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Brief article

A pilot trial of a videogame-based exercise program for methadone maintained patients

Christopher J. Cutter, Ph.D. [a,b,*], Richard S. Schottenfeld, M.D. [a], Brent A. Moore, Ph.D. [a], Samuel A. Ball, Ph.D. [a], Mark Beitel, Ph.D. [a,b], Jonathan D. Savant, B.S. [b], Matthew A. Stults-Kolehmainen, Ph.D. [c], Christopher Doucette, B.A. [b], Declan T. Barry, Ph.D. [a,b]

[a] Yale University School of Medicine, Department of Psychiatry, New Haven, CT 06511 United States
[b] Pain Treatment Services, APT Foundation, Inc., New Haven, CT 06519 United States
[c] Northern Illinois University, IL 60115 United States

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ABSTRACT

Few studies have examined exercise as a substance use disorder treatment. This pilot study investigated the feasibility and acceptability of an exercise intervention comprising the Wii Fit Plus™ and of a time-and-attention sedentary control comprising Wii™ videogames. We also explored their impact on physical activity levels, substance use, and psychological wellness. Twenty-nine methadone-maintained patients enrolled in an 8-week trial were randomly assigned to either Active Game Play (Wii Fit Plus™ videogames involving physical exertion) or Sedentary Game Play (Wii™ videogames played while sitting). Participants had high satisfaction and study completion rates. Active Game Play participants reported greater physical activity outside the intervention than Sedentary Game Play participants despite no such differences at baseline. Substance use decreased and stress and optimism improved in both conditions. Active Game Play is a feasible and acceptable exercise intervention, and Sedentary Game Play is a promising time-and-attention control. Further investigations of these interventions are warranted.

1. Introduction

Exercise participation is associated with improvements in physical (Berlin & Colditz, 1990; Franco et al., 2005; Garber et al., 2011; Helmrich et al., 1991; Hu et al., 2004; Lawlor & Hopker, 2001; Mead et al., 2009; Penedo & Dahn, 2005) and mental health outcomes among non-clinical and clinical samples (Armstrong & Edwards, 2003; Babyak et al., 2000; Bosscher, 1993; DiLorenzo et al., 1999; Doyne et al., 1987; Dunn et al., 2005; Goodwin, 2003; McNeil et al., 1991; Mead et al., 2009; Pinchasov et al., 2000; Sexton et al., 1989; Singh et al., 1997; Veale et al., 1992). Exercise interventions also are promising for the treatment of substance-use disorders. To date, published research on the potential therapeutic effects of exercise in patients with substance-related disorders has focused largely on nicotine dependence, where it has been shown that physical activity reduces cigarette craving (Hassova et al., 2012) and may assist in smoking cessation (Pekmezi et al., 2012; Zschucke et al., 2012).

Few studies have examined exercise interventions as a treatment for alcohol or drug use disorders (Pekmezi et al., 2012; Ussher et al., 2012; Zschucke et al., 2012). Most of these have used aerobic (e.g., running) or anaerobic (e.g., strength training) interventions performed on specialized equipment under the supervision of an exercise specialist (Bize et al., 2010; Brown et al., 2009, 2010; Buchowski et al., 2011; Dolezal et al., 2013; Donaghy, 1997; Kinnunen et al., 2008; Marcus et al., 2005; Palmer et al., 1988; Roessler, 2010; Sinyor et al., 1982; Ussher et al., 2003). Control conditions in these trials have varied; most used treatment as usual controls and did not control for the time and attention of the exercise intervention (Bize et al., 2010; Brown et al., 2009, 2010; Donaghy, 1997; Kinnunen et al., 2008; Marcus et al., 2005; Palmer et al., 1988; Roessler, 2010; Sinyor et al., 1982; Ussher et al., 2003), although an ongoing multi-site study evaluating a thrice-weekly, one-on-one supervised vigorous exercise intervention initiated during residential drug treatment is using a health education time-and-attention control (Stoutenberg et al., 2012; Trivedi et al., 2011).

To date, clinical trials of the efficacy of exercise in reducing substance use have faced three challenges: (1) low exercise adherence, (2) difficulty devising a credible time-and-attention control condition, and (3) high cost of interventions involving specialized exercise equipment, personnel, or facilities which may not be feasible to implement in many substance abuse treatment programs. We attempted to address these challenges by conducting a pilot investigation of an innovative, engaging, inexpensive, and transportable onsite exercise intervention in an outpatient methadone maintenance treatment (MMT) setting, where frequent

* Corresponding author at: Christopher Cutter, Yale University School of Medicine, 495 Congress Avenue, 2nd Floor, New Haven, CT 06519. Tel.: +1 203 285 2717; fax: +1 203 781 4681.
E-mail address: christopher.cutter@yale.edu (C.J. Cutter).

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attendance would facilitate regular on-site participation. Our primary aim was to assess the feasibility (i.e., adherence to the exercise regimen and retention) and acceptability (i.e., satisfaction) of the Wii Fit Plus™ exergames (i.e., videogames that require physical exertion), called "Active Game Play," in comparison to a sedentary, time-and-attention control condition involving Wii™ sedentary videogames that are played while sitting, called "Sedentary Game Play." Our secondary aim was to assess whether Active Game Play was associated with significant energy expenditure and, as compared with Sedentary Game Play, higher levels of exercise participation outside of the clinic. We also examined whether illicit substance use decreased and psychological wellness (i.e., perceived stress, optimism, psychiatric symptomology, life satisfaction) increased in Active Game Play and Sedentary Game Play participants over the course of the 8-week randomized pilot study.

2. Materials and methods

2.1. Participants

Participants were 29 patients receiving MMT at the APT Foundation, Inc., a non-profit community-based organization that specializes in the treatment of opioid dependence. Study inclusion criteria included an ability to read and understand English and past-week use of illicit opioids or cocaine as evidenced by self-report or urine toxicology findings. Individuals were excluded if they: (1) exhibited current suicide or homicide risk, (2) were unable to complete the informed consent procedures or baseline assessments due to psychiatric or cognitive impairment, (3) had a known seizure disorder, or (4) had a medical condition that would interfere with daily, low-to-moderate physical exercise (e.g., advanced cellulitis, acute musculoskeletal injuries).

Enrollment for the study began on February 15, 2010 and ended on December 31, 2011. As shown in Fig. 1, twenty-nine of the 124 individuals screened were determined to be eligible for the study, provided written informed consent, and were randomly assigned to receive either Active Game Play or Sedentary Game Play. Forty-three patients initially indicated interest but subsequently declined to participate when they were contacted to schedule a study appointment. Fifty-two patients were deemed ineligible due to: absence of illicit opioid or cocaine use within the past 7 days ($n = 44$); a known seizure disorder ($n = 2$); discharge from the MMT program ($n = 3$); and contraindicated medical conditions ($n = 3$). The study was approved by the Human Investigation Committee of the Yale University School of Medicine and the APT Foundation Board. Research assistants conducted all baseline (pre-intervention), weekly (post-randomization), and end-point (8 weeks following randomization) assessments. Participants were provided compensation of $15 for weekly assessment completion (but were not remunerated for video game play session attendance).

2.2. Interventions

Participants received standard treatment at the MMT program, which consisted of: counseling group attendance at least once per month and daily methadone medication as prescribed. Participation in this study did not fulfill the clinic's monthly group attendance requirement. All randomized participants were provided access to Active Game Play or Sedentary Game Play in a private office on a research unit adjacent to the MMT clinic. A member of the research team conducted an orientation session, which consisted of providing (1) the intervention rationale: participants were informed that the purpose of each intervention was to decrease substance use and promote health by regular engagement in a physical activity [Active Game Play] or a non-drug-related pleasurable activity [Sedentary Game Play]; (2) logistical information (location, frequency, and duration of study appointments); and (3) a demonstration, which included guiding participants through their initial use of the intervention. On each occasion that participants used the Wii™, a research assistant was available to answer questions, assist them, and monitor intervention adherence. In the Active Game Play condition, the research assistant recorded the session length, the Wii Fit Plus™ report of the mode and duration of the exercise activity (e.g., running), as well as the associated energy expended (i.e., kilocalories burned). The participant's weight was measured and recorded weekly by the Wii Fit Plus™ body test system. Each participant created a Wii Fit Plus™ avatar called a "Mii." Avatars in video games are visual representations of game players' selves, which may foster player engagement (Jin, 2009).

2.2.1. Active Game Play

The Wii Fit Plus™ includes four categories of exergames (aerobics, strength, balance, and yoga) that dovetail with the four types of exercises recommended by the American College of Sports Medicine and the American Heart Association public health guidelines for a balanced, moderate intensity exercise program: aerobic, resistance, flexibility, and neuromotor exercises (Garber et al., 2011; Haskell et al., 2007). Each Wii Fit Plus™ category contained a variety of exergames from which participants were free to choose. Participants were required

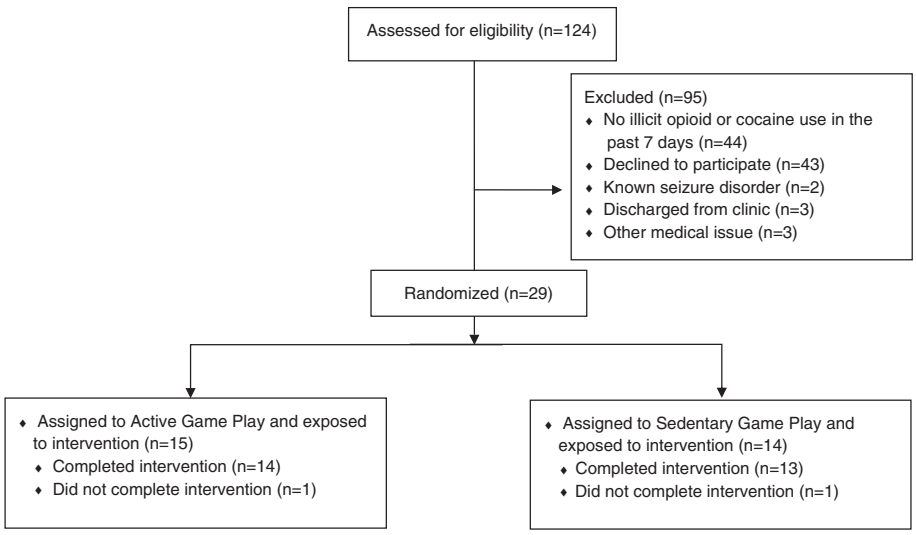

Fig. 1. Participant flow in the study.