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Smoking-related outcomes and associations with tobacco-free policy in addiction treatment, 2015–2016

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ABSTRACT

Objective: This study assessed changes in smoking-related outcomes in two cross-sectional samples of clients enrolled in addiction treatment and whether tobacco-free grounds policies were associated with smoking-related outcomes.

Method: Clients in 25 programs were surveyed in 2015 (N = 1176) and 2016 (N = 1055). The samples were compared on smoking prevalence, cigarettes per day (CPD), thinking of quitting, past year quit attempts, staff and clients smoking together, attitudes towards quitting, and tobacco-related services. Second, programs with (n = 6) and without (n = 17) tobacco-free grounds at both time points were compared on smoking-related outcomes. Last, we examined changes in these measures for two programs that adopted tobacco-free grounds between 2015 and 2016.

Results: There was one difference across years, such that the mean score for the tobacco Program Service scale increased from 2.37 to 2.48 (p = 0.043, effect size = 0.02). In programs with tobacco-free grounds policies, compared to those without, both CPD and the rate of staff and clients smoking together were significantly lower. In the two programs where tobacco-free grounds were implemented during study years, client smoking prevalence decreased (92.5% v. 67.6%, p = 0.005), the rate of staff and clients smoking together decreased (35.6% v. 4.2%, p = 0.031), mean CPD decreased (10.62 v. 8.24, p < 0.001) and mean tobacco services received by clients increased (2.08 v. 3.05, p < 0.001).

Conclusion: Addiction treatment programs, and agencies responsible for licensing, regulating and funding these programs, should implement tobacco-free grounds policies.

1. Introduction

The Centers for Disease Control and Prevention (CDC) recently reported that cigarette smoking among adults in the United States (U.S.) had decreased from 20.9% in 2005–15.1% in 2015 (Jamal et al., 2016). During this time, smoking prevalence decreased in every age group, in every racial/ethnic group, in nearly all educational attainment groups, and in all Census Regions. Although some have commented that decrease in U.S. smoking prevalence has slowed or stopped (King et al., 2011; Mendez and Warner, 2004), Jamal et al. (2016) report a statistically significant decrease from 16.8% in 2014–15.1% in 2015.

As smoking prevalence declines overall, smoking in subgroups becomes increasingly important in terms of tobacco control, health disparities (Okuyemi et al., 2015) and social justice (Heaton and Nelson, 2004). Compared to 15.1% in the general population, smoking prevalence was 40.6% among persons with serious psychological distress

(Jamal et al., 2016), a category that combines a number of risk groups. Smoking prevalence is 25% for persons with anxiety disorders, 30% for those with depressive disorders (Grant et al., 2004), and 50–80% for those with schizophrenia (Prochaska et al., 2008; Schroeder, 2009). Lasser et al. (2000) estimated that 44% of all cigarettes smoked in the U.S. were consumed by persons with mental health diagnoses, and Higgins et al. (2016) estimated that 14% of all U.S. smokers are persons with drug and/or alcohol abuse problems.

A review of smoking prevalence in U.S. addiction treatment programs, from 1987 to 2009, found a median annual smoking prevalence of 76.3% (Gwydish et al., 2011a). Among all admissions to addiction treatment in New York State, annual smoking rates ranged from 69.5% in 2007–71.2% in 2012 (Gwydish et al., 2015). A 2015 survey of persons enrolled in 24 addiction treatment programs reported a smoking rate of 77.9% (Gwydish et al., 2016b). These studies show no observable decrease in smoking prevalence among persons enrolled in addiction

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treatment, from 1987 to 2015, and highlight the need for innovative approaches to smoking in this population.

There are, however, reasons to expect that smoking could decrease among those enrolled in addiction treatment. First is the continuing decline in population smoking prevalence (Jamal et al., 2016). Second, access to tobacco cessation services should be expanding, based on U.S. mental health parity legislation (Garcia, 2010), because the 2010 Affordable Care Act (ACA) was expected to increase the numbers of persons who receive addiction treatment (Buck, 2011), and because the ACA required coverage of smoking cessation intervention. Third, the 2009 Family Smoking Prevention and Tobacco Control Act placed regulatory authority over tobacco products into the hands of the Food and Drug Administration (FDA), with the mandate to protect public health (National Institutes of Health, 2012).

The addiction treatment field has also noted the high rates of smoking among clients (Guydish et al., 2011a), the excess tobacco-related mortality in this population (Bandiera et al., 2015; Hser et al., 1994; Hurt et al., 1996), and the impact of smoking cessation on other treatment outcomes (McKelvey et al., 2017; Prochaska et al., 2004; Thurgood et al., 2016). Some have called for tobacco policies in state-level treatment systems (Krauth and Apollonio, 2015), and some states have implemented such policies, including tobacco-free grounds. (Brown et al., 2012; Drach et al., 2012; Williams et al., 2005).

Tobacco-free grounds policies include complete smoking bans on all program grounds (CDC, 2015), and may offer a policy approach to epidemic smoking in addiction treatment. Workplace smoking bans increase smoking cessation and reduce cigarette consumption (Bauer et al., 2005; Fichtenberg and Glantz, 2002), and complete bans reduce smoking more than partial bans (Tabuchi et al., 2016). Around one third of U.S. addiction treatment facilities had smoking bans on program property (Muilenburg et al., 2016; Shi and Cummins, 2015; Substance Abuse and Mental Health Services Administration, 2017) and 7 states required comprehensive indoor and outdoor smoking bans in treatment programs (National Association of State Alcohol and Drug Abuse Directors, 2010). One review of mental health and addiction treatment centers found that smoking restrictions had little effect on clients quitting smoking (el-Guebaly et al., 2002). However, pre-post assessments of the New York State tobacco-free grounds policy found that client smoking prevalence decreased significantly from 69.4% to 62.8% (Guydish et al., 2012), and that screening for smoking and use of cessation services increased post policy (Brown et al., 2012). Eby and Laschober (2013) found greater clinician support for smoking cessation in New York programs, compared to programs in other states that had not implemented tobacco-free grounds policies. Staff smoking prevalence and client cigarette consumption declined, and client attitudes toward quitting were more positive five years after policy implementation (Pagano et al., 2016a). Apart from New York State studies, Knudsen et al. (2010) found that programs with tobacco-free grounds policies reported lower smoking prevalence among counselors than those with indoor-only policies, and Richey et al. (2017) found that tobacco-free grounds implementation was not accompanied by a decrease in client census.

The current paper asks, first, whether any changes in smoking behavior were observed among clients enrolled in addiction treatment programs from 2015 to 2016 and, second, whether tobacco-free grounds policies were associated with differences in smoking-related measures.

2. Methods

2.1. Sampling design

We recruited a random sample of addiction treatment programs through the National Institute on Drug Abuse (NIDA) Clinical Trials Network (CTN) in 2013. We first identified CTN-affiliated programs meeting these inclusion criteria: publicly-funded, had at least 60 active

clients, and the program director would designate a staff liaison to coordinate with the research team. From 48 programs meeting these criteria, 33 were randomly selected and contacted. Six programs were no longer eligible, two declined, and one was not needed to meet recruitment goals. The remaining 24 programs were located in 14 states (CA, CT, FL, HI, NC, NY, OH, OR, PA, SC, SD, TX, WV, VA). Sampling design, program selection, and program recruitment, procedures were previously reported (Guydish et al., 2016b). One program was added to the sample in 2015, because it was transitioning to a tobacco free grounds policy and offered an opportunity to observe any changes associated with policy implementation. The current paper uses data from all 25 programs, including 7 outpatient, 11 residential, and 7 methadone programs.

2.2. Participants and procedures

Each program was site visited in 2014, 2015, and 2016. Cross-sectional and anonymous surveys were expected to represent independent samples, but some respondents in 2015 said they remembered taking the survey before. In 2016 all participants were asked whether they had taken the survey previously, enabling removal of any likely repeating cases. Data presented here are from site visits made to each program in 2015 and 2016, with repeating cases removed to support independence of the samples. The mean time between site visits to the same program, from 2015 to 2016, was 321.3 days (SD = 6.7).

Two research team members visited each clinic at each visit, and logistics of each visit were coordinated with the program liaison designated by the program director. In residential programs, participants were recruited into multiple time slots throughout the day, while in methadone programs, clients were recruited during morning dosing hours. Clients in outpatient programs were recruited either before or after group counseling sessions. Both smokers and non-smokers were eligible to participate if they had been in treatment for at least 10 days and if they were physically present in the program on the day of the site visit. The 10 day time in treatment criterion ensured that clients had time to become aware of program tobacco policies. These procedures yielded a systematic sample in outpatient and methadone programs, where clients visit daily or weekly, and yielded a census sample in residential programs where clients reside on a daily basis.

The research team explained the study to all clients who expressed interest to participate, and completed informed consent procedures. No information was recorded for those uninterested in the survey, and all those who completed the consent process also completed the survey. Participants completed surveys using iPads. The number of participants surveyed in each site ranged from 31 to 55, with a median of 50. Client respondents received a \$20 gift card, and each program received a \$2000 incentive after each site visit. Following the site visit, the director of each program was interviewed by phone concerning tobacco-related policies and services. Additional details concerning client surveys and director interviews are reported elsewhere (Guydish et al., 2016b; Pagano et al., 2016b). Study procedures were approved by the University of California, San Francisco, Institutional Review Board.

2.3. Measures

2.3.1. Client demographic characteristics and use of tobacco products

Clients reported age, gender, highest education level achieved, race/ethnicity, and type of program where they were recruited (outpatient, residential, methadone). The study was funded by the FDA Center for Tobacco Products, in part, to better understand use of tobacco products, so questions included the use of cigarettes, electronic cigarettes (e-cigarettes), smokeless tobacco, and cigars, and use of more than one tobacco product.

2.3.2. Smoking-related outcome measures

Participants were asked whether they were current smokers, defined

as having smoked more than 100 cigarettes in their lifetime and also self-identifying as current smokers at the time of the survey. All participants were asked, “Do staff and clients ever smoke together,” and the proportion reporting “yes” was used as a measure of organizational climate with respect to smoking. Current smokers reported number of cigarettes smoked per day (CPD). Current smokers were asked “Are you seriously thinking of quitting smoking?,” an item used to measure stage of change for readiness to quit smoking (DiClemente et al., 1991). For analyses, responses were dichotomized into whether or not the participant was thinking of quitting in the next 30 days. Current smokers also reported whether they had made a quit attempt lasting at least 24 h in the past year.

Respondents also completed the Smoking Knowledge, Attitudes and Services (S-KAS) survey (Guydish et al., 2011b). In this analysis we used the Attitude (8 items) and Program Service (8 items) subscales. Attitude items ask, for example, whether clients in the program want to quit smoking, whether the program prioritizes counseling for smoking cessation, and whether the client is aware of community smoking cessation resources. Program Service items ask, for example, whether the current program had provided the client with educational material about quitting smoking, whether quitting smoking is a requirement of the program, and whether the risks of smoking were discussed with the client. All items are scored from 1 to 5, and a higher scale score (the mean of the item scores) reflects more positive attitudes toward smoking cessation, or receipt of more tobacco cessation services in the current treatment program. Prior research demonstrated acceptable reliability ($\alpha = 0.75$) for the Attitude scale and high reliability ($\alpha = 0.82$) for the Program Service scale (Guydish et al., 2011b).

2.3.3. Program tobacco policy

Following each site visit the program director was interviewed concerning tobacco policies in their clinic, and interviews were transcribed (Pagano et al., 2016b). After the first director interview, two raters independently read the interviews to assess whether a clinic did (1) or did not (0) have a tobacco-free grounds policy, defined as a ban on indoor and outdoor smoking with no designated smoking areas. Inter-rater reliability was good ($\kappa = 0.73$), and disagreements on policy status were resolved through discussing with a third rater. In one case where the presence of tobacco-free grounds was still uncertain, the program director was contacted for confirmation.

Among the 6 addiction treatment programs with a tobacco-free grounds policy during all survey periods, four programs explicitly extended the ban to include electronic cigarettes and two programs explicitly prohibited staff and clients from smoking together. Two program directors said there were consequences for staff or clients smoking on grounds, while the remaining four directors reported no specific consequences for breaking the ban. None of the programs prohibited clients from smoking when they were not on program grounds. Among the two programs that adopted a tobacco-free grounds policy after the initial survey, one prohibited staff from showing evidence of smoking, and both had established consequences for both staff and clients who smoke on program grounds.

2.4. Data analysis

Across all programs, the total sample size was 1176 in 2015 and 1202 in 2016. In 2016, however, 147 cases said they took the survey previously ($n = 109$), were unsure ($n = 34$), or were missing data for this item ($n = 4$). Of the 147 cases, 60% were from methadone programs, 22% were from outpatient programs, and 18% were from residential programs. Because all responses were anonymous, it was not possible to use a model accounting for non-independence of some observations. Therefore, these 147 cases were dropped from analysis. Included in analyses were 1176 cases in 2015 and 1055 cases in 2016.

We first compared samples across the two waves, using Pearson’s chi-square test for categorical variables and the *t*-test for continuous

variables, on demographic characteristics, treatment type, and use of each tobacco product. This was to indicate whether the two samples differed in ways that should be adjusted in later analyses. Second, we compared the two samples on each of the 7 smoking-related outcomes using regression models, adjusting for treatment type (outpatient, residential, methadone) which was significantly different across two samples at the univariate analyses. The regression models also controlled for nesting of clients within program. This was to assess the level of change on each outcome from 2015 to 2016.

As there were few differences on smoking-related outcomes over time, we collapsed across waves and compared outcomes for clients in programs with ($n = 6$) and without ($n = 17$) tobacco-free grounds. Tobacco free-grounds status (yes/no) was consistent over time for 23 programs, but 2 programs adopted tobacco-free grounds policies between 2015 and 2016. Consequently, the comparison of smoking-related outcomes by policy status included only the 23 programs where tobacco-free policy status was the same at both time points. Moreover, policy status was confounded with program type, such that 1 of 9 residential programs, 1 of 7 outpatient programs, and 4 of 7 methadone programs had tobacco free grounds at both times. To minimize potential confounding, we compared smoking-related outcomes by policy status within each program type. While demographic variables showed no difference across waves for the total sample (see Table 1), they were often associated with outcomes when analyzing policy status within

Table 1
Demographic characteristics and use of tobacco products among persons enrolled in 25 addiction treatment programs over time.

	Mean (SD) or n (%)		p value (2016 vs. 2015)
	2015 (N = 1176)	2016 (N = 1055)	
Age	38.5 (11.87)	37.9 (11.83)	0.212
Gender			0.487
Male	604 (51.4%)	519 (49.2%)	
Female	566 (48.1%)	527 (50.0%)	
Other	6 (0.5%)	8 (0.8%)	
Education			0.531
< HS	256 (21.8%)	222 (21.1%)	
HS/GED	401 (34.2%)	384 (36.5%)	
> HS	516 (44.0%)	447 (42.5%)	
Race			0.927
Hispanic	160 (13.6%)	152 (14.4%)	
Black/African American	200 (17.0%)	165 (15.6%)	
White	658 (56.0%)	587 (55.6%)	
American Indian/Alaska	53 (4.5%)	54 (5.1%)	
Asian/Pacific Islander	26 (2.2%)	24 (2.3%)	
Other	79 (6.7%)	73 (6.9%)	
Treatment type			0.034
Outpatient	345 (29.3%)	307 (29.1%)	
Residential	479 (40.7%)	479 (45.4%)	
Methadone	352 (29.9%)	269 (25.5%)	
Weekly Use of Tobacco Products ^{a,b}			
Cigarettes	910 (77.4%)	811 (76.9%)	0.775
E-cigarettes	187 (16.1%)	165 (15.7%)	0.829
Smokeless Tobacco	94 (8.1%)	60 (5.7%)	0.031
Little Filtered Cigars	76 (6.5%)	86 (8.2%)	0.135
Cigars	43 (3.7%)	36 (3.4%)	0.749
Weekly use of at least one product	964 (82.0%)	872 (82.7%)	0.674
Multiple Product Use ^a			0.424
No product	212 (18.0%)	183 (17.3%)	
One product only	687 (58.4%)	644 (61.0%)	
Multiple products	277 (23.6%)	228 (21.6%)	

^a Self-report use of tobacco products at least weekly in the past 30 days.
^b Percentages add to more than 100% due to multiple product use.

each program type. Consequently, analyses comparing policy and non-policy programs controlled for analyses adjusted for age, gender, education, and race/ethnicity, and for nesting of clients within program.

For the two programs that changed their tobacco-free grounds policy status from 2015 to 2016, we compared each of the smoking-related outcomes in 2015 (pre-policy) and 2016 (post-policy). These analyses also controlled for demographic characteristics and for nesting.

3. Results

3.1. Smoking behavior among clients enrolled in addiction treatment programs, 2015–2016

Clients recruited in 2015 had a mean age of 38.5 (SD = 11.87), nearly half were women (48.1%), and 44% had some education beyond high school (Table 1). The 2015 sample was 56% White, 17% African American, 13.6% Hispanic, 4.5% American Indian or Alaska Native, and 2.2% Asian/Pacific Islander. Participants were recruited from outpatient (29.3%), methadone (29.9%), and residential (40.7%) programs. Most (77.4%) smoked cigarettes at least weekly, 82% used at least one tobacco product on a weekly basis, and 23.6% used more than one tobacco product. These characteristics did not differ between the 2015 and 2016 samples, except that there were fewer methadone participants (p = 0.034) and fewer smokeless tobacco users in 2016 (p = 0.031).

Table 2 shows means or proportions for the 7 selected smoking-related outcomes, at each wave. Comparisons adjusted for program type and for nesting of participants within program. In the 2015 sample, most respondents were current smokers (77.4%), nearly one-third (32.3%) reported that staff and clients smoked together in their program, and mean CPD was 13.04. Among current smokers, 25.6% were thinking of quitting in the next 30 days, and 50.5% had made a quit attempt in the past year. In the context of a 5 point scale where 5 reflects positive attitudes about quitting or receipt of more tobacco services, mean scores were 3.09 for the S-KAS Attitude scale and 2.37 for the Program Service scale. There was a single significant difference across years, such that the S-KAS Program Service scale increased from 2015 to 2016 (p = 0.043). The effect size for this difference (0.02) can be interpreted in light of Cohen (1988), which considers effect sizes at or below 0.2 to represent “small” effects.

3.2. Association of tobacco free grounds policy with smoking-related outcomes

As there was only one significant difference in the analysis of smoking outcomes across waves, we collapsed waves and compared each outcome for programs that did and did not have a tobacco free grounds policy in place. For these analyses, we used a subset of 23

Table 2
Tobacco outcomes over time for 25 programs.

	Adjusted Mean/Proportion ^a		p value ^a
	2015	2016	
	(N = 1176)	(N = 1055)	
Client smoking prevalence	77.4%	76.9%	0.828
Staff and clients smoking together	32.3%	28.5%	0.269
Cigarettes per Day (CPD)	13.04	13.04	0.996
Thinking of quitting in the next 30 days	25.6%	25.5%	0.969
Any quit attempts in past year	50.5%	50.5%	0.982
Client S-KAS attitude	3.09	3.11	0.539
Client S-KAS program service	2.37	2.48	0.043

^a Adjusted for program type; and for nesting participants within program.

Table 3
Tobacco outcomes between programs with and without tobacco-free grounds for 23 programs

	Adjusted mean/proportion ^a		p value ^a
	Policy program	No policy program	
Residential			
Client smoking prevalence	89.9%	82.3%	0.014
Staff and client smoking together	27.0%	50.6%	0.005
Cigarettes per day (CPD)	9.7	11.0	0.009
Thinking of quitting in the next 30 days	40.4%	27.4%	0.009
Any quit attempts past year	55.5%	56.0%	0.810
Client S-KAS attitude	3.29	3.05	0.268
Client S-KAS program service	3.01	2.25	0.276
Outpatient			
Client smoking prevalence	48.8%	70.5%	< 0.001
Staff and client smoking together	6.4%	23.4%	< 0.001
Cigarettes per day (CPD)	9.1	11.5	< 0.001
Thinking of quitting in the next 30 days	25.3%	25.6%	0.861
Any quit attempts past year	67.9%	57.2%	< 0.001
Client S-KAS attitude	3.31	3.15	0.318
Client S-KAS program service	2.78	2.37	0.387
Methadone			
Client smoking prevalence	84.1%	81.2%	0.365
Staff and client smoking together	21.2%	47.7%	0.004
Cigarettes per day (CPD)	12.3	13.6	0.045
Thinking of quitting in the next 30 days	21.4%	22.0%	0.820
Any quit attempts past year	49.2%	42.8%	0.299
Client S-KAS attitude	3.10	3.13	0.775
Client S-KAS program service	2.54	2.53	0.931

^a Adjusted for age, gender, race and education; and controlled for nesting participants within program.

programs where the policy was the same at both waves, and removed 2 programs that shifted from having no policy in 2015 to having a policy in 2016. Because policy status was confounded with program type, comparisons shown in Table 3 were performed within program type. Models shown in Table 3 adjusted for age, gender, race/ethnicity, and education, and controlled for nesting of clients within program.

Two significant findings were consistent across all three program types. First, the proportion of respondents reporting that staff and clients smoked together in their program was lower in programs with tobacco-free grounds policies compared to programs without such policies. Second, mean CPD was lower in programs with tobacco-free grounds policies compared to those without. Smoking prevalence was inconsistently associated with program policy status. In residential programs smoking prevalence was higher in the tobacco-free grounds program, compared to others without the policies, and in outpatient programs smoking prevalence was lower in the tobacco free-grounds policy program. Two associations were specific to program type. The residential program with a policy had more clients thinking of quitting in the next month compared to programs without (40.4% v. 27.4%, p = 0.009), and the outpatient program with a policy had more clients making a quit attempt in the past year compared to programs without (67.9% v. 57.2%, p < 0.001).

3.3. Analysis of change in smoking-related outcomes pre-post tobacco free grounds policy

Two residential programs adopted tobacco-free grounds policies between survey data collection in 2015 and 2016. For these programs combined, Table 4 shows adjusted means and proportions for smoking-

Table 4
Tobacco outcomes pre- and post-policy implementation for 2 programs.

	Adjusted mean/proportion ^a		p value ^a
	Pre-policy	Post-policy	
Client smoking prevalence	92.5%	67.6%	0.005
Staff and client smoking together	35.6%	4.2%	0.031
Cigarettes per day (CPD)	10.62	8.24	<0.001
Thinking of quitting in the next 30 days	26.9%	31.6%	0.058
Any quit attempts past year	38.5%	52.1%	0.155
Client S-KAS attitude	3.08	3.07	0.925
Client S-KAS program service	2.08	3.05	<0.001

^a Adjusted for age, gender, race and education; and controlled for nesting participants within program.

related outcomes before and after policy implementation, adjusting for demographic variables and controlling for nesting within program. Five of the seven outcomes show significant difference from pre to post-policy, and all differences are in the direction of improved outcomes following implementation of tobacco-free grounds.

4. Discussion

In 25 addiction treatment programs, and comparing annual cross-sectional samples of clients recruited in 2015 and 2016, we observed no difference over time for smoking prevalence, staff and clients smoking together, and CPD, or for the rates of thinking of quitting, making quit attempts. We saw no difference over time for client attitudes toward quitting smoking, and a small increase for program services related to tobacco. While there is a continuing decline in smoking in the U.S. general population in recent years (Jamal et al., 2016), we observe no such decline in persons enrolled in addiction treatment. Together with previous reports, these findings suggest no decrease in smoking prevalence among persons enrolled in publicly-funded addiction treatment from 1987 through 2016 (Guydish et al., 2016a; Guydish et al., 2011a; Guydish et al., 2015).

The finding of little or no change over time for most tobacco-related measures suggests that public health, tobacco control, and addiction treatment efforts to address tobacco use have limited impact in this population so far. Innovative approaches are necessary to address smoking in this population, and possibly in other populations where smoking remains prevalent. These may include regulating the amount of nicotine in cigarettes to reduce addictiveness (Benowitz and Henningfield, 2013), eliminating menthol flavoring, which appears to be associated with greater nicotine addiction and more difficulty in quitting (Benowitz and Samet, 2011; Foulds et al., 2010; Keeler et al., 2016) or, acceptable in Europe but not in the U.S., using e-cigarettes as a harm reduction strategy (Hartmann-Boyce et al., 2016).

Compared to programs with no such policy, those having tobacco-free grounds recorded lower rates of staff and clients smoking together and lower CPD across all treatment types. Thinking of quitting smoking was associated with tobacco free grounds in residential programs, while making a past year quit attempt was associated with tobacco-free grounds in outpatient programs. Smoking prevalence was higher in the residential program with tobacco-free policies, and lower in the outpatient program having such a policy. It is possible that the single residential program that already implemented tobacco free grounds by the time of the first data collection did so partly in response to a high rate of smoking among clients. In two residential treatment programs where tobacco-free grounds policies were implemented between 2015 and 2016, analysis of smoking-related outcomes showed significantly decreased smoking behavior and increased receipt of tobacco-related services post policy.

These findings suggest the potential for tobacco-free grounds policies to impact smoking-related outcomes in addiction treatment

programs. These findings are consistent with studies of workplace smoking bans (Bauer et al., 2005; Fichtenberg and Glantz, 2002), and with studies reporting on the New York State tobacco-free initiative implemented in addiction treatment programs (Brown et al., 2012). Tobacco free grounds policies have been widely implemented in other healthcare settings, including primary care clinics, hospitals, and psychiatric facilities (American Hospital Association, 2017; American Nonsmokers' Rights Foundation, 2017). As tobacco-free grounds have been implemented in about one-third of addiction treatment facilities (Muilenburg et al., 2016; Shi and Cummins, 2015; Substance Abuse and Mental Health Services Administration, 2017), there seems little argument about feasibility of implementation. In addiction treatment settings, where smoking is epidemic, such policies have the advantage of providing a consistent message concerning all drug use, including tobacco use, and that the program is concerned with client health beyond drug use (Knapp et al., 1993). Moreover, use of tobacco-free grounds does not require lengthy rule setting and comment periods of federal regulatory actions, and does not carry current controversy of use of e-cigarettes. Implementation of tobacco free grounds policies offers an immediate, low cost and actionable strategy for addressing tobacco use in addiction treatment programs, and supports a program environment where client smoking can be addressed more effectively by, for example, reducing or eliminating the negative practice of staff and clients smoking together (Guydish et al., 2017).

One limitation is that we did not examine how well the tobacco-free grounds policies were followed or enforced. Differences in implementation, enforcement, and compliance of tobacco-free grounds policies is an important area for future research. Other study limitations include limited generalizability, as programs participating in this research were drawn from the NIDA CTN and some differences between CTN and non-CTN programs have been reported (Ducharme and Roman, 2009; Susukida et al., 2016). The programs in this study were publicly-funded, which is true for two-thirds of addiction treatment programs in the U.S. (Mark et al., 2007), but do not represent privately funded programs or those operated by large healthcare providers such as Kaiser. Clients within each program were recruited using census or convenience procedures, and may not fully represent all clients in the selected programs. Findings reported are based on cross-sectional analyses and do not permit causal attribution.

4.1. Conclusion

Findings reported from a large sample of clients drawn from a national sample of addiction treatment programs indicate first, little change over time in smoking prevalence or other smoking-related measures in this population and second, support the use of tobacco-free grounds policies as a strategy to address smoking in these settings. We recommend that the Center for Substance Abuse Treatment require tobacco-free grounds policies as a condition for block grant and capacity expansion funding to addiction treatment programs, that state agencies concerned with regulation and licensing of addiction treatment programs require adoption of tobacco-free grounds and that, even in the absence of any future mandate, addiction treatment programs implement tobacco-free grounds as a way to reduce health risks for both program staff and clients.

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Contributors

Joseph Guydish conceived the study, had oversight of all implementation and analysis and drafted the paper. Deborah Yip executed data collection, developed literature review, drafted sections of the manuscript, and interpreted qualitative data regarding program policies. Thao Le managed data, conducted analyses presented, and contributed to data interpretation. Noah Gubner executed data collection and contributed to literature review and data interpretation. Kevin Delucchi provided consulting on the analysis plan, statistical methods, and data interpretation. Paul Roman contributed to development of program sampling procedures, drew the sample of programs using data previously collected by his research team, and commented on the manuscript. All authors have read and approved of the submission of this manuscript to *Drug and Alcohol Dependence*.

Conflict of interest

No conflict declared.

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