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Contingency management and cognitive behavioral therapy for trauma-exposed smokers with and without posttraumatic stress disorder

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Abstract

Introduction: Trauma-exposed individuals with and without posttraumatic stress disorder (PTSD) are more likely to smoke and less successful in quit attempts than individuals without psychopathology. Contingency management (CM) techniques (i.e., incentives for abstinence) have demonstrable efficacy for smoking cessation in some populations with psychopathology, but have not been well tested in PTSD. This pilot study examined the feasibility of CM plus brief cognitive behavioral therapy (CBT) in promoting smoking cessation among trauma-exposed individuals with and without PTSD.

Methods: Fifty trauma-exposed smokers (18 with PTSD) were asked to abstain from tobacco and nicotine replacement therapy for one month. During week one of cessation, CBT was provided

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Contributors

All authors participated in manuscript preparation. Dr. Lee conducted the data analysis. Drs. Rasmusson, Pineles, Krishnan-Sarin, Japuntich and Gregor participated in study design. Drs. Rasmusson and Pineles led data collection.

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DECLARATION OF INTERESTS

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Conflict of Interest

The authors declare that there are no conflicts of interest.

daily and increasing CM stipends were paid for each continuous day of biochemically-verified abstinence; CM stipends were withheld in response to smoking lapses and reset to the initial payment level upon abstinence resumption. CBT and fixed payments for study visits were provided during the subsequent three weeks.

Results: Of the 50 eligible participants who attended at least one pre-quit visit (49% female, 35% current PTSD), 43 (86%) attended the first post-quit study visit, 32 (64%) completed the first week of CM/CBT treatment, and 26 (52%) completed the study. Post-quit seven-day point prevalence abstinence rates for participants with and without PTSD, respectively, were similar: 39% vs. 38% (1 week), 33% vs. 28% (2 weeks), 22% vs. 19% (3 weeks), and 22% vs. 13% (4 weeks).

Conclusions: Use of CM + CBT to support tobacco abstinence is a promising intervention for trauma-exposed smokers with and without PTSD.

Keywords

Stress Disorders; Post-Traumatic; Psychological Trauma; Tobacco Use Disorder; Contingency Management; Tobacco Use Cessation

1. INTRODUCTION

Individuals with posttraumatic stress disorder (PTSD) have a high prevalence of smoking (34–85%; Feldner, Babson, & Zvolensky, 2007; Fu et al., 2007) severe withdrawal (Dedert et al., 2012), and low quit rates (Lasser et al., 2000). Little is known about the efficacy of cessation treatments for smokers with psychiatric comorbidities (Hitsman, Moss, Montoya, & George, 2009; Prochaska, 2010). In the few trials that have included individuals with psychiatric disorders, tobacco cessation medications were less effective for smokers with psychiatric diagnoses (Stead et al., 2012; Tsoi, Porwal, & Webster, 2013). Additional research on the efficacy of behavioral treatments for smoking cessation, such as contingency management (CM), is needed in smokers with psychiatric comorbidities (Evins, Cather, & Laffer, 2015).

CM was developed to treat alcohol use disorders (e.g., Higgins & Petry, 1999) based on the theory that substance use is maintained by the reinforcing effects of drugs and can be decreased by powerful non-drug reinforcers of abstinence (Petry, 2000). CM thus has three components: objective verification of abstinence, tangible reinforcement for abstinence, and withholding of reinforcement when abstinence is not verified. CM is often combined with cognitive behavioral therapy (CBT) and has been shown to be effective in reducing tobacco use among difficult-to-treat populations including adolescents (Krishnan-Sarin et al., 2006) and individuals with schizophrenia (Roll, Higgins, Steingard, & McGinley, 1998; Tidey, Rohsenow, Kaplan, Swift, & Reid, 2011), substance use disorders (Alessi, Petry, & Urso, 2008; Dunn et al., 2010), and symptoms of depression (Secades-Villa et al., 2015).

In the only study testing CM for smokers with PTSD, 22 smokers were treated with a combination of CBT, pre-cessation nicotine replacement therapy (NRT) added to low nicotine cigarettes, bupropion, and post-cessation NRT (Hertzberg et al., 2013). Participants were randomized to a four-week CM protocol or a yoked control condition. At the end of

treatment, 82% of the CM group and 45% of the control group were abstinent, thus demonstrating the promise of *CM as adjuvant treatment* for smokers with PTSD. The efficacy of CM + CBT without pharmacological support for smoking cessation in PTSD remains unknown.

Herein we report the results of a one-month pilot study of CM and brief CBT in treatment-seeking, trauma-exposed smokers with and without PTSD who were *free from pharmacological treatments for smoking cessation* throughout a four-week quit attempt. As smokers with psychiatric diagnoses generally have lower quit rates than those without, we hypothesized that CM + brief CBT would be associated with lower rates of abstinence over the 4-week trial in smokers with current PTSD compared to trauma-exposed smokers without PTSD.

2. MATERIAL AND METHODS

Study procedures were approved by the VA Boston Healthcare System Institutional Review Board; participants provided written, informed consent. Recruitment began in October 2011 and data collection ended in October 2014. The study design, in which all participants received CM + brief CBT, supported a primary investigation of smoking cessation-related changes in neurobiological factors associated with smoking lapse. (Japuntich, Gregor, Marx, Pineles, & Rasmussen, 2015)

2.1 Participants

Trauma-exposed smokers, aged 18–60 years, were recruited via advertisements posted to clinic and community bulletin boards, internet websites, public transportation and newspapers. All advertisements included the maximum study payment. Initial advertisements highlighted payment for abstinence (e.g., “Earn money while you quit smoking”). Later advertisements targeted interest in cessation (e.g., “Do you want to quit smoking?”).

Inclusion criteria included exposure to a DSM IV-TR defined criterion A1 traumatic event (American Psychiatric Association, 2000), daily tobacco use (≥ 5 cigarettes/day), and motivation to quit tobacco (see below). Although we defined trauma according to DSM IV-TR, all index traumatic events were consistent with DSM 5 criteria. Given the parent study focus on neurobiological predictors of abstinence, we did not match groups on demographic characteristics or tobacco use history. Nevertheless, the groups did not significantly differ on most demographic variables (Table 2).

Exclusion criteria included unwillingness to abstain from illicit drugs or alcohol, a positive urine drug test or alcohol breathalyzer test, urine cotinine < 200ng/ml, pregnancy, presence of an unstable medical condition, high risk for suicidality, schizophreniform disorder, and non-tobacco substance use disorder in the past 6 months. Because tobacco cessation pharmacotherapies affect levels of the neuroendocrine factors of interest, participants using smoking cessation pharmacotherapy were excluded. For trauma-exposed participants without PTSD, current or past DSM IV-TR diagnoses (except phobias, single episode past

major depression, a past eating disorder, or a past substance use disorder with abstinence maintained for 6 months prior to enrollment) were exclusionary.

2.2 Procedures

Ascertainment of eligibility.—Interested participants completed a telephone pre-screen. Qualifying individuals attended an in-person screening session that included: written informed consent; urine testing for drugs, cotinine, and pregnancy; alcohol and carbon monoxide breathalyzer tests; clinical blood and urine tests; an electrocardiogram; a medical history and physical examination; clinician-administered psychiatric evaluations; and questionnaires regarding nicotine dependence, motivation to quit, and trauma history.

Smoking Cessation Study Visits.—Eligible participants attended two pre-quit visits and eleven post-quit visits (Table 1). During the first week of the quit attempt, participants attended in-person visits each weekday. During the second week, participants attended three in-person visits and received two counseling calls. During the third and fourth weeks, participants attended weekly in-person visits. At each visit, participants received CBT for smoking cessation (Peters et al., 2014). Participants also completed questionnaires, an assessment of tobacco use, breathalyzer tests for alcohol and CO (Smokerlyzer Pico+, Covita, Santa Barbara, CA), and urine tests for illicit drugs, pregnancy (females only), and cotinine (Nymox Pharmaceuticals, Hasbrouck Heights, NJ, USA). Urine samples for cotinine testing were collected by participants at home on weekend days and tested at the next weekday appointment. Participants could receive up to \$740 for study participation if they attended all visits, completed all parent study tasks, and were abstinent during the first 8 days of the quit attempt. As clinical status at visit 12 was a main outcome for the parent study, we incentivized participants by paying them \$100 to attend this visit. Participants also were paid to participate in optional psychophysiological tasks at this visit.

Contingency management.—For the first eight days post-quit, participants received CM to support abstinence. Participants were paid \$10 on the first day of verified abstinence. Payment increased by \$10 per day for each consecutive day of verified abstinence (i.e., \$10 on day 1, \$20 on day 2, etc.) until payment reached a maximum of \$50 per day. When a participant did not meet abstinence criteria, payment was withheld on that day and the CM payment was reset to \$10 on the next day of verified abstinence.

CBT.—CBT for tobacco cessation was provided by a clinical psychologist (Peters et al., 2014). The first pre-quit visit focused on tobacco use history, reasons to quit, and obtaining support. The second pre-quit visit focused on making a quit plan and challenging negative thoughts. The post-quit visits focused on relapse prevention strategies and, if applicable, reinitiating the quit attempt. Later sessions focused on maintaining abstinence.

2.3 Measures

Demographics and Smoking History Questionnaire.—Self-reports regarding participant demographics and tobacco use history were obtained at the pre-quit visits.

Motivation to quit was measured using a Contemplation Ladder on which smokers rated motivation to quit from 0 (“no thought of quitting”) to 10 (“taking action to quit”; Biener & Abrams, 1991). A score of $\geq 7/10$ was required for study inclusion.

Tobacco use.—Tobacco use was assessed using a smoking calendar and timeline follow back at in-person visits (Robinson, Sobell, Sobell, & Leo, 2014). Participants reporting use of cigarettes, other tobacco products, electronic cigarettes, or NRT, or failing to attend the study visit were considered to be non-abstinent. Self-reports of tobacco abstinence were biochemically confirmed by: a) an expired breath CO ≤ 8 ppm (or ≤ 10 ppm for the first two visits post-quit), b) a urine cotinine at the same or lower level than that of the previous day, and c) a urine cotinine level ≤ 100 ng/ml after the first week. Cotinine was measured using a semi-quantitative dipstick (0 = 0–10 ng/ml; 1 = 10–30 ng/ml; 2 = 30–100 ng/ml; 3 = 100–200 ng/ml; 4 = 200–500 ng/ml; 5 = 500–1000 ng/ml; 6 = >1000 ng/ml). If the CO and cotinine indicators disagreed, a consensus was reached by three investigators based on environmental CO exposure and timing of prior tobacco use. During weeks two to four, self-report was used to ascertain abstinence on the days between clinic visits. Three measures of tobacco use were calculated: (1) biochemically-validated 7-day point-prevalence abstinence for weeks 1, 2, 3 and 4, (2) lapse (i.e., self-report of tobacco use, lack of biochemical verification of abstinence, or failure to attend a study visit), and (3) continuous abstinence (number of consecutive days of post-quit biochemically-verified abstinence).

Fagerström Test of Nicotine Dependence (FTND).—The FTND (Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991) a six-item self-report measure of nicotine dependence, was administered at the screening visit.

MINI International Neuropsychiatric Inventory version 6 (MINI).—The MINI (Sheehan et al., 1998) is a structured clinical interview used to ascertain DSM IV diagnoses. MINI modules administered during screening included: Current and lifetime major depressive disorder, bipolar disorder, panic disorder, agoraphobia, alcohol dependence, alcohol abuse, substance dependence, substance abuse, and psychotic disorder; current (only) social phobia, obsessive compulsive disorder, bulimia, anorexia, and generalized anxiety disorder.

Traumatic Life Events Questionnaire (TLEQ).—This self-report measure assessing 20 types of traumatic events was administered at the screening visit. (Kubany et al., 2000).

Clinician Administered PTSD Scale-Symptom Version (CAPS).—The CAPS (CAPS-SX; Blake et al., 1995) was used to ascertain current and lifetime PTSD diagnosis, as well as the frequency and intensity of DSM-IV PTSD symptoms over the past month and during a month in the past when symptoms were worst.

Center for Epidemiologic Studies Depression Scale (CES-D).—The CES-D (Radloff, 1977) is a 20-item self-report scale used to estimate depression/negative mood at baseline and weekly throughout the study.

2.4 Data analysis

The analytic sample included 50 participants who attended at least one pre-quit visit (not including the screening visit). Logistic regression was used to evaluate differences in biochemically-verified, 7-day point-prevalence abstinence between diagnostic groups (current PTSD vs. no current PTSD; reference group = non-abstinent), as well as differences in abstinence predicted by severity of PTSD or depressive symptoms. Logistic regression was used to ascertain whether PTSD status predicted smoking lapse. A t-test compared PTSD severity between abstinent participants and those who lapsed. Kaplan Meier survival analyses tested whether PTSD status was associated with duration of time to the first smoking lapse during treatment. Finally, multilevel regression was used to compare diagnostic group changes in urine cotinine (i.e., smoking reduction) between the screening visit and post-quit visits. As the results were similar when adjusted for age, sex and nicotine dependence, and because of the small sample size, unadjusted results are reported. We did not adjust for multiple comparisons due to the small sample size and the exploratory nature of the study.

3. RESULTS

3.1 Participant flow and final sample characteristics

One hundred and fifty-two participants completed the screening visit; 91 were excluded (Figure 1). Primary reasons for exclusion were having an unstable medical condition, an exclusionary psychiatric diagnosis, no previous trauma exposure, or a positive illicit drug test. Fifty participants (48% female) with a mean age of 43.5 ($SD=12.1$) and mean motivation to quit score of 9.2/10 ($SD=1.05$) were eligible and attended at least one post-screening, pre-quit visit (Table 2). Eighteen participants (36%) had current PTSD and 32 participants (64%) were free of current PTSD, among whom 11 (22% of the full sample of 50) had past, but not current PTSD, and 21 (42%) never met criteria for PTSD. Of the 50 participants for whom data were analyzed, 43 (86%) attended at least 1 post-quit visit. Thirty-two participants (64%) completed all 8 days of CM + CBT. Eight participants (16%) withdrew or were lost to follow-up during the CM + CBT period after either not meeting biochemical verification criteria for abstinence despite reporting abstinence ($n=3$) or reporting smoking ($n=5$). One participant withdrew due to exacerbation of PTSD symptoms. Two participants were excluded (due to a positive illicit drug test and suicidal ideation requiring clinical intervention). Twenty-six participants (52%) completed the study.

3.2 Point prevalence abstinence

There was not a significant difference between the trauma-exposed participants with and without current PTSD in biochemically-verified abstinence at any timepoint (Table 3). Results were similar when considering lifetime PTSD (current and past) vs. no lifetime PTSD. Abstinence also was not predicted by current PTSD or depressive symptom severity (supplemental Table 1).

3.3 Lapse

Smoking lapses occurred in 14 (78%) of the participants with current PTSD and in 27 (84%) of the participants without current PTSD. There was no significant difference in the odds of lapse between groups (OR=0.65, 95% CI 0.15, 2.80). Similarly, those who lapsed did not have more severe baseline PTSD symptoms (lapsed: $M = 31.58$, $SD = 30.32$ vs. abstinent: $M = 39.0$, $SD = 42.86$; $t = 0.62$, $p = 0.54$).

3.4 Survival

The median time to lapse was 6.0 days for those with PTSD vs. 5.0 days for those without current PTSD. On the Kaplan-Meier curves, which show the probability of remaining abstinent across days in treatment, the log-rank test showed no significant effect of current PTSD status in the distribution of the survival functions ($\chi^2 = 0.50$, $p = 0.48$).

3.5 Reductions in cotinine

There was no main effect of current PTSD status on reduction in cotinine from the screening visit to the post-quit period [$F(1,33) = 0.21$, $p = 0.65$]. Across study days, current PTSD was associated with a nonsignificant 0.24 ($SE = 0.52$) unit greater reduction in the cotinine dipstick reading since screening compared to the no current PTSD group ($t = 0.46$, $p = .65$). The average decreases in cotinine dipstick units after screening were 2.86 ($SD = 1.57$) on Day 5, 3.23 ($SD = 1.68$) on Day 8, 2.62 ($SD = 1.94$) on Day 15, 2.04 ($SD = 2.17$) on Day 22, and 2.00 ($SD = 1.83$) on Day 29.

4. DISCUSSION

This is the first study to investigate the feasibility of CM + brief CBT for smoking cessation unaided by smoking cessation medication in motivated, treatment-seeking, trauma-exposed smokers with and without PTSD. During the one-week CM + brief CBT protocol, nearly 40% of study participants maintained biochemically-verified abstinence. Abstinence rates diminished when CM reinforcement of abstinence ceased and clinic visits became less frequent. No differences in abstinence rates were found between otherwise healthy trauma-exposed smokers and smokers with PTSD.

The lack of difference in cessation outcomes by current PTSD status was surprising because smokers with PTSD generally have more difficulty quitting smoking than individuals without psychopathology (Lasser et al., 2000). However, all participants in the study had trauma exposure. It is possible that factors associated with trauma exposure rather than PTSD interfered with smoking cessation success (Feldner et al., 2007). Previous studies of CM in smokers without psychopathology have not evaluated possible effects of trauma exposure. It is also possible that CM reduced differences in lapse propensity between the trauma-exposed individuals with and without PTSD. However, the study was likely underpowered to detect such differences.

Tobacco dependence is difficult to treat in individuals with PTSD. In one large scale treatment study conducted in Veteran with PTSD (McFall et al., 2010), smokers were randomly assigned to specialty care in a smoking cessation clinic or integrated care. Results

showed a benefit of integrated care: 12-month biochemically confirmed abstinence rates were 9% in integrated care vs. 5% in specialty care. While promising, there remained substantial room for improvement in cessation rates for Veteran smokers with PTSD.

The current study suggests that CM + brief CBT for tobacco cessation may augment abstinence rates among individuals with PTSD. Nearly 40% of the trauma-exposed smokers maintained complete abstinence for a week when supported by CM + brief CBT. These results compare favorably to a study of *unaided* smoking cessation in which only 6% of participants with PTSD maintained abstinence for a week (Zvolensky et al., 2008). However, given that previous studies find that abstinence rates are associated with the magnitude of CM reinforcement in general population smokers, one might have expected higher abstinence rates in the current study (Ledgerwood, 2008). In our study, abstinence rates after discontinuation of CM declined over three weeks to 22% and 13%, respectively, in the PTSD and trauma-exposed control groups, suggesting that continuation of CM reinforcement might have improved long-term abstinence rates.

It is a challenge to compare the results of the current study to other CM studies, as the quantity, frequency and duration of CM; adjuvant treatments; and the duration of follow-up in these studies differ. Nevertheless, to help put our results in context, we review the end-of-treatment results of two other CM studies in smokers with trauma exposure and PTSD. In a study of smokers with PTSD (Hertzberg et al., 2013), 82% of a group receiving CM combined with NRT, bupropion, and low nicotine cigarettes maintained abstinence until one month post-quit, while only 45% of the group not receiving CM and pharmacotherapy to support cessation did so. In a study of 20 homeless Veterans (60% with PTSD) receiving bupropion, NRT and 4 weeks of CM (with verification of abstinence by CO monitoring over a mobile phone), the rate of sustained abstinence was 55% at the end of CM (Carpenter et al., 2015).

Our results are similar to CM trials for smoking cessation in difficult-to-treat smokers not receiving NRT or pharmacotherapy. Across two trials in adolescent smokers, 4 weeks of CM + brief CBT resulted in a 36–55% abstinence rate (Cavallo et al., 2007; Krishnan-Sarin et al., 2013). In studies of smokers with schizophrenia or substance use disorders, CM was associated with similar or lower abstinence rates than those in the current study (Alessi et al., 2008; Drummond et al., 2014; Rohsenow et al., 2015; Roll et al., 1998; Tidey, O'Neill, & Higgins, 2002; Tidey et al., 2011).

The findings of this study should be interpreted in view of study limitations. This was a single site, small pilot study, which limits the generalizability of the findings. The low retention rates further diminished study size and may suggest that: a) drop-out was related to anticipated difficulties with smoking cessation, b) maintenance of abstinence without pharmaceutical support was too difficult for these participants, and/or c) the penalty for lapsing was too great. Other CM protocols have sometimes used lesser penalties for lapses, such as reducing reinforcement for two visits following lapse, but not completely resetting reinforcements (Higgins et al., 2014). Combining CM with an effective smoking cessation medication also may have boosted abstinence; however, previous studies have shown similar effects of CM with bupropion or NRT vs. CM without pharmacotherapy in smokers with

schizophrenia and SUDs (Dunn, Saulsgiver, & Sigmon, 2011; Tidey et al., 2002; Tidey et al., 2011). Animal models also suggest that nicotine may interfere with PTSD recovery by enhancing passive avoidance and contextual fear conditioning; thus, caution may be warranted when using NRT in smokers with PTSD (Davis, Porter, & Gould, 2006; Faiman, de Erausquin, & Baratti, 1991; Gould & Wehner, 1999; Nordberg & Bergh, 1985; Tian et al., 2011). In the current study, 6% of participants withdrew after failing to meet biochemical verification whilst self-reporting abstinence. This discrepancy may have resulted from false reporting or a failure of verification. The cotinine test used is reliable for determining abstinence, but not necessarily for quantification of absolute cotinine levels (Gaalema, Higgins, Bradstreet, Heil, & Bernstein, 2011). As the bulk of participant payments occurred during CM, participants might have been less motivated to attend follow-up visits regardless of smoking status. While low self-rated motivation to stop smoking was exclusionary, some participants may have misrepresented their motivation in order to qualify for the study. Finally, the demands of the study may have promoted attrition. Participants were required to come to the clinic 8 times over two weeks; the burden of parent study tasks also may have promoted attrition.

The lack of a yoked CBT control group represents an additional limitation that precludes conclusions about the efficacy of CM compared to brief CBT. However, previous studies found CM to be superior to yoked control conditions in smokers with PTSD simultaneously treated with medication and CBT (Hertzberg et al., 2013) and smokers with depressive symptoms simultaneously treated with CBT (Secades-Villa et al., 2015). Thus, it is likely that CM + brief CBT would have outperformed brief CBT alone. Finally, the lack of long-term follow-up limits our ability to assess the impact of the study interventions on sustained abstinence.

5. CONCLUSIONS

In conclusion, this pilot study suggests that the use of CM to support smoking cessation in trauma exposed smokers with and without PTSD is promising. Future work is needed to further establish the efficacy of CM in trauma-exposed individuals by comparing CM to a yoked control treatment in a larger sample. The possibility that extended CM might extend long-term abstinence also should be investigated. Future work using telehealth methods to verify abstinence (e.g., Alessi, Rash, & Petry, 2017; Dallery, Raiff, & Grabinski, 2013) also may improve real world applications of this treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Contingency management is feasible to use with trauma exposed smokers.
- Contingency management is a promising treatment for trauma exposed smokers.
- Effects of contingency management abated when contingencies were removed.

Fig. 1.
Participant flow.

Table 1:

Study timeline and payment schedule

Study phase	Week	Study Visit	Post-quit day	Payment	CM Payment
Telephone Screen		n/a		\$0	
Screening Visit	1	1		\$60	
Pre-quit	2	2		\$25	
		3		\$50	
CM	3	4	1	\$5	\$10
		5	2	\$5	\$20
		6	3	\$5	\$30
		7	4	\$5	\$40
		8	5	\$5	\$50
			6		\$50 ^I
			7		\$50 ^I
	4	9	8	\$5	\$50
Follow-up		10	10	\$25	
		11	12	\$25	
	5	12	15	\$150	
	6	13	22	\$25	
	7	14	29	\$25	

Note: CM=Contingency Management; Visit Payment=payment for attendance regardless of tobacco use status; Contingency Management Payment=Maximum payment for abstinence if participant was abstinent since quit day.

^I Payments for days 6 and 7 were administered during the day 8 visit.

Table 2.

Descriptive statistics by current PTSD^a status, for participants who were eligible for the study ($N = 50$).

	Never or prior PTSD ($n=32$)		Current PTSD ($n=18$)		$t(df)$ or χ^2	p -value
	M or %	SD	M or %	SD		
Female	46.9%	--	50.0%	--	0.05	0.83
Age	43.98	11.60	44.49	13.15	-0.14 (48)	0.89
Hispanic	6.3%	--	5.6%	--	0.01	0.92
Minority	62.5%	--	33.3%	--	3.93	0.05
Veteran	75.0%	--	44.4%	--	4.67	0.03
Education (years)	13.94	2.72	13.78	2.90	0.19 (48)	0.85
FTND ^b total score	4.44	2.12	5.83	1.69	-2.39 (48)	0.02
Age at smoking onset	15.67	5.47	14.53	3.86	0.76 (45)	0.45
Urine cotinine category at screening ^c	5.13	0.91	5.22	0.81	-0.38 (48)	0.71
Cigarettes per day	13.47	6.03	18.59	7.68	-2.53 (45)	0.02
CAPS ^d total score (screening)	11.88	14.72	70.33	18.45	-12.3 (48)	<.0001
Number of trauma categories endorsed	7.06	3.22	9.39	4.33	-2.16 (48)	0.04
CES-D ^e total score (pre-quit)	9.30	7.62	27.59	11.75	-5.77 (27.8)	<.0001
History of alcohol dependence/abuse	54.8%	--	58.8%	--	0.07	0.79
Motivation to quit (screening) ^f	9.15	1.17	9.28	0.83	-0.39	0.70
History of substance dependence/abuse	45.2%	--	58.8%	--	0.82	0.37
History of alcohol or substance dependence / abuse	74.2%	--	82.3%	--	0.41	0.52

^a posttraumatic stress disorder;

^b Fagerström Test for Nicotine Dependence;

^c 0=0–10ng/ml, 1= 10–30ng/ml, 2=30–100ng/ml, 3=100–200ng/ml, 4=200–500ng/ml, 5=500–1000ng/ml, 6=>1000ng/ml;

^d Clinician Administered PTSD Scale;

^e Center for Epidemiologic Studies Depression Scale;

^f Contemplation Ladder (score range 0–10)

Table 3:

7-day biochemically confirmed point-prevalence abstinence rates by PTSD group status

Post-quit time-point	PTSD group		OR	95% CI
	Current PTSD (<i>n</i> =18)	No Current PTSD (<i>n</i> =32)		
1 week	7 (39%)	12 (38%)	1.06	0.33, 3.48
2 weeks	6 (33%)	9 (28%)	1.28	0.37, 4.45
3 weeks	4 (22%)	6 (19%)	1.24	0.30, 5.13
4 weeks	4 (22%)	4 (13%)	2.00	0.43, 9.21