



# The Preliminary Efficacy and Feasibility of Group-Based Smoking Cessation Treatment Program for Incarcerated Smokers

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## Abstract

Group-based tobacco dependence treatment has been known to help smokers to quit in general adult populations, but the feasibility and efficacy of this type of smoking cessation treatment in correctional settings remain uncertain. A 6-week group-based smoking cessation treatment with nicotine replacement therapy (NRT) in the form of nicotine patches was implemented in seven male prison facilities, in the Northeast, among smokers who were born biologically as male. Exhaled breath carbon monoxide (CO) levels were collected from participants at each session to confirm smoking status. Participants were evaluated at the 1-month post-group treatment follow-up to determine abstinence. Those who were lost to follow-up were recorded as continued smoking and not using NRT nicotine patches. The goal of the study was to explore the feasibility and preliminary efficacy of conducting a smoking cessation treatment program for incarcerated smokers. A total of 350 inmates were screened, 177 inmates were enrolled across the prison sites for the 6-week program, and 102 inmates completed the program. A majority of those enrolled reported that they began smoking when they were between 15 and 19 years of age (44.9%) and were smoking on average for 26 years. Less than half (21.3%) reported ever using electronic cigarettes at baseline and in Session 1, 116 individuals who attended reported a median CO level of 18.0 parts per million (ppm). At a 1-month follow-up, 43 individuals reported a median CO level of 5.00 ppm. The study demonstrated preliminary efficacy and feasibility of group-based smoking cessation treatment with NRT nicotine patches in incarcerated smokers.

## Keywords

Criminal justice system, pharmacotherapy, prisons, group-based smoking cessation treatment, tobacco use

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As of 2016 (latest data available), approximately 2,162,400 individuals are incarcerated in the United States (Kaeble & Cowhig, 2018), with 50%–80% of incarcerated individuals reporting they currently smoke tobacco products, including cigarettes (Spaulding et al., 2018), versus 14% in the U.S. general adult population (Centers for Disease Control and Prevention, 2018). U.S. prisons have adopted varying degrees of smoke-free resolutions to prohibit indoor smoking in their correctional facilities, but these strategies are not optimal for eliminating smoking (Patrick & Marsh, 2001; Spaulding et al., 2018; Thibodeau et al., 2012; Vaughn & del Carmen, 1993a, 1993b).

The Federal Bureau of Prisons made their prison and detention facilities 100% smoke-free in 2004; however,

these federal smoking bans do not apply to correctional officers, and inmates are permitted to smoke for religious reasons (U.S. Department of Justice Federal Bureau of Prisons, 2015, 2017). While federal policies,

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such as the Clean Air Act (United States Environmental Protection Agency, n.d.), ban smoking in public places, some state-run correctional facilities have had varying degrees of adherence to these guidelines (Ambrose & Barua, 2004; Kauffman et al., 2008; U.S. Department of Justice Federal Bureau of Prisons, 2015, 2017; United States Environmental Protection Agency; Vaughn & del Carmen, 1993a).

Widespread implementation of prison smoking bans has not been reported to achieve long-term cessation benefits because of the availability of contraband tobacco products in these settings (Butler et al., 2007; Lincoln et al., 2009). A study conducted by Lincoln et al. (Lincoln et al., 2009) reported that incarcerated smokers in smoke-free prisons who quit smoking while in prison had a relapse rate of 86.3% 1-month after release. One reason for this may be that smoking cessation treatment for incarcerated people has not accompanied smoking bans (Butler et al., 2007; Lincoln et al., 2009; Thibodeau et al., 2012). The Valera et al. study of incarcerated smokers reported most participants expressed a keen interest in quitting in the next 30 days (Valera et al., 2019). Their lack of knowledge about how to quit tobacco smoke, combined with limited access to evidence-based treatment, made it difficult for them to quit smoking (Valera et al., 2019). This is concerning because without treatment, only 5% of those who quit achieve long-term smoking abstinence (Schlam & Baker, 2013).

The culture of the prison community (e.g., the inmate code, compliance to general prison rules, monotonous routine, the potential for violence and assault; Hayner & Ash, 1940) combined with specific common characteristics of incarcerated individuals are factors contributing to higher smoking rate. Unfortunately, many of the characteristics identified in individuals involved with the criminal justice system—that is, histories of substance abuse, mental illness, poverty, and low educational attainment (Binswanger et al., 2009; Richmond et al., 2009; Spaulding et al., 2018)—are also characteristics associated with higher rates of smoking. People who are incarcerated suffer from behavioral health problems at considerably higher rates than the general U.S. population, with almost half (48%) of inmates diagnosed with a mental illness and 26% with a substance use disorder (SUD) (Al-Rousan et al., 2017; Massoglia, 2008). In addition to increasing smoking risk-taking behaviors, these health conditions also contribute to mounting health-care costs and countless deaths. Having a behavioral health disorder makes one more likely to smoke, and it also may make smokers who want to quit experience more difficulties in quitting (Glasheen et al., 2014; Lawrence et al., 2011; Richardson et al., 2019).

The high smoking rates among people who are incarcerated can be attributed, in part, to the prevalence of

behavioral and mental health problems among these individuals (Djachenko et al., 2015; Kennedy et al., 2016; Valera et al., 2018). Smoking may be used as a coping mechanism in prisons for them to deal with stress (Turan & Turan, 2016). These stressors, which are unique to a correctional setting, include missing family/friends, lack of freedom, prison lockdown, long periods of boredom in cells, and stress surrounding the personal situation they must deal with upon return to the community (Sieminska et al., 2006). Other everyday stressors that inmates experience behind correctional walls include heightened stress when interacting with correctional officers and medical staff, thus exacerbating mistrust and distrust between prison staff and inmates, and potential fear of other inmates harming them (Porter, 2019). Chronic stress during incarceration may be dealt with by tobacco products, which, combined with the lack of smoking cessation treatments, may contribute to high smoking rates.

This is problematic because the current scientific literature on the dangers of tobacco products and nicotine dependence and importance of smoking cessation treatment reveals that smoking is a risk factor for many cancers and it remains the leading cause of preventable mortality and morbidity in the United States (Centers for Disease Control and Prevention, 2018; Office of Surgeon General (US), 2004; West, 2017). However, some marginalized groups have been overlooked in smoking cessation treatment, which may impede uptake and success of the plethora of smoking cessation strategies that are available for the general community. Specifically, correctional populations have been overlooked for smoking cessation treatments, suggesting the dire need for cessation assistance in this population. Despite this, at present, there is a lack of smoking cessation treatment and programs in United State state prisons (Alberg et al., 2013; Ambrose & Barua, 2004; Centers for Disease Control and Prevention, 2018; Institute of Medicine, 2015; National Commission on Correctional Health Care, 2006; Office of Surgeon General (US), 2004; Restum, 2005; World Health Organization, n.d).

### *Evidence-Based Smoking Cessation Treatment to Support Abstinence*

The combination of group-based counseling with pharmacotherapy has been identified to be the most effective type of intervention (Stead et al., 2017). Because of its efficacy and well-known safety, nicotine replacement therapy (NRT) is recommended as a first-line pharmacological treatment to aid cessation attempts. Additionally, the effectiveness of counseling approaches has been documented in the general adult population (Stead et al., 2017). The 1-year smoking abstinence rate for those who use NRT products during a quit attempt in the general

population varies, ranging from 8% to 25% (Stead et al., 2017). Even minimal counseling (i.e., at least 10 min) increases abstinence rates by 30%, and more time spent in sessions (along with direct contact offered by trained counselors, clinicians, or tobacco treatment specialists) can more than double abstinence rates (Stead et al., 2017). Therefore, this pilot study aimed to explore the feasibility and preliminary efficacy of conducting a smoking cessation treatment program for smokers who are incarcerated.

## Methods

A 6-week group-based smoking cessation treatment with pharmacotherapy, in the form of nicotine patches, was implemented in seven prison facilities, in the Northeast, among cisgender male and transgender female incarcerated smokers. Prison sites A–F received the group-based smoking cessation treatment in person. Facilitators used telemedicine approaches for Weeks 2–5 in the form of video consultations to reach a remote Prison Site G. Exhaled breath carbon monoxide (CO) levels were collected from all participants at each weekly session from Prison Sites A–F to confirm smoking. CO levels were collected at Week 1, Week 6, and 1-month follow-up from Prison Site G. The State Department of Corrections Institutional Review Board (IRB) and the Rutgers University, New Brunswick Health Science IRB approved the pilot study.

### Study Design

The investigative team implemented a single-arm, staggered start design across seven medium and maximum prison sites from May 2019 to August 2019, with two simultaneous classes enrolled at each of the sites. Participants were evaluated at the 1-month follow-up post-group quit date to determine abstinence from cigarette smoking. Those who were lost to follow-up were recorded as continuing to smoke and not using nicotine patches. The staggered start design was selected to ensure that all participants from each of the seven prison facilities had the opportunity to participate in the intervention. Additionally, participants were no longer enrolled in the study if they missed three or more sessions.

### Participants

Participants met all of the following eligibility criteria: (a)  $\geq 18$  years of age; (b) able to speak, read, and write in English well enough to understand the informed consent and complete the study; (c) smoked at least 5 cigarettes per day over the past 7-days, as confirmed by CO level (Perkins et al., 2013); (d) residing in the prison's general

population section (not in solitary confinement); (e) able to provide informed consent; and (f) medically eligible to use NRT patches, as determined by the prison medical staff. *Exclusion.* Participants who met the following criteria were not eligible: (a) undergoing extensive medical care during the length of the study (e.g., chemotherapy, radiation, surgery); (b) due for court appearance within 3 months of the study (using prison records, date of parole, or transfer); (c) currently using any smoking cessation pharmacotherapy (e.g., NRT, bupropion, varenicline); and/or (d) expected to be paroled/released or transferred to another facility in or before 9–12 months.

### Study Recruitment

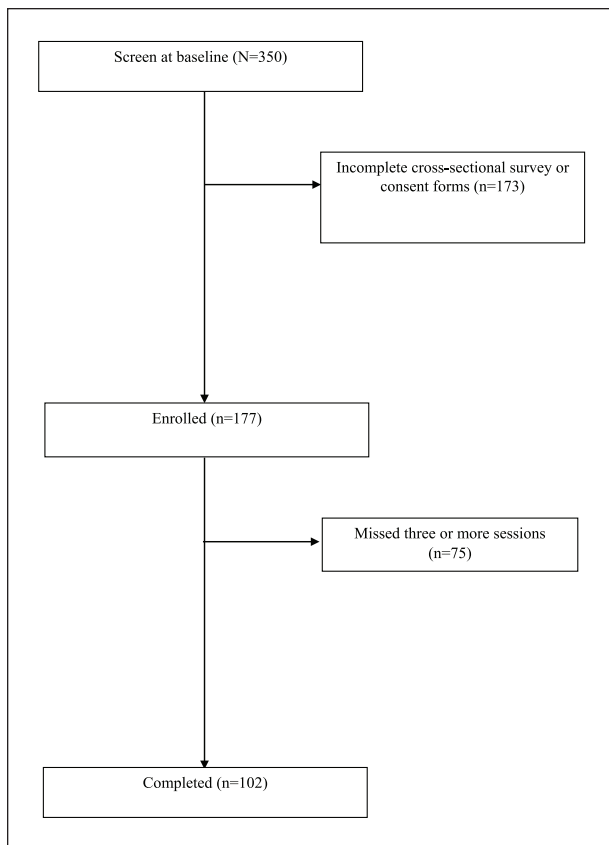
An advertisement describing the pilot study was given to prison liaisons who recruited incarcerated smokers enrolled in an alcohol and substance abuse program at each of the seven institutions. The prison liaisons collected the sign-up sheets two weeks before the team's scheduled visit. An orientation session was provided to the inmates who signed up at each of the prison sites. Potential participants completed an in-person initial screening form to determine eligibility. This form included questions related to demographics, smoking status, and general health. Once it was determined that inmates were eligible, they were provided a consent form to complete. The investigative team reviewed the consent form and answered any questions. Inmates were given time to read over the form and provide written consent to participate.

### Screening, Study Enrollment, and Completion

Figure 1 describes the flow diagram of the data collection procedures. Study personnel screened 350 participants, at least 50 from each of the seven participating institutions. A total of 173 were ineligible for multiple reasons: not completing baselines assessments, incomplete smoking behavior surveys, or not completing informed consent procedures. Approximately 177 participants enrolled, and of those, 102 completed the program. Table 1 describes the total number of participants who enrolled and completed the group-based smoking cessation treatment across seven prison facilities.

### Measures

Participants completed a 40-min baseline assessment and 15-min smoking behavior survey where they provided information on patterns of cigarette smoking, cessation factors, tobacco dependence, mental/physical health factors that may contribute to tobacco dependence, and criminal justice history. They also performed a CO test and provided additional demographic information. After



**Figure 1.** Flow diagram of study participants.

**Table 1.** Total Number of Participants Who Enrolled and Completed the Program by Prison Facility.

Sites	Enrolled	Completed
A	31	18
B	43	17
C	26	16
D	17	13
E	20	12
F	14	9
G	26	17

completing the baseline assessments, participants were enrolled in the 6-week, once-weekly, group smoking cessation treatment program, including the use of NRT patches.

### **Intervention: 6-Week Group Smoking Cessation Treatment Program**

The group-based smoking treatment program is described in Figure 2. The team used the 2007 edition of Dr. Abrams

et al.'s *The Tobacco Dependence Treatment Handbook: A Guide to Best Practices* (Abrams et al.), which follows the U.S. Public Health Service Clinical Practice Guidelines (Fiore, 2000; Kotsen et al., 2018), and the cognitive social learning model as a framework for this study (Bauld et al., 2009; Judge et al., 2005; Lindson et al., 2019). No alterations were made to the curriculum, but additional information relevant to the incarcerated environment and inmate characteristics was included.

One certified tobacco treatment specialist (CTTS), two research assistants trained in public health and tobacco dependence, and one peer health navigator facilitated the program. The same facilitators remained with a given group through all sessions. The program was 6 weeks long, with classes meeting weekly. Through curriculum content, participants were encouraged to track their tobacco use. The weekly sessions were 1.5 hr in duration, occurred for 6 weeks, and were delivered at each of the prison sites. Prison Sites A–F began with CO testing to validate smoking status. The CO testing for Prison G was administered in Week 1, Week 6, and 1-month follow up.

The goals of the facilitators were to identify common issues participants had with quitting smoking, problem-solve with the group, provide extra treatment support, maintain group cohesion, facilitate discussion, and help the group develop the necessary coping skills to transition from being smokers to ex-smokers (Fiore, 2000). The facilitators also developed a treatment plan for each participant and discussed the group's Tobacco Quit Date (TQD) on the morning of Session 2.

During the first 45 min of each session, participants, with the guidance of their facilitators, discussed the smoking behaviors and the quit attempts they encountered during the previous week. Each treatment session included therapeutic elements derived from motivational interviewing, cognitive-behavioral therapy, and relapse prevention strategies (Abrams et al., 2007).

### **Week 1: Preparation Session**

The first session was known as the preparation session, where facilitators worked on setting a positive tone and discussed the benefits of participating in group treatment. Facilitators worked with participants to begin monitoring their smoking behavior, understand their triggers, and prepare their group TQD for Week 2. In this session, the facilitators recommended complementary pharmacotherapy to participants, including NRT, to help participants quit and prescription pharmacotherapy to reduce acute withdrawal symptoms of nicotine. Participants were then provided with instructions on how to use the NRT patch. They discussed its safety, efficacy, side effects, and protocol for NRT adherence.



**Figure 2.** Group-based smoking cessation treatment program.

### *Week 2: Review of Cognitive Social Learning and Group TQD*

Group TQD began the morning of Week 2. Before Week 2, participants were sent to the prison medical clinic to have a patch placed on their upper arm. Upon arrival, participants completed CO monitoring. This session also focused on managing nicotine withdrawal symptoms and developing strategies to deal with cravings and urges, including discussions on how to use medications correctly. Topics for Session 2 included behavioral strategies to support quitting behaviors (e.g., getting rid of the remaining cigarettes in their cells, removing lighters from cells), reviewing abstinence plans and cognitive techniques (e.g., self-talk strategies), reinforcing the nature of social support with the group to “share success,” and discussing substitutes for cigarettes or other tobacco products.

### *Weeks 3–4: Lifestyle Changes, Coping, and Making Healthy Decisions*

Participants completed CO testing. The group continued to focus on issues related to managing negative mood, mental health, and well-being (e.g., managing stress, identifying appropriate coping mechanisms, increasing self-worth), problem areas (e.g., managing triggers, boredom), and the use of NRT patches.

### *Week 5: Maintenance, Relapse Prevention, and Abstinence*

Participants completed CO monitoring prior to group discussion. This week’s topic focused on relapse prevention

(exploring emotional and social triggers and reframing smoking slips) and social and peer support. Participants who had continued smoking after the quit date (i.e., beginning of Session 2) were encouraged to make additional attempts to quit, and advice was provided from the facilitators and those who stopped smoking.

### *Week 6: Achieving Long-Term Abstinence*

Participants returned for their final session and completed CO monitoring. This session focused on celebrating progress, reviewing coping strategies, tapering and weaning off of medication, lifestyle behavior changes, and examining fears and anxiety. In addition, participants shared their experiences with the group and explored lessons learned. Inmates who attended three or more sessions received a certificate of completion of the program.

### *Follow-Up Session*

At 1-month follow-up, post group-treatment, participants completed a self-reported questionnaire regarding their smoking behaviors from the past 7 days. The smoking status was confirmed using the CO monitoring device. Participants were asked to self-report their current smoking status by marking a “Yes” or “No” answer to the question “Are you still a smoker?”

### *NRT Patch: Dosing, Distribution, and Use*

NRT patches were ordered from the prison institution’s pharmacy. NRT patches were provided, free of charge, to all enrolled participants. Well path, the medical provider

at the state correctional institution, assigned an attending physician and prison staff, including a prison nurse or a registered physician assistant, to administer the NRT patch to study participants. Prior to enrolling in the smoking cessation treatment program, the attending physician met with each participant to complete a tobacco dependence clinical assessment form. The participants' health records were reviewed to determine any possible contraindications with the NRT patches. Facilitators used a tobacco dependence clinical assessment survey at baseline, and participants' dosage of NRT patch was calculated using a step-down regiment based on the number of cigarettes participants smoked daily.

Participants were given a standard 8-week tapering course of NRT patches (NicoDerm CQ Patches; Centers for Disease Control and Prevention; NicoDerm). NRT Patches are FDA-approved, over-the-counter nicotine replacements that have been approved for adults 18 years and over who want to quit smoking (NicoDerm, n.d). Participants received standard instructions for using the NRT patch in Session 1. The prison clinic handled any adverse reactions to the patch and provided information regarding these reactions to researchers. Each morning, participants returned used NRT patches to the medical staff.

### Exhaled Breath CO Monitoring

Exhaled breath CO levels were collected for each of the study participants at each session of group treatment by using a Smokerlyzer (coVita, n.d). The Smokerlyzer measures exhaled CO levels in parts per million (ppm), which calculates percent carboxyhemoglobin (%COHb) in the blood based on exhaled breath CO concentration, which is reported to be highly correlated with smoking status (Jarvis et al., 1987; Middleton & Morice, 2000). A cutoff CO of <6 ppm at a 1-month follow-up is a commonly accepted outcome measure in smoking cessation studies (Middleton & Morice, 2000).

### Statistical Analysis

The primary outcome of tobacco abstinence is confirmed by expired CO in ppm at 7-day point prevalence abstinence (no smoking for 7 days), at 1-month follow-up, post-group treatment, using CO biochemical-verified abstinence, with <6 ppm. When participants did not attend a treatment session, they were considered as continuing to smoke for data purposes.

The analysis of this study was undertaken in multiple steps to assure the integrity of variables and statistical models. SAS version 9.4 was used to calculate descriptive statistics to summarize baseline characteristics of the total sample, those enrolled, and those who completed the

program. Next, demographic differences were examined between those screened, those enrolled, and those who completed the program. Chi-square tests were used to test for differences between those who completed the program and those who did not complete the program.

## Results

### Sample Participation at Baseline

Baseline characteristics of all inmates who were enrolled at baseline and then categorized according to whether or not they finished the 6-week program are shown in Table 2. The average age of inmates enrolled at baseline was 42.97 years ( $SD = 10.29$ ) with no statistically significant difference between those who completed the program and those who did not ( $42.61 \pm 10.64$  vs.  $43.43 \pm 9.88$ ,  $p = .607$ ). A large majority of inmates who finished the program were male ( $n = 96$ , 94.2%) and transgender females ( $n = 5$ , 4.9%). Most of those who enrolled were White ( $n = 111$ , 62.7%) followed by African American/Black ( $n = 49$ , 27.7%) and Latinx ( $n = 10$ , 5.6%). Approximately, 22% of inmates ( $n = 38$ ) had a body mass index (BMI) categorized as normal, 36.2% ( $n = 64$ ) were overweight, and 16.4% ( $n = 29$ ) were obese.

### Criminal Justice Experience

Inmates enrolled at baseline self-reported their criminal justice history as well as the current length of incarceration, employment, and condition of the prison facility in Table 3. On average, inmates were incarcerated for at least 95 months ( $SD = 109.19$ ) or 7.9 years. Participants were more likely to experience their first incarceration at the age of 21 years ( $SD = 8.76$ ). A majority ( $n = 118$ , 66.7%) of the inmates self-reported currently working inside the prison facility and making \$0.17 to \$0.48 per hour or they were students ( $n = 21$ , 11.9%).

### Smoking Behaviors and Nicotine Dependence

The smoking behaviors, quit attempts, and medical consultation related to tobacco smoke among inmates are reported in Table 4. Over half of the participants reported smoking more since being incarcerated ( $n = 99$ , 55.9%), while less than 10% reported that they started smoking during incarceration. On average, inmates smoked cigarettes a total of 26.65 ( $SD = 11.26$ ) years. Most inmates began smoking daily between the age of 15 and 19 years ( $n = 80$ , 45.2%) or 10 and 14 years ( $n = 68$ , 38.4%). Over half of the participant smoked more than 20 cigarettes per day ( $n = 103$ , 58.2%), smoked menthol cigarettes ( $n = 149$ , 84.2%), and relight their cigarettes ( $n = 118$ , 66.7%). Inmates reported that they attempted to quit

**Table 2.** Sociodemographic Characteristics of Incarcerated Smokers.

Variable	Total Sample (n = 177)	Completed Program (n = 102)	Not Completed Program (n = 75)	p Value
Current age	42.97 (10.29)	42.61 (10.64)	43.43 (9.88)	.607
Gender				.909
Male	167 (94.4)	96 (94.2)	71 (94.7)	
Transgender female	9 (5.1)	5 (4.9)	4 (5.3)	
Sexual orientation				.224
Gay/homosexual/bisexual	8 (4.5)	3 (2.9)	5 (6.7)	
Heterosexual/straight	162 (91.5)	97 (95.1)	65 (86.7)	
Other	1 (0.6)	0 (0)	1 (1.3)	
State residence prior to incarceration				.202
Northeast	156 (88.1)	87 (85.3)	69 (92.0)	
Midwest	1 (0.6)	1 (1.0)	0 (0)	
South	8 (4.5)	7 (6.9)	1 (1.3)	
West	1 (0.6)	1 (1.0)	0 (0)	
Current marital status				.655
Single, never married	98 (55.4)	56 (54.9)	42 (56.0)	
Married	31 (17.5)	20 (19.6)	11 (14.7)	
Divorced/separated/ widowed	48 (27.1)	26 (25.5)	22 (29.3)	
Race/ethnicity				.552
Caucasian/White	111 (62.7)	66 (64.7)	45 (60.0)	
African American/Black	49 (27.7)	27 (26.5)	22 (29.3)	
Hispanic/Latinx	10 (5.6)	4 (3.9)	6 (8.0)	
Other	7 (4.0)	5 (4.9)	2 (2.7)	
Primary language spoken at home				.127
English	167 (94.4)	99 (97.1)	68 (90.7)	
Spanish	2 (1.1)	0 (0)	2 (2.7)	
Both English and Spanish	6 (3.4)	2 (2.0)	4 (5.3)	
Other	1 (0.6)	0 (0)	1 (1.3)	
Highest level of education achieved				.346
High school/GED or less	97 (54.8)	57 (55.9)	40 (53.3)	
Some college/technical school	62 (35.0)	31 (30.4)	31 (41.3)	
College degree	12 (6.8)	8 (7.8)	4 (5.3)	
Graduate degree	2 (1.1)	2 (2.0)	0 (0)	
Body mass index				.736
Normal	38 (21.5)	23 (22.5)	15 (20.0)	
Overweight	64 (36.2)	38 (37.3)	26 (34.7)	
Obese	29 (16.4)	14 (13.7)	15 (20.0)	

smoking in the past for more than 24 hrs ( $n = 98$ , 55.4%) and had a medical professional talk to them about quitting smoking ( $n = 110$ , 62.1%). In terms of nicotine dependence, majority of inmates were either moderately dependent ( $n = 67$ , 37.9%) or highly dependent ( $n = 81$ , 45.8%).

Withdrawal symptoms and triggers are presented in Table 5. The most common withdrawal symptoms reported by inmates include cravings ( $n = 138$ , 78.0%), agitation/irritability ( $n = 119$ , 67.2%), frustration ( $n = 104$ , 58.8%), impatience/restlessness ( $n = 93$ , 52.5%), and anxiety/nervousness ( $n = 90$ , 50.8%). In regard to triggers for tobacco

use, the most common reported were after meals ( $n = 157$ , 88.7%), under stress ( $n = 136$ , 76.8%), around other smokers or chewers ( $n = 134$ , 75.7%), before going to bed ( $n = 131$ , 74.0%), alone and bored ( $n = 131$ , 74.0%), and drinking coffee, tea, or soda ( $n = 127$ , 71.8%).

### Current Medical Diagnoses and Substance Use

Participants were asked about current mental and physical health problems (Table 6). The most frequent mental health problems reported were depression ( $n = 39$ , 22.0%), anxiety ( $n = 31$ , 17.5%), and insomnia ( $n = 19$ ,

**Table 3.** Criminal Justice Experience.

Variable	Total Sample ( <i>n</i> = 177)	Completed Program ( <i>n</i> = 102)	Not Completed Program ( <i>n</i> = 75)	<i>p</i> Value
Age at first incarceration	21.46 (8.76)	21.68 (8.57)	21.19 (9.04)	.720
Months in prison for current incarceration	95.62 (109.19)	105.87 (126.27)	81.54 (78.69)	.123
Charges for first-time incarceration*				
Drug distribution offense	26 (14.7)	14 (13.7)	12 (16.0)	
Drug possession offense	25 (14.1)	13 (12.7)	12 (16.0)	
Property offense (e.g., theft, burglary, car theft)	50 (28.2)	33 (32.4)	17 (22.7)	
Fraud, embezzlement, or identify theft	3 (1.7)	2 (2.0)	1 (1.3)	
Rape, sexual assault	10 (5.6)	5 (4.9)	5 (6.7)	
Molestation	4 (2.3)	2 (2.0)	2 (2.7)	
Violence offense (e.g., battery, murder, manslaughter)	39 (22.0)	21 (20.6)	18 (24.0)	
Other	38 (21.3)	16 (15.7)	22 (28.9)	
Current employment in prison				.404
Working	118 (66.7)	70 (68.6)	48 (64.0)	
Student	21 (11.9)	8 (7.8)	13 (17.3)	
Unemployed, but looking	20 (11.3)	13 (12.7)	7 (9.3)	
Disability	3 (1.7)	2 (2.0)	1 (1.3)	
Other	13 (7.3)	7 (6.9)	6 (8.0)	
Condition of facility during current incarceration				.868
Very poor	14 (7.9)	9 (8.8)	5 (6.7)	
Poor	34 (19.2)	21 (20.6)	13 (17.3)	
OK	88 (49.7)	49 (48.0)	39 (52.0)	
Good	35 (19.8)	20 (19.6)	15 (20.0)	
Very good	5 (2.8)	2 (2.0)	3 (4.0)	

Note. \* Participants were able to select each of the options as "yes" or "no." Frequencies were calculated out of the total sample size (*n* = 177) for each offense committed.

10.7%). Heart disease was the highest reported physical health condition among inmates (*n* = 33, 18.6%). In terms of substance use, inmates reported using marijuana (*n* = 70, 39.5%), alcohol (*n* = 60, 33.9%), cocaine (*n* = 53, 29.9%), heroin (*n* = 35, 19.8%), caffeine in excess (*n* = 43, 24.3%), and dietary supplements (*n* = 5, 2.8%).

### Nicotine Patches—Distribution Hurdles, Usage, and Side Effects

The majority of the participants were provided 21 mg nicotine patches for the first four weeks, then tapered every 2 weeks to 14 mg after Week 2 and then to 7 mg, based on their baseline survey answer whether they smoked greater than 10 cigarettes per day. Some side effects from the use of the nicotine patch reported by participants were vivid dreams and irritation to the nicotine patch, which were reported to the prison nurse.

There were a few hurdles in dispensing the nicotine patches to the participants across the prison sites, which was overcome by speaking directly with the medical director at Well path and the prison health administrator. Initially, to receive nicotine patches, participants had to complete a "sick-call" slip requesting medical attention.

Inmates participating in the study claimed that even though they completed the sick-call slips, they were ignored and not permitted to obtain the nicotine patches. Study facilitators solved this problem by revising the protocol to receive nicotine patches and working closely with the medical examiner. Participants' names were printed out and given directly to the nurses by the attending physician. The nurses entered the participant list into their electronic health records so that triaging could be electronically tracked. The attending physician reviewed the list of the subjects who were permitted to receive patches for accuracy. A call-out list was given to the correctional officer on duty at each of the housing units to send study participants to the medication window or pill line each morning to return their used NRT patch for a new one.

### CO Monitoring Results: Biochemical Verification of Self-Reported Smoking Levels

At each weekly session, participants were asked to self-report their smoking status by marking "Yes" (still smoking >1 cigarette) or "No" (nonsmoker), which was then biochemically verified using CO breath test. Table 7



**Table 4.** Smoking Behaviors of People who are Incarcerated ( $n = 177$ )

Variable	N (%) or Mean (SD)
Age first became a daily smoker	
Under 10	3 (1.7)
10–14 years old	68 (38.4)
15–19 years old	80 (45.2)
Over 20 years old	20 (11.3)
Number of years smoked cigarettes	26.65 (11.26)
Cigarettes smoked per day	
None	4 (2.3)
Fewer than 10	6 (3.4)
10–19 cigarettes	56 (31.6)
20 or more cigarettes	103 (58.2)
Relighting	
Yes	118 (66.7)
No	55 (31.1)
Smoked menthol cigarettes	
Yes	149 (84.2)
No	27 (15.3)
Fagerstrom Test for Nicotine Dependence	
Low dependence	5 (2.8)
Low-to-moderate dependence	14 (7.9)
Moderate dependence	67 (37.9)
High dependence	81 (45.8)
Attempted quitting tobacco smoking for more than 24 hr	
Yes	98 (55.4)
No	56 (31.6)
Electronic cigarette ever used	
Yes	37 (20.9)
No	140 (79.1)
Smoking behavior since incarceration	
Started to smoke	15 (8.5)
Smoked more	99 (55.9)
Smoked less	17 (9.6)
Quit smoking	4 (2.3)
No change	37 (20.9)
Medical professional talk about quitting smoking	
Yes	110 (62.1)
No	60 (33.9)
Don't know	3 (1.7)

describes the number of participants who attended each weekly session and the median CO level. Breath CO levels were assessed each week for the enrolled participants. At Week 1, 115 participants completed their first CO reading. The median CO level was 18.0 ppm. The final median CO reading (at Week 6) of the 80 participants was 5.5 ppm.

Forty-three participants (out of 102 who completed the program) were not lost to follow-up and participated in a 4-week follow-up; their median CO level was 5 ppm. Finally, in Table 8, there were no statistical differences in

**Table 5.** Withdrawal Symptoms and Triggers of Nicotine Dependence in Prison\*

Variable	N (%)
Withdrawal symptoms	
Agitation/irritability	119 (67.2)
Anger/hostility	78 (44.1)
Anxiety/nervousness	90 (50.8)
Craving	138 (78.0)
Difficulty concentrating	43 (24.3)
Fatigue	15 (8.5)
Disorientation	14 (7.9)
Frustration	104 (58.8)
Increased appetite/weight gain	84 (47.5)
Depressed mood	67 (37.9)
Impatience/restlessness	93 (52.5)
Insomnia	28 (15.8)
Triggers for tobacco use	
At work	53 (29.9)
Attending meetings	29 (16.4)
Anxiousness	116 (65.5)
Under stress	136 (76.8)
Needing to concentrate	37 (20.9)
Drinking coffee, tea, or soda	127 (71.8)
Talking on the phone	19 (10.7)
To keep busy	59 (33.3)
Around other smokers (or chewers)	134 (75.7)
Before going to bed	131 (74.0)
Alone and bored	131 (74.0)
Children present	12 (6.8)
After meals	157 (88.7)
Relaxing	79 (44.6)
Wanting to cheer up	31 (17.5)
Hunger	65 (36.7)
Pain	46 (26.0)

Note. \*Participants were able to select each of the options as “yes” or “no.” Frequencies were calculated out of the total sample size ( $n = 177$ ) for each of the uncomfortable symptoms and triggers.

CO between those who completed and did not complete the program at Session 6 ( $9.80 \pm 8.97$  vs.  $10.20 \pm 12.83$ ,  $p = .925$ ).

## Discussion

Incarcerated smokers, similar to other marginalized populations who smoked, have minimal experience participating in tobacco dependence treatment and using NRT as a form of smoking cessation (de Andrade & Kinner, 2016). It is essential to identify effective smoking cessation interventions that can be immediately implemented in correctional settings. This study provided preliminary evidence in which a 6-week group-based smoking cessation treatment with NRT patches showed improvement in cessation

**Table 6.** Current Mental and Physical Health and Substance Use History ( $n = 177$ )

Variable	N (%)
Physical health	
Heart disease	
Yes	33 (18.6)
No	144 (81.4)
Diabetes	
Yes	5 (2.8)
No	172 (97.2)
Stroke	
Yes	1 (0.6)
No	176 (99.4)
Cancer	
Yes	1 (0.6)
No	176 (99.4)
Lung disease (e.g., asthma or COPD)	
Yes	10 (5.6)
No	167 (94.4)
Kidney or liver disease	
Yes	13 (7.3)
No	164 (92.7)
Dental problems	
Yes	12 (6.8)
No	165 (93.2)
Sinus or nasal problems (e.g., rhinitis, polyps)	
Yes	11 (6.2)
No	166 (93.8)
Mental health	
Depression	
Yes	39 (22.0)
No	138 (78.0)
Anxiety	
Yes	31 (17.5)
No	146 (82.5)
Schizophrenia	
Yes	3 (1.7)
No	174 (98.3)
Bipolar disorder	
Yes	12 (6.8)
No	165 (93.2)
Seizure/convulsions/epilepsy	
Yes	4 (2.3)
No	173 (97.7)
Cognitive disorder (e.g., ADHD, neurological disorder)	
Yes	8 (4.5)
No	169 (95.5)
Self-harm	
Yes	15 (8.5)
No	162 (91.5)
Difficulty sleeping/insomnia	
Yes	19 (10.7)
No	158 (89.3)

(continued)

**Table 6. (continued)**

Variable	N (%)
Substance use*	
Abused alcohol	60 (33.9)
Marijuana use	70 (39.5)
Cocaine use	53 (29.9)
Heroin use	35 (19.8)
Caffeine in excess	43 (24.3)
Dietary supplements	5 (2.8)

Note.\*Participants were able to select each of the options as "current" or "past." Frequencies were calculated out of the total sample size ( $n = 177$ ) for each of the substances for either selecting current or past use. ADHD = attention deficit hyperactivity disorder; COPD = chronic obstructive pulmonary disease.

**Table 7.** Number of Inmates Who Attended Each Session.

Session	N	Median Carbon Monoxide Level (Range)
1	115	18.0 (1.0–52.0)
2	60	17.0 (0–45.0)
3	43	12.0 (0–41.0)
4	69	6.0 (0–44.0)
5	63	8.0 (0–37.0)
6	80	5.5 (0–38.0)
One-month follow-up	43	5.0 (0–35.0)

efforts suggesting that an intensive group-based smoking cessation treatment with pharmacotherapy may be an effective option to address tobacco dependence in correctional settings.

The pilot study yielded several findings that support the need for further development of a group-based smoking cessation program for smokers who are incarcerated. The majority of inmates in the study self-reported to be cisgender, heterosexual, and White. Among Black men who enrolled ( $n = 49$ ) in the intervention, 55% of them completed the study, and among the Whites enrolled ( $n = 111$ ), 55% also completed, thus demonstrating similar results in completing the intervention. A previous study demonstrated that Black and non-Black smokers are highly motivated to quit smoking, but men who are incarcerated lack the resources to consider cessation as a possibility (Valera et al., 2019).

Transgender female inmates were enrolled in the program ( $n = 9$ ). The health care and housing policies surrounding transgender inmates are lagging far behind. A transgender person is placed in a male or female institution based on the biological sex of the inmate as initially determined during processing and classification, which is observed by a correctional officer during intake (Routh et al., 2017)—disregarding an inmate's chosen gender identity. Prison-based group-based smoking cessations

**Table 8.** Exhaled Carbon Monoxide of Those who Did Complete the Program and Those Who Did Not Complete the Program

Session	Completed Program Mean (SD)	Did Not Complete Program Mean (SD)	p Value
1	18.18 (10.71)	18.59 (12.55)	.860
6	9.80 (8.97)	10.20 (12.83)	.925

ought to be tailored to meet the needs of transgender individuals as they not only experience chronic and daily stress, but some might be undergoing hormone therapy or other necessary treatment, experiencing frequent harassment or abuse, and physical and sexual assault from other inmates and prison staff or correctional officers (James et al., 2016).

Participation was sufficiently high to support the feasibility of obtaining adequate subsample sizes and controls for future large-scale smoking cessation studies in state prisons. Less than half of the participants were not lost to follow-up and actively completed all components of the smoking cessation program. Although unnecessary to establish study effectiveness, participants who completed the program appeared to have either reduced smoking or quit altogether through the cessation program ( $n = 43$  program participants), noted by low CO breath levels, suggesting promising results for a larger-scale smoking cessation study.

It is possible to improve retention of study participants for future effectiveness research by expanding the potential participant pool to all inmates; recruitment in this pilot study occurred only with inmates who were enrolled in a substance abuse program, limiting potential participants. By increasing sample size and prison sites, participants who are lost to follow-up will not significantly affect study data. Tightening eligibility criteria may prevent losing participants to follow-up, and removing barriers to participation (i.e., increasing flexibility around inmates' schedules so they can still participate in group therapy sessions) may also increase participation and retention numbers.

Facilitation of both the group therapy sessions and dispatch of NRT patches was high, strongly suggesting the feasibility of the use of both in more extensive, future studies. Session facilitators held bachelor's degrees or graduate-level degrees and were experts in tobacco dependence treatment; they comprised a CTTS and a peer counselor. They succeeded in eliciting a variety of different responses from participants in both the survey and group sessions about, for example, their smoking habits, feelings surrounding quitting, side effects from quitting, and the use of the NRT patch. Facilitators maintained confidentiality in creating group TQD plans and fostered group cohesion.

### Feasibility

Dispatch and participant use of NRT patches was moderately successful, despite some administrative hurdles, which were overcome by revising study protocols at each prison site and communicating with the prison health administrator. Study facilitators were able to work smoothly with the prison's pharmacy in ordering patches at an affordable cost. The prison pharmacy coordinated with prison officials and prison medical staff to medically clear participants for NRT use. The nurses identified and addressed any contraindications, the CTTS calculated appropriate NRT patch dosages based on participants' smoking dependence and discussed NRT use and side effects with them, and nurses dispatched the patches to each of the participants. Although initially, the practice of dispensing sick-call slips to participants to obtain NRT patches was unsuccessful, study facilitators were able to overcome this hurdle by providing prison nurses with a list of study participants who should receive NRT patches. For future studies, this "list" method will be employed.

Moreover, the therapy sessions occurred when participants were assigned to educational or treatment activities, which did not appear too disruptive to the prison facility or have a significant impact on prison staff time. All six sessions were conducted within the 1.5-hr block.

### Limitations

There were several limitations to this study that should be considered when interpreting the findings. The participants represented only a small sample of smokers who are incarcerated, and there was no comparison group available. Thus, assessing the effectiveness of the intervention was not possible. Except for class attendance and NRT medication adherence, researchers did not track program compliance. There are no data on whether other behaviors (food, exercise, using e-cigarettes or other tobacco products) were used as substitutes in place of cigarettes.

Another limitation was that the sample was pulled from a prison substance abuse program, which may have biased the study results. The characteristics of inmates enrolled in this program may be different from the general inmate population as a whole. Recruitment was conducted

in this program because it was hypothesized that recruitment would be feasible as they were already attending treatment programs. Future studies should draw from the general inmate population to not only increase the sample size but also understand the maximum number of inmates wanting to quit smoking in entire prison facilities.

### *Implications for Men and Transgender Women Health Equity*

Cisgender Men and transgender women who are incarcerated for an extended time face significant barriers to accessing health-care services to address chronic, acute, and, often, behavioral and substance use problems (Spaulding et al., 2018). Smoking remains the leading preventable habit that causes heart and lung disease, cancer, oral health problems, and chronic obstructive pulmonary disease, among others (Centers for Disease Control and Prevention, 2018; Office of Surgeon General (US), 2004; West, 2017). Prison facilities should not take a limited view to combat smoking, which suggests that mere tobacco bans will stop people from smoking cigarettes or using tobacco products. Tobacco bans without the appropriate smoking cessation resources do not eliminate smoking, vaping, and tobacco use in state prisons (Butler et al., 2007; Lincoln et al., 2009; Thibodeau et al., 2012). One of the working assumptions in this study is that incarceration might be an appropriate venue to conduct smoking cessation prevention and intervention programs (Burgess-Allen et al., 2006; Marshall et al., 2001). That said, every inmate who enters a state correctional facility should be screened and assessed for tobacco dependence during processing and classification. The classification process provides an opportunity to evaluate the individual's health problems and psychological needs and offers a plan for treatment.

The "5" A's model (Ask, Advise, Assess, Assist, Arrange) (Fiore, 2000; Kotsen et al., 2018) should be used during evaluation to discuss with inmates their readiness or motivation to quit. When the inmate discloses interest in quitting during incarceration, the prison facility should facilitate the quitting process. This may include a combination of tailored counseling and pharmacotherapy to reduce symptoms of withdrawal and to provide techniques to deal with the effects of quitting and reducing the risk of relapse (Bauld et al., 2009; Judge et al., 2005; Lindson et al., 2019). For instance, the group-based smoking cessation intervention in this study provided inmates with a safe space to share some of the pressures and stressors of their incarceration, including the experiences of transgender women. In contrast, the facilitators shared behavioral and cognitive coping strategies to respond to stress without the aid of a cigarette, tobacco product, or vaping device. By providing smoking cessation prevention and treatment programs, this could

potentially result in a significant reduction of mortality- and morbidity-related deaths attributed to smoking during incarceration (Matthew et al., 2005).

### **Conclusion**

In conclusion, this study demonstrated the preliminary efficacy and appropriateness of conducting a 6-week group-based smoking cessation program with the administration of NRT patches that can be utilized in a more extensive prison-based study. Even with small sample size, the positive gains of tobacco dependence treatment could provide opportunities to help incarcerated smokers quit tobacco.

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