors and were followed prospectively at 10-year intervals. Data come from

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