



Cigarette Smoking During Substance Use Disorder Treatment: Secondary Outcomes from a National Drug Abuse Treatment Clinical Trials Network study

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ABSTRACT

Introduction: The majority of patients enrolled in treatment for substance use disorders (SUDs) also use tobacco. Many will continue to use tobacco even during abstinence from other drugs and alcohol, often leading to smoking-related illnesses. Despite this, little research has been conducted to assess the influence of being a smoker on SUD treatment outcomes and changes in smoking during a treatment episode.

Methods: In this secondary analysis, cigarette smoking was evaluated in participants completing outpatient SUD treatment as part of a multi-site study conducted by the National Drug Abuse Treatment Clinical Trials Network. Analyses included the assessment of changes in smoking and nicotine dependence via the Fagerström Test for Nicotine Dependence during the 12-week study among all smokers (aim #1), specifically among those in the experimental treatment group (aim #2), and the moderating effect of being a smoker on treatment outcomes (aim #3).

Results: Participants generally did not reduce or quit smoking throughout the course of the study. Among a sub-set of participants with higher baseline nicotine dependence scores randomized to the control arm, scores at the end of treatment were lower compared to the experimental arm, though measures of smoking quantity did not appear to decrease. Further, being a smoker was associated with poorer treatment outcomes compared to non-smokers enrolled in the trial.

Conclusions: This study provides evidence that patients enrolled in community-based SUD treatment continue to smoke, even when abstaining from drugs and alcohol. These results add to the growing literature encouraging the implementation of targeted, evidence-based interventions to promote abstinence from tobacco among SUD treatment patients.

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1. Introduction

The majority of patients enrolled in treatment for substance use disorders (SUDs) also use tobacco with reported rates as high as 97% (Bobo, 1989; Guydish et al., 2011; Kalman, 1998; McClure, Acquavita, Dunn, Stoller, & Stitzer, 2014a; Nahvi, Richter, Li, Modali, & Arnsten, 2006; Pajusco et al., 2012). This is significantly higher than the smoking rate in the general population, which is currently 19.3% in the United

States (Centers for Disease Control and Prevention, 2012). Those enrolled in treatment for SUDs are more likely to die due to smoking-related illnesses than from complications from their primary drug of choice (Baca & Yahne, 2009; Hser, McCarthy, & Anglin, 1994; Hurt et al., 1996). Attempts to explain the relationship between nicotine and the use of other substances have involved conceptual models including, biological vulnerabilities due to nicotine during adolescents (Kelley & Rowan, 2004; Lydon, Wilson, Child, & Geier, 2014; Santos, Marin, Cruz, Delucia, & Planeta, 2009), common neural pathways, substrates, and dysregulation contributing to addiction (Kalivas, Lalmiere, Knackstedt, & Shen, 2009), and pharmacological interactions between drugs potentially increasing their reinforcing properties (Mello, Mendelson, Sellers, & Kuehnle, 1980; Mello, Lukas, & Mendelson,

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1985; Mutschler, Stephen, Teoh, Mendelson, & Mello, 2002). Additional conceptual models, not specific to nicotine, have focused on reinforcer pathology (Bickel, Johnson, Koffarnus, MacKillop, & Murphy, 2014) and reward seeking (Arias-Carrion & Salama, 2012), to name only a few.

Despite high rates of smoking among SUD treatment patients and the well-known negative health effects of smoking, the majority who enter SUD treatment as cigarette smokers will not contact resources to assist them in quitting, and tobacco cessation services are not always available onsite for those who might be interested. Several studies administered across treatment settings have reported low levels of both availability and use of smoking cessation services in participating SUD programs (Eby & Laschober, 2013; Friedmann, Jiang, & Richter, 2008; Fuller et al., 2007; Knudsen & Studts, 2011; Laschober & Eby, 2013; Richter, Choi, McCool, Harris, & Ahluwalia, 2004), though services are becoming more common with the introduction of state mandates and smoking cessation guidelines for SUD treatment clinics (Guydish et al., 2012; Williams et al., 2005).

Recent evidence appears to suggest that non-smokers or former smokers may have better drug abstinence outcomes or proxies of outcomes compared to smokers. This is concerning given that the majority of SUD patients are smokers, and they may be starting treatment episodes already at a disadvantage. Among users of both tobacco and cannabis, a recent review showed poorer cannabis cessation outcomes compared to cannabis only users (Peters, Budney, & Carroll, 2012), and a human laboratory-based study showed that co-users of tobacco and cannabis were more likely to relapse (to cannabis) compared to non-smoking cannabis users (Haney et al., 2013). Smoking during opioid detoxification was shown to increase opioid craving (Mannelli, Wu, Peindl, & Gorelick, 2013). It has also been found that cocaine-dependent patients who stopped smoking in response to smoking cessation treatment provided concurrently with SUD treatment had improved cocaine-use outcomes relative to those who continued to smoke (Winhusen, Kropp, Theobald, & Lewis, 2014). The aforementioned results suggest that there is a potentially important relationship between tobacco use and SUD treatment outcomes. Studies to this point have been substance-specific, and may be limited in generalizability. The current report, however, includes data from a large, geographically diverse outpatient SUD treatment population, and may provide additional insight, generalizability, and support for the previous findings that smokers appear to have poorer SUD treatment outcomes.

Additionally, little is known about changes in smoking during an SUD treatment episode, and published evaluations have been limited to adolescent populations. One study found that smoking persisted throughout SUD treatment and increased at the 12-month follow-up visit (Coleman-Cowger & Catlin, 2013). Another study showed that among adolescents in treatment for cannabis use disorders, moderate and heavy cigarette smokers decreased their cigarettes per day only slightly during treatment, but showed similar smoking rates at follow-up, while mild smokers decreased their cigarettes per day during treatment and follow-up (Shelef, Diamond, Diamond, & Myers, 2009). Among adolescents enrolled in a cannabis cessation pharmacotherapeutic clinical trial, there were no changes in cigarette smoking during treatment (McClure, Baker, & Gray, 2014b), while another report showed that adolescent cannabis users with attention-deficit/hyperactivity disorder who reduced their cannabis use by at least 50% following treatment also significantly decreased their cigarette smoking (Gray et al., 2011). The scarcity of data on this topic suggests that the majority of treatment trials among SUD populations do not assess or do not report the impact of SUD treatment on cigarette smoking and other tobacco use, presenting a missed opportunity for future trials and intervention improvement.

In order to contribute to the literature on the complex issue of cigarette smoking among SUD treatment patients, the current report explored cigarette smoking within the context of a randomized controlled effectiveness trial of a Web-delivered psychosocial treatment (WEB-TX) conducted within the National Drug Abuse Treatment Clinical Trials Network (NIDA CTN) (Campbell et al., 2012; Campbell

et al., 2014). This secondary analysis had three main aims; 1) assess if smoking and nicotine dependence changed over the course of the 12-week study, 2) explore if the treatment group (therapeutic education system [TES]) showed reductions in smoking and changes in nicotine dependence over the treatment period compared to the control group (treatment as usual [TAU]), and 3) determine if being a smoker moderated the effect of treatment with TES (versus TAU) on abstinence from drugs and alcohol.

Though TES as a treatment intervention for drugs and alcohol does not target cigarette smoking specifically, the content material of TES focuses on skills-based learning for achieving and maintaining abstinence from drugs (e.g., drug refusal, coping with craving and withdrawal, avoiding triggers, etc.). It follows that interventions of this sort targeting SUDs may extend to cigarette smoking through knowledge and acquired skills that may prove useful in cessation efforts. In a broader sense, it is also possible that the improvement of SUD symptomology is associated with reductions in tobacco use or cessation. Evaluation of the relations between smoking and substance use is valuable for the continued improvement of treatment strategies to address both concurrently.

2. Methods

2.1. Participants and procedures

The parent trial (WEB-TX; CTN-0044) was conducted within 10 outpatient, geographically-diverse, community-based SUD treatment programs (Campbell et al., 2012; Campbell et al., 2014). Enrolled participants were adult men and women ($N = 507$) who were within the first 30 days of their current treatment episode. After screening and baseline assessment, participants were randomized to receive 12 weeks of either standard TAU ($n = 252$) or TAU + TES ($n = 255$), whereby TES replaced 2 hours of standard care per week. TES (Bickel, Marsch, Buchhalter, & Badger, 2008; Marsch et al., 2014) consisted of a Web-delivered version of the community reinforcement approach (Onken, J.D., & Boren, 1997) that incorporated voucher-based contingency management (Higgins et al., 1994; Peirce et al., 2006; Petry et al., 2005; Stitzer, Petry, & Peirce, 2010) to promote abstinence from drugs and alcohol. TES has 62 computer-delivered, interactive, multimedia modules, which covered skills for achieving and maintaining abstinence. Participants made two weekly research assessment visits for 12 weeks and completed 3- and 6-month follow-up visits. Primary outcomes for this study (Campbell et al., 2014) and further study details (Campbell et al., 2012, 2013) are described elsewhere, but briefly, participants randomized to TES had greater abstinence rates and lower treatment dropout rates compared to a standard outpatient treatment control condition (Campbell et al., 2014). The trial was registered with Clinicaltrials.gov (NCT01104805).

2.2. Measures

2.2.1. Smoking

Cigarette smoking was self-reported during the trial. Smoking status and nicotine dependence were assessed at the baseline visit, weeks 4, 8, and 12 during treatment, and at the 3- and 6-month follow-up visits. Participants were asked if they currently smoked cigarettes and if they were using any smoking cessation medication (i.e., nicotine replacement, bupropion, varenicline, or other). If participants endorsed smoking, they completed the six-item Fagerström Test for Nicotine Dependence (FTND, range 0–10) (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991). Responses on the FTND were summed resulting in a score of nicotine dependence, with 10 indicating the most severe level of dependence. Two specific items, often referred to as the Heaviness of Smoking Index (HSI) (Heatherton, Kozlowski, Frecker, Rickert, & Robinson, 1989; Kozlowski, Porter, Orleans, Pope, & Heatherton, 1994), from the FTND were examined in a separate analysis. The first item was

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