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Predictors of smoking cessation group treatment engagement among veterans with serious mental illness

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Abstract

High prevalence rates of tobacco use, particularly cigarettes, pose a serious health threat for individuals with serious mental illness (SMI), and research has demonstrated the effectiveness of pharmacotherapy and psychosocial interventions to reduce tobacco use in this group. However, few studies have considered predictors of tobacco cessation treatment engagement among individuals with SMI. The current study examined predictors of engagement in smoking cessation groups among veterans with SMI engaged in mental health services at three VA medical centers. All veterans were participating in a smoking cessation treatment study. Of 178 veterans who completed baseline assessments, 127 (83.6%) engaged in treatment, defined as attending at least three group sessions. Forty-one ($N = 41$) predictors across five domains (demographics, psychiatric concerns, medical concerns, smoking history, and self-efficacy to quit smoking) were identified based on previous research and clinical expertise. Using backward elimination to determine a final multivariable logistic regression model, three predictors were found to be significantly related to treatment engagement: marital status (never-married individuals more likely to engage); previous engagement in group smoking cessation services; and greater severity of positive symptoms on the Brief Psychiatric Rating Scale. When included in the multivariable logistic regression model, the full model discriminates between engagers and non-engagers reasonably well (c statistic = 0.73). Major considerations based on these findings are: individuals with SMI appear to be interested in smoking cessation services; and serious psychiatric symptomatology should not discourage treatment providers from encouraging engagement in smoking cessation services.

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Keywords

Smoking cessation; Treatment engagement; Serious mental illness; Veterans

1. Introduction

Smoking cigarettes is a major health problem among individuals with serious mental illness (SMI). Prevalence rates of smoking in SMI range from 55 to 70% (Dickerson, Stallings, Origoni, Schroeder, et al., 2013; Dickerson, Stallings, Origoni, Vaughan, et al., 2013; Dickerson, Yu, Dalcin, Jerome, et al., 2013; Smith, Mazure, & McKee, 2014) compared to about 15% of the general population (Centers for Disease Control and Prevention, 2016). Consequences of smoking for individuals with SMI are serious, including increased cardiovascular disease rates (Carney, Jones, & Woolson, 2006; Dickerson, Stallings, Origoni, Schroeder, et al., 2013; Dickerson, Stallings, Origoni, Vaughan, et al., 2013; Dickerson, Yu, Dalcin, Jerome, et al., 2013, Wehring et al., 2012), metabolic syndromes (De Hert et al., 2011; Meyer & Stahl, 2009), and earlier mortality (Brown et al., 2011; Bushe, Taylor, & Haukka, 2010; Dickerson, Stallings, Origoni, Schroeder, et al., 2013; Dickerson, Stallings, Origoni, Vaughan, et al., 2013; Dickerson, Yu, Dalcin, Jerome, et al., 2013).

Given rates and consequences of smoking among individuals with SMI, smoking cessation (SC) services should be an important component of treatment. The 2009 Schizophrenia Patient Outcomes Research Team (PORT) recommendations highlight bupropion and adjunctive group therapy (e.g., education and skills-based interventions) as effective SC treatments for individuals with SMI (Bennett, Wilson, Genderson, & Saperstein, 2013; Bennett et al., 2015; Buchanan et al., 2010). Integrating SC services within mental health treatment programs can help with service access and utilization (Bennett et al., 2015).

Treatment initiation (e.g., attending an introductory session) and engagement (e.g., attending at least 2–4 sessions) is poor for individuals with SMI, especially for substance use treatment (Corrigan, Liberman, & Engel, 1990; Miner, Rosenthal, Hellerstein, & Muenz, 1997; Nosé, Barbui, & Tansella, 2003). Thus, engagement is an important concern when providing SC services to individuals with SMI. While limited work has been done on smoking cessation treatment engagement among individuals with SMI, research has highlighted the role of systemic barriers (e.g., lack of smoking cessation services offered or provider skepticism; Carosella, Ossip-Klein, & Owens, 1999; Himelhoch & Daumit, 2003; Lucksted, Dixon, & Sembly, 2000; Vogt, Hall, & Marteau, 2005), illness-related concerns (e.g., positive and negative symptoms, cognitive impairment, level of nicotine dependence; Bellack & DiClemente, 1999; Esterberg & Compton, 2005; Forchuk et al., 2002; Lucksted et al., 2000; McEvoy & Allen, 2002; Patkar et al., 2002), and person-related factors (e.g., motivation; Addington, el-Guebaly, Addington, & Hodgins, 1997; Carey, 1996; Carosella et al., 1999; Esterberg & Compton, 2005; Osher & Kofoed, 1989; Van Dongen, Kriz, Fox, & Haque, 1999; Ziedonis & Trudeau, 1997).

Studies conducted on general and psychiatric samples identified several psychosocial factors related to engagement. Demographic variables related to engagement include older age (Cupertino et al., 2007; Khara, Okoli, Nagarajan, Aziz, & Hanley, 2015; Richards et al.,

2014), more education (Cupertino et al., 2007), unemployment (Lee, Hayes, McQuaid, & Borrelli, 2010), non-chronic homelessness (Richards et al., 2014), healthcare coverage (Cupertino et al., 2007; Richards et al., 2014), and more friends who smoke (Lee et al., 2010). Research on mental health factors is mixed; some studies suggest that higher levels of depression, anxiety, and stress are related to treatment adherence, whereas others report the opposite (Lee et al., 2010; MacPherson, Stipelman, Duplinsky, Brown, & Lejuez, 2008; Richards et al., 2014). No or limited history of problematic alcohol or drug use has been shown to be related to engagement (Richards et al., 2014). People with a greater number of comorbid medical conditions were more likely to engage in treatment (Khara et al., 2015).

Specific to smoking history, earlier age of initiation and greater levels of addiction were related to engagement in SC treatment (Khara et al., 2015; Lee et al., 2010). Greater engagement has been associated with receiving quit advice from providers, using SC services in the past, and reporting increased readiness, motivation or confidence to quit (Cupertino et al., 2007; Khara et al., 2015; Lee et al., 2010).

Work on engagement in SC services has generally excluded people with active psychosis or serious psychiatric conditions, so little is known about factors related to engagement among those with SMI. A study of SC treatment engagement among individuals with SMI found that being around fewer people who smoked and receiving others' approval to quit led to greater engagement (Aschbrenner, Ferron, Meuser, Bartels, & Brunette, 2015). Additionally, a recent review found that using smoking as a coping strategy and a positive smoking culture in mental health settings were barriers to engagement for individuals with SMI (Trainor & Leavey, 2017). The current study sought to expand this area of the literature by examining predictors of engagement in group SC treatment among veterans with SMI.

2. Methods

2.1. The parent study

Data for this study were taken from a randomized controlled trial comparing two psychosocial group interventions to reduce smoking among veterans with SMI (Bennett et al., 2015). In brief, participants were randomly assigned to either behavioral or supportive group interventions (24 biweekly sessions each), both of which were integrated into outpatient mental health treatment programs. Participants were offered, but not required, to use nicotine replacement therapy or SC medications. Baseline and post-treatment assessments were completed. Results showed short-term reduction in number of cigarettes smoked and reports of making at least one quit attempt for both groups (nonsignificant group differences), with few participants (11%) achieving abstinence.

2.2. The present study

2.2.1. Participants—Participants included 178 veterans with SMI enrolled in outpatient mental health programs at three Veterans Administration Medical Centers and a study evaluating group smoking cessation treatment for individuals with SMI. Participants were predominantly male (89.3%) and Black (70.8%), with an average age range in the mid-50s. On average, participants had some college experience and were currently unemployed

(87.6%). Almost half of the participants were widowed, divorced, or separated (47.3%). Participants were nicotine-dependent based on self-reported smoking (minimum 10 cigarettes per day) and the Fagerström Test of Nicotine Dependence (FTND) (Heatherton, Kozlowski, Frecker, & Fagerström, 1991). All participants had a DSM-IV-diagnosed SMI: schizophrenia spectrum disorders (schizophrenia and schizoaffective disorder, 43.3%), bipolar disorder (27.5%), major depression with psychotic features (5.1%), other psychotic disorders (2.2%), or posttraumatic stress disorder (21.9%). Exclusion criteria included current problematic substance use and history of serious neurological disorder, head trauma, or serious intellectual disability. See Table 1 for additional demographic information.

2.2.2. Measures—Based on research and clinical expertise, 41 variables from baseline measures were identified as possible predictors of engagement and were organized into five domains: demographics, psychiatric concerns, medical concerns, smoking history, and self-efficacy for quitting (Table 1). Given limited research on treatment engagement for individuals with SMI, the study researchers pulled from literature on smoking cessation in SMI and were over-inclusive in their initial review of possible predictors.

2.2.2.1. Demographics: Selected demographic variables included: age, race (African American, not-African American), marital status (never married, married/separated/divorced/widowed), education (high school or less, more than high school), and disability variables (Service Connection; other disability benefits).

2.2.2.2. Psychiatric concerns: Mental health symptoms were assessed through the SF-12 Health Survey (Ware, Kosinski, & Keller, 1996), the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962), and the Quality of Life Interview-Brief Version (BQOL) (Lehman, 1995). The SF-12 is a 12-item questionnaire assessing past month physical and mental health status. A mental health composite score was created, ranging from 0 (lowest level of health) to 100 (highest level of health). The BPRS is a 20-item interview assessing psychopathology severity, focusing on psychotic symptoms. Items were rated on a 7-point Likert-type scale ranging from 1 (not present) to 7 (extremely severe). An overall sum score was calculated. Subjective quality of life was obtained through ratings on the BQOL, a questionnaire looking at satisfaction across several domains (e.g., health, relationships, daily activities).

2.2.2.3. Medical concerns: Physical health status was assessed through the SF-12, a medical conditions questionnaire (MCON), and a service use form. An SF-12 physical health composite score was created (ranging from 0 to 100). Participants indicated on the MCON whether they had ever been diagnosed with specific medical conditions (e.g., diabetes, respiratory problems, hypertension), and a dichotomous variable was also created (zero or one versus two or more health problems). The service use form included questions related to number of hospitalizations and emergency room visits within the past 90 days.

2.2.2.4. Smoking history: A Smoking History Form (SHF), the FTND, and an objective test of dependence (smokerlyzer) provided information on smoking history and nicotine dependence. The SHF included questions related to smoking initiation, patterns of use (e.g., time lapsed until first cigarette), social aspects of smoking (e.g., having friends who smoke),

and past experiences with quitting (e.g., number of past quit attempts, use of different SC services). The FTND is a 9-item questionnaire assessing current smoking behavior (e.g., daily quantity, difficulty refraining, cigarette nicotine content, level of inhalation). The EC 50 Micro II Smokerlyzer Breath Carbon Monoxide Monitor (Bedfont Instruments) was used to measure expired carbon monoxide levels (ppm).

2.2.2.5. Self-efficacy for quitting: Perceived self-efficacy for quitting smoking was assessed through items on the SHF, the Temptation to Smoke Scale (TSS), and the Abstinence Self-Efficacy Scale, Smoking Version (ASES) (DiClemente, Prochaska, & Gibertinin, 1985). The SHF included items related to the participants' confidence to quit and resist the urge to smoke. The TSS and ASES are 20-item scales assessing the degree to which participants felt tempted to smoke in varied situations (TSS) and were confident in abstaining from smoking in those situations (ASES). Four subscales (Negative Affect, Social/Positive Influences, Physical/Other Concerns, and Withdrawal/Urges) and an overall score were calculated for each.

2.2.3. Data analysis—Descriptive statistics were obtained for all variables. Continuous variables were standardized for regression analysis. When categorical variables with low frequency counts in any category ($N < 20$) were found, categories were either dichotomized or, if cell counts were still low, the variable was removed as a possible predictor. After variable screening, 41 predictor variables were identified and considered for the multivariable model (Table 1).

Point-biserial or Pearson correlations between all 41 eligible predictors and the treatment engagement were reviewed. Variables that were univariately associated with engagement ($p < 0.10$) were screened for multicollinearity ($r > 0.50$) with other eligible predictors, and then entered into a multivariable logistic regression model to determine their level of association after adjustment for other associated factors. The final model was determined by backward elimination and retained predictors that were significantly related to treatment engagement. As there were few missing values (0–5 across all variables), no missing data analyses were conducted.

3. Results

Of the 412 veterans screened for eligibility, 178 (43.2%) consented and completed baseline assessments. Of these, 127 (83.6%) engaged in treatment, defined as attending at least three group sessions.

Of the 41 identified predictors, three were significantly correlated with treatment engagement: marital status ($r = -0.21$, $p < 0.01$), such that those who were never married were more likely to engage in treatment; past group SC treatment ($r = 0.24$, $p < 0.01$), with those who previously engaged in group SC treatment being more likely to engage; and positive symptoms on the BPRS ($r = 0.19$, $p < 0.05$), with those with greater positive symptom severity being more likely to engage.

The final multivariable engagement model retained these three predictors (Table 2). After adjusting for other predictors, veterans who were never married had 2.84 greater odds of engaging in treatment. Participants who had attended SC groups in the past had 3.40 greater odds of engaging. Lastly, veterans with higher BPRS positive symptom ratings had 1.59 greater odds of engaging; however, in the full multivariate model, the relation between BPRS score and engagement was not significant ($p = 0.06$). The concordance (“c”) statistic of the full model was 0.73 (possible range 0.50–1.00), indicating that the multi-variable model reasonably discriminated between engagers and non-engagers versus the intercept-only model ($c = 0.50$).

4. Discussion

Understanding predictors of SC treatment engagement in SMI is key to offering acceptable and effective services to these smokers. This study identified predictors of engagement among a sample of veterans with SMI, a largely unexamined group. In fact, most studies to date have examined general adult samples, often excluding individuals with severe psychopathology. Using data from a randomized controlled trial (Bennett et al., 2015), factors were examined to determine the extent to which they predicted engagement in group SC treatment. Of 41 eligible variables representing, only three – marital status, previous group SC treatment, and positive symptoms – predicted engagement. Interestingly, factors directly related to smoking (e.g., history, readiness) were unrelated to engagement.

Several things can be considered with these predictors. With never-married veterans being more likely to engage, perhaps fewer obligations to family allowed for more flexibility and time in their schedule to attend sessions. For those who previously engaged in group SC services, this may indicate that individuals are willing to keep trying the same treatment; also, being familiar with the group format may have led to less reluctance and greater willingness to attend.

Individuals with severe psychopathology, including hallucinations and delusions, are often overlooked in treatment and research studies, the assumption being they will have difficulty engaging due to interfering positive symptoms. The finding that veterans with greater positive symptoms were more likely to engage showed the opposite. Similar to a study finding that greater length of time in treatment was predictive of SC among individuals with SMI (Santa Ana, LaRowe, Armeson, Lamb, & Hartwell, 2016), perhaps individuals with greater symptomatology had a longer history of treatment and more clinical support to encourage group attendance.

It is also important to discuss what did not predict engagement in this study, especially variables related to smoking history, readiness to quit, and other mental and physical health symptoms linked with treatment engagement in other studies. Seeing that findings from this study were different from prior research may help researchers and clinicians think twice about whom they decide to include or exclude in specific treatment services. Readiness and level of tobacco use may not be the sole reason for needing or being willing to engage in treatment, so it may be important to offer SC services to a wide array of individuals.

Caution with generalization should be taken. All participants were veterans actively engaged in VA mental health treatment through. They all also consented to participate in a SC study, so their rates of engagement were likely higher than a general clinical sample. Also, by being engaged in both research and treatment, the veterans' regular contact with research and clinical staff could have affected engagement. Despite these limitations, this study was able to add to the literature on predictors of SC treatment engagement through its specific focus on individuals with SMI. We can improve interventions (and ultimately, treatment outcomes) for individuals with SMI by considering how to encourage sustained attendance and for individuals who are hard to engage.

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Highlights

- Smoking cessation (SC) services should be encouraged for people with serious mental illness (SMI).
- Veterans with SMI enrolled in an SC treatment study completed baseline measures.
- Forty-one variables were identified as possible predictors of SC group treatment engagement.
- Engagement predictors included single marital status, severe psychiatric symptoms, and prior SC group experience.
- Serious psychiatric symptoms should not keep providers from recommending SC services.

Table 1

Candidate predictors of treatment engagement (N = 41 predictors) and descriptive information.

Domain	Variable	M (SD) or %
Demographics	Age	54.78 (7.18)
	Race (African American)	70.8%
	Education (more than high school)	53.4%
	Marital status (Never married)	33.2%
	Disability benefits (yes)	51.4%
	Number of sessions	10.88 (7.34)
	Engagement (attended at least 3 sessions)	83.6%
Mental health	SF-12 Mental Health Composite Score	42.82 (11.76)
	BPRS ^a – positive symptoms	4.69 (2.61)
	BPRS – negative symptoms	4.66 (2.29)
	BPRS – total	34.22 (8.16)
	BQOL ^b – subjective quality of life	4.51 (0.97)
	SF-12 physical health composite score	42.86 (11.77)
Physical health	MCON ^c questionnaire	
	Diabetes (D)	26.6%
	Respiratory problem (R)	38.4%
	Hypertension (H)	55.4%
	MCON questionnaire – 2 or more medical conditions	75.71%
	Service utilization form – hospitalized in past 90 days	16.9%
	Fagerstrom test of nicotine dependence	7.34 (2.03)
Smoking history	Objective test – Smokerlyzer PPM	12.24 (8.81)
	SHF ^d – age of initiation	16.47 (6.50)
	SHF – quantity (# cigarettes/day)	15.24 (9.80)
	SHF – smoke more in morning than rest of day	35.6%
	SHF – hardest cigarette to give up (first)	41.5%
	SHF – time (min) lapsed until first cigarette	34.39 (76.05)
	SHF – smoking even when ill	44.3%
	SHF – social network that smokes (family, friends, coworkers)	
	SHF – social network concerned about smoking	71.2%
	SHF – lifetime use of cessation services	
	Medication	26.7%
	Nicotine patch	68.0%
	Nicotine gum	52.3%
	Nicotine lozenge	23.6%
	Group therapy	36.0%
	SHF – number of quit attempts in past year	2.39 (2.85)
	SHF – number of days of previous quit attempt	83.61 (599.62)
	TSS ^e – negative	3.98 (0.86)

Domain	Variable	M (SD) or %
Self-efficacy to quit	TSS – positive/social	3.40 (0.82)
	TSS – craving	3.37 (0.74)
	TSS – total	3.65 (0.64)
	ASES ^f – negative	2.13 (0.84)
	ASES – positive/social	2.60 (0.81)
	ASES – craving	2.64 (0.79)
	ASES – total	2.42 (0.69)
	SHF – quit goal	80.8%
	SHF – consider quitting in next month	64.4%
	SHF – attempts to reduce quantity of cigarettes	59.0%
	SHF – confidence to quit	33.9%
	SHF → 50% confidence to resist urge to smoke	49.5%

^aBrief psychiatric rating scale.

^bQuality of life scale-brief version.

^cMedical Condition.

^dSmoking History Form.

^eTemptation to Smoke Scale.

^fAbstinence Self Efficacy Scale.

Table 2

Full multivariate logistic regression model predicting treatment engagement ($N = 174^a$).

Variable	Beta estimate	Standard error (SE)	Wald χ^2 statistic	p Value	Adjusted odds ratio	95% confidence interval
Intercept	0.32	0.24	1.81	0.18	–	–
Marital status	1.04	0.43	5.92	0.02	2.84	(1.22, 6.57)
Past group	1.22	0.42	8.35	0.004	3.40	(1.48, 7.81)
BPRS-pos	0.46	0.24	3.63	0.06	1.59	(0.99, 2.55)

^a $N = 4$ participants dropped ($n = 3$ from engaged group, $n = 1$ from not engaged group) due to missing values on predictor variables.