Journal of Substance Abuse Treatment 46 (2014) 43–51

Contents lists available at ScienceDirect

Journal of Substance Abuse Treatment

Web-based behavioral treatment for substance use disorders as a partial replacement of standard methadone maintenance treatment

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ARTICLE INFO

Article history:
Received 8 April 2013
Received in revised form 6 August 2013
Accepted 7 August 2013

Keywords:
Behavioral therapy
Computer
Internet
Web
Opioid
Treatment

ABSTRACT

This study is the first experimental trial to evaluate the effectiveness of a Web-based behavioral intervention when deployed in a model where it partially substituted for standard counseling in a community-based specialty addiction treatment program. New opioid-dependent intakes in methadone maintenance treatment ($n = 160$) were randomly assigned for 12 months to either: (1) standard treatment or (2) reduced standard treatment plus a Web-based psychosocial intervention, the Therapeutic Education System (TES). Results demonstrated that replacing a portion of standard treatment with TES resulted in significantly greater rates of objectively measured opioid abstinence (48% vs. 37% abstinence across all study weeks; $F(1, 158) = 5.90$, $p < .05$ and 59% vs. 43% abstinence on weeks participants provided urine samples for testing; $F(1, 158) = 8.81$, $p < .01$). This result was robust and was evident despite how opioid abstinence was operationally defined and evaluated. The potential implications for service delivery models within substance abuse treatment programs and other healthcare entities are discussed.

1. Introduction

Therapeutic tools that harness existing and emerging technologies (e.g., Internet, mobile devices) offer considerable promise in the assessment, prevention, treatment, and recovery management of substance use disorders. Technology-based assessments can enable greater standardization of data collection and greater accuracy in reporting of sensitive data (e.g., substance use; behavior that may place one at risk for HIV, hepatitis, or other infectious diseases) (Kobak, Greist, et al., 1996; Marsch & Bickel, 2004). Technology-based interventions may include computer-assisted psychosocial treatment (e.g., behavior therapy, HIV prevention interventions) as well as tools for ongoing recovery support/relapse prevention (Marsch, 2012; Marsch & Dallery, 2012; Moore, Fazzino, Gernet, Cutter, & Barry, 2011).

Such technologies can expand the self-monitoring of patients and the reach of clinicians through technology-based behavioral monitoring systems and support systems; and can enhance patients' self-learning and self-management through interactive programs and tools. They can also engage patients, clinicians and an extended support network in shared decision-making through use of electronic decision support systems (Ben-Zeev et al., 2012; Marsch, 2011; Marsch, 2012).

Harnessing technology in the treatment and recovery management of substance use disorders may increase the quality, reach, and personalization of care in a manner that is cost-effective. These tools can also ensure fidelity in the delivery of interventions, thus assuring delivery of empirically-supported treatment. This is particularly important, as prior work has shown that training clinicians to deliver evidence-based behavioral treatment is time-consuming, clinicians are often not accurate in their assessment of when they are delivering evidence-based treatment, and intensive ongoing training and supervision are needed to ensure that interventions are delivered with fidelity (Martino et al., 2011; Moyers et al., 2008; Smith et al., 2012). Additionally, by having on-demand access to "just in time" therapeutic support via electronic devices, individuals can prevent costly escalation of substance use and related problems and unnecessary healthcare utilization. Technology-based therapeutic tools may be used in conjunction with various systems of care or as stand-alone tools for individuals who are unable (or do not wish) to access care for problematic

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http://dx.doi.org/10.1016/j.jsat.2013.08.012

substance use. Leveraging technology in this way offers great promise for leading to entirely new models for delivery of science-based approaches to addressing substance use disorders.

The promise of this approach is further underscored by the extraordinary rate at which access to the Internet and mobile devices has been growing among a wide array of populations. Over 80% of Americans have Internet access and about 90% subscribe to mobile phone services (Internet & Life Project, 2013). Worldwide, over 90% of individuals subscribe to mobile phone services, resulting in approximately 6.8 billion mobile phone subscriptions (Sanou, 2013). Growing evidence suggests that increased access to these technologies is also evident in many traditionally underserved and health disparity populations (Gibbons et al., 2011). Offering behavioral interventions on a wide array of platforms (e.g., desktop computers, mobile devices) offers great promise to reach large numbers of individuals. A large and rapidly expanding scientific literature has demonstrated the promise and clinical utility of a wide array of interactive, technology-based behavioral interventions targeting mental health disorders, including issues of depression, anxiety, post-traumatic stress disorder, eating disorders, as well as severe mental illness (e.g., Ben-Zeev et al., 2012; Foroushani, Schneider, & Assareh, 2011; Marks, Cavanagh, & Gega, 2007; Newman, Szkodny, Llera, & Przeworski, 2011). Additionally, there is a growing literature focused on how such technology-based tools can be implemented into mental health service delivery models to complement existing services (e.g., Ben-Zeev et al., 2012; Bennett-Levy et al., 2010) as well as methods and metrics for implementation research (e.g., Damschroder et al., 2009; Proctor et al., 2009).

Although a number of studies have evaluated the role of technology in addressing smoking and alcohol use disorders (e.g., Chen et al., 2012; White et al., 2010), only a small (but growing) line of research has demonstrated empirical support for technology-based behavioral interventions targeting chronic illicit substance use disorders. Among these therapeutic tools is a 6-session computerized cognitive behavioral intervention, called the Computer-based Training in Cognitive Behavioral Therapy (or CBT4CBT) program, developed by Carroll and colleagues. This program, which is largely video-based, teaches key cognitive behavioral skills, including coping skills, decision making skills, and understanding patterns of substance use. CBT4CBT has been shown to significantly enhance skills acquisition and substantively reduce substance use when provided as an adjunct to standard outpatient substance abuse treatment with a diverse sample of substance-using individuals (Carroll et al., 2008; Carroll et al., 2009).

The Motivational Enhancement System, a single-session intervention, has been shown to be acceptable and easy to use among postpartum women with substance involvement when provided within a health care setting (Ondersma, Chase, Svikis, & Schuster, 2005) and was associated with a reduction in illicit substance use among this population (Ondersma, Svikis, & Schuster, 2007). Additionally, the SHADE program (Self-Help for Alcohol and Other Drug Use and Depression), a motivational intervention targeting comorbid substance use and depressive disorders, was shown to produce equivalent outcomes to a comparable clinician-delivered intervention (Kay-Lambkin, Baker, Kelly, & Lewin, 2011; Kay-Lambkin, Baker, Lewin, & Carr, 2009). Further, a combined motivational and cognitive behavioral, Web-based intervention for cannabis use disorders was shown to produce comparable outcomes to in-person therapy (Budney et al., 2011).

One of the first technology-based behavioral interventions developed and evaluated in experimental research with individuals with substance use disorders is the Therapeutic Education System (TES) (Bickel, Marsch, Buchhalter, & Badger, 2008). TES is a Web-based psychosocial intervention that is theoretically grounded in the Community Reinforcement Approach (CRA) and Cognitive Behavior Therapy approaches to behavioral treatment of substance use disorders. CRA is an approach to behavior therapy designed to help individuals establish and maintain new patterns of behavior that do not involve substance use but which leverage social, recreational, family and vocational reinforcers to help individuals in their recovery from substance use disorders (Budney & Higgins, 1998).

TES is an interactive, Web-based, self-directed tool composed of 65 modules addressing a broad array of skills and behavior designed to help substance-abusing individuals successfully stop their substance use, gain life skills, and establish new behavioral repertoires that do not involve substance abuse and can be clinically meaningful. TES uses informational technologies to ensure mastery of content (fluency) via individually-paced presentation of content and testing to check for mastery of the material. Core modules focus on cognitive–behavioral and relapse prevention skills training as well as HIV prevention. Optional modules address a broad array of skills and behaviors related to employment status, family/social relations, financial management, communication skills, decision-making skills, management of negative moods and depression, time management, and recreational activities as well as specific content designed for HIV- and/or hepatitis C-positive individuals related to healthy living and effective management of these conditions. TES also includes an (optional) contingency management incentives system, in which individuals can earn monetary vouchers or prizes contingent on documented evidence of reaching some therapeutic goal (e.g., provision of substance-free urine samples).

TES has been evaluated in several experimental trials. In an initial, 23-week efficacy trial, opioid-dependent individuals ($n = 135$) maintained on buprenorphine medication were randomly assigned to one of three behavioral therapy conditions: (1) standard counseling (standard in most methadone-treatment settings in the U.S.), (2) CRA behavioral therapy, delivered with fidelity by highly-trained masters' level clinicians, along with contingency management incentives (delivered contingent on opioid- and cocaine-negative urine samples) or (3) CRA behavioral therapy delivered by TES, along with contingency management incentives (delivered contingent on opioid-and cocaine-negative urine samples). Participants in both the clinician-delivered CRA intervention and the computer-assisted (TES) CRA intervention demonstrated comparable levels of opioid- and cocaine-abstinence, and significantly greater rates of abstinence relative to those in the standard treatment condition (Bickel et al., 2008).

A second randomized trial ($n = 56$) evaluated the clinical utility of the modules on HIV, hepatitis and sexually transmitted infections with young persons in outpatient substance abuse treatment (without any contingency management incentives) as an enhancement to comparable content presented by a trained prevention specialist. Results indicated that the Web-based TES modules on these topics, when provided as an adjunct to an educator-delivered prevention intervention, increased accurate prevention knowledge, increased intentions to carefully choose partners, and was perceived as significantly more useful relative to the educator-delivered intervention when provided alone. Results suggested that these Web-based modules may be effective and engaging and may increase the adoption of effective HIV and disease prevention science (Marsch et al., 2011).

A pilot study randomized cocaine-using individuals ($n = 28$) to either: (1) TES plus standard outpatient treatment or (2) standard outpatient treatment alone for 8 weeks. Results showed that participants who received TES along with standard treatment showed larger increases in CRA-related knowledge and were significantly more likely to use effective coping strategies relative to those who received standard treatment alone (Brooks, Ryder, Carise, & Kirby, 2010).

Although research to date has generated promising data regarding the clinical utility of technology-based therapeutic tools as adjuncts to standard substance abuse treatment or as interventions that may be