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Acute changes in obsessions and compulsions following moderate-intensity aerobic exercise among patients with obsessive-compulsive disorder

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ABSTRACT

Aerobic exercise can acutely influence anxious and depressive mood in both clinical and nonclinical populations. However, there are no existing studies that have examined the acute effect of exercise on mood, anxiety, obsessions, and compulsions in patients with OCD. The primary aim of this study was to examine acute changes in these symptoms after engaging in single exercise sessions during a 12-week exercise intervention for 15 (53% female; mean age = 41.9 years) patients with OCD. Participants reported reductions in negative mood, anxiety, and OCD symptoms at the end of each exercise session relative to the beginning. Changes in the magnitude of the effect of exercise in reducing negative mood and anxiety remained fairly stable while levels of self-reported obsessions and compulsions decreased over the duration of the intervention. Results of this study point toward the promising effect of exercise for acute symptom reduction in patients with OCD.

1. Introduction

While pharmacological and behavioral therapy interventions for treatment of OCD have demonstrated empirical support, most patients continue to experience clinically significant symptoms following treatment (Eddy, Dutra, Bradley, & Westen, 2004; Fisher & Wells, 2005). Incorporating aerobic exercise as an adjunct to existing OCD treatment has been proposed as a potentially effective strategy to help the large proportion of patients who remain with clinically significant OCD symptoms, despite receiving currently available treatments. Although promising, only two small studies have examined the benefits of aerobic exercise for OCD symptom reduction. Initial support for this approach comes from a pilot study conducted by our research group of a 12-week, moderate-intensity aerobic exercise intervention for 15 patients with OCD. We found a beneficial effect of exercise on OCD symptom severity reduction (Brown et al., 2007). Similar results have been independently reported by Lancer, Motta, and Lancer (2007) among 11 patients with current OCD symptoms who demonstrated a significant reduction in self-reported obsessive-compulsive symptoms at the end of a 6-week exercise intervention and at 1-month follow-up. Beyond these findings in OCD, exercise interventions have consistently demonstrated improved short and long-term outcomes as treatments for depression (Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005; Ernst, Rand, & Stevinson, 1998; Stathpoulou, Powers, Berry, Smits, & Otto, 2006), panic disorder (Broocks et al., 1998; Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991), and generalized anxiety disorder (Martinsen, Hoffart, & Solberg, 1989).

In addition to long-term physical health benefits of aerobic exercise interventions, a growing body of evidence has documented that aerobic exercise can acutely reduce anxious and depressive mood in both clinical and nonclinical populations (Bodin & Martinsen, 2004; Stathpoulou et al., 2006). In an early review of three meta-analyses of primarily nonclinical populations, Petruzzello et al. (1991) found consistent support for the positive effect of an acute bout of aerobic exercise on reductions in state anxiety. While studies with clinical populations of patients diagnosed with an anxiety disorder are fewer, the available evidence similarly points toward the anxiolytic effect of acute exercise. O'Connor (2005) found effect sizes (Cohen's *d*) ranging from 0.60 to 0.89 when examining reductions in state anxiety among patients with panic disorder after both maximal and submaximal treadmill exercise tests. In an experimental paradigm, healthy participants who were injected with an anxiogenic pharmacological agent and then were randomized to 30-min of exercise reported less anxiety than those who then were randomized to 30-min of rest (Strohle et al., 2005). Taylor (2000) conducted a comprehensive review of 24 studies examining the acute effects of exercise on anxiety reduction and found that only 3 studies did not demonstrate anxiety-reducing effects. Therefore,

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there is substantial support for the acute mood-enhancing effects of aerobic exercise.

Among individuals with OCD, the severity of obsessions and compulsions has been related to the intensity of negative moods (Spinella, 2005). Given evidence for the acute mood enhancing effects of exercise, coupled with the interrelationship between negative moods and OCD symptoms, it is possible that a similar acute reduction in obsessions and compulsions may also occur with exercise. To date, we are not aware of any other study that has examined the acute benefits of exercise for mood as well as obsession and compulsion symptom reduction among individuals with clinically significant symptoms of OCD.

The primary aim of this study is to examine the acute benefits of aerobic exercise on mood, anxiety, obsessions, and complusions among patients with OCD. In doing so, we report on secondary data analyses from our published pilot study (i.e., Brown et al., 2007) that examined the effect of a 12-week aerobic exercise intervention for patients with OCD. In that study, levels of mood, anxiety, obsessions, and compulsions were assessed before and after each weekly exercise session. As a result, these unique data afford us the opportunity to examine the acute effect of a single session of aerobic exercise, as well as changes in the acute effect of exercise on mood, anxiety, obsessions, and compulsions over the 12-week intervention period. We hypothesize that single sessions of aerobic exercise will significantly reduce mood, anxiety, obsessions, and compulsions among patients with OCD. In addition, given the effects of exercise on OCD symptom severity demonstrated in the pilot study (Brown et al., 2007), we hypothesize that obsessions and compulsions will decrease as a function of exercise over duration of the 12-week intervention.

2. Method

2.1. Participants

Study participants: (a) were between 18 and 65 years of age, (b) met DSM-IV criteria for OCD, (c) had Yale-Brown Obsessive Compulsive Scale (Y-BOCS) scores > 16, (d) were receiving OCD treatment for at least 3 months, (e) were currently sedentary; i.e., not regularly participating in aerobic physical exercise (at least 20 min/day, 3 days/week) for prior 6 months (Read et al., 2001). Participants were excluded if they: (a) met current DSM-IV criteria for alcohol or drug abuse/dependence (except nicotine) within the past 6 months, (b) met current DSM-IV criteria for anorexia or bulimia nervosa, (c) met lifetime DSM-IV criteria for a psychotic disorder or bipolar disorder, (d) were currently suicidal or homicidal, (e) had marked organic impairment, (f) had physical disabilities or medical problems that would prevent or hinder participation in a program of moderate-intensity exercise, (g) were currently pregnant or intending to become pregnant during the 12 weeks of the intervention.

Participants were recruited from October 2003 to June 2004 from an OCD specialty clinic at Butler Hospital, a private psychiatric hospital in Providence, RI. Permission from the hospital's Institutional Review Board was obtained to conduct this study. Fifteen (15) Caucasian individuals were enrolled in the study (8 were female; mean age = 41.9 $\pm$ 11.2 years). The mean Y-BOCS score at baseline was 22.9 (S.D. = 3.5) (Brown et al., 2007). Participants had a history of the following comorbid psychiatric disorders: mood (73%), anxiety (33%), substance abuse (26%), and eating disorders (6%). All participants were engaged in ongoing treatment for OCD (see Brown et al., 2007, for more detail).

2.2. Procedure

A more detailed description of the study procedures is available elsewhere (Brown et al., 2007). During the consent process, participants were invited to participate in a study "designed to better understand the relationship between exercise and obsessive thoughts and compulsive behaviors among persons with OCD" and were told that the "information obtained from this study will help us to have a better idea of the ways in which exercise may facilitate the process of improved OCD and mood symptoms." After obtaining informed consent, participants were administered a brief physical activity screen to determine potential eligibility and then engaged in a structured baseline assessment to confirm study eligibility as well as baseline levels of OCD symptom severity (as measured by the Y-BOCS). Medical clearance to participate in an exercise program was obtained through a physician's review of patient's medical history and a submaximal graded treadmill test. Once eligible, participants engaged in a 12-week moderate-intensity aerobic exercise intervention.

At each exercise intervention session, the study exercise physiologist guided participants on the intensity and duration of the exercise to be performed. Exercise sessions began at 20 min per session and gradually progressed to 40 min per session by week 12. Participants exercised at a rate that achieved 55–69% (moderate-intensity; Pollock et al., 1998) of age-predicted maximal heart rate (i.e., 220-age). Heart rate and blood pressure were monitored before, during, and after exercise. In addition, participants were asked to report rate of perceived exertion (RPE) midway through their exercise session. Several types of exercise equipment were available to study participants, including treadmills, recumbent bicycles, and elliptical machines. Before and after each exercise session, participants were asked, utilizing the NIMH self-rating scale (see description below), about their current mood, anxiety, obsessions, and compulsions symptom levels.

Participants in the study were also given "prescriptions" from the exercise physiologist (tailored to their level of fitness) to engage in moderate-intensity aerobic exercise on a minimum of two to three other occasions during the week for the duration of the 12-week exercise program. These other exercise occasions took place in the context of their own environment (e.g., in their home or through community resources). In addition, participants were required to self-monitor exercise by filling out a weekly log with the various exercise activities they engaged in during the week, duration of each activity, and self-reported rate of perceived exertion for each activity.

2.3. Measures

2.3.1. Structured Clinical Interview for DSM-IV (SCID-P; First, Spitzer, Gibbon, & Williams, 1995)

To assess for diagnostic inclusion and exclusion criteria, the SCID was administered at baseline. DSM-IV psychiatric disorders of interest were determined by the relevant sections of the SCID-P which included the mood, anxiety, substance abuse, psychotic, and eating disorders modules (First et al., 1995).

2.3.2. Y-BOCS

The Y-BOCS (Goodman et al., 1989) is a rater-administered 10-item scale with specific probes and anchors that assess severity of 5 domains for obsessions and compulsions. These domains include time, distress, interference, resistance, and control.

2.3.3. NIMH self-rating scale (Greenberg et al., 1998)

This scale was developed to be sensitive to acute changes as a function of pharmacological challenges (Greenberg et al., 1998). Four items were used as global ratings of current mood, anxiety, obsessions and urges to engage in compulsions just prior to exercising and immediately afterwards, each week of the 12-week aerobic intervention. This pre-post-interval ranged from 20 to 40 min depending on duration of the exercise, with shorter intervals