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Sustained, New, Never, and Discontinued Tobacco Cessation Services Adopters

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Abstract

This study examined longitudinal adoption patterns of tobacco cessation (TC) counseling and TC pharmacotherapy in substance use disorder treatment programs and baseline predictors (program characteristics and program culture) of these patterns 12-months later. Telephone survey data were collected in 2010 from 685 randomly sampled program administrators working in geographically representative treatment programs across the U.S. Regarding TC counseling, about 41% of programs never adopt, 33% sustain, and 27% change adoption patterns. Concerning TC pharmacotherapy, about 62% of programs never adopt, 19% sustain, and 18% change adoption patterns. The three most consistent predictors of counseling adoption patterns are TC reimbursement, TC financial resource availability, and smoking culture. For TC pharmacotherapy adoption patterns, the most consistent predictors include profit status, TC reimbursement, level of care, TC financial resource availability, and smoking culture. Findings provide insights into program characteristics and program culture as both potential barriers and facilitators of longitudinal TCS adoption.

Keywords

smoking cessation availability; tobacco dependence; adoption of evidence-based practices; addiction treatment; longitudinal study

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1. Introduction

Tobacco ranks among the most commonly abused substances in the U.S. (National Institute on Drug Abuse [NIDA], 2012), with about 21% of the general adult population being current smokers (Centers for Disease Control and Prevention, 2013). The tobacco use among people in treatment for substance use disorders (SUDs) is more than three times higher, ranging from 65% to 87% (Guydish et al., 2011). Patients seeking treatment for SUDs also smoke more and are twice as likely to die from tobacco-related causes (Hays et al., 1999; Hurt et al., 1996; Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002).

At the same time, 70% to 80% of SUD patients want to quit smoking (Richter & Arnsten, 2006), can successfully quit (Hughes, Novy, Hatsukami, Jensen, & Callas, 2003), and experience beneficial outcomes on concurrent treatment for other SUDs (Richter & Arnsten, 2006). Because many patients need help to quit smoking (Tobacco Use Recovery Now!, 2009), SUD treatment programs are prime settings for providing evidence-based tobacco cessation services (TCS) recommended by national guidelines including counseling and pharmacotherapy (Fiore et al., 2008). Given the generally low adoption of TCS in SUD treatment programs (Friedmann, Jiang, & Richter, 2008; Knudsen & Studts, 2011; Muilenburg, Laschober, & Eby, 2014a,b; Rothrauff & Eby, 2011), the current study longitudinally examines SUD program administrator reports of TC counseling and TC pharmacotherapy adoption patterns (sustained, new, never, and discontinued), as these are necessary conditions for implementation patterns, and their program-level predictors to better understand the adoption process.

Adoption differs from implementation in two major ways: First, adoption refers to the availability of TCS in treatment programs whereas implementation refers to the consistent use of TCS by clinicians. Second, adoption of TCS comes before implementation because unless TCS are made available, implementation cannot occur (Fixsen, Naoom, Blase, Friedman, & Wallace, 1995). Thus, understanding the adoption of TCS is an important first step in the diffusion of TCS innovations (Rogers, 1962).

Rogers' (1962) seminal work on the diffusion of innovations suggests that the adoption of evidence-based practices (EBPs) is initially slow as few people and organizations are aware of the innovation, increases as awareness grows, and levels off once most organizations have adopted the EBPs. Despite strong theoretical support that the diffusion of innovations is a process, most studies examining the adoption of TCS have used cross-sectional designs (e.g., Friedmann et al., 2008; Knudsen, Studts, Boyd, & Roman, 2010; Rothrauff & Eby, 2011). Although these studies provide important insight into the adoption of TCS at a given point in time, they provide no information on change in the adoption process *within treatment programs over time*. Likewise, cross-sectional studies cannot tell whether or not programs that are initially non-adopters become adopters over time or if they maintain their status quo.

Only two empirical studies have investigated longitudinal adoption patterns of TCS and factors that predict adoption patterns over time (Knudsen, Muilenburg, & Eby, 2013; Knudsen & Studts, 2011). Both studies find considerable change in service offerings.

Knudsen et al. (2013) examined the sustainment of TC counseling over a three year period, finding that approximately 40% of treatment programs discontinued TC counseling over time. Knudsen and Studts (2011) focused exclusively on two types of nicotine replacement therapies (NRTs; patch or gum) and provided a more detailed analysis of changes in adoption patterns by comparing sustained, non-, discontinued, and recent adopters over a four year window. Considerable variability was reported in adoption over time, with 28% of programs reporting some change in NRT availability. Both studies also examined baseline predictors of adoption patterns. Organizational characteristics such as accreditation status (Knudsen et al., 2013), private funding, being on a hospital campus, having access to physicians, offering inpatient/residential treatment, and providing other TCS (Knudsen & Studts, 2011), were predictive of adoption patterns. Moreover, Knudsen et al. (2013) found that administrator attitudes regarding the positive impact of TC on SUD recovery and fewer organizational barriers (e.g., less demanding protocols, greater staff skills) predicted sustained adoption of NRT.

However, there are limitations to both studies that support further investigation into TCS adoption patterns. One limitation is the narrow definition of TCS adoption by focusing only on two types of counseling (Knudsen et al., 2013) and two types of NRT (Knudsen & Studts, 2011). This stands in contrast to the broader range of TC counseling and TC pharmacotherapy advocated by the national guidelines (Fiore et al., 2008). Further, although one of the studies compared sustained, non-, discontinued, and recent adopters, it focused only on two types of NRTs and did not examine program administrator attitudes as predictors of adoption patterns (Knudsen & Studts, 2011).

A last limitation is the time-spans used to examine changes in TCS adoption patterns, which ranged from 3 to 4 years from baseline. Because innovation adoption and implementation theories (e.g., Fixsen et al., 1995; Rogers, 1962) do not specify or speculate about an exact time-span within which adoption changes can be expected to or should take place, examining more diverse time-spans such as fewer years between baseline to follow-up is important to provide greater insights into the adoption process. It also allows us to compare the base rate of adoption between studies using shorter versus longer time-spans. This may help inform future research and theorizing about the dynamic aspects of EBP adoption.

The present study builds and expands on existing research to address these gaps in the TCS literature. Specifically, we provide the most comprehensive perspective on TCS adoption to date by examining changes over a 12-month period and examining four types of TC counseling and nine types of TC pharmacotherapy as outlined in the national guidelines (Fiore et al., 2008). In so doing we examine TC counseling and TC pharmacotherapy separately, recognizing that the predictors of these different types of TCS may be important to consider. Moreover, we examine a range of both program characteristics and indicators of program culture as predictors of four different adoption patterns over time (sustained, never, discontinued, and new adopters).

Using data from a nationally random sample of SUD treatment program administrators, we address three research questions: (1) What percent of treatment programs are classified as sustained, never, discontinued, and new adopters of TC counseling and TC

pharmacotherapy? (2) What baseline treatment program characteristics (profit status, hospital or medical affiliation, extent of TC reimbursement, level of care, availability of TC financial resource availability) and baseline treatment program culture (perceptions regarding the program's smoking culture and positive effect of TCS on sobriety) predict TC counseling adoption patterns? (3) What baseline treatment program characteristics and baseline treatment program culture predict TC pharmacotherapy adoption patterns?

2. MATERIALS AND METHODS

2.1. Study Design and Sample

Longitudinal data were obtained from the Managing Effective Relationships in Treatment Services (MERITS III) project, which started in 2010. MERITS III is designed to assess the effect that SUD treatment program processes and management practices have on the adoption, implementation, and sustainability of TCS in treatment programs. All procedures were approved by the University of Georgia Institutional Review Board. Detailed information on the study design has been published previously (Muilenburg, Laschober, & Eby, 2014a,b).

Briefly, the 2010 Substance Abuse and Mental Health Services Administration (SAMHSA) National Directory provided the sampling frame for MERITS III. The Directory included 11,153 SUD programs that were comprised of Federal, State, local government, and private facilities, were located across the U.S., and included all levels of care. To screen for eligibility in MERITS III, all programs listed in the Directory were first assigned a random number. Then, trained research assistants called program administrators to screen and qualify for eligibility. To be eligible the program had to provide SUD counseling services in a community setting. Programs that offered only methadone maintenance, Veterans Administration (VA) programs, DUI educational programs, or those listed as Halfway Houses and only offered detoxification services were excluded.

Approximately 5,000 programs were contacted to compile a list of 2,679 eligible programs. Working from this list of eligible programs, trained research assistants called to request a 30-minute structured phone interview with program administrators. A total of 1,006 administrators participated, 171 were no-shows even after repeated attempts, 422 refused to participate, 944 could not be reached (i.e., phone disconnected, program closed), 125 were duplicate programs, and 11 no longer qualified. Thus, the basic phone interview response rate was 62.91% (see Gripp, Luloff, & Yonkers, 1994 for basic phone interview response rate calculation).

The same 1,006 treatment programs were contacted again one year later and invited to participate in a follow-up survey: 685 program administrators completed the 30-minute follow-up phone interview, 244 programs could not be reached (e.g., phone disconnected, program closed), 4 programs were no longer eligible, and 71 administrators refused participation. This resulted in a final sample of 685 treatment programs that participated at both baseline and 12-month follow-up.

2.2. Measures

2.2.1—Adoption of TC counseling and adoption of TC pharmacotherapy was measured at baseline and 12-month follow-up. Program administrators reported whether their program adopted (made available) at least one of four types of *TC counseling services* (individual counseling that focuses on social support specifically for TC, individual counseling that focuses on problem solving/skills training specifically for TC, four or more individual counseling sessions specifically for TC, group counseling specifically for TC) recommended by the national guidelines (Fiore et al., 2008). Further, program administrators stated whether their program adopted at least one of the nine currently endorsed TC pharmacotherapies (nicotine patch, gum, nasal spray, lozenge, inhaler, bupropion-SR, varenicline, clonidine, nortriptyline) (Fiore et al., 2008).

Adoption of TC counseling and TC pharmacotherapy at each time period was recorded as 0 = *not adopted* and 1 = *adopted*. Based on responses at both baseline and follow-up, four adoption patterns were created separately for TC counseling and TC pharmacotherapy: 1 = *sustained adopters* (reported TCS at baseline and follow-up), 2 = *new adopters* (reported no TCS at baseline but TCS at follow-up), 3 = *never adopters* (reported no TCS at either baseline or follow-up), and 4 = *discontinued adopters* (reported TCS at baseline but not at follow-up).

2.2.2—Treatment program characteristics were measured at baseline and included five separate characteristics. Program administrators reported whether their program operated as a *non-profit* entity (0 = *no*, 1 = *yes*) and whether their program was *affiliated with a hospital or other medical facility* (0 = *no*, 1 = *yes*). Additionally, a four-item scale was developed for this study to measure the *extent to which TCS were reimbursable*, including counselor time spent providing individually-based TCS, counselor time spent providing group-based TCS, pharmacological interventions for TC, and other financial resources that exist within the treatment program to support TCS. Responses were recorded on a Likert-type scale and ranged from 1 = *no extent* to 4 = *great extent*. The scale was created by calculating the mean across the four items ($\alpha = .76$). Further, administrators reported on the *level of care* offered in their treatment program including outpatient (OP) only, inpatient (IP) only, and a mixture of OP and IP care. Because previous research has shown differences between OP and other types of care related to the adoption of EBPs (e.g., Friedmann et al., 2008; Knudsen & Studts, 2011), a dichotomous variable was created with 1 indicating *OP only care* and 0 indicating *mixed care*.

Finally, a modified and shortened version of Klein, Conn, and Sorra's (2001) scale was used to assess the *availability of financial resources for TCS*. Items included: "This treatment program's financial constraints make it difficult to offer the amount of smoking cessation services that patients need." (reverse scored), "Because of this treatment program's financial constraints, we have been unable to incorporate smoking cessation into treatment planning for patients." (reverse scored), "In this treatment program, money has been readily available to support activities related to smoking cessation with patients.", and "This treatment program can't afford to pay for all the training and education needed to implement smoking cessation services for patients." (reverse scored). Responses were recorded on a Likert-type

scale and ranged from 1 = *strongly disagree* to 5 = *strongly agree*. The scale was created by calculating the mean across the four items ($\alpha = .79$).

2.2.3—Treatment program culture was measured at baseline and included two scales. *Administrator perceptions of the program's smoking culture* was measured with a 6 -item scale (Knudsen et al., 2010). Items included: "Smoking is an accepted part of the staff culture at this treatment program. ", "Smoking and tobacco use are not important issues in the successful treatment of other substance abuse problems.", "Our treatment protocol is so demanding that there would be little or no time for adding smoking cessation activities. ", "Allowing patients to continue their smoking or other tobacco use facilitates successful treatment of their primary substance abuse issues. ", "Our staff generally does not have the skills to provide smoking cessation treatments to patients. ", and "Our staff does not have interest in providing our patients with smoking cessation treatments." Responses were measured with a Likert-type scale and ranged from 1 = *strongly disagree* to 5 = *strongly agree*. The scale was created by calculating the mean across the 6 items ($\alpha = .65$).

Positive effect of TC on sobriety was measured with one item (Hurt, Croghan, Offord, Eberman, & Morse, 1995). Program administrators were asked, "In your opinion, which of the following best describes how smoking cessation interventions will affect a patient's chance of sobriety?" Responses were measured with a Likert -type scale and ranged from 1 = *definitely decreases chance of sobriety* to 5 = *definitely increases chance of sobriety*.

2.2.4. Control variable—Because we used baseline predictors to examine differences in TC counseling and TC pharmacotherapy adoption patterns 12 months later, we controlled for whether the same or a different treatment program administrator completed a survey at both baseline and follow-up (0 = *same administrator*, 1 = *change in administrator*).

2.3. Data Analysis

Descriptive statistics were used to describe the relative frequency of different patterns of TC counseling and TC pharmacotherapy adoption over time (RQ1). To examine the relationships between the four TC counseling (RQ2) and TC pharmacotherapy (RQ3) adoption patterns and both program characteristics and program culture characteristics, a series of bivariate multinomial logistic regressions were conducted separately for each independent variable. This approach has been used in prior research with group sizes similar to the present study (e.g., Abraham, Knudsen, & Roman, 2011). Considering the large number of comparisons conducted, we adjusted the p value to .01 to account for the increased possibility of a Type I error.

Multinomial logistic regression is comparable to logistic regression. However, whereas logistic regression is used when the dependent variable (DV) has two categories, multinomial logistic regression is used when the DV has more than two categories. In our study, the DV had four categories (sustained, never, discontinued, new adopters). Multinomial logistic regression compares all categories to a reference category. Because we were interested in comparing all categories to each other, we ran the analyses in three stages. First, we used never adopters as the reference category and obtained comparisons to sustained, discontinued, and new adopters. The results were reported in the first three

columns in Tables 2 and 3. Second, we used sustained adopters as the reference category and obtained comparisons to the other groups. Only the comparisons to discontinued and new adopters were presented in columns 4 and 5 because the comparison to never adopters was already reported in the first column. Third, we used discontinued adopters as the reference category and obtained comparisons to the other groups. Only the comparison to new adopters was presented in column 6 because the comparisons to the other adopters were already reported in columns 2 and 4.

Additionally, similar to odds ratios reported and interpreted with logistic regression results, relative risk ratios (RRR) are reported and interpreted with multinomial logistic regression results. RRR greater than 1.00 indicate positive relationships and RRR smaller than 1.00 indicate negative relationships between the predictor and the dependent variable. The control variable (change in program administrator from baseline to follow-up) was included in each analysis (results are not shown but are available upon request).

3. RESULTS

3.1. Descriptive Statistics

According to program administrators, 73.05% of treatment programs operated as nonprofit entities, 57.23% provided outpatient only level of care, and 15.47% of treatment programs were affiliated with a hospital or other medical facility. Administrators also reported a 1.43 mean ($SD = 0.66$) extent of TCS reimbursement (scale of 1–4), a 2.62 mean ($SD = 0.88$) TCS financial availability (scale of 1–5), a 2.30 mean ($SD = 0.64$) perceived smoking culture (scale of 1–5), and a 3.78 mean ($SD = 1.00$) extent of perceived positive effect of TC on sobriety (scale of 1–5). In the majority of treatment programs (88.03%), the same program administrator provided data at baseline and 12 month follow-up.

3.2. TC Counseling and TC Pharmacotherapy Adoption Rates and Adoption Patterns (RQ1)

Table 1 shows the results regarding the adoption rates at baseline and 12-month follow-up as well as the adoption patterns separately for TC counseling and TC pharmacotherapy. Adoption of TC counseling was reported by 46.72% of program administrators at baseline compared to 45.11% at 12-month follow-up, which represents a non-significant difference ($z = .40, p = .685$). TC pharmacotherapy adoption rates were even lower, with only 28.32% of program administrators at baseline and 28.47% at 12-month follow-up reporting the adoption of TC pharmacotherapy, which was also a no significant difference ($z = .00, p = .974$).

When comparing adoption patterns of TCS over 12-months, a more fine-grained picture of (non) adoption over time emerges. For both TC counseling and TC pharmacotherapy adoption, programs were most frequently categorized as never adopters (40.73% and 62.48%, respectively). This was followed by sustained TC counseling and TC pharmacotherapy adopters (32.55% and 19.27%, respectively). The patterns with the lowest adoption rates for both TC counseling and TC pharmacotherapy were discontinued adopters (14.16% and 9.05%, respectively) and new adopters (12.55% and 9.20%, respectively). Cross-tabulations further showed that 243 (35.47%) programs never adopted either TC

counseling or TC pharmacotherapy and 90 (13.14%) programs sustained both TC counseling and TC pharmacotherapy (results are not shown).

3.3. Baseline Treatment Program Characteristics and Treatment Program Culture Predicting TC Counseling Adoption Patterns (RQ2)

Table 2 displays the bivariate multinomial logistic regression results regarding TC counseling comparing sustained (column 1), discontinued (column 2), and new adopters (column 3) to never adopters; sustained to discontinued adopters (column 4); and sustained (column 5) and discontinued adopters (columns 6) to new adopters.

3.3.1. Treatment program characteristics—Treatment programs that operated as nonprofit entities were significantly more likely to be sustained adopters compared to never adopters (RRR = 1.88). Programs affiliated with a hospital or other medical facility were significantly more likely to be sustained (RRR = 2.67) than never adopters. Programs with a greater extent of TC reimbursement were significantly more likely to be sustained (RRR = 16.49), discontinued (RRR = 8.70), and new (RRR = 4.90) adopters than never adopters; significantly more likely to be sustained than discontinued (RRR = 1.89) and new (RRR = 3.36) adopters. Outpatient only programs were significantly less likely than inpatient/mixed programs to be sustained rather than never adopters (RRR = 0.50) and significantly more likely to be sustained than new adopter (RRR = 2.25). Programs with greater TC financial resource availability were significantly more likely to be sustained (RRR = 2.32), discontinued (RRR = 1.46), and new (RRR = 1.59) adopters compared to never adopters; and significantly more likely to be sustained than discontinued (RRR = 1.59) and new (RRR = 1.47) adopters.

3.3.2. Treatment program culture—Treatment programs with administrators reporting more of a smoking culture were significantly less likely to be sustained (RRR = 0.24), discontinued (RRR = 0.57), and new (RRR = 0.58) adopters than never adopters; and significantly less likely to be sustained than discontinued (RRR = 0.42) and new (RRR = 0.41) adopters. Finally, programs with administrators who perceived more positive effects of TC on sobriety were significantly more likely to be sustained than never (RRR = 1.59) and discontinued (RRR = 1.45) adopters.

3.4. Baseline Treatment Program Characteristics and Treatment Program Culture Predicting TC Pharmacotherapy Adoption Patterns (RQ3)

Similar to Table 2, Table 3 shows the bivariate multinomial logistic regression for TC pharmacotherapy comparing sustained (column 1), discontinued (column 2), and new adopters (column 3) to never adopters; sustained to discontinued adopters (column 4); and sustained (column 5) and discontinued (column 6) adopters to new adopters.

3.4.1. Treatment program characteristics—Treatment programs that operated as nonprofit entities were significantly more likely to be sustained (RRR = 1.91), discontinued (RRR = 4.49), and new (3.89) adopters compared to never adopters. Programs affiliated with a hospital or other medical facility were significantly more likely to be sustained (RRR = 5.49) and discontinued (RRR = 2.83) than never adopters. Programs with a greater extent of

TC reimbursement were significantly more likely to be sustained (RRR = 3.32), discontinued (RRR = 1.94), and new (RRR = 2.11) than never adopters. Outpatient only programs were significantly less likely than inpatient/mixed programs to be sustained (RRR = 0.22) and discontinued (RRR = 0.24) than never adopters; and significantly less likely to be sustained (RRR = 0.42) than new adopters. Programs with greater TC financial resource availability were significantly more likely to be sustained (RRR = 2.13) than never adopters; significantly more likely to be sustained (RRR = 1.79) than discontinued adopters; and significantly more likely to be sustained (RRR = 1.88) than new adopters.

3.4.2. Treatment program culture—Treatment programs with administrators reporting more of a smoking culture were significantly less likely to be sustained than never (0.47), discontinued (RRR = 0.34), and new (RRR = 0.45) adopters. No significant effects were found for administrators' perceptions of the positive effect of TC on sobriety.

4. DISCUSSION

The findings from this study show that the most consistent overall predictors of counseling adoption patterns are TC reimbursement, TC financial resource availability, and smoking culture. For TC pharmacotherapy adoption patterns, the most consistent overall predictors include non-profit status, TC reimbursement, level of care, TC financial resource availability, and smoking culture. Additionally, sustained adopters are most well differentiated from other adoption patterns by the study predictors, whereas discontinued versus new adopters show no differences.

4.1. TCS Adoption Rates and Longitudinal TCS Adoption Patterns

We find that TC counseling is adopted in less than half of treatment programs at both baseline and 12-months later. Adoption rates for TC pharmacotherapy are considerably lower, with less than one third of treatment programs adopting pharmacotherapy at both baseline and 12-month follow-up. These findings of generally low adoption rates are consistent with prior cross-sectional findings (e.g., Friedmann et al., 2008; Knudsen et al., 2013, 2010; Muilenburg et al., 2014a,b; Rothrauff & Eby, 2011) and at first glance suggest that the adoption of TCS remains relatively stable over time. However, when tracking TC counseling and TC pharmacotherapy adoption longitudinally, a very different pattern emerges.

In terms of stability over time, roughly 41% of treatment programs are classified as never adopting TC counseling and 62% as never adopting TC pharmacotherapy. An additional 33% of treatment programs that adopt TC counseling and 19% of treatment programs that adopt TC pharmacotherapy at baseline sustain the adoption over time. In about 18%–27% of treatment programs there is a shift in adoption of TC counseling and TC pharmacotherapy over 12 months, with some treatment programs discontinuing and others newly adopting TC counseling and TC pharmacotherapy. These findings are generally consistent with prior longitudinal research, which finds that about 50% of treatment programs never adopt TC pharmacotherapy (Knudsen & Studts, 2011) and between 28% (Knudsen & Studts, 2011) and 40% (Knudsen et al., 2013) report a change in TCS adoption over a three to four year period. The differences reported here are likely due to the much shorter follow-up time-span

in the current study, more fine-grained measures of TCS, and differences in the sample design (i.e., sampling frame, sample size).

Our findings demonstrate the volatility of TCS adoption and highlight the limitations of relying on snapshots of adoption at a particular point in time when characterizing the status of TCS in SUD treatment. They also signal limited progress in the adoption and sustainability of TCS in SUD treatment programs despite national efforts to promote the use of TCS (Fiore et al., 2008). In particular, the high number of never and discontinued adopters are troubling given the high rate of tobacco use among patients in SUD treatment (Guydish et al., 2011) and greater associated health risks (Richter et al., 2002) among those seeking concurrent treatment for other SUDs. Taken together, our findings indicate a potential missed opportunity to improve the health of individuals who are in the process of making other lifestyle changes that may also support TC efforts.

4.2. Predictors of Longitudinal TCS Adoption Patterns

Our findings indicate that treatment program characteristics and program culture exert a strong and consistent, albeit somewhat different effect, on the adoption of TC counseling and the adoption of TC pharmacotherapy over time. These overall findings are supported by prior research showing that both program characteristics (e.g., Friedmann et al., 2008; Knudsen & Studts, 2011; Muilenburg et al., 2014a,b) and program culture (e.g., Knudsen et al., 2010) are related to the adoption of TCS.

4.2.1. TC Counseling—Compared to other types of adopters, never adopters report lower reimbursement for TC, lower financial resources available for TC, and more of a smoking culture. Additionally, never adopters are more likely to be affiliated with a hospital or in outpatient only settings compared to sustained adopters. These findings suggest that lack of resources and support for TC may well account for the absence of adoption at either baseline or 12-months later, both of which have been identified as barriers to the adoption of TCS in general (e.g., Fiore et al., 2008; Ziedonis, Guydish, Williams, Steinberg, & Foulds, 2006)

Considering that close to half of programs (41%) never adopt TC counseling, considerable work is needed to lessen this research-to-practice gap. Because changes to health insurance and billing practices take time to go into effect, our recommendations here focus on program culture change, particularly in outpatient settings, that can be immediately implemented. Culture change requires a high level champion for change (Warrick, 2009). In the context of SUD treatment, this might be the CEO, President, or a local program administrator. Internal policies and practices also need to be institutionalized to support culture change (Warrick, 2009). This might include implementing 100% tobacco-free policies, posting print material advocating TC in public areas, providing educational pamphlets to patients who smoke, encouraging staff to quit smoking, and offering training for staff on the importance of treating tobacco dependence alongside other addictions.

By contrast, sustained adopters are more likely to report reimbursement for TC, have greater financial resources available for TC, and perceive a lower smoking culture than other adopters. Additionally, administrators in this group are more likely to perceive positive effects of TC on sobriety compared to most other adopters. Considering the strong effect

that program characteristics and program culture have on the sustained adoption of TC counseling, ethnographic field research is needed to identify specific features of these treatment programs that sustain adoption over time. Findings will also shed light on programs' decisions to delay the adoption of TCS and what sets them apart from never adopters.

It is also informative to examine the predictors of programs that discontinue TC counseling because in these programs there was sufficient interest, and arguably strong financial resources, to initially adopt this new practice, followed by an inability (failure) to sustain adoption over time. Our findings indicate that discontinued adopters have more supportive program characteristics (greater reimbursement and more financial support at baseline) and a more favorable program culture than never adopters, yet less supportive program characteristics and program culture than sustained adopters. Interestingly, discontinued adopters do not differ from new adopters, pointing to an area of future research that needs to be explored further.

4.2.2. TC Pharmacotherapy—Compared to other types of adopters, never adopters are less likely to be non-profit programs, less likely to be affiliated with a hospital or other medical facility, have less TC reimbursement, and are more likely to offer outpatient only care. They are also less likely than sustained adopters to have TC financial resources available and more likely to have a stronger smoking culture. Given the financial pressure facing many treatment programs (Morgenstern, Blanchard, Morgan, Labouvie, & Hayaki, 2001) and variability in the extent to which TC is a billable service in SUD treatment (Ziedonis et al., 2006), it appears that lack of TCS reimbursement is a driving force behind the decision not to adopt, to delay adoption, and not to continue with TC pharmacotherapy.

Along the line of financial considerations, profit status as a barrier to TC pharmacotherapy adoption and sustainability may reflect the greater competitive pressure and financial profit-orientation among for-profits in general (Tudway & Pascal, 2006), which may make it more difficult to adopt and sustain innovations over time. Findings on the affiliation with a hospital or medical facility are consistent with previous cross-sectional research on the adoption of TC pharmacotherapy in outpatient treatment programs (Friedmann et al., 2008) and a longitudinal study of NRT (Knudsen & Studts, 2011). The growing trend in hospitals to be "smoke-free" (Williams et al., 2009) and the overarching emphasis on health in medical settings may explain the greater discontinuation as well as lack of pharmacotherapy adoption in more than half of the programs.

Sustained adopters of TC pharmacotherapy are further more likely than discontinued and new adopters to report TC reimbursement, TC financial resources availability, and less likely to perceive a strong smoking culture. In short, treatment programs need the necessary financial support and staff buy-in to sustain TC pharmacotherapy adoption. In line with staff buy-in, educational efforts targeting staff are particularly important because many clinicians lack training and knowledge in TCS and harbor misconceptions about TCS (Ziedonis et al., 2006). Clinical staff may also not fully understand the dangers of tobacco use among their patients who smoke or be knowledgeable about efficacious tobacco cessation pharmacotherapy. Education may further be effective given evidence that it is associated

with increased adoption of non-TC pharmacotherapy (e.g., Knudsen, Ducharme, Roman, & Link, 2005; Rieckmann et al., 2011).

4.3. Limitations and Conclusions

Limitations need to be considered when interpreting the findings beyond the current study. All SUD treatment programs were located in the community and results may not apply to non-community-based treatment programs such as those located in prisons and VA hospitals. Further, the focus of our study was on longitudinal adoption patterns of TCS, which is different from implementation patterns. Adoption is concerned with the availability of TCS and occurs before implementation, which refers to the use of TCS (Gotham, 2006). This represents an important topic for future research, namely longitudinal implementation patterns of TCS (sustained, new, never, and discontinued) in SUD treatment programs.

Further, our response rate may indicate a response bias such that the adoption of TCS is overestimated. However, we point out here that our cross-sectional adoption rates are similar to other studies (e.g., Friedmann et al., 2008; Knudsen & Studts, 2011). Finally, although the purpose of our study was to investigate the adoption of TCS and predictors of adoption from program administrator perspectives, future studies may want to consider more objective measures particularly regarding TC reimbursement and TC financial resource availability to examine predictors of TC adoption patterns.

In conclusion, findings from this study show the importance of examining the adoption of TCS from a longitudinal perspective and separately for TC counseling and TC pharmacotherapy to more fully understand the adoption process. As we demonstrate, the adoption of TCS can be characterized by sustainability, discontinuation, never adoption, and new adoption, which varies systematically for TC counseling and TC pharmacotherapy based on program characteristics and attributes of the treatment program culture. By adding to the literature on adoption of TCS, the current study should serve as a springboard for additional research on diverse clinician-level and program-level longitudinal predictors of TCS in a wide range of community and non-community based settings.

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References

- Abraham AJ, Knudsen HK, Roman PM. A longitudinal examination of alcohol pharmacotherapy adoption in substance use disorder treatment programs: patterns of sustainability and discontinuation. *Journal of Studies on Alcohol and Drugs*. 2011; 72:669–677. [PubMed: 21683049]
- Centers for Disease Control and Prevention. Smoking among adults with mental illness. 2013. Available at, <http://www.cdc.gov/features/vitalsigns/smokingandmentalillness/>
- Fiore, MC., et al. Treating tobacco use and dependence: 2008 Update. 2008. Available at, http://www.surgeongeneral.gov/tobacco/treating_tobacco_use08.pdf
- Fixsen, DL.; Naoom, SF.; Blase, KA.; Friedman, RM.; Wallace, F. Implementation research: a synthesis of the literature. Tampa, FL: University of South Florida; 1995.

- Friedmann PD, Jiang L, Richter KP. Cigarette smoking cessation services in outpatient substance abuse treatment programs in the United States. *Journal of Substance Abuse Treatment*. 2008; 34:165–172. [PubMed: 17509809]
- Gotham HJ. Advancing the implementation of evidence-based practices into clinical practice: how do we get there from here? *Professional Psychology: Research and Practice*. 2006; 32:606–613.
- Gripp SI, Luloff AE, Yonkers RD. Reporting response rates for telephone surveys used in agricultural economics research. *Agricultural and Research Economics Review*. 1994; 23:200–206.
- Guydish J, Passalacqua E, Tajima B, Chan M, Chun J, Bostrom A. Smoking prevalence in addiction treatment: a review. *Nicotine & Tobacco Research*. 2011; 13:401–411. [PubMed: 21464202]
- Hays JT, Schroeder DR, Offord KP, Croghan IT, Patten CA, Hurt RD, Jorenby DE, Fiore MC. Response to nicotine dependence treatment in smokers with current and past alcohol problems. *Annals of Behavioral Medicine*. 1999; 21:244–250. [PubMed: 10626032]
- Hughes JR, Novy P, Hatsukami DK, Jensen J, Callas PW. Efficacy of nicotine patch in smokers with a history of alcoholism. *Alcohol: Clinical and Experimental Research*. 2003; 27:946–954.
- Hurt RD, Croghan IT, Offord KP, Eberman KM, Morse RM. Attitudes toward nicotine dependence among chemical dependency unit staff-before and after a smoking cessation trial. *Journal of Substance Abuse Treatment*. 1995; 12:247–252. [PubMed: 8830151]
- Hurt RD, Offord KP, Croghan IT, Gomez-Dahl L, Kottke TE, Morse RM, Melton LJ 3rd. Mortality following inpatient addictions treatment. *Journal of the American Medical Association*. 1996; 275:1097–1103. [PubMed: 8601929]
- Klein KJ, Conn AB, Sorra JS. Implementing computerized technology: an organizational analysis. *Journal of Applied Psychology*. 2001; 86:811–824. [PubMed: 11596799]
- Knudsen HK, Ducharme LJ, Roman PM, Link T. Buprenorphine diffusion: the attitudes of substance abuse treatment counselors. *Journal of Substance Abuse Treatment*. 2005; 29:95–106. [PubMed: 16135338]
- Knudsen HK, Muilenburg J, Eby LT. Sustainment of smoking cessation programs in substance use disorder treatment organizations. *Nicotine & Tobacco Research*. 2013; 15:1060–1068. [PubMed: 23132659]
- Knudsen HK, Studts JL. Availability of nicotine replacement therapy in substance use disorder treatment: longitudinal patterns of adoption, sustainability, and discontinuation. *Drug and Alcohol Dependence*. 2011; 118:244–250. [PubMed: 21531090]
- Knudsen HK, Studts JL, Boyd S, Roman PM. Structural and cultural barriers to the adoption of smoking cessation services in addiction treatment organizations. *Journal of Addictive Diseases*. 2010; 29:294–305. [PubMed: 20635279]
- Morgenstern J, Blanchard KA, Morgan TJ, Labouvie E, Hayaki J. Testing the effectiveness of cognitive-behavioral treatment for substance abuse in a community setting: within treatment and posttreatment findings. *Journal of Consulting and Clinical Psychology*. 2001; 69:1007–1017. [PubMed: 11777104]
- Muilenburg JL, Laschober TC, Eby LT. Climate for innovation, 12-step orientation, & tobacco cessation treatment. *Journal of Substance Abuse Treatment*. 2014a; 46:447–455. [PubMed: 24355811]
- Muilenburg JL, Laschober TC, Eby LT. Organizational factors as predictors of tobacco cessation pharmacotherapy availability in addiction treatment programs. *Journal of Addiction Medicine*. 2014b; 8:59–65. [PubMed: 24365803]
- National Institute on Drug Abuse [NIDA]. What are the extent and impact of tobacco use?. 2012. Available at, <http://www.drugabuse.gov/publications/research-reports/tobacco-addiction/what-are-extent-impact-tobacco-use>
- Richter KP, Ahluwalia HK, Mosier MC, Nazir N, Ahluwalia JS. A population-based study of cigarette smoking among illicit drug users in the United States. *Addiction*. 2002; 97:861–869. [PubMed: 12133125]
- Richter KP, Arnsten JH. A rationale and model for addressing tobacco dependence in substance abuse treatment. *Substance Abuse Treatment, Prevention, and Policy*. 2006; 1:23.

- Rieckmann TR, Kavas AE, McFarland BH, Abraham AJ. A multi-level analysis of counselor attitudes toward the use of buprenorphine in substance abuse treatment. *Journal of Substance Abuse Treatment*. 2011; 41:374–385. [PubMed: 21821379]
- Rogers, EM. *Diffusion of innovations*. Free Press; New York: 1962.
- Rothrauff TC, Eby LT. Counselors' knowledge of the adoption of tobacco cessation medications in substance abuse treatment programs. *The American Journal on Addictions*. 2011; 20:56–62. [PubMed: 21175921]
- Tobacco Use Recovery Now! Tobacco treatment for persons with substance use disorders. A toolkit for substance abuse treatment providers. 2009. Available at, <http://smokingcessationleadership.ucsf.edu/Downloads/SteppDADtoolkit.pdf>
- Tudway R, Pascal AM. Corporate governance, shareholder value and societal expectations. *Corporate Governance*. 2006; 6:305–316.
- Warrick DD. Developing organization change champions. A high payoff investment. *OD Practitioner*. 2009; 41:14–19.
- Williams SC, Hafner JM, Morton DJ, Holm AL, Milberger SM, Koss RG, Loeb JM. The adoption of smoke-free hospital campuses in the United States. *Tobacco Control*. 2009; 18:451–458. [PubMed: 19700437]
- Ziedonis DM, Gwydys J, Williams J, Steinberg M, Foulds J. Barriers and solutions to addressing tobacco dependence in addiction treatment. *Alcohol Research & Health*. 2006; 29:228–235. [PubMed: 17373414]

Highlights

- Adoption patterns vary between tobacco cessation counseling and pharmacotherapy.
- Counseling adoption is predicted by reimbursement, resources, and smoking culture.
- Pharmacotherapy adoption is predicted by profit status, reimbursement, care level.
- Pharmacotherapy adoption is further predicted by resources and smoking culture.

Table 1

Descriptive Statistics of Tobacco Cessation (TC) Counseling and TC Pharmacotherapy Adoption

Variables	<i>f</i>	%
TC Counseling		
adopted at baseline ^a (Yes)	320	46.72
adopted at 12-month follow-up ^a (Yes)	309	45.11
TC Pharmacotherapy		
adopted at baseline ^a (Yes)	194	28.32
adopted at 12-month follow-up ^a (Yes)	195	28.47
Patterns of TC Counseling Adoption at 12-Month Follow-Up		
Never adopters	279	40.73
Sustained adopters	223	32.55
Discontinued adopters	97	14.16
New adopters	86	12.55
Patterns of TC Pharmacotherapy Adoption at 12-Month Follow-Up		
Never adopters	428	62.48
Sustained adopters	132	19.27
Discontinued adopters	62	9.05
New adopters	63	9.20

Note.

^aNo statistically significant difference in adoption rates between baseline and 12-month follow-up.

Table 2
Bivariate Multinomial Logistic Regression Results: Predictors of Tobacco Cessation (TC) Counseling Adoption Patterns

Variables	Sustained vs. Never RRR (95% CI)	Discontinued vs. Never RRR (95% CI)	New vs. Never RRR (95% CI)	Sustained vs. Discontinued RRR (95% CI)	Sustained vs. New RRR (95% CI)	Discontinued vs. New RRR (95% CI)
Baseline treatment program characteristics						
1. Non-profit	1.88** (1.24–2.87)	0.93 (0.56–1.55)	1.34 (0.77–2.32)	2.03 (1.17–3.53)	1.41 (0.78–2.54)	0.69 (0.36–1.34)
2. Hospital/medical	2.67*** (1.59–4.46)	2.05 (1.05–4.01)	2.05 (1.03–4.09)	1.30 (0.70–2.41)	1.30 (0.68–2.47)	1.00 (0.46–2.16)
3. TC reimbursement	16.49*** (9.13–29.78)	8.70*** (4.63–16.37)	4.90*** (2.44–9.85)	1.89*** (1.32–2.72)	3.36*** (2.03–5.56)	1.78 (1.01–3.11)
4. Outpatient only	0.50*** (0.35–0.72)	0.73 (0.46–1.18)	1.13 (0.68–1.88)	0.68 (0.42–1.11)	2.25** (0.45–0.27)	0.65 (0.36–1.19)
5. TC financial resources	2.32*** (1.86–2.90)	1.46** (1.10–1.94)	1.59** (1.19–2.12)	1.59** (1.20–2.11)	1.47** (1.10–1.96)	0.92 (0.65–1.30)
Baseline treatment program culture						
6. Smoking culture	0.24*** (0.17–0.33)	0.57** (0.39–0.85)	0.58*** (0.39–0.87)	0.42*** (0.28–0.63)	0.41*** (0.27–0.63)	0.99 (0.61–1.60)
7. Positive effect of TC on sobriety	1.59*** (1.31–1.92)	1.10 (0.87–1.38)	1.24 (0.97–1.59)	1.45** (1.13–1.86)	1.28 (0.98–1.66)	0.88 (0.66–1.19)

Note. Sample size ranged from 653 to 685 due to missing data. Analyses were run separately for each predictor, controlling for change in program administrator from baseline to follow-up (0 = no, 1 = yes; control variable results are not shown). Relative risk ratios (RRR) > 1.00 indicate positive relationship. RRR < 1.00 indicate negative relationship. Non-profit (0 = no, 1 = yes), hospital/medical affiliation (0 = no, 1 = yes), extent of TC reimbursement (1 = no extent to 4 = great extent), Outpatient only (0 = inpatient only/mix, 1 = outpatient only), TC financial resources availability (1 = strongly disagree to 5 = strongly agree), perceived smoking culture (1 = strongly disagree to 5 = strongly agree), perceived positive effect of TC on sobriety (1 = definitely decreases chance of sobriety to 5 = definitely increases chance of sobriety).

**
 $p < .01$,

 $p < .001$.

Table 3
Bivariate Multinomial Logistic Regression Results: Predictors of Tobacco Cessation (TC) Pharmacotherapy Adoption Patterns

Variables	Sustained vs. Never RRR (95% CI)	Discontinued vs. Never RRR (95% CI)	New vs. Never RRR (95% CI)	Sustained vs. Discontinued RRR (95% CI)	Sustained vs. New RRR (95% CI)	Discontinued vs. New RRR (95% CI)
Baseline treatment program characteristics						
1. Non-profit	1.91** (1.20–3.06)	4.49*** (1.88–10.71)	3.89** (1.73–8.78)	0.43 (0.17–1.10)	0.49 (0.20–1.20)	1.15 (0.36–3.66)
2. Hospital/medical	5.49*** (3.35–9.00)	2.85** (1.40–5.73)	2.24 (1.08–4.66)	1.94 (0.95–3.95)	2.45 (1.17–5.16)	1.27 (0.52–3.10)
3. TC reimbursement	3.32*** (2.45–4.51)	1.94** (1.28–2.95)	2.11*** (1.40–3.18)	1.71 (1.13–2.59)	1.57 (1.05–2.36)	0.92 (0.56–1.52)
4. Outpatient only	0.22*** (0.15–0.34)	0.24*** (0.18–0.43)	0.54 (0.31–0.92)	0.92 (0.49–1.75)	0.42** (0.23–0.77)	0.45 (0.22–0.93)
5. TC financial resources	2.13*** (1.69–2.69)	1.19 (0.87–1.64)	1.14 (0.83–1.55)	1.79** (1.26–2.54)	1.88*** (1.32–2.66)	1.05 (0.70–1.58)
Baseline treatment program culture						
6. Smoking culture	0.47*** (0.34–0.65)	1.40 (0.91–2.14)	1.03 (0.68–1.57)	0.34*** (0.20–0.55)	0.45** (0.28–0.74)	1.36 (0.78–2.37)
7. Positive effect of TC on sobriety	1.16 (0.95–1.42)	0.93 (0.71–1.21)	0.96 (0.74–1.24)	1.25 (0.92–1.69)	1.21 (0.90–1.64)	0.97 (0.69–1.38)

Note. Sample size ranged from 653 to 685 due to missing data. Analyses were run separately for each predictor, controlling for change in program administrator from baseline to follow-up (0 = no, 1 = yes; control variable results are not shown). Relative risk ratios (RRR) > 1.00 indicate positive relationship. RRR < 1.00 indicate negative relationship. Non-profit (0 = no, 1 = yes), hospital/medical affiliation (0 = no, 1 = yes), extent of TC reimbursement (1 = no extent to 4 = great extent), Outpatient only (0 = inpatient only/mix, 1 = outpatient only), TC financial resources availability (1 = strongly disagree to 5 = strongly agree), perceived smoking culture (1 = strongly disagree to 5 = strongly agree), perceived positive effect of TC on sobriety (1 = definitely decreases chance of sobriety to 5 = definitely increases chance of sobriety).

**
 $p < .01$,

 $p < .001$.