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Original Investigation

History and Correlates of Smoking Cessation Behaviors Among Smokers With Serious Mental Illness

Su Fen Lubitz MPH¹, Alex Flitter MA¹, E. Paul Wileyto PhD²,
Douglas Ziedonis MD, MPH³, Nathaniel Stevens¹, Frank Leone MD⁴,
David Mandell ScD¹, John Kimberly PhD⁵, Rinad Beidas PhD^{1,6,7},
Robert A. Schnoll PhD¹

¹Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; ²Department of Biostatistics, Epidemiology, and Informatics, University of Pennsylvania, Philadelphia, PA; ³Department of Psychiatry, University of California, San Diego, CA; ⁴Department of Medicine, Pulmonary, Allergy, & Critical Care Division, University of Pennsylvania, Philadelphia, PA; ⁵Department of Management, The Wharton School of Business, University of Pennsylvania, Philadelphia, PA; ⁶Department of Medical Ethics and Health Policy, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; ⁷Penn Implementation Science Center at the Leonard Davis Institute of Health Economics (PISCE@LDI), University of Pennsylvania, Philadelphia, PA

Corresponding Author: Robert A. Schnoll, PhD, Department of Psychiatry, Perelman School of Medicine, University of Pennsylvania, 3535 Market Street, 4th Floor, Philadelphia, PA 19104, USA. Telephone: 215-746-7143; Fax: 215-746-7140; E-mail: schnoll@penncmedicine.upenn.edu

Abstract

Introduction: Individuals with serious mental illness (SMI) smoke at rates two to three times greater than the general population but are less likely to receive treatment. Increasing our understanding of correlates of smoking cessation behaviors in this group can guide intervention development.

Aims and Methods: Baseline data from an ongoing trial involving smokers with SMI ($N = 482$) were used to describe smoking cessation behaviors (ie, quit attempts, quit motivation, and smoking cessation treatment) and correlates of these behaviors (ie, demographics, attitudinal and systems-related variables).

Results: Forty-three percent of the sample did not report making a quit attempt in the last year, but 44% reported making one to six quit attempts; 43% and 20%, respectively, reported wanting to quit within the next 6 months or the next 30 days. Sixty-one percent used a smoking cessation medication during their quit attempt, while 13% utilized counseling. More quit attempts were associated with lower nicotine dependence and carbon monoxide and greater beliefs about the harms of smoking. Greater quit motivation was associated with lower carbon monoxide, minority race, benefits of cessation counseling, and importance of counseling within the clinic. A greater likelihood of using smoking cessation medications was associated with being female, smoking more cigarettes, and receiving smoking cessation advice. A greater likelihood of using smoking cessation counseling was associated with being male, greater academic achievement, and receiving smoking cessation advice.

Conclusions: Many smokers with SMI are engaged in efforts to quit smoking. Measures of smoking cessation behavior are associated with tobacco use indicators, beliefs about smoking, race and gender, and receiving cessation advice.

Implications: Consideration of factors related to cessation behaviors among smokers with SMI continues to be warranted, due to their high smoking rates compared to the general population. Increasing our understanding of these predictive characteristics can help promote higher engagement in evidence-based smoking cessation treatments among this subpopulation.

Introduction

Over the past 50 years, advances in treatment, health policy, and public awareness have helped reduce the US adult population smoking rate from 42%¹ in 1965 to 12.1% today.² Unfortunately, the same public health achievement has not been realized among certain population subgroups, such as individuals with serious mental illness (SMI). Indeed, studies show that the rate of smoking among those with an SMI is 27%–68.8%.^{3,4} Not surprisingly, therefore, individuals with an SMI suffer disproportionately from tobacco-related disease morbidity and mortality.^{5,6} A recent large population-based cohort study showed that smoking can explain upward of almost 10 years of life lost among those with an SMI and that smoking may account for about one-third of all deaths in the population.⁷

Unfortunately, far less is known about the smoking cessation behaviors of smokers with an SMI, including their rate of interest in quitting, the degree to which they engage in cessation treatment, and factors that are associated with such cessation behaviors.⁸ Now that there is greater evidence for the efficacy of treatments for nicotine dependence for those with an SMI,⁹ capitalizing on such evidence may depend on understanding the degree to which this population of smokers are willing to use these treatments and what factors are associated with greater willingness to use such treatments. In the general population, engaging in steps toward cessation by making a quit attempt, expressing motivation to quit, and utilizing evidence-based treatments substantially increase the probability of smoking cessation.^{10–13} Further, studies in the general population of quit attempts, quit motivation, and treatment utilization have helped guide efforts to increase treatment utilization and reduce smoking rates.¹⁴

Thus, in this study, we sought to describe rate of quit motivation, frequency of quit attempts, and use of cessation treatments as initial steps in the cessation process among smokers with SMI. Further, we explored predictors of these initial yet important steps in the smoking cessation process, including demographic and smoking-related characteristics, features of the psychiatric condition, beliefs about smoking and cessation, and system-level smoking cessation factors such as the availability of cessation services where mental health care is delivered. Past research has identified many of these variables as predictors of cessation behaviors in the general population,^{14–17} but this is among the first studies to explore this issue among smokers with SMI. Addressing these issues can inform the design and implementation of smoking cessation treatments with this critically under-served subgroup of smokers.

Methods

Design and Setting

For this study, we used baseline data collected from participants who were partaking in an ongoing cluster-randomized clinical trial evaluating the effects of two approaches to training clinicians to treat nicotine dependence among those with SMI on clinician treatment of tobacco use and client smoking (ClinicalTrials.gov ID: NCT02849652). Community mental health clinics (CMHCs) within the City of Philadelphia's Community Behavioral Health network,

a nonprofit managed care organization that manages public behavioral health services, ($N = 10$) have been randomized to one of the two training programs. Sites were eligible for this trial if they had an electronic health record, provided access to prescription data, and could enroll at least 12 staff in the trial. Clients at the CMHCs completed surveys of smoking behaviors to evaluate the effects of the two training programs. For a complete description of the study procedures see the work of Flitter et al.¹⁸

Participants

Across the 10 sites, we recruited 482 clients for the trial ($M = 48$, $SD = 12.9$, range = 34–74). To be eligible, clients had to be aged 18 or older, report daily average of 5 cigarettes/day for the past 6 months, have a documented Diagnostic and Statistical Manual of Mental Disorders Axis I or II disorder and receive mental health treatment at an enrolled CMHC (the present definition of SMI), able to communicate in English, and able to provide informed consent. Clients who report exclusive use of electronic cigarettes were not eligible for this study.

Procedures

The Institutional Review Boards at the University of Pennsylvania and the City of Philadelphia provided approval. Following randomization at the level of the CMHC, a research personnel attended clinics for 3–5 weeks to enroll participants (staff and clients) prior to training. Clients were approached in the waiting area to determine interest in enrolling or called phone lines listed on flyers and posters at the clinic; interested clients were screened for eligibility. Enrolled clients completed a baseline assessment (see Measures/Variables section).

Measures/Variables

Demographic, Smoking, and Disease Characteristics

Demographic information was collected from all clients (gender, age, race, education, employment, income, marital status), as was smoking history data (age at initiation, carbon monoxide [CO], smoking rate), including the Fagerström Test for Nicotine Dependence (Table 1).¹⁹ Current DSM Axis I and II disorders were documented from clinics' electronic medical record and each participant completed the Revised Behavior and Symptom Identification Scale, a 24-item assessment of mental health functioning²⁰; the total Revised Behavior and Symptom Identification Scale score was used.

Client Beliefs About Tobacco Cessation and Cessation Treatment, and Smoking Cessation Services

The Smoking Knowledge, Attitudes, and Services instrument²¹ was administered to clients. The Smoking Knowledge, Attitudes, and Services items evaluate attitudes about smoking cessation such as “patients want appointments for smoking cessation treatment” and “quitting smoking can threaten my recovery.” Items are assessed using a Likert-type scale from 1 “strongly disagree” to 5 “strongly agree.” The Smoking Knowledge, Attitudes, and Services also assesses smoking cessation services (ie, system-level). Clients respond

Table 1. Characteristics of Sample

	Quit attempts (N (%) or mean [SD])			Quit motivation (N (%) or mean [SD])			Medication use (N (%) or mean [SD])			Counselor use (N (%) or mean [SD])		
	None	1–5	6+	No	Yes, within 6 months	Yes, within 30 days	No	Yes	No	Yes	No	Yes
Demographics, smoking, and illness characteristics												
Gender (% female)	89 (42.4%)	94 (44.8%)	27 (12.9%)	74 (35.4%)	95 (45.5%)	40 (19.1%)	72 (34.3%)	138 (65.7%)	192 (91.4%)	18 (8.6%)		
Race (% minority)	132 (42.6%)	141 (45.5%)	37 (11.9%)	99 (31.9%)	138 (44.5%)	73 (23.3%)	134 (43.2%)	176 (56.8%)	262 (84.5%)	48 (15.5%)		
Education (% less than or equal to some HS)	70 (45.8%)	65 (42.5%)	18 (11.8%)	50 (33.1%)	69 (45.7%)	32 (21.2%)	67 (43.8%)	86 (56.2%)	140 (91.5%)	13 (8.5%)		
Employment (% employed)	31 (41.9%)	29 (39.2%)	14 (18.9%)	21 (28.4%)	38 (51.4%)	15 (20.3%)	29 (39.2%)	45 (60.8%)	60 (81.1%)	14 (18.9%)		
Income (% <\$20k)	179 (44.2%)	177 (43.7%)	49 (12.1%)	145 (36.1%)	178 (44.3%)	79 (19.7%)	156 (38.5%)	249 (61.5%)	355 (87.7%)	50 (12.3%)		
Marital status (% married)	29 (42.6%)	29 (42.6%)	10 (14.7%)	32 (47.1%)	23 (33.8%)	13 (19.1%)	162 (39.1%)	252 (60.9%)	59 (86.8%)	9 (13.2%)		
Psychiatric disorders (% ≥2)	151 (41.4%)	170 (46.6%)	44 (12.1%)	123 (33.9%)	171 (47.1%)	69 (19.0%)	136 (37.3%)	229 (62.7%)	317 (86.8%)	48 (13.2%)		
FTND (% at least high)	5.7 (2.0)	4.9 (2.1)	4.8 (2.5)	5.1 (2.1)	5.3 (2.0)	5.2 (2.3)	5.1 (2.2)	5.3 (2.1)	5.2 (2.1)	5.0 (2.0)		
Age started smoking	15.8 (4.5)	16.1 (4.8)	16.3 (5.7)	16.0 (5.1)	15.9 (4.4)	16.1 (5.1)	16.4 (5.2)	15.7 (4.5)	16.0 (4.9)	15.7 (4.3)		
Age at eligibility screen	46.1 (11.4)	45.8 (12.1)	44.6 (11.4)	45.5 (11.8)	46.2 (11.4)	45.2 (12.2)	46.0 (12.3)	45.6 (11.2)	45.9 (11.5)	45.0 (12.5)		
Carbon monoxide (ppm)	17.5 (10.5)	15.2 (11.4)	13.2 (7.6)	16.6 (10.8)	16.6 (11.5)	13.0 (7.7)	15.1 (9.9)	16.5 (11.1)	15.9 (10.6)	16.0 (11.2)		
Cigarettes/day	13.1 (7.8)	11.7 (7.7)	15.0 (10.3)	13.0 (8.0)	13.0 (7.9)	11.5 (8.6)	11.4 (6.5)	13.6 (9.0)	12.8 (8.0)	12.4 (9.1)		
BASIS-R	32.0 (24.0)	32.9 (21.7)	36.6 (21.4)	31.7 (23.2)	33.9 (23.3)	33.6 (20.4)	34.5 (25.0)	32.0 (21.0)	32.9 (23.0)	33.4 (20.8)		
Attitudes												
Hazards of smoking	3.7 (1.3)	4.0 (1.0)	4.0 (1.3)	3.8 (1.2)	3.9 (1.2)	3.9 (1.2)	3.8 (1.2)	3.9 (1.2)	3.8 (1.2)	3.9 (1.1)		
Smoke more than 20 yrs, little benefit	2.7 (1.3)	2.5 (1.3)	2.2 (1.2)	2.8 (1.3)	2.4 (1.2)	2.6 (1.3)	2.7 (1.3)	2.5 (1.3)	2.6 (1.3)	2.7 (1.3)		
Quit threaten recovery	2.7 (1.2)	2.7 (1.1)	2.3 (1.1)	2.7 (1.2)	2.6 (1.2)	2.6 (1.2)	2.7 (1.2)	2.6 (1.2)	2.6 (1.2)	2.6 (1.2)		
Concerned about smoking	3.8 (1.0)	3.9 (1.0)	3.9 (1.1)	3.5 (1.1)	4.1 (0.7)	4.0 (1.1)	3.7 (1.0)	3.9 (1.0)	3.9 (1.0)	3.9 (1.1)		
Counseling would help quit	3.5 (1.3)	3.6 (1.1)	3.7 (1.3)	3.3 (1.2)	3.7 (1.2)	3.8 (1.1)	3.6 (1.3)	3.6 (1.2)	3.6 (1.2)	3.6 (1.2)		
Systems												
Staff ask if you smoke	0.6 (0.5)	0.7 (0.5)	0.6 (0.5)	0.7 (0.5)	0.7 (0.5)	0.6 (0.5)	0.6 (0.5)	0.7 (0.5)	0.6 (0.5)	0.7 (0.5)		
Staff/clients smoke together	0.3 (0.5)	0.4 (0.5)	0.3 (0.47)	0.4 (0.5)	0.3 (0.5)	0.3 (0.5)	0.3 (0.5)	0.4 (0.5)	0.3 (0.5)	0.3 (0.5)		
Provided cessation advice	0.3 (0.5)	0.4 (0.5)	0.5 (0.5)	0.4 (0.5)	0.4 (0.5)	0.4 (0.5)	0.3 (0.5)	0.4 (0.5)	0.3 (0.5)	0.6 (0.5)		
Provided cessation referral	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)		
Smoking cessation part of tx	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.3 (0.4)	0.2 (0.4)	0.2 (0.4)	0.2 (0.4)	0.3 (0.4)		
Smoking cessation required	0.1 (0.2)	0.01 (0.12)	0.1 (0.3)	0.04 (0.2)	0.02 (0.2)	0.1 (0.3)	0.1 (0.2)	0.04 (0.2)	0.1 (0.2)	0.1 (0.2)		

HS = high school; FTND = Fagerstrom Test for Nicotine Dependence; BASIS-R = Behavior and Symptom Identification Scale; tx = treatment; 48 participants reported smoking less than 5 cigarettes on the assessment day but reported smoking on average at least 5 cigarettes/day for the past 30 days.

“yes” or “no” to questions about whether they are routinely asked about their smoking status, advised to quit smoking, whether staff and clients smoke together at the clinic, whether clients are provided with a referral for smoking cessation treatment, and whether smoking cessation treatment is a requirement at the clinic or provided as routine care.

Smoking Cessation Behaviors

We assessed four indicators of smoking cessation behavior: quit motivation, quit attempts, and use of behavioral smoking cessation treatment and the Food and Drug Administration (FDA)-approved smoking cessation medications. For quit motivation, clients were asked if they were “seriously thinking of quitting smoking,” to which they responded “yes, within the next 30 days,” “yes, within the next 6 months but not within the next 30 days,” or “no, not thinking of quitting.” For quit attempts, clients were asked “how many times in the past year did you quit for at least 24 hours”; responses were grouped as 0, 1–5, at least 6. Lastly, for counseling and tobacco use medications, clients indicated “yes” or “no” to whether they had used such treatments to quit smoking. Quit motivation was correlated with quit attempts ($r = .18, p < .01$) and use of behavioral counseling for smoking ($r = .10, p < .05$); quit attempts was correlated with use of tobacco use medications ($r = .15, p < .01$) and use of behavioral counseling for smoking ($r = .09, p < .05$); use of tobacco use medications was associated with use of behavioral counseling for smoking ($r = .14, p < .01$).

Statistical Analyses

Descriptive statistics characterized the sample, including smoking cessation behaviors (eg, quit motivation). Analysis of variance and chi-square tested demographic, smoking, and disease characteristics, beliefs about smoking and cessation, and smoking cessation services (independent variables) as correlates of smoking cessation behaviors (dependent variables). As done previously,¹⁸ factors related to smoking cessation behaviors ($p < .1$) were included in multi-level fixed effects regression models to control for the within-cluster correlation from collecting data from participants within clinics. Separate linear (for continuous dependent variables) or logistic (for binary dependence variables) regression models were tested for each smoking cessation behavior and predictors were evaluated using standardized coefficients and t tests (for linear models) or odds ratios and z tests (for logistic models), as well as probabilities and 95% confidence intervals. Model estimates using generalized estimating equations yielded within-cluster correlations of .0005 to .03, indicating low associations among observations from the same clinic.

Results

Sample Characteristics

Fifty-six percent (272/482) of the sample were male; 64% of the sample were from minority racial groups (59% [284/482] African American) and 10% (50/482) were Hispanic; 32% (136/481) of the sample had some high school education or less; 85% (408/482) of the sample were unemployed and 84% (405/482) of the sample reported an annual household income of less than or equal to \$20 000; 86% (414/482) of the sample were single; 74% (357/482) of the sample reported two or more DSM diagnoses (either depression, psychotic, anxiety, personality, substance, or eating disorder); 47% (224/474) of the sample reported high or very high levels of nicotine

dependence. The average age of participants was 45.8 years (range: 19–74, SD = 11.6). On average, participants started smoking when they were 16 years old (range: 5–40; SD = 4.8), reported smoking 12.8 cigarettes/day (range: 1–60; SD = 8.2), and recorded a breath CO of 15.9 ppm (range: 0–79; SD = 10.7).

History of Smoking Cessation Behaviors

Overall, nearly two-thirds of the sample (63.1% [304/479]) indicated that they want to quit smoking, 19.7% (95/479) within the next 30 days. Likewise, more than half of the sample (56.7%) have made at least one 24-hour quit attempt (273/482), and 12.9% reported making six or more 24-hour quit attempts (62/482). Almost two-thirds of the sample (60.8% [293/482]) have used an FDA-approved smoking cessation medication in a quit attempt but only 13.3% (64/482) of the sample used behavioral counseling in a past quit attempt.

Correlates of Smoking Cessation Behaviors

For quit attempts, participants who reported a greater number of quit attempts reported lower CO ($F[2,475] = 4.72, p < .05$), higher baseline smoking rate ($F[2,466] = 4.09, p < .05$), lower nicotine dependence ($F[2,471] = 8.85, p < .01$), were more likely to have a single DSM diagnosis ($\chi^2[2] = 4.90, p < .01$), greater recognition of the hazards associated with smoking ($F[2,476] = 3.77, p < .05$), lower endorsement that they had been smoking for more than 20 years so there is little benefit to quitting ($F[2,477] = 4.17, p < .05$), lower endorsement that quitting smoking would threaten their psychiatric recovery ($F[2,477] = 2.42, p < .1$), and greater endorsement of smoking cessation treatment being required as part of mental health treatment ($F[2,477] = 4.98, p < .01$).

For quit motivation, participants who reported a higher level of quit motivation had lower baseline CO ($F[2,472] = 4.35, p < .05$), were more likely to be from a minority racial group ($\chi^2[2] = 16.58, p < .01$), have a single DSM diagnosis ($\chi^2[2] = 7.67, p < .05$), reported greater concern about the health consequences of smoking ($F[2,475] = 5.19, p < .01$), reported greater endorsement that smoking cessation counseling would help them quit smoking ($F[2,472] = 9.69, p < .01$), reported greater endorsement that smoking cessation treatment should be a required part of mental health treatment ($F[2,476] = 5.12, p < .01$), and reported lower endorsement that they had been smoking for more than 20 years so there is little benefit to quitting ($F[2,475] = 5.19, p < .01$).

Greater participant use of FDA-approved smoking cessation medications was associated with being female ($\chi^2[1] = 3.81, p < .1$), being Caucasian ($\chi^2[1] = 4.79, p < .05$), reporting a greater smoking rate ($F[1,467] = 8.09, p < .01$), reporting greater concern about the health consequences of smoking ($F[1,478] = 4.94, p < .05$), and reporting having received smoking cessation advice more frequently ($F[1480] = 4.58, p < .05$). Greater participant use of smoking cessation behavioral counseling was associated with being male ($\chi^2[1] = 7.45, p < .05$), being minority ($\chi^2[1] = 4.17, p < .1$), higher educational achievement ($\chi^2[1] = 4.82, p < .05$), greater endorsement of smoking cessation treatment being a required part of mental health treatment ($F[1,480] = 7.79, p < .01$), and reporting having received smoking cessation advice more frequently ($F[1,480] = 12.67, p < .01$).

Prediction Models of Smoking Cessation Behaviors

As given in Table 2, making more frequent quit attempts was associated with lower nicotine dependence, lower CO, greater recognition

Table 2. Multi-Level Fixed Effects Linear Regression Models of Predictors of Quit Attempts and Quit Motivation

	β	t	p	95% CI
Quit attempts				
Number of psychiatric disorders	0.004	-0.36	.95	-0.14, 0.15
FTND	-0.06	-4.08	<.01	-0.08, -0.03
Baseline carbon monoxide	-0.008	-2.54	.01	-0.13, -0.002
Hazards of smoking clearly demonstrated	0.07	2.48	.01	0.01, 0.12
Smoked for >20 years, little health benefit to quitting	-0.04	-1.50	.13	-0.09, 0.01
Quitting would threaten mental illness recovery	-0.02	-0.67	.51	-0.08, 0.04
Smoking cessation required as part of treatment	0.08	0.63	.77	-0.24, 0.40
Quit motivation				
Number of psychiatric disorders	0.09	1.25	.21	-0.05, 0.24
Baseline carbon monoxide	-0.008	-2.64	.01	-0.01, -0.002
Race	-0.37	-5.04	<.01	-0.51, -0.23
Concerned about smoking	0.14	4.19	<.01	0.08, 0.21
Smoked for >20 years, little health benefit to quitting	-0.04	-1.69	.09	-0.09, 0.01
Counseling would help quit	0.08	3.09	.01	0.03, 0.14
Smoking cessation required as part of treatment	0.50	2.21	.03	0.05, 0.95

CI = confidence interval; FTND = Fagerström Test for Nicotine Dependence.

Table 3. Multi-Level Fixed Effects Logistic Regression Models of Predictors of Medication Use and Counselor Use

	OR	z	p	95% CI
Medication use				
Sex	1.61	2.25	.02	1.06, 2.44
Race	1.18	0.72	.47	0.74, 1.90
Cigarettes per day	1.04	2.49	.01	1.01, 1.07
Concerned about smoking	1.18	1.53	.13	0.96, 1.45
Provided advice	1.62	2.18	.03	1.05, 2.51
Counselor use				
Sex	0.51	-2.09	.04	0.27, 0.96
Race	0.58	-1.4	.14	0.28, 1.19
Education	2.50	2.50	.01	1.21, 5.16
Provided advice	2.02	2.29	.02	1.11, 3.69
Smoking cessation required as part of treatment	1.58	1.32	.19	0.80, 3.12

CI = confidence interval; FTND = Fagerström Test for Nicotine Dependence; OR = odds ratio.

of the hazards associated with smoking, and lower endorsement that they had been smoking for more than 20 years so there is little benefit to quitting. Greater quit motivation was associated with lower CO, being from a racial minority group, greater concern about this health consequences of smoking, greater belief that smoking cessation counseling would help them quit smoking and that smoking cessation treatment should be a required part of mental health treatment, and lower endorsement that they had been smoking for more than 20 years so there is little benefit to quitting. As given in Table 3, greater use of FDA-approved smoking cessation medications was associated with being female, smoking more cigarettes per day, and having been provided with smoking cessation advice. Lastly, greater use of smoking cessation behavioral counseling was associated with being male, greater educational achievement, and being provided with smoking cessation advice.

Discussion

Summary of Findings

This study was designed to describe the smoking cessation behavior among smokers with an SMI and explore correlates of smoking cessation behaviors in this population of smokers that have been relatively under-served by the clinical and research tobacco control

community. Indeed, despite the progress made to reduce the rate of smoking across the US adult population, the prevalence of smoking in the SMI community remains two to three times higher than in the general population today.² Addressing this health disparity requires knowledge of factors associated with smoking behaviors in the SMI population in order to assist with intervention development.

First, the rates of smoking cessation behaviors, including self-reported quit attempts, quit motivation, and use of medications and counseling for smoking cessation, converge with data that indicate that smokers with SMI are engaged in quitting efforts, and motivated to do so, but remain under-treated in these efforts, especially with regard to behavioral interventions. With regard to quit attempts, international surveys have shown that the median prevalence of past year 24-hour quit attempts is 43%,²² while US surveys have shown that prevalence rates of quit attempts are 66%, 67%, and 72% for those with no insurance, private insurance, or Medicaid, respectively,²³ and a rate of 66% overall.²⁴ These findings support recent analyses suggesting that the prevalence of quit attempts has been increasing in recent years among smokers with psychiatric comorbidity²⁵ as it has been for the general population²⁶ and that smokers with an SMI try to quit smoking at about the same rate as the general population. Likewise, with regard to quit motivation, 63% of smokers in the present sample report a readiness to quit smoking within the next

6 months. This converges well with studies in the general population of smokers,²⁷ including from studies using large national surveys³⁸ and with past studies with smokers who have psychiatric comorbidities.^{29,30} These data challenge what Prochaska³¹ referred to as the *myth* that smokers with SMI are not motivated to quit smoking. Lastly, that more than 60% of the sample had used an FDA-approved smoking cessation medication during a quit attempt exceeds similar data from the general population^{32,33} and from the Medicare population³⁴ and converges well with previous data collected from smokers with a psychiatric comorbidity,³⁵ suggesting that most smokers with an SMI are offered some form of medication to help them quit. In contrast, the rate at which smokers with SMI use smoking cessation behavioral counseling is very low and indicates an important target for initiatives to improve tobacco use treatment for this population. Utilization of behavioral interventions for smoking is generally low across the population,³⁶ but the present data converge with previous studies of smokers with SMI, which have reported rates of behavioral treatment for smoking in this population of the less than 10%.³⁷

Second, the present results offer useful information about factors associated with smoking cessation behavior among those with an SMI in order to develop content for an intervention or understand who to target interventions toward. With regard to the latter, few demographic and smoking-related variables were associated with smoking cessation behaviors. Interventions developed to increase smoking cessation behaviors, however, may need to be targeted to nonminority smokers, who reported lower interest in quitting, and to smokers with greater nicotine dependence and higher smoking rates (based on CO), who reported fewer quit attempts and lower quit motivation. These results are consistent with past results, which have reported that African Americans report greater quit motivation but not greater success with cessation,^{38,39} and with other studies that have described the linkage between such smoking-related characteristics and quit attempts and motivation.^{40,41} Likewise, efforts to address tobacco use in this population may need to include increasing the use of medications among males and increasing the use of behavioral counseling for all but particularly for women. Past research has indicated that men are less likely to use medications to quit smoking,^{32,42} and the other studies have highlighted the important role that gender plays in determining the use of medications to quit smoking.⁴³ The lower use of behavioral smoking cessation interventions among women is divergent from past studies⁴⁴ and may be an artifact of the overall very low rate of counseling utilization in the present sample. Indeed, given the exceptionally low rate of counseling utilization for smoking, targeted efforts based on gender to increase use are not warranted. Further, smokers with lower educational attainment showed lower rates of cessation counseling, which is consistent with past findings.⁴⁵ Given the higher rate of tobacco use among those with lower educational attainment, and that the combination of counseling and medication yields the highest quit rates, efforts to promote cessation among those with SMI should target those with lower levels of education. Lastly, since the number of comorbid psychiatric diagnosis was not associated with cessation behaviors in prediction models, efforts to address these behaviors can focus on the general population within mental health care facilities.

Comparison to Other Studies

In developing the content of interventions to promote smoking cessation behaviors, the present results suggest that including procedures

to increase beliefs that are reflective of tobacco use being harmful, that it is not too late to quit, and that counseling may be helpful may lead to increased cessation behaviors. These results are consistent with previous studies with smokers who have SMI⁴⁶ and smokers in the general population.^{47,48} They are also congruent with previous studies evaluating behavioral interventions with smokers who have SMI that have yielded an increase in smoking cessation treatment engagement.⁴⁹ While behavioral counseling and medications are necessary to increase cessation, basic educational materials and messages could be created within mental health care treatment facilities to increase basic awareness of the harmful effects of smoking in order to increase initial smoking cessation behaviors among those with SMI. In addition, our results suggest that system-level policies could increase quit motivation and treatment engagement. Studies are needed to evaluate if incorporating clinic procedures that require the provision of smoking cessation advice and referral to treatment can increase motivation to quit and utilization of behavioral and pharmacological smoking cessation treatments. Such simple structural changes, which can be embedded within an electronic health record, have been shown to increase engagement in smoking cessation treatment.⁵⁰

Limitations

These results should be viewed within the context of study limitations. First, the data are cross-sectional, so causal interpretations of the relationships reported here are not warranted. Second, the data are self-reported (eg, we did not confirm baseline reports of using smoking cessation medications) and so they are susceptible to sources of bias and misreporting. Lastly, participants were aware that they were enrolled in a trial that was evaluating two methods of training clinic personnel to address tobacco use among the clients and, thus, may have experienced some degree of the Hawthorne effect (ie, altered responses due to awareness of participation in a study) in responding. For example, participant involvement in this study may itself have influenced participant responses, including level of motivation.

Strengths

Nevertheless, this is among the only studies to examine smoking cessation behaviors among a large and diverse sample of smokers recruited from community mental health care clinics across a large metropolitan city. The data suggest that, like smokers in the general population, smokers with SMI are motivated to quit smoking and make repeated attempts to do so, but they underutilize evidence-based treatments to achieve cessation, especially behavioral interventions. Moving forward, interventions to increase smoking cessation behaviors may be effective if they promote beliefs congruent with the health benefits of cessation and incorporate system-level initiatives to require the provision of quit advice and smoking cessation treatment within standard mental health care. Integrating such efforts to increase cessation behaviors may help address the critical issue of reducing tobacco use in this highly under-served subgroup of smokers in order to address the disparity in smoking evident in this population.

Funding

This work was supported by grants from the National Cancer Institute (R01 CA202699) and the National Institute on Drug Abuse (K24 DA045244).

Declaration of Interests

RAS receives medication and placebo free from Pfizer and has provided consultation to Pfizer. RAS has provided consultation to GlaxoSmithKline and Palliatech. RB has received royalties from Oxford University Press and has provided consultation to Merck and the Camden Coalition of Healthcare Providers.

Acknowledgments

The authors thank Cherie Brummans, Michael Brody, Geoff Neimark, and Matthew Hurford for assistance with study implementation and site recruitment.

References

- Centers for Disease Control and Prevention. Achievements in public health, 1900–1999: tobacco use—United States, 1900–1999. *MMWR Morb Mortal Wkly Rep.* 1999;48(43):986–993.
- US Census Bureau. *Tobacco Use Supplement Current Population Survey.* 2019. <https://cancercontrol.cancer.gov/brp/tcrb/tus-cps/results/data1819/cpsjul18-DataBrief.pdf>
- Ziedonis D, Hitsman B, Beckham JC, et al. Tobacco use and cessation in psychiatric disorders: National Institute of Mental Health report. *Nicotine Tob Res.* 2008;10(12):1691–1715.
- Cook BL, Wayne GF, Kafali EN, Liu Z, Shu C, Flores M. Trends in smoking among adults with mental illness and association between mental health treatment and smoking cessation. *JAMA.* 2014;311(2):172–182.
- Colton CW, Manderscheid RW. Congruencies in increased mortality rates, years of potential life lost, and causes of death among public mental health clients in eight states. *Prev Chronic Dis.* 2006;3(2):A42.
- Miller BJ, Paschall CB 3rd, Svendsen DP. Mortality and medical comorbidity among patients with serious mental illness. *Psychiatr Serv.* 2006;57(10):1482–1487.
- Tam J, Warner KE, Meza R. Smoking and the reduced life expectancy of individuals with serious mental illness. *Am J Prev Med.* 2016;51(6):958–966.
- Weinberger AH, Funk AP, Goodwin RD. A review of epidemiologic research on smoking behavior among persons with alcohol and illicit substance use disorders. *Prev Med.* 2016;92:148–159.
- Anthenelli RM, Benowitz NL, West R, et al. Neuropsychiatric safety and efficacy of varenicline, bupropion, and nicotine patch in smokers with and without psychiatric disorders (EAGLES): a double-blind, randomised, placebo-controlled clinical trial. *Lancet.* 2016;387(10037):2507–2520.
- Hartmann-Boyce J, Stead LF, Cahill K, Lancaster T. Efficacy of interventions to combat tobacco addiction: Cochrane update of 2013 reviews. *Addiction.* 2014;109(9):1414–1425.
- Silfen SL, Cha J, Wang JJ, Land TG, Shih SC. Patient characteristics associated with smoking cessation interventions and quit attempt rates across 10 community health centers with electronic health records. *Am J Public Health.* 2015;105(10):2143–2149.
- Cahill K, Stevens S, Perera R, Lancaster T. Behavioural interventions for smoking cessation: an overview and network meta-analysis. *Cochrane Database Syst Rev.* 2013;(5):CD009329. doi: 10.1002/14651858.CD009329.pub2
- Kotz D, Brown J, West R. ‘Real-world’ effectiveness of smoking cessation treatments: a population study. *Addiction.* 2014;109(3):491–499.
- Vangeli E, Stapleton J, Smit ES, Borland R, West R. Predictors of attempts to stop smoking and their success in adult general population samples: a systematic review. *Addiction.* 2011;106(12):2110–2121.
- Burris JL, Wahlquist AE, Carpenter MJ. Characteristics of cigarette smokers who want to quit now versus quit later. *Addict Behav.* 2013;38(6):2257–2260.
- Emery JL, Sutton S, Naughton F. Cognitive and behavioral predictors of quit attempts and biochemically-validated abstinence during pregnancy. *Nicotine Tob Res.* 2017;19(5):547–554.
- Lee HS, Catley D, Harris KJ. Improving understanding of the quitting process: psychological predictors of quit attempts versus smoking cessation maintenance among college students. *Subst Use Misuse.* 2014;49(10):1332–1339.
- Flitter AS, Lubitz SF, Ziedonis D, et al. A cluster-randomized clinical trial testing the effectiveness of the addressing tobacco through organizational change model for improving the treatment of tobacco use in community mental health care: preliminary study feasibility and baseline findings. *Nicotine Tob Res.* 2019;21(5):559–567.
- Heatherston TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström test for nicotine dependence: a revision of the Fagerström Tolerance Questionnaire. *Br J Addict.* 1991;86(9):1119–1127.
- Eisen SV, Normand SL, Belanger AJ, Spiro A 3rd, Esch D. The revised behavior and symptom identification scale (BASIS-R): reliability and validity. *Med Care.* 2004;42(12):1230–1241.
- Stroup ST. Management of medical illness in persons with schizophrenia. *Psychiatr Ann.* 2000;30(1):35–40.
- Ahluwalia IB, Smith T, Arrazola RA, et al. Current tobacco smoking, quit attempts, and knowledge about smoking risks among persons aged ≥15 years—Global Adult Tobacco Survey, 28 Countries, 2008–2016. *MMWR Morb Mortal Wkly Rep.* 2018;67(38):1072–1076.
- Naavaal S, Malarcher A, Xu X, Zhang L, Babb S. Variations in cigarette smoking and quit attempts by health insurance among us adults in 41 states and 2 jurisdictions, 2014. *Public Health Rep.* 2018;133(2):191–199.
- Lavinghouze SR, Malarcher A, Jama A, Neff L, Debot K, Whalen L. Trends in quit attempts among adult cigarette smokers—United States, 2001–2013. *MMWR Morb Mortal Wkly Rep.* 2015;64(40):1129–1135.
- Kulik MC, Glantz SA. Softening among U.S. smokers with psychological distress: more quit attempts and lower consumption as smoking drops. *Am J Prev Med.* 2017;53(6):810–817.
- Gitchell JG, Shiffman S, Sembower MA. Trends in serious quit attempts in the United States, 2009–14. *Addiction.* 2017;112(5):897–900.
- Boudreaux ED, Sullivan A, Abar B, Bernstein SL, Ginde AA, Camargo CA Jr. Motivation rulers for smoking cessation: a prospective observational examination of construct and predictive validity. *Addict Sci Clin Pract.* 2012;7:8.
- O’Connor RJ, Rees VW, Rivard C, Hatsukami DK, Cummings KM. Internalized smoking stigma in relation to quit intentions, quit attempts, and current e-cigarette use. *Subst Abuse.* 2017;38(3):330–336.
- Grana RA, Ramo DE, Fromont SC, Hall SM, Prochaska JJ. Correlates of tobacco dependence and motivation to quit among young people receiving mental health treatment. *Drug Alcohol Depend.* 2012;125(1–2):127–131.
- Mann-Wrobel MC, Bennett ME, Weiner EE, Buchanan RW, Ball MP. Smoking history and motivation to quit in smokers with schizophrenia in a smoking cessation program. *Schizophr Res.* 2011;126(1–3):277–283.
- Prochaska JJ. Smoking and mental illness—breaking the link. *N Engl J Med.* 2011;365(3):196–198.
- Kasza KA, Cummings KM, Carpenter MJ, Cornelius ME, Hyland AJ, Fong GT. Use of stop-smoking medications in the United States before and after the introduction of varenicline. *Addiction.* 2015;110(2):346–355.
- Soulakova JN, Crockett LJ. Unassisted quitting and smoking cessation methods used in the United States: analyses of 2010–2011 tobacco use supplement to the current population survey data. *Nicotine Tob Res.* 2017;20(1):30–39.
- Jarlenski M, Hyon Baik S, Zhang Y. Trends in use of medications for smoking cessation in Medicare, 2007–2012. *Am J Prev Med.* 2016;51(3):301–308.
- Tulloch HE, Pipe AL, Clyde MJ, Reid RD, Els C. The quit experience and concerns of smokers with psychiatric illness. *Am J Prev Med.* 2016;50(6):709–718.
- Young-Wolff KC, Klebaner D, Campbell CI, Weisner C, Satre DD, Adams AS. Association of the affordable care act with smoking and tobacco treatment utilization among adults newly enrolled in health care. *Med Care.* 2017;55(5):535–541.
- Carrillo S, Nazir N, Houser E, et al. Impact of the 2015 CMS inpatient psychiatric facility quality reporting rule on tobacco treatment. *Nicotine Tob Res.* 2017;19(8):976–982.
- Keeler C, Max W, Yergler V, Yao T, Ong MK, Sung HY. The association of menthol cigarette use with quit attempts, successful cessation, and

- intention to quit across racial/ethnic groups in the United States. *Nicotine Tob Res.* 2017;19(12):1450–1464.
39. Savoy E, Reitzel LR, Scheuermann TS, et al. Risk perception and intention to quit among a tri-ethnic sample of nondaily, light daily, and moderate/heavy daily smokers. *Addict Behav.* 2014;39(10):1398–1403.
 40. Rohsenow DJ, Martin RA, Tidey JW, Monti PM, Colby SM. Comparison of the cigarette dependence scale with four other measures of nicotine involvement: correlations with smoking history and smoking treatment outcome in smokers with substance use disorders. *Addict Behav.* 2013;38(8):2409–2413.
 41. Ussher M, Kakar G, Hajek P, West R. Dependence and motivation to stop smoking as predictors of success of a quit attempt among smokers seeking help to quit. *Addict Behav.* 2016;53:175–180.
 42. Fix B V, Hyland A, Rivard C, et al. Usage patterns of stop smoking medications in Australia, Canada, the United Kingdom, and the United States: findings from the 2006–2008 International Tobacco Control (ITC) four country survey. *Int J Environ Res Public Health.* 2011;8(1):222–233.
 43. Myers MG, Chen T, Schweizer CA. Factors associated with accepting assistance for smoking cessation among military veterans. *Nicotine Tob Res.* 2016;18(12):2288–2292.
 44. Hughes JR, Marcy TW, Naud S. Interest in treatments to stop smoking. *J Subst Abuse Treat.* 2009;36(1):18–24.
 45. Patterson F, Jepsen C, Kaufmann V, et al. Predictors of attendance in a randomized clinical trial of nicotine replacement therapy with behavioral counseling. *Drug Alcohol Depend.* 2003;72(2):123–131.
 46. Brunette MF, Ferron JC, Aschbrenner KA, Pratt SI, Geiger P, Kosydar S. Attitudes about smoking cessation treatment, intention to quit, and cessation treatment utilization among young adult smokers with severe mental illnesses. *Addict Behav.* 2019;89:248–255.
 47. Lazuras L, Chatzipolychroni E, Rodafinos A, Eiser JR. Social cognitive predictors of smoking cessation intentions among smoker employees: the roles of anticipated regret and social norms. *Addict Behav.* 2012;37(3):339–341.
 48. Hyland A, Borland R, Li Q, et al. Individual-level predictors of cessation behaviours among participants in the International Tobacco Control (ITC) Four Country Survey. *Tob Control.* 2006;15(suppl 3):83–94.
 49. Steinberg ML, Williams JM, Stahl NF, Budsock PD, Cooperman NA. An adaptation of motivational interviewing increases quit attempts in smokers with serious mental illness. *Nicotine Tob Res.* 2016;18(3):243–250.
 50. Zhang B, Chaiton MO, Diemert LM, Bondy SJ, Brown KS, Ferrence R. Health professional advice, use of medications and smoking cessation: a population-based prospective cohort study. *Prev Med.* 2016;91:117–122.