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Can persons with a history of multiple addiction treatment episodes benefit from technology delivered behavior therapy? A moderating role of treatment history at baseline

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HIGHLIGHTS

- It is largely unknown for whom technology-based interventions for SUDs work.
- We found interaction effects of TES vs. control in relation to treatment histories.
- Drug abstinence was moderated by study arms and SUD treatment history.
- Computer-based TES worked well even among persons with long treatment histories.

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ABSTRACT

A growing line of research has shown positive treatment outcomes from technology-based therapy for substance use disorders (SUDs). However, little is known about the effectiveness of technology-based SUD interventions for persons who already had numerous prior SUD treatments. We conducted a secondary analysis on a 12-month trial with patients (N = 160) entering methadone maintenance treatment (MMT). Patients were randomly assigned to either standard MMT treatment or a model in which half of standard counseling sessions were replaced with a computer-based intervention, called Therapeutic Education System (standard + TES). Four treatment history factors at baseline, the number of lifetime SUD treatment episodes, detoxification episodes, and inpatient/outpatient treatment episodes were categorized into three levels based on their tertile points, and analyzed as moderators. Dependent variables were urine toxicology results for opioid and cocaine abstinence for 52-weeks. The standard + TES condition produced significantly better opioid abstinence than standard treatment for participants with 1) a moderate or high frequency of lifetime SUD treatment episodes, and 2) those with all three levels (low, moderate and high) of detoxification and inpatient/outpatient treatment episodes, *ps* < .01. The standard + TES condition enhanced cocaine abstinence compared to standard treatment among people with 1) a moderate or high frequency of lifetime SUD treatment episodes, 2) a high level of detoxification episodes, and 3) a moderate or high level of inpatient treatment history, *ps* < .01. We found that including technology-based behavioral therapy as part of treatment can be more effective than MMT alone, even among patients with a history of multiple addiction treatment episodes.

1. Introduction

Many persons with substance use disorders (SUDs) suffer from continuing abuse of drugs and relapse during their lifetimes, even after successfully completing addiction treatment (McLellan, 2002; Witkiewitz & Marlatt, 2004). About 40% to 60% of the people discharged from substance abuse treatment programs return back to active substance use within a year (Brecht & Herbeck, 2014; McLellan, Lewis, O'Brien, & Kleber, 2000). McLellan et al. (2000) argue that substance dependence and recovery processes should be treated and monitored like chronic illness through ongoing care and personalized support to optimize recovery outcomes. Treatment-resistant patients with continuous relapses despite multiple episodes of treatment may require reinstatement or adjustment in their routine treatments (White et al., 2014). On one hand, it is plausible to argue that patients with extensive

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treatment histories need intensive, in-person treatment with professional monitoring and customized care from highly skilled counselors (McGovern, Wrisley, & Drake, 2005). On the other hand, it is also reasonable to predict that patients with treatment-resistant SUDs may need a novel approach, such as a technology-based treatment as part of their care in order to offer highly personalized, evidence-based content as well as interactive, constantly available care. There is, however, no empirical evidence to gauge these alternative predictions. Understanding optimal models of care (clinician-delivered treatment vs. technology-assisted treatment) is an important area of research to better understand how to help these difficult cases of patients with chronic, treatment-resistant SUDs.

Technology-based interventions for SUDs are becoming increasingly popular (Dallery, Jarvis, Marsch, & Xie, 2015; Litvin, Abrantes, & Brown, 2013). Technology-based therapeutic tools can promote just-in-time monitoring and support (Cucciare, Weingardt, Greene, & Hoffman, 2012; Ondersma, Grekin, & Svikis, 2011), highly tailored, personalized content with easy access (Litvin et al., 2013), as well as patients' coping competence and fluency in recovery (Marsch, Carroll, & Kiluk, 2014a). These therapeutic benefits may be particularly helpful for those with a long history of SUD treatments and chronic relapses. Despite the considerable promise of technology-assisted SUD therapeutic tools, surprisingly very little is known as to whether and to what extent these tools can work for persons with chronic relapse who have already received multiple addiction treatments.

1.1. Secondary analysis using treatment history variables as moderators

Our investigation is designed to fill this gap by exploring whether a technology-based therapy will generate better or worse treatment outcomes for patients with a long history of relapses and multiple episodes of addiction treatment. This aim centers on a critical examination of not just whether technology-based interventions for SUDs work, but for whom they work (Kim, Marsch, Guarino, Acosta, & Aponte-Melendez, 2015). We conducted an exploratory secondary analysis to systematically examine the role of treatment history as a moderating factor of treatment outcomes for technology-assisted therapies. This analysis offers an unprecedented insight into the subgroups of patients with shorter vs. longer treatment histories that benefit or do not benefit from technology-based SUD therapy (Kazdin, 2007). In this investigation, we explored various treatment histories, such as lifetime SUD treatment, inpatient vs. outpatient treatment episodes, and detoxification-only treatment episodes. This level of specification was intended to allow us to distinguish whether a technology-assisted treatment, compared to standard alone treatment, works differently across subgroups of patients with various types and levels of treatment histories.

1.2. Technology-based intervention for SUD: therapeutic education system

Our data are from a clinical trial (Marsch et al., 2014b) testing the Therapeutic Education System (TES), a widely studied and empirically supported web-based intervention for SUD treatment. The primary outcomes from this trial have been published elsewhere (Marsch et al., 2014b). TES is grounded in the Community Reinforcement Approach (CRA) and the Cognitive Behavior Therapy (CBT) approaches to SUD treatment (Bickel, Marsch, Buchhalter, & Badger, 2008), and based on fluency-building information technology and an interactive learning process with 67 modules. TES incorporates these behavior change principles in a systematic, individualized manner, to deliver evidence-based care with high fidelity (Marsch et al., 2014a). The content and behavioral therapy principles on which TES is based are reported in the primary outcomes paper in greater detail (Marsch et al., 2014b).

The TES intervention has demonstrated efficacy and effectiveness in the treatment for SUDs in several randomized clinical trials. Bickel et al. (2008) found that TES produced weeks of opioid and cocaine abstinence that were comparable to the treatment outcomes achieved by highly trained therapists. Campbell et al. (2012, 2014b) conducted a multisite randomized clinical trial within the National Drug Abuse Treatment Clinical Trials Network (CTN) evaluating the effectiveness of TES among more than 500 participants in outpatient treatment for SUD across 10 US states over 12 weeks. Campbell et al. (2014b) found that the integration of TES had a significant effect on reducing treatment dropout while enhancing abstinence compared to the treatment-as-usual group. In a recent randomized controlled clinical trial, Marsch et al. (2014b) found that computer-based TES, when it replaced half of the face-to-face therapeutic sessions in methadone maintenance treatment (MMT), resulted in significantly greater opioid abstinence (as measured via urine testing) compared to the treatment-as-usual condition over the 12 month evaluation period.

Despite promising findings from the web-based TES and its documented advantages over standard alone treatment, no research has directly examined whether this technology-based therapeutic tool can enhance treatment outcomes for patients with a long history of repetitive participation in SUD treatment. In secondary analyses, we directly examine the interaction effects of treatment condition and different SUD treatment histories on drug abstinence. Given the lack of published data on this topic, we conduct exploratory secondary analyses to address this research question rather than proposing a directional hypothesis.

2. Methods

2.1. Study setting and random assignment

The study was conducted in a methadone maintenance treatment (MMT) program in a large urban area in the northeastern United States. To be eligible, participants at the study site had to be ≥18 years of age, had to meet DSM criteria for opioid dependence, and be within their first 30 days of MMT program entry. Sufficient English language skills were required for study participation in order to comprehend and respond to the intervention content and study assessments. Individuals who entered the MMT program for detoxification only were not eligible to participate. The study protocol was approved by the Institutional Review Board at the National Development and Research Institutes. All the participants ($N = 160$) provided written informed consent before study participation.

Participants were randomly assigned to either the standard treatment condition (control group, *hereafter*) or the reduced standard treatment + computer-based TES condition (experimental group, *hereafter*) in an intent-to-treat design. Randomization was not blinded. The CONSORT diagram and study procedure are reported elsewhere (Marsch et al., 2014b).

2.1.1. Control group: standard treatment

Participants in standard treatment received daily maintenance doses of methadone (ranging from approximately 80–100 mg/day) and individual counseling at the study MMT site. Each counseling session lasted up to approximately 60 min and occurred once per week for the first four weeks, and every other week thereafter (although participants with persistent illicit drug use continued to meet with their counselor on a weekly basis). Counseling therapy sessions were delivered by experienced Certified Alcohol and Substance Abuse Counselors (CASACs), and largely focused on helping patients understand and comply with program guidelines, resolving personal problems (e.g., employment), teaching cognitive coping skills, monitoring treatment progress (e.g., abstinence), and providing weekly group supervision. The content of standard treatment was consistent with that provided by the majority of MMT programs (McLellan, Arndt, Metzger, Woody, & O'Brien, 1993).