ORIGINAL INVESTIGATION

Sustainment of Smoking Cessation Programs in Substance Use Disorder Treatment Organizations

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ABSTRACT

Introduction: The majority of individuals who enter substance use disorder (SUD) treatment also use tobacco. Integrating smoking cessation services into SUD treatment may have substantial public health benefits, but few studies have examined whether organizations offering counseling-based smoking cessation programs sustain them over time.

Methods: This study examines sustainment of smoking cessation programs using 2 waves of data collected from 150 SUD treatment organizations. Data were collected in 2006–2008 and 2009–2010 using face-to-face interviews, telephone interviews, and mailed surveys. Logistic regression models of sustainment were estimated with administrators' attitudes toward smoking cessation and organizational barriers as covariates.

Results: About 60.2% of these SUD treatment organizations sustained their counseling-based smoking cessation programs at follow-up. Sustainment was significantly more likely when administrators' baseline attitudes about the impact of smoking cessation on recovery were more supportive (odds ratio, $OR = 1.84$; 95% confidence interval, $CI = 1.13$ – 3.01 ; $p = .015$) and when programs were accredited ($OR = 3.95$, 95% $CI = 1.65$ – 9.50 , $p = .002$). Worsening over time of barriers encompassing staff interest, staff skills, and competing treatment demands were negatively associated with sustainment ($OR = 0.58$, 95% $CI = 0.42$ – 0.81 , $p = .001$).

Conclusions: These findings provided empirical support for theoretical perspectives regarding the importance of leadership and staff expertise in promoting sustainment of innovations over time. Although the majority of SUD treatment organizations sustained their smoking cessation programs, the 40% rate of discontinuation is concerning and highlights the ongoing challenges faced by tobacco control efforts in substance abuse treatment.

INTRODUCTION

Individuals with substance use disorders (SUDs) have rates of tobacco use that generally range between 70% and 80% (Kalman et al., 2001; McCarthy, Collins, & Hser, 2002; Richter, Ahluwalia, Mosier, Nazir, & Ahluwalia, 2002). In addition to the negative health effects of smoking (Hser, McCarthy, & Anglin, 1994; Hurt et al., 1996), individuals who receive SUD treatment but continue to smoke are at heightened risk of SUD relapse (Lemon, Friedmann, & Stein, 2003; Tsoh, Chi, Mertens, & Weisner, 2011). Notably, smoking cessation interventions delivered during treatment increase the odds of posttreatment abstinence from patients' primary substance of abuse (Prochaska, Delucchi, & Hall, 2004).

These risks underscore the significance of delivering smoking cessation interventions during SUD treatment. Such services are recommended in the Public Health Service's (PHS) clinical practice guideline, *Treating Tobacco Use and Dependence: 2008 Update* (Fiore et al., 2008). There have

been many calls in recent years for integrating smoking cessation services into SUD treatment (Baca & Yahne, 2009; Hall & Prochaska, 2009; Kalman, Kim, DiGirolamo, Smelson, & Ziedonis, 2010; Prochaska, 2010; Reid et al., 2007; Richter & Arnsten, 2006; Schroeder & Morris, 2010).

Counseling is recommended in the PHS clinical practice guideline (Fiore et al., 2008), yet few SUD treatment organizations offer counseling-based smoking cessation programs (Delucchi, Tajima, & Gwydish, 2009; Gwydish, Tajima, Chan, Delucchi, & Ziedonis, 2011). A large national study reported that only 17% of SUD organizations offered a counseling-based program for smoking cessation (Knudsen, Studts, Boyd, & Roman, 2010). In some respects, it is surprising that adoption is so low, given the close similarities between counseling for smoking cessation and the core intervention of SUD treatment, which is psychosocial counseling (White, 1998). However, smoking cessation has historically been viewed by the treatment system as a low priority, with providers often considering tobacco to be less harmful than patients' other substance use (McCool, Richter, & Choi,

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2005; Ziedonis, Guydish, Williams, Steinberg, & Foulds, 2006) or fearing that smoking cessation would promote SUD relapse (Prochaska, 2010). Counselors generally receive little training about smoking cessation and report limited knowledge about the PHS guideline (Knudsen & Studts, 2010; Knudsen, Studts, & Studts, 2012; Rothrauff & Eby, 2011), posing additional barriers. Although smoking cessation programs are rarely available, cross-sectional studies have shown that they are more likely to be offered when organizational cultures value smoking cessation (Fuller et al., 2007) and provide training to staff (Knudsen et al., 2010; Richter, Choi, McCool, Harris, & Ahluwalia, 2004).

Most previous research on the availability of smoking cessation services in SUD treatment has used cross-sectional designs (Delucchi et al., 2009; Fuller et al., 2007; Guydish et al., 2011; Hahn, Warnick, & Plemmons, 1999; Knudsen et al., 2010; McCool et al., 2005; Richter et al., 2004), with one recent study on the effectiveness of organizational change interventions to promote adoption (Guydish et al., 2012). Guydish and colleagues found that residential treatment programs were able to increase their delivery of nicotine replacement therapy (NRT) and tobacco-related practices after the programs completed a structured change process. Less is known about sustainment of smoking cessation programs in the natural environment. Studies of other SUD services have shown that organizations do change their service offerings over time (Ducharme, Knudsen, & Roman, 2006; Knight, Edwards, & Flynn, 2010; Knudsen, Roman, & Ducharme, 2005; Pollack, D'Aunno, & Lamar, 2006).

Indeed, prior research from this sample of SUD treatment programs found considerable discontinuation of NRT over time. Data from an interval prior to this study revealed that about 43% of programs discontinued offering NRT during a 4-year period (Knudsen & Studts, 2011). SUD programs that were reliant on private sources of funding, located in hospitals, had access to staff physicians and reported that they taught smoking cessation to patients were at lower risk of NRT discontinuation, relative to the odds of sustained adoption. This prior research did not include any measures of organizational barriers or administrator attitudes toward smoking cessation services, heightening the unique contributions of this study.

It is also important to consider whether sustainment is associated with the availability of other smoking cessation interventions, such as pharmacotherapies. Comparing sustained adopters to discontinuers can identify whether discontinuation of smoking cessation programs represents an organizational departure from intervening with smokers or whether discontinuers offer other approaches, such as NRT or prescription medications.

This research examined the sustainment of counseling-based smoking cessation programs and was guided by three research questions. First, to what extent were smoking cessation programs sustained over approximately 3 years? Second, were administrators' attitudes toward smoking cessation and organizational barriers associated with sustainment over time? Finally, did sustained adopters and discontinuers differ in the availability of pharmacotherapies at follow-up?

METHODS

Samples and Data Collection

This research focuses on a subset of organizations offering counseling-based smoking cessation programs from random samples

of privately funded SUD treatment organizations, publicly funded treatment organizations, and therapeutic communities (TCs) in the National Treatment Center Study (NTCS). Full descriptions regarding how these samples were constructed in 2002–2004 have been published (Dye, Ducharme, Johnson, Knudsen, & Roman, 2009; Knudsen, Ducharme, & Roman, 2007). Briefly, the strategy relied on random sampling of U.S. counties from 10 population-based strata, identification of all treatment organizations in these counties using published directories, random sampling of organizations, and telephone screening. Privately funded and publicly funded programs were required to offer SUD treatment at least equivalent to structured outpatient care (Mee-Lee, Gartner, Miller, Shulman, & Wilford, 1996). Privately funded programs received less than 50% of their funding from governmental grants and contracts, whereas publicly funded programs received at least 50% of their funding from these sources. The sample of TCs was unique, in that endorsement of this distinctive treatment model was the key eligibility criterion (DeLeon, 2000; Prendergast, Podus, & Chang, 2000).

For this study, data were collected in two waves. In 2006, all NTCS organizations were contacted by telephone to ascertain whether the organization still provided SUD treatment (see Figure 1). Telephone interviews on smoking cessation services were completed with 897 administrators (85.2% response rate). The interview contained 44 core items, with 57 additional items for organizations that actually offered smoking cessation services. Participating organizations received a \$25 honorarium. Baseline data collection occurred from September 2006 to January 2008 (Knudsen et al., 2010).

This panel was recontacted between August 2009 and December 2010. Telephone screening confirmed ongoing delivery of SUD treatment. Survey packets, containing a study description letter, two consent forms, an honorarium payment form, and the survey, were mailed to administrators. The survey largely repeated the measures collected at baseline. Nonrespondents were mailed a second packet approximately 8 weeks later and later contacted by telephone. After providing verbal informed consent, administrators were interviewed using the same measures as the mailed survey. Data were obtained from 704 organizations (83.7% response rate), which received a \$75 honorarium. These procedures were approved by the Institutional Review Boards of the University of Georgia and the University of Kentucky.

Given the substantive focus on sustainability, analyses were restricted to 153 organizations that offered a counseling-based smoking cessation program at baseline (Figure 1). Follow-up data were obtained from 135 administrators (88.2% response rate) in 33 states and the District of Columbia. The average duration between waves of data collection was 2.7 years ($SD = 0.6$); additional analyses (not shown) indicated that duration was not associated with sustainment of smoking cessation programs.

Measures

The primary-dependent variable was sustainment of a counseling-based smoking cessation program. At baseline, administrators indicated whether their organization offered a formal smoking cessation program. Affirmative responses prompted additional questions measuring whether the program included individual and/or group counseling sessions dedicated to smoking cessation. Organizations offering a smoking cessation program with at least one type of counseling were considered baseline adopters. These same items were utilized at follow-up

Sustainment of smoking cessation programs

Figure 1. Study enrollment of substance use disorder (SUD) treatment organizations.

to categorize organizations on sustainment (1 = sustained adopters, 0 = discontinuers).

The independent variables were administrators' attitudes and their reports of organizational barriers regarding smoking cessation, measured at baseline and follow-up. These items appear in Table 1. A final cultural measure was the administrators' perception of the percentage of clinical staff who were tobacco users.

To control for organizational structure, these analyses drew upon data collected when programs were initially recruited into the NTCS. Control variables included sample type (publicly funded, TCs, or privately funded sample), location in a health care setting (1 = hospital or community mental health center, 0 = freestanding), ownership (1 = government owned, 0 = privately owned), profit status (1 = for profit, 0 = nonprofit), accreditation by the Joint Commission or the Commission on the Accreditation of Rehabilitation Facilities (1 = accredited, 0 = not accredited), and delivery of only outpatient SUD treatment services (1 = outpatient only, 0 = not outpatient only). Organizational size was measured by the number of full-time equivalent employees (FTEs) and was natural log transformed to adjust for skew.

Finally, availability of NRT, bupropion-SR, and varenicline was measured at baseline and follow-up. Each variable was dichotomous.

Data Analysis

In addition to descriptive statistics, paired *t* tests and Wilcoxon's sign-rank tests for administrator attitudes and organizational

barriers at baseline and follow-up were calculated. The distribution of change scores was examined to calculate the percentage of programs reporting changes in these variables.

Prior to estimating models of sustainment, multiple imputation was utilized to avoid the weaknesses of listwise deletion (Allison, 2002). The dataset was restricted to 150 cases that offered a smoking cessation program at baseline and were open at follow-up; programs that had closed were excluded. The "ice" command in Stata 12.0 was implemented (Ambler, Omar, & Royston, 2007; Royston, 2004, 2005a, 2005b), using the dependent variables, independent variables, and control variables to generate 25 imputed datasets. During model estimation, the "mi estimate" command averaged the estimates from each of the datasets (Barnard & Rubin, 1999).

The dependent variable of sustainment was dichotomous, so logistic regression was used (Long, 1997). As noted by Menard (2008), modeling change in two-wave panel data with a categorical outcome requires greater consideration of the type of change that is theoretically of interest. Our interest in sustainability led to the decision to restrict the sample to baseline adopters of smoking cessation programs because these are the only organizations for which sustained adoption over time is possible. Initially, a series of bivariate logistic regression models for each control variable was estimated. Significant control variables ($p < .05$, two-tailed test) were included in models for each baseline independent variable. A second set of models examined change scores for each independent variable. Finally, a multivariate model was constructed

Table 1. Descriptive Statistics of Substance Use Disorder (SUD) Programs Offering a Counseling-Based Smoking Cessation Program at Baseline

	Baseline, <i>M (SD)</i>	Follow-up, <i>M (SD)</i>	Paired <i>t</i> test	Reporting no change, % (<i>n</i>)
<i>Administrators' attitudes</i>				
Thinking about smoking cessation in the context of substance abuse treatment, how much emphasis should be placed on smoking cessation during the treatment of a nonnicotine substance problem? ^a	2.99 (0.96)	3.02 (0.98)	$t_{(131)} = 0.29$	39.4 (52)
How do you feel providing smoking cessation interventions will affect a smoking patient's success at 1-year follow-up on their alcohol/nonnicotine drug abuse problem? ^b	2.88 (1.06)	2.83 (1.04)	$t_{(127)} = -0.36$	33.6 (43)
<i>Organizational barriers</i>				
To what extent are the following true about your center? ^c				
Smoking is an accepted part of the staff culture at this treatment program	1.81 (1.72)	1.58 (1.48)	$t_{(132)} = -1.27$	32.3 (43)
Smoking and tobacco use are not important issues in the successful treatment of other substance abuse problems	1.35 (1.53)	1.67 (1.45)	$t_{(128)} = 1.78$	24.8 (32)
Our treatment protocol is so demanding that there would be little or no time for adding smoking cessation activities	1.04 (1.44)	1.29 (1.42)	$t_{(130)} = 1.56$	29.0 (38)
Allowing clients to continue their smoking or other tobacco use facilitates successful treatment of their primary substance abuse issues	1.71 (1.68)	1.45 (1.43)	$t_{(129)} = -1.40$	26.9 (35)
It is very difficult to be reimbursed for staff time devoted to clients' smoking cessation	2.73 (2.15)	2.25 (1.95)	$t_{(124)} = -2.10^*$	28.0 (35)
Our staff generally do not have the skills to provide smoking cessation treatments to clients	1.38 (1.54)	1.42 (1.46)	$t_{(130)} = 0.24$	31.3 (41)
Our staff do not have interest in providing our clients with smoking cessation treatments	1.42 (1.44)	1.45 (1.43)	$t_{(131)} = 0.14$	35.6 (47)
Percentage of clinical staff who smoke or use tobacco ^d	19.48 (19.17)	16.95 (20.55)	$t_{(125)} = 1.33$; $z = 2.60^{**}$	17.5 (22)

Notes. ^aResponse options were 0 = none, 1 = little, 2 = some, 3 = moderate, and 4 = a lot.

^bResponse options were 0 = definitely decrease chances for sobriety, 1 = probably decrease chances for sobriety, 2 = have no effect, 3 = probably increase chances for sobriety, and 4 = definitely increase chances for sobriety.

^cResponses ranged from 0 = no extent to 5 = very great extent.

^dIn addition to the paired *t* test, the Wilcoxon's sign-rank test is reported.

***p* < .01 and **p* < .05 (two-tailed tests).

that incorporated all significant variables from the preceding analyses.

RESULTS

Descriptive Statistics

At baseline, 153 SUD treatment organizations offered a counseling-based smoking cessation program. Of these programs, about 39.9% (*n* = 61) were privately funded, 30.7% (*n* = 47) were publicly funded, and 29.4% (*n* = 45) were TCs. About one third (34.0%; *n* = 52) were embedded within health care settings. Few were owned by governmental entities (13.7%; *n* = 21) or were operated as for-profit organizations (9.8%; *n* = 15). Nearly half were accredited (49.3%; *n* = 75) and about 28.9% (*n* = 46) only offered outpatient SUD treatment services. The average organization had 39.6 FTEs (*SD* = 50.6); this measure ranged from 2.0 to 310.0 with a median of 20.0 FTEs (interquartile range = 10.5, 45.0). The mean for the natural log transformed variable of size was 3.1 (*SD* = 1.7). At baseline, 62.8% offered NRT (*n* = 96). Availability of bupropion (31.5%; *n* = 46) and varenicline (14.6%; *n* = 21) was lower.

The majority of SUD organizations sustained their smoking cessation programs over the study period. About 60.2% (*n* = 77) of organizations sustained their counseling-based smoking cessation program at follow-up, whereas 39.8% (*n* = 51) discontinued this service.

Table 1 presents descriptive statistics for administrators' attitudes and the seven organizational barriers to smoking cessation services. There was little change over time, as evidenced by nearly all *t* tests failing to achieve statistical significance. The only barrier that changed over time was the measure of the difficulty in receiving reimbursement for smoking cessation interventions. Notably, this mean significantly decreased, indicating that organizations found it less difficult to get reimbursement for smoking cessation at follow-up, although this barrier remained the most strongly endorsed. This difference was also significant when the nonparametric Wilcoxon's sign-rank test was used. For the percentage of tobacco-using staff, the paired *t* test failed to achieve statistical significance, but the Wilcoxon's sign-rank test was significant ($z = 2.60$, $p < .01$). The positive ranks were higher than the negative ranks, indicating that the baseline mean percentage of tobacco-using staff was greater than the follow-up mean. When change scores were calculated,

Sustainment of smoking cessation programs

Table 2. Logistic Regression Models of Sustainment of Smoking Cessation Programs in 150 Substance Use Disorder (SUD) Treatment Organizations

	Series 1: Baseline variables, <i>b</i> (<i>SE</i>)	Series 2: Change score variables, <i>b</i> (<i>SE</i>)
<i>Administrators' attitudes</i>		
Model 1: Emphasis on smoking cessation SUD treatment	0.51 (0.22)*	−0.13 (0.17)
Model 2: Impact of smoking cessation interventions on SUD recovery	0.58 (0.20)**	−0.26 (0.14)
<i>Organizational barriers</i>		
Model 3: Smoking is an accepted part of the staff culture	−0.03 (0.11)	0.01 (0.09)
Model 4: Smoking and tobacco use are not important issues in SUD treatment	−0.03 (0.13)	−0.09 (0.10)
Model 5: Treatment protocol is too demanding	−0.05 (0.13)	−0.30 (0.12)**
Model 6: Allowing tobacco use facilitates successful SUD treatment	−0.13 (0.12)	0.08 (0.10)
Model 7: Difficult to be reimbursed for staff time devoted to smoking cessation	−0.12 (0.09)	−0.07 (0.08)
Model 8: Staff lacks skills to provide smoking cessation treatments	−0.06 (0.12)	−0.30 (0.11)*
Model 9: Staff lacks interest in providing smoking cessation treatments	0.04 (0.14)	−0.22 (0.11)*
Model 10: Percentage of clinical staff who smoke or use tobacco	0.00 (0.01)	−0.00 (0.01)

Notes. *b* = unstandardized coefficient; *SE* = standard error. All models adjust for accreditation status and organizational size.

p* < .05 and *p* < .01 (two-tailed tests).

only 25%–35% of organizations had change scores equaling zero (i.e., identical scores at both points in time). Examination of the distributions suggests the lack of significant changes for most measures may reflect similar percentages of programs reporting increases and decreases in these variables.

Models of Sustainment of Smoking Cessation Programs

Bivariate logistic regression models estimated the relationships between sustainment and the control variables. There were no differences in sustainment between publicly funded, privately funded, and TC organizations. Two organizational characteristics were associated with sustainment. First, accredited SUD organizations were significantly more likely than nonaccredited agencies to sustain these programs (*b* = 1.25, *SE* = 0.37, 95% *CI* = 0.52–1.98, *p* = .001). Second, there was a positive association between organizational size and sustainment (*b* = 0.39, *SE* = 0.18, 95% *CI* = 0.04–0.74, *p* = .03).

Models of sustainment for each baseline variable were estimated while controlling for accreditation and organizational size (Table 2, Series 1). Administrators' baseline attitude regarding the importance of delivering smoking cessation during SUD treatment was positively associated with the likelihood of sustained adoption (Model 1). Similarly, there was a positive association between sustainment and administrators' baseline perceptions that smoking cessation had a positive impact on clients' prospects for recovery (Model 2). Organizational barriers and the percentage of tobacco-using staff were not associated with sustainment.

In Series 2 of Table 2, change scores were analyzed while controlling for accreditation and organizational size. Change scores for administrators' attitudes were not associated with sustainment. Changes in three organizational barriers were negatively associated with sustained adoption, indicating that

increases (i.e., worsening) in these barriers were associated with lower odds of sustainment. Increasing endorsement that the organization's treatment protocol was too demanding was negatively associated with sustainment (Model 5). The likelihood of sustainment was significantly lower in organizations reporting worsening in staff skill levels (Model 8) and reduced staff interest (Model 9).

A multivariate model of sustainment was then estimated. Initially, the change scores for the three organizational barriers were included separately, which yielded a model in which none were significant. Pearson's correlation coefficients for these three measures were between .40 and .56 (all *p* < .001). Given that these items represented pragmatic barriers to smoking cessation, they were combined into a mean scale (α = 0.72), and the multivariate model was reestimated (Table 3). Administrators' attitudes at baseline regarding the impact of smoking cessation on SUD recovery were positively associated with sustainment. The scale of organizational barriers was also significant, such that worsening of these barriers over time was negatively associated with sustainment. Accredited organizations were more likely than nonaccredited programs to sustain smoking cessation programs over time.

Sustainment and Pharmacotherapy

Sustained adopters and discontinuers were compared regarding the availability of pharmacotherapies at follow-up using chi-square tests. Sustainers of smoking cessation programs were significantly more likely to offer any type of pharmacotherapy (73.7% vs. 28.6%, χ^2 = 24.6, *p* < .001) at follow-up than discontinuers. Differences were also seen for NRT (73.3% vs. 25.5%, χ^2 = 26.7, *p* < .001), sustained-release bupropion (35.6% vs. 10.0%, χ^2 = 10.3, *p* = .001), and varenicline (41.7% vs. 10.0%, χ^2 = 14.5, *p* < .001).

Table 3. Multivariate Logistic Regression Model of Sustainment of Smoking Cessation Programs in 150 Substance Use Disorder (SUD) Treatment Organizations

Variables	<i>b</i> (<i>SE</i>)	<i>OR</i> (95% <i>CI</i>)
Administrator's attitude regarding emphasis on smoking cessation SUD treatment	0.37 (0.24)	1.45 (0.88, 2.38)
Administrator's attitude regarding impact of smoking cessation interventions on SUD recovery	0.61* (0.25)	1.84* (1.11, 3.06)
Scale of change scores for treatment protocol demands, staff skills, and staff interest as barriers	-0.54** (0.17)	0.58** (0.40, 0.84)
Accredited (vs. not accredited)	1.37** (0.45)	3.95** (1.94, 8.03)
Organizational size (natural log number of FTEs)	0.29 (0.21)	1.34 (0.92, 1.96)
Constant	-3.89** (1.14)	0.02** (0.00, 0.21)

Notes. *b* = unstandardized coefficient; *CI* = confidence interval; FTEs = full-time equivalent employees; *OR* = odds ratio; *SE* = standard error.

p* < .05 and *p* < .01 (two-tailed tests).

McNemar chi-square tests also identified different patterns of change from baseline to follow-up regarding availability of pharmacotherapy. For sustained adopters of smoking cessation programs, there was no significant change in the percentage offering any pharmacotherapy (77.6% vs. 73.6%, $\chi^2 = 0.82$, *p* = .37), but there was a significant increase in the adoption of varenicline (19.7% vs. 42.4%, $\chi^2 = 15.00$, *p* < .001). Rates of adoption for NRT (73.3% at both timepoints) and bupropion (41.4% vs. 35.7%, $\chi^2 = 0.89$, *p* = .35) did not change. In contrast, the availability of any pharmacotherapy significantly decreased for discontinuers of smoking cessation programs (51.0% vs. 28.6%, $\chi^2 = 8.07$, *p* < .01). Discontinuers had low but stable rates of varenicline (10.4% at both timepoints) and bupropion-SR (15.2% vs. 8.7%, $\chi^2 = 1.00$, *p* = .32), but NRT adoption declined by nearly half, from 51.0% to 28.6% ($\chi^2 = 10.29$, *p* < .01).

DISCUSSION

This study is the first to examine the sustainment of counseling-based smoking cessation programs within SUD treatment organizations over time. Although the majority of organizations sustained these programs over approximately 3 years, nearly 40% ceased offering this service. This finding is similar to the rate of discontinuation of NRT previously reported in SUD programs for a prior 4-year period (Knudsen & Studts, 2011). This rate of discontinuation of smoking cessation programs has added significance because discontinuers reported a significant reduction in the availability of NRT over time.

The sustainment of innovations has been the focus of numerous conceptual models but empirical tests have been limited (Brownson, Dreisinger, Colditz, & Proctor, 2012). Our analyses identified three significant predictors of sustained adoption of smoking cessation programs. First, administrators' baseline beliefs about the value of smoking cessation for patients' SUD recovery were positively associated with sustainment. This finding is consistent with conceptual models of sustainability pointing to the importance of organizational leadership, or "champions," in sustaining innovations (Aarons, Hurlburt, & Horwitz, 2011; Johnson, Hays, Center, & Daley, 2004; Proctor et al., 2009; Simpson, 2002). Notably, the average respondent reported some ambivalence about the impact of smoking

cessation on recovery, suggesting additional dissemination of information regarding the positive impact of quitting smoking on SUD recovery may be important for sustainability.

This study elucidated the associations between organizational barriers and sustainment, specifically that the worsening of barriers related to staff and competing demands from the organization's other treatment protocols reduced the odds of sustainment. To some extent, the barrier of competing demands may be indicative of limited integration of smoking cessation services into the existing organizational system. Shediach-Rizkallah and Bone's (1998) conceptual model includes lack of integration for programs that seem to "stand alone" as a risk factor for discontinuation. Our measure of counseling-based smoking cessation programs reflected this type of "standalone" program insofar as we defined programs as having sessions were focused specifically on tobacco. In addition, conceptual models have contended that resources, particularly staff expertise, are vital to sustainability (Aarons et al., 2011; Johnson et al., 2004), and these data support such claims. Future research should consider the mechanisms explaining worsening staff interest and skills. For example, turnover by skilled staff may weaken organizational support for these services, but our current data cannot address this possibility.

There was no evidence that rates of staff smoking were a risk factor for discontinuation. Some have argued that cultures of staff smoking can be barriers to service delivery (Guydish, Passalacqua, Tajima, & Manser, 2007; Ziedonis et al., 2006), yet neither baseline staff smoking rates nor changes in this variable were associated with sustainment. One potential issue is whether administrators can accurately estimate smoking rates. Comparison of the average staff smoking rate at baseline (19.6%) to the smoking rate reported by surveyed counselors (20.4%) was similar (Knudsen & Studts, 2010), suggesting that administrators may perceive staff smoking rates with some degree of accuracy.

Accreditation was positively associated with sustainment of counseling-based smoking cessation programs. As noted by the National Quality Forum (2007), regulatory and accreditation bodies can serve as important promoters of evidence-based practices. For example, the Joint Commission has increasingly focused on tobacco in its standards, including smoke-free campuses and smoking cessation counseling as requirements (Balkstra, Fields, & Roesler, 2006; Longo et al., 1998).

Sustainment of smoking cessation programs

This study also considered several structural characteristics that were related to sustainment of NRT (Knudsen & Studts, 2011). The structural characteristics associated with NRT sustainment were not significant in this study. In part, these differences in predictors provide support for theoretical perspectives regarding how types of different innovations vary in their compatibility with organizations (Aarons et al., 2011; Proctor et al., 2009; Rogers, 2003). Sustained adoption of NRT was associated with indicators of a more biomedical orientation to treatment, such as location in a hospital setting and access to physicians. Given that counseling-based smoking cessation programs do not necessarily require a biomedical orientation, it is perhaps unsurprising that these variables were not associated with sustainment of this intervention.

An important caveat is that counselors may address tobacco in counseling sessions even in the absence of a formal program. However, greater implementation of counseling is achieved when formal programs were in place (Knudsen et al., 2012). Unfortunately, we could not collect additional counselor data at follow-up, which precluded analyses of program discontinuation and the implementation behaviors of individual counselors.

Limitations

Several limitations of the study should be noted. First, the existing samples from the NTCS do not include all types of treatment. Notably, the NTCS excludes programs embedded within the Veterans Administration system, corrections-based programs, and programs that dispense methadone without offering other levels of care. Second, the sample size was limited because fewer than 20% of organizations at baseline offered counseling-based smoking cessation programs. Although longitudinal data were valuable, it would have been preferable to have more than two timepoints. All data were self-reported by administrators, which raises questions about social desirability and recall bias. It was not possible to examine whether changes in respondents between waves of data collection were associated with sustainment. These analyses were unable to control for the year that programs initiated smoking cessation counseling; a long history of offering such services may be associated with sustainment. The rate of sustainment may be unique to these early adopting programs, and it is unknown whether these findings would generalize to later adopters.

An additional limitation is sample attrition, which was examined through a series of bivariate multinomial logistic regression models. Associations between participation status at the follow-up (i.e., closure, hard refusal, or unable to be contacted, with participation as the reference category) and structural characteristics, smoking cessation medications, organizational barriers, and staff tobacco use were estimated for the 153 organizations with smoking cessation programs at baseline. There were no significant differences, but this may reflect the small cell sizes for the three types of nonparticipation.

Response bias was also examined for the full baseline sample of 897 organizations. At the bivariate level, participation status did vary by availability of a counseling-based smoking cessation program, profit status, sample type, organizational size, and administrator attitudes. These variables were entered into a multivariate model, which yielded only three significant differences. Publicly funded programs were less likely than

privately funded programs to directly refuse to participate. Similar to prior research (Knudsen et al., 2005), larger programs were significantly less likely to close. Finally, having a counseling-based smoking cessation program was protective against closure. These differences suggest that some caution may still be warranted in interpreting the findings. However, the finding that offering a counseling-based smoking cessation program protected against organizational closure suggests an additional benefit of offering this service.

This study also provides the opportunity to consider the intersection of public policy and sustainment of clinical interventions. In 2008, New York was the first in the United States to institute a statewide policy requiring tobacco-free campuses and delivery of smoking cessation services by all licensed SUD treatment programs (Brown, Nonnemaker, Federman, Farrelly, & Kipnis, 2012; Eby, Sparks, Evans, & Selzer, 2012). Of the 10 New York SUD organizations that participated at follow-up, none discontinued their counseling-based smoking cessation programs, suggesting that state policy may play an important role in sustaining evidence-based practices.

The majority of individuals who enter SUD treatment also use tobacco, placing them at heightened risk of SUD relapse, morbidity, and mortality. Nearly 40% of treatment organizations that had adopted counseling-based smoking cessation programs discontinued this service over time. Sustained adopters were distinct from discontinuers with regard to leaders' attitudes at baseline, increases in organizational barriers over time, and accreditation in ways that were consistent with conceptual models of sustainability. The movement away from offering tobacco-related interventions may have negative implications for the long-term health of patients receiving SUD treatment as well as efforts to achieve greater tobacco control.

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DECLARATION OF INTERESTS

The authors have no competing interests.

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