



Review

Exercise training – A beneficial intervention in the treatment of alcohol use disorders?



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ABSTRACT

Background: A growing body of evidence suggests that exercise training may have multiple beneficial effects in individuals with mental health or substance use disorders. Yet, relatively little knowledge exists regarding the benefits of exercise training to augment treatment for alcohol use disorders (AUDs). **Purpose:** The purpose of this narrative review is to present a summary of the growing body of published literature supporting exercise training as a treatment strategy for individuals with AUDs. We will provide evidence on the myriad of ways in which exercise may exert a positive effect on AUD outcomes including stress, anxiety, impulsivity, and depression. Further, we will explore how these mechanisms share common neurobiological pathways. The role of exercise in enhancing the social environment and increasing individual self-efficacy to reduce excess and/or inappropriate alcohol consumption will also be discussed. **Discussion:** We will conclude with a description of completed investigations involving exercise training and provide suggestions for next steps in this innovative field of study.

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1. Introduction

Alcohol use disorders (AUDs) affect approximately 18 million people in the United States (Center for Behavioral Health Statistics and Quality, 2013), with nearly 88,000 deaths per year occurring from alcohol-related causes (Stahre et al., 2014). One in 10 deaths per year, as well as an average of 30 years of potential life lost, can be attributed to excessive drinking among working-age adults (CDC, 2014). Injuries, violence, risky sexual behavior, and fetal alcohol spectrum disorders can occur with short-term alcohol consumption, while long-term use can lead to increased anxiety and depression, unemployment, and is associated with cardiovascular and circulatory diseases (CDC, 2014; Shield et al., 2014). As such, AUDs are an important public health concern and necessitate effective treatment options to best help affected individuals.

A substantial level of attention has been dedicated to developing efficacious treatments for AUDs, including medication, behavioral therapy, and mutual-help groups, that can be offered in both outpatient treatment settings, as well as in short- and long-term residential treatment facilities (National Institute on Alcohol Abuse and Alcoholism, 2010). Treatments are often combined, such as behavioral and pharmacological therapy, to better help patients establish behavioral and coping strategies that aid in recovery and ameliorate persistent symptoms that increase vulnerability to relapse (Dolan et al., 2013). However, challenges still remain in providing efficacious, individualized treatment plans and outcomes vary according to the severity of the AUD and the patient's motivation to change (Bottlender et al., 2006). Given the complexities and shortcomings of current treatment strategies, further work is required to strengthen AUD treatment and seek out novel treatment options that increase engagement in substance-free behaviors (Wackernah et al., 2014; Correia et al., 2005).

Exercise training, primarily in the form of structured aerobic exercise, has been employed in the treatment of a number of addictive disorders including gambling, marijuana and stimulant drug use, and smoking (Marcus et al., 1999; Trivedi et al., 2011a,b; Angelo et al., 2013). Several studies have shown that engaging individuals in exercise training programs prior to, or as a part of, their smoking cessation efforts positively impacts their short-term abstinence rates (Marcus et al., 1999; Bock et al., 2012). Those who exercised more frequently and/or intensely (Marcus et al., 2005), and were better able to maintain a stable body weight (Kawachi et al., 1996; Marcus et al., 1999; Farley et al., 2012) were more successful in their cessation efforts. Similarly, participation in a supervised 2-week exercise-training program reduced marijuana cravings and use in an adult population (Buchowski et al., 2011). Finally, exercise training in substance abuse treatment has been gaining greater levels of attention (Lynch et al., 2013). Pilot investigations involving substance users in outpatient treatment settings have demonstrated that exercise training leads to a significant increase in percent days abstinent (Brown et al., 2010) and decreased urges to use drugs (Roessler, 2010). Additionally, a large, multi-site randomized control trial investigating the impact of exercise training as an augmentation to stimulant abuse treatment in residential treatment centers is currently in progress (Trivedi et al., 2011a,b; Stoutenberg et al., 2012).

Despite the need for more efficacious treatment strategies for individuals with AUDs, and the growing body of evidence of exercise training in other populations with mental health or substance use disorders, relatively little evidence exists regarding the direct impact of exercise training in the treatment of AUDs. While a recent meta-analysis by Wang et al. (2014) demonstrated that exercise training is an effective strategy in enhancing substance abuse outcomes in general, only three studies were included in their analyses

that specifically examined exercise training as a part of for AUDs, two of which involved low-intensity yoga programs. This highlights the need for more high quality research investigations. With increasing knowledge regarding the impact of exercise training on mental health and several pathways related to AUDs, there is a need to summarize these benefits and demonstrate the potential utility of exercise training as a part of a comprehensive AUD treatment program. The purpose of this narrative review is to provide insight into the role of exercise training on several pathways related to AUDs including stress, anxiety, impulsivity, and depression, as well as their common neurobiological pathways. We will conclude with a description of completed investigations involving exercise training and alcohol use and provide suggestions for next steps in this innovative field of study.

2. Role of stress and anxiety in alcohol use disorders

Anxiety is a diverse and common comorbidity among individuals with AUDs (Wolitzky-Taylor et al., 2011). Data suggest that there is a significant, bi-directional relationship between anxiety disorders and excessive alcohol use (Kushner et al., 2000). Individuals with an anxiety disorder were 2.6 times more likely to have alcohol dependence, and more than a third of adults with alcohol dependence had at least one form of an anxiety or mood disorder (Grant et al., 2004; Teesson et al., 2009). Individuals may use alcohol as a coping mechanism (i.e., self-medication theory) for emotional events or social situations where anxiety levels are likely to increase to numb their emotions, improve overall mood, and assist in social situations (Bolton et al., 2006; Robinson et al., 2009). Withdrawal symptoms related to chronic alcohol dependence may increase anxiety symptoms and trigger panic attacks, presenting a significant risk for relapse (Driessen et al., 2001; Willinger et al., 2002). Such changes may persist for months or years after abstinence; thus, individuals may continue to suffer from anxiety episodes related to social events involving alcohol consumption long-term (Kushner et al., 2000).

Alcohol consumption also reduces the tension associated with the experience of stress (e.g., tension-reduction hypothesis) and alleviates negative effects caused by stressful life events (Sinha, 2001). Additionally, post-traumatic stress disorder (PTSD) and alcohol misuse are often common occurrences (Debell et al., 2014), with as many as 59% of individuals suffering from PTSD also having an AUD (Ralevski et al., 2014). Researchers commonly study the interaction between extreme stress events and increased voluntary, compulsive alcohol consumption in rats and mice (Whitaker et al., 2014). Following a single stressful event, Long-Evans rats increased their voluntary alcohol consumption, regardless of whether they had any prior exposure to alcohol (Meyer et al., 2013). A history of stress exposure also seems to be an important moderating factor for alcohol consumption as it may affect self-administering behaviors (Logrip and Zorrilla, 2012).

Patients receiving treatment for AUDs often benefit from concurrent treatment that target underlying problems for comorbid anxiety and stress disorders that may serve to maintain one another (Lynskey, 1998). Yet, historically patients with comorbid substance use and mental health problems have had to seek addiction treatment first, a practice that may lead to untreated mental health problems (Havassy et al., 2009). Addressing comorbid anxiety disorders concurrently with AUD treatment may prevent alcohol problems from persisting or worsening (Watt et al., 2006; Wolitzky-Taylor et al., 2015). Clearly, there is a need for more integrative approaches to dealing with anxiety and stress disorders as a necessary part of any AUD treatment program (Wolitzky-Taylor et al., 2011; Morley et al., 2013).

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