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A preliminary, randomized trial of aerobic exercise for alcohol dependence ☆

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ABSTRACT

Interventions targeting physical activity may be valuable as an adjunct to alcohol treatment, but have been relatively untested. In the current study, alcohol dependent, physically sedentary patients were randomized to: a 12-week moderate-intensity, group aerobic exercise intervention (AE; $n = 25$) or a brief advice to exercise intervention (BA-E; $n = 23$). Results showed that individuals in AE reported significantly fewer drinking and heavy drinking days, relative to BA-E during treatment. Furthermore adherence to AE strengthened the beneficial effect of intervention on alcohol use outcomes. While high levels of moderate-intensity exercise appeared to facilitate alcohol recovery regardless of intervention arm, attending the group-based AE intervention seemed to further enhance the positive effects of exercise on alcohol use. Study findings indicate that a moderate intensity, group aerobic exercise intervention is an efficacious adjunct to alcohol treatment. Improving adherence to the intervention may enhance its beneficial effects on alcohol use.

1. Introduction

While treatments for alcohol dependence have demonstrated efficacy (Miller & Wilbourne, 2002; Read, Kahler, & Stevenson, 2001), relapse remains problematic with rates of relapse in the first year following treatment ranging from 60–90% (Brownell, Marlatt, Lichtenstein, & Wilson, 1986; Maisto, Connors, & Zywiak, 2000; Miller, Walters, & Bennett, 2001; Weisner, Matzger, & Kaskutas, 2003). Over the years, stagnant rates of relapse in alcohol use and other addictive disorders have garnered much needed attention (Marlatt & Donovan, 2005; Moos & Moos, 2006), which led to new approaches to relapse prevention. The work of Marlatt and colleagues (Marlatt & Donovan, 2005) is among the most prominent, and relapse prevention strategies based on this model have shown promise in the treatment for alcohol use disorders (Carroll, 1996; Irvin, Bowers, Dunn, & Wang, 1999; Witkiewitz & Marlatt, 2004). However, unequal attention has been paid to each component of this model. In particular, the lifestyle modification component, one of the primary domains of Marlatt's model, has received the least emphasis in relapse prevention programs for alcohol dependence (Marlatt & Witkiewitz, 2005; Witkiewitz & Marlatt, 2004), and as a result, rigorous empirical evaluation is lacking.

Among approaches to lifestyle modification, exercise holds particular promise for relapse prevention. Exercise has been described as "a highly recommended lifestyle change activity" for relapse prevention (Marlatt & Gordon, 1985, P 309), and the potential value of exercise and fitness in the prevention and treatment of addictive disorders has been widely noted (Agne & Paolucci, 1982; Taylor, Sallis, & Needle, 1985; Tkachuk & Martin, 1999). A growing body of empirical research has begun to explore potential treatment applications of exercise for a variety of clinical problems (USDHHS, 1996). Exercise also has the potential to be cost-effective, flexible and accessible; many forms of exercise may be conducted independently at little expense. Moreover, exercise has minimal side effects and far less risk of adverse events than the use of psychotropic medication (Broocks et al., 1998). In short, exercise appears to offer decided advantages as a treatment strategy for alcohol dependent individuals.

☆ The current study was conducted in the United States.

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Despite its potential value, only two controlled studies have examined the effects of an exercise intervention in individuals with excessive alcohol use. A study involving inpatients in alcohol rehabilitation treatment (Sinyor, Brown, Rostant, & Seraganian, 1982) revealed that participants in the exercise group demonstrated better abstinence outcomes post-treatment than did non-exercising participants. A later study (Murphy, Pagano, & Marlatt, 1986) found that heavy drinking college students assigned to either running or yoga/meditation demonstrated significant decreases in quantity of alcohol consumption relative to no exercise control participants. Findings from both studies are consistent in supporting a positive relationship between exercise and drinking outcomes. However, both studies also suffer from methodological limitations, including non-random assignment to treatment (i.e., using different treatment site as a comparison group) in the former study (Sinyor et al., 1982), and use of a non-clinical population (i.e., participants were undergraduates who qualified as heavy social drinkers) (Murphy et al., 1986).

In addition, no studies to date have examined potential mediators of the relationship between exercise and alcohol use in a controlled exercise study. There are a number of proposed mechanisms by which exercise may facilitate recovery from alcohol problems; in particular, the positive impacts of exercise on symptoms of depression and anxiety have been well documented (Babyak et al., 2000; Carek, Laibstain, & Carek, 2011; Craft & Landers, 1998; Dinas, Koutedakis, & Flouris, 2011; Dunn, Trivedi, & O'Neal, 2001; Gill, Womack, & Safranek, 2010; Lawlor & Hopker, 2001; Mead et al., 2009; Perraton, Kumar, & Machotka, 2010). Such evidence suggests that exercise may reduce relapse risk by alleviating symptoms of depression and anxiety, especially given that depressive and anxiety symptoms are common among alcohol dependent patients and are often associated with relapse and poor treatment outcome (Brown et al., 1998; Gill et al., 2010; Suter, Strik, & Moggi, 2011). Research has also supported the role of self-efficacy in alcohol recovery, with higher self-efficacy to avoid drinking consistently predicting better treatment outcomes (Greenfield et al., 2000; Ilgen, Tiet, Finney, & Moos, 2006; Rychtarik, Prue, Rapp, & King, 1992; Vielva & Iraurgi, 2001). Engaging in regular exercise may indirectly increase self-efficacy via its beneficial effects on positive and negative affect (Peluso & Guerra de Andrade, 2005; Penedo & Dahn, 2005; Reed & Ones, 2006) and craving (Ussher, Sampuran, Doshi, West, & Drummond, 2004), and in turn, reduce alcohol intake or risk of relapse. In summary, there is theoretical and empirical support for the proposition that exercise interventions may lead to positive outcomes for alcohol dependent patients through several underlying mechanisms. However, to date standardized, structured, exercise-based interventions for alcohol use have not been evaluated in methodologically rigorous clinical trials.

The current study is the second in a series of studies intended to address this gap in the literature. In the first study (Brown et al., 2009), we described the development of a 12-week, supervised group aerobic exercise program as an adjunctive intervention for alcohol dependent patients in recovery. The exercise intervention also taught participants cognitive–behavioral strategies to help them incorporate exercise into their daily lives and offered financial incentives for program adherence. We also presented preliminary data from a small pilot study demonstrating the feasibility of the intervention and yielding significant reductions in alcohol consumption and improvements in cardiorespiratory fitness (Brown et al., 2009). In the present study, we report the results of a preliminary, randomized controlled trial of this adjunctive exercise intervention for individuals in early recovery from alcohol dependence. In addition to providing a more rigorous test of this novel intervention for alcohol dependence, the present study addresses methodological limitations of previous studies. Specifically, participants were randomly assigned to treatment condition, and the exercise sessions were supervised, with duration and intensity carefully monitored and recorded to ensure patient participation and accurate delivery of the intervention.

First, we hypothesized that, as an adjunct to treatment among physically sedentary alcohol dependent patients in early recovery, a 12-week moderate-intensity group aerobic exercise intervention (AE) would be more effective than a brief advice to exercise comparison condition (BA-E) in reducing the quantity and frequency of alcohol use due to the exercise supervision, group support, cognitive–behavioral strategies and financial incentives offered by the AE intervention. Secondly, we predicted that regardless of intervention conditions, higher levels of exercise at follow-up assessments would be associated with lower levels of alcohol use. Thirdly, we hypothesized that AE would yield greater improvements in depressive and anxiety symptoms, and self-efficacy (potential mediators/secondary outcomes) relative to BA-E. Finally, we predicted that greater levels of exercise as well as cardiorespiratory fitness would be observed in AE compared to BA-E.

2. Method

2.1. Participants

A total of 49 participants were recruited from alcohol and drug day treatment services program at Butler Hospital ($n = 20$) and from the community via media advertisements ($n = 29$). Patients at the Butler Hospital program had an attending psychiatrist, a counselor whom they met with daily to coordinate their treatment, and they participated in cognitive–behavioral groups aimed at teaching sobriety and relapse prevention coping skills. Study participants met the following inclusion criteria; 1) being between 18 and 65 years of age, 2) meeting DSM-IV-TR criteria for alcohol dependence, 3) currently sedentary (i.e., exercising less than 60 minutes per week for the past 6 months), 4) being in early alcohol recovery (i.e., currently in alcohol treatment and abstinent from alcohol for less than 90 days), and 5) having been medically cleared to engage in moderate intensity exercise by the study physician. The exclusion criteria included: 1) non-alcohol, substance dependence (except nicotine dependence), 2) anorexia or bulimia nervosa, 3) bipolar disorder, 4) a history of psychotic disorder or current psychotic symptoms, 5) current suicidality, 6) marked organic impairment, 7) physical disabilities, medical problems, or use of medications that would interfere with participation in a program of moderate exercise, and 8) current pregnancy or intent to become pregnant during the next 12 weeks. The consort diagram is shown in Fig. 1. Participants were recruited from an intensive alcohol treatment program and from the community, and provided informed consent. Demographic data and baseline drinking variables are presented in Table 1, and indicate that control and treatment groups were equivalent in age, gender, ethnicity and education, marital status, employment status and baseline drinking variables.

2.2. Measures

2.2.1. Health questionnaire & physical activity screen

The health questionnaire assessed health history and status, including medical conditions that might complicate participation in a moderate intensity exercise program. The interview was used as a screen to determine sedentary status, and queried regular engagement in moderate intensity activity and assessed frequency and length of time of participation in exercise of this type.

2.2.2. Structured Clinical Interview for DSM-IV (SCID-P)

Relevant sections of the SCID-P (First, Spitzer, Gibbon, & Williams, 1995) were administered to determine diagnostic criteria for inclusion/exclusion criteria.

2.2.3. Time-line-follow-back (TLFB)

The TLFB interview was used to assess daily alcohol use at baseline and during follow-up. The TLFB has excellent reliability (Sobell, Maisto,