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Posttraumatic Stress Symptoms and Their Association With Smoking Outcome Expectancies Among Homeless Smokers in Boston

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Abstract

Introduction: Cigarette smoking and traumatic life experiences are each common among homeless adults, but the prevalence and correlates of posttraumatic stress disorder (PTSD) symptoms among homeless smokers are not known. We assessed symptoms of PTSD and their association with smoking outcome expectancies in a sample of homeless smokers in Boston.

Methods: We used time-location sampling to conduct an in-person survey of homeless adult smokers using Boston Health Care for the Homeless Program clinical services. We assessed symptoms of PTSD with the PTSD Checklist—Civilian version and considered scores at least 14 as positive. We used the Smoking Effects Questionnaire to assess positive and negative smoking outcome expectancies. We modeled the associations between PTSD screening status and smoking expectancies using design-adjusted linear regression.

Results: Eighty-six percent of eligible individuals participated ($N = 306$). Sixty-eight percent of participants screened positive for PTSD. Screen-positive respondents were younger ($P = .001$), more likely to report fair/poor health ($P = .01$), chronic obstructive pulmonary disease ($P = .02$), and past-month hallucinations ($P = .004$), and had greater drug ($P < .001$) and alcohol ($P < .001$) use severity and cigarette dependence ($P = .002$). In analyses controlling for these confounders, PTSD screen-positive participants more strongly endorsed smoking to reduce negative affect ($P = .01$), smoking for social benefits ($P = .002$), and smoking for weight control ($P = .03$). Exploratory analyses suggested that these associations were driven by avoidance/numbing and re-experiencing symptoms.

Conclusions: Symptoms of posttraumatic stress are common among homeless smokers and strongly associated with positive smoking outcome expectancies. Tobacco cessation programs for this population should consider screening for PTSD and fostering a trauma-sensitive treatment environment.

Implications: In this study of homeless cigarette smokers in Boston, over two-thirds of participants screened positive for PTSD. PTSD screen-positive respondents more strongly endorsed multiple positive smoking outcome expectancies than screen-negative individuals. These findings suggest

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that the psychological sequelae of trauma may be a pervasive but under-recognized factor impacting the persistence of smoking among homeless people. Tobacco cessation programs for this population should consider screening for PTSD, fostering a trauma-sensitive treatment environment, and incorporating strategies that have shown promise in smokers with PTSD.

Introduction

An estimated 68%–80% of homeless adults are current cigarette smokers.[1–6] Traumatic life experiences[7,8] and posttraumatic stress disorder (PTSD)[9–13] are common among homeless people, but no studies have examined the role of PTSD in sustaining smoking behavior in this population.

In non-homeless populations, people with PTSD have a higher prevalence of smoking, smoke more heavily, and have more difficulty quitting than individuals without PTSD.[14,15] Smokers with PTSD may also differ from other smokers in their smoking outcome expectancies, or beliefs about the consequences of their smoking. Expectations for smoking to reduce negative affect appear particularly important for smokers with PTSD,[15–21] and PTSD symptoms have also been linked with smoking expectancies for social facilitation and stimulation.[20,22]

These observations raise the question of whether trauma and its psychological sequelae could be under-recognized factors promoting the persistence of smoking among homeless people. If symptoms of PTSD are common among homeless smokers and associated with more positive smoking expectancies, then this might have important implications for the design and conduct of smoking cessation interventions targeting this population. To address this question, we (1) assessed the burden of posttraumatic stress symptoms among homeless smokers, (2) compared the sociodemographic, health, and tobacco use characteristics of PTSD screen-positive and screen-negative homeless smokers, and (3) assessed the association between PTSD screening status and smoking outcome expectancies among homeless smokers.

Methods

Participants and Setting

In April–July, 2014, we used time-location sampling[23,24] to conduct an in-person survey of 306 homeless adult smokers using Boston Health Care for the Homeless Program clinical services. Boston Health Care for the Homeless Program serves more than 11 000 individuals annually through a network of service sites based in emergency shelters, transitional housing facilities, hospitals, and other social service settings in greater Boston.[25,26] For efficiency, we constrained our sampling frame to five clinical sites that account for 64% of the annual patient care volume at Boston Health Care for the Homeless Program. At each site, we randomly sampled half-day clinic sessions, which comprised the primary sampling units. During randomly sampled clinic sessions, interviewers consecutively approached patients after their clinic visit to screen them for eligibility.

Eligibility criteria included self-reported English proficiency, age at least 18 years, current cigarette smoking (≥100 cigarettes lifetime and currently smoking some days or every day[27]), and current homelessness. Consistent with the US federal definition[28] and identical to definitions used in other surveys of homeless people,[29,30] we defined current homelessness as usually sleeping in an emergency or transitional shelter, a church, an abandoned building, a place of business, a vehicle, anywhere outside, or a hotel or motel in the past 7 days or, if currently staying in an inpatient or residential treatment facility, in the 7 days prior to admission to that facility. We also included individuals who were doubling-up with others in the past 7 days because of not having a place of their own.[29–31]

After obtaining informed consent, one of seven trained interviewers verbally administered the 159-item questionnaire in a private area using an electronic tablet. We compensated participants $20 in cash for completing the questionnaire.[32–34] The study was approved by the Partners Human Research Committee.

Measures

Sociodemographics

Demographic variables included age, gender, self-reported race and ethnicity, educational attainment, and military service history.

Homelessness History

We asked the age that participants first experienced homelessness, the number of times they had been homeless, and the duration of the current homeless episode.

Traumatic Life Experiences

We asked participants whether they had ever been physically or sexually assaulted. We assessed traumatic head injury with an item developed for use in a county jail population[35] and used in prior studies of homeless individuals.[29]

Physical Health

We assessed self-reported general health status, chronic obstructive pulmonary disease, and cardiovascular disease.

Behavioral Health

We assessed past 30-day drug use severity, alcohol use severity, and psychiatric severity with the Addiction Severity Index (ASI)—Fifth Edition,[36] which has been validated in homeless populations.[37–39]

Tobacco Use

We assessed daily cigarette consumption and cigarette dependence using the Fagerstrom Test of Nicotine Dependence.[40] To gauge the social aspects of smoking, we asked participants how many of their five closest associates smoke cigarettes[41] and how many times they are offered a cigarette during a typical day.[42]

PTSD Screening

We assessed symptoms of PTSD using the six-item short-form of the 17-item PTSD Checklist—Civilian version (PCL-C),[43–45] whose psychometric properties are detailed elsewhere.[46–48] Anchored on "a stressful experience from the past," the PCL-C assesses the extent (1 = not at all, 5 = extremely) to which an individual has been bothered in the past 30 days by symptoms corresponding to those delineated in

the Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition, Text Revision, criteria for PTSD.[49] The six-item PCL-C was developed for a primary care setting and explains 92%–94% of the variance in the full 17-item version.[43] We considered individuals with scores at least 14 as PTSD screen-positive.[43] At this cutoff value, the six-item PCL-C had a sensitivity of 0.92 and a specificity of 0.72 for identifying PTSD in a diverse primary care sample.[43] We did not have adequate information to establish a formal diagnosis of PTSD.

Smoking Outcome Expectancies

We assessed smoking outcome expectancies with the 33-item Smoking Effects Questionnaire.[50] The Smoking Effects Questionnaire assesses both positive and negative expectancies. Positive expectancies include smoking for (1) reduction of negative affect, (2) stimulation, (3) positive social effects, and (4) weight control. Negative expectancies include concerns about (1) negative physical effects, (2) negative psychosocial effects, and (3) future health problems related to smoking. Each expectancy domain is assessed with four or five statements (eg, "Smoking helps me when I am bored.") that participants are asked to endorse ("true") or refute ("false"). We used the frequency scoring approach by summing the number of "true" items within each expectancy scale.[50]

Statistical Analysis

We compared the sociodemographic characteristics, homelessness histories, physical health conditions, drug and alcohol use severities, psychiatric severity, tobacco use characteristics, and smoking outcome expectancies of PTSD screen-positive and screen-negative participants using the Rao-Scott Chi-square test for categorical data and the Wald F test for continuous data.

We then assessed the association between PTSD screening status (independent variable) and each smoking outcome expectancy domain (dependent variables) using multiple linear regression models adjusting for age, gender, race/ethnicity, self-reported general health status, self-reported chronic obstructive pulmonary disease, past-month hallucinations, alcohol use severity, drug use severity, and cigarette dependence, all selected based on prior hypotheses and bivariate testing. We calculated standardized regression coefficients (B) to facilitate effect size comparisons among variables with differing scales.

We did not control for ASI-derived psychiatric severity in the regression models because the ASI psychiatric module contains items assessing symptoms that overlap directly with those assessed in the PCL-C (eg, "difficulty concentrating"), are prominent features of PTSD (eg, "serious anxiety or tension"), and frequently co-occur with PTSD (eg, "serious depression"), creating a problem with collinearity. Since individuals with psychotic disorders may have distinct smoking outcome expectancy patterns[51] and may also have a high burden of trauma and PTSD,[52–55] we used past-30 day hallucinations from the ASI as a proxy for psychosis in the multivariable models. We explored whether gender modified the effect of PTSD on outcome expectancies by including an interaction term in the multivariable models; in all cases, this term was nonsignificant and therefore removed from the final models.

Our primary analyses treated PTSD screening status as a binary indicator variable since this approach is likely to be most applicable to clinical settings. In supplemental analyses (Supplementary Material), we explored the associations between smoking outcome expectancies and PCL-C symptom cluster subscores to better understand which PTSD symptoms may be driving the observed associations. Additionally, we repeated all outcome expectancy analyses substituting the ASI psychiatric severity score in place of the PTSD variables to assess whether the associations identified for PTSD were similar to those for nonspecific psychiatric symptoms.

We used the survey procedures in SAS version 9.4 (SAS Institute, Cary, NC) to account for the sampling design of the study.

Results

Of 876 individuals approached by interviewers, 726 (83%) completed the eligibility screener. Of 357 eligible individuals, 306 (86%) consented to participate. The demographic characteristics of respondents are shown in Table 1.

Posttraumatic Stress

The mean PCL-C score was 17.3. Sixty-eight percent of participants (N = 203) screened positive for PTSD. In comparison to PTSD screen-negative participants, screen-positive participants were younger, experienced their first episode of homelessness at an earlier age, had higher lifetime prevalences of traumatic head injury, physical assault, and sexual assault, and had greater drug use severity, alcohol use severity, and psychiatric severity (Table 1).

Tobacco Use Characteristics

Despite smoking a similar number of cigarettes each day, screen-positive respondents had significantly higher cigarette dependence scores than screen-negative respondents (Table 1). PTSD screen-positive participants were also more likely to report that all five of their closest peers were smokers and to be offered a cigarette at least once a day.

Smoking Outcome Expectancies

Positive Outcome Expectancies

In fully-adjusted analyses, screening positive for PTSD was significantly associated with smoking to reduce negative affect, smoking for positive social effects, and smoking for weight control (Table 2). Cigarette dependence was strongly correlated with several positive expectancies.

Negative Outcome Expectancies

In fully-adjusted analyses, PTSD screening status was not significantly associated with negative outcome expectancies. Fair/poor general health status was strongly correlated with negative psychosocial and physical health expectancies.

Supplemental Analyses

In multivariable analyses focusing on PCL-C symptom cluster subscores, avoidance/numbing and re-experiencing showed the strongest associations with positive outcome expectancies (Supplementary Material). Multiple regression analyses of the associations between ASI psychiatric severity and outcome expectancies were significant only for smoking to reduce negative affect (B = 0.17, P = .04).

Discussion

The burden of trauma and posttraumatic stress symptoms was high in this clinic-based sample of homeless smokers in Boston. In analyses adjusted for multiple confounders, participants who screened positive for PTSD more strongly endorsed multiple positive outcome

Table 1. Characteristics of Participants, Overall and by PTSD Screening Status

	All *N* = 306	PTSD screen (+) *N* = 203	PTSD screen (–) *N* = 95	*P*
Demographics				
Age, years, mean (*SD*)	47.6 (10.0)	46.3 (10.0)	50.4 (9.6)	.001
Gender, *N* (%)				
Male	228 (74.8)	147 (72.4)	76 (80.0)	.21
Female	72 (23.6)	53 (26.1)	18 (18.9)	
Transgender	5 (1.6)	3 (1.5)	1 (1.1)	
Race/ethnicity, *N* (%)				
White non-Hispanic	108 (35.5)	68 (33.7)	39 (41.1)	.29
Black non-Hispanic	124 (40.8)	82 (40.6)	38 (40.0)	
Other non-Hispanic	16 (5.3)	13 (6.4)	2 (2.1)	
Hispanic	56 (18.4)	39 (19.3)	16 (16.8)	
High school graduate, *N* (%)	211 (69.2)	138 (68.0)	70 (73.7)	.25
Military veteran, *N* (%)	23 (7.6)	15 (7.4)	8 (8.5)	.72
Homelessness characteristics				
Past-week sleeping arrangement, *N* (%)				
Shelter	219 (71.6)	143 (70.4)	70 (73.7)	.36
Rough[a]	50 (16.3)	37 (18.2)	12 (12.6)	
Doubled-up	37 (12.1)	23 (11.3)	13 (13.7)	
Length of current episode, years, mean (*SD*)	5.4 (7.4)	5.2 (7.2)	5.7 (7.1)	.50
Lifetime homeless episodes, mean (*SD*)	4.1 (6.5)	4.3 (6.5)	3.6 (6.7)	.46
Age first homeless, years, mean (*SD*)	30.8 (13.3)	29.3 (12.5)	34.3 (14.3)	.01
Traumatic experiences				
Traumatic head injury, lifetime, *N* (%)	196 (65.3)	142 (70.0)	54 (56.8)	.03
Physically assaulted, lifetime, *N* (%)	242 (80.7)	173 (85.2)	69 (72.6)	.02
Sexually assaulted, lifetime, *N* (%)	78 (26.0)	62 (30.5)	16 (16.8)	.01
Physical health				
Fair or poor health status, *N* (%)	150 (49.7)	110 (54.2)	38 (40.0)	.01
COPD, *N* (%)	74 (24.5)	57 (28.1)	16 (16.8)	.02
Cardiovascular disease, *N* (%)	34 (11.3)	24 (11.8)	9 (9.5)	.53
Behavioral health				
Drug use severity (0–1), mean (*SD*)[b]	0.13 (0.12)	0.15 (0.12)	0.08 (0.09)	<.001
Alcohol use severity (0–1), mean (*SD*)[b]	0.22 (0.25)	0.26 (0.26)	0.14 (0.20)	<.001
Psychiatric severity (0–1), mean (*SD*)[b]	0.42 (0.24)	0.51 (0.20)	0.23 (0.20)	<.001
Hallucinations, past month, *N* (%)[b]	43 (14.3)	38 (18.7)	5 (5.3)	.004
Tobacco use				
Cigarettes per day, mean (*SD*)	12.5 (8.3)	12.5 (7.8)	11.9 (8.0)	.51
Cigarette dependence (0–10), mean (*SD*)[c]	4.4 (2.3)	4.7 (2.2)	3.9 (2.1)	.002
All five closest peers smoke, *N* (%)	155 (51.3)	113 (55.9)	41 (43.2)	.04
Offered cigarette ≥once/d, *N* (%)	147 (48.5)	110 (54.2)	35 (36.8)	.03

COPD = chronic obstructive pulmonary disease; PTSD = posttraumatic stress disorder.

[a]Sleeping "rough" denotes any arrangement where a person sleeps outside or in a place not intended for human habitation (eg, car or abandoned building).[56]

[b]Based on the Addiction Severity Index—Fifth Edition.[36]

[c]Based on the Fagerstrom Test of Nicotine Dependence.[40]

expectancies for smoking than screen-negative individuals. These findings suggest that the psychological sequelae of trauma may be a pervasive but under-recognized factor impacting the persistence of smoking among homeless people.

Our study results extend the body of evidence documenting an association between PTSD symptoms and smoking to reduce negative affect,[15–21] highlighting the potential role of emotion regulation skills in homeless smokers with symptoms of PTSD. Consistent with another study,[20] PTSD screen-positive respondents more strongly endorsed positive social expectancies related to smoking, and they were also more likely to report that all of their peers are smokers and that they are offered a cigarette at least once per day. This suggests that the social aspects of smoking may be uniquely important for homeless smokers with symptoms of PTSD and that treatment programs should consider group-oriented or peer-based approaches in addition to environmental interventions (eg, shelter smoking restrictions) to reshape social norms around smoking in this population.

Limitations

Our focus on a sample of homeless smokers seeking clinical care limits the generalizability of our findings and likely overestimates the burden of posttraumatic stress symptoms among homeless people at-large, although it may approximate what clinicians serving this population are likely to encounter in practice. The cross-sectional, self-reported nature of the data introduces the possibility of reporting bias or unmeasured confounding and precludes a causal interpretation of our findings. Although we were unable to establish a diagnosis of PTSD, our findings were generally concordant with other studies that used formal diagnostic criteria in examining the association between PTSD and smoking expectancies.[19,20] Additionally, the lack of similar associations between the ASI psychiatric severity

Table 2. Association Between PTSD Screening Status and Smoking Outcome Expectancies, Adjusted for Displayed Covariates Using Multiple Linear Regression

	Positive outcome expectancies[a]				Negative outcome expectancies[a]		
	Reduce negative affect	Positive social	Stimulation	Weight control	Negative psychosocial	Negative physical health	Future health concerns
Main independent variable							
PTSD screen-positive[b]	**B = 0.20**	**B = 0.23**	B = 0.08	**B = 0.12**	B = −0.04	B = 0.07	B = 0.10
	P = .01	**P = .002**	P = .23	**P = .03**	P = .56	P = .27	P = .12
Model covariates							
Age	B = −0.06	B = −0.01	B = −0.002	B = −0.06	B = 0.04	B = 0.03	B = −0.02
	P = .16	P = .90	P = .97	P = .32	P = .45	P = .56	P = .73
Male	B = −0.04	B = 0.02	B = −0.02	B = 0.07	B = 0.10	**B = 0.13**	B = 0.14
	P = .38	P = .77	P = .59	P = .19	P = .12	**P = .02**	P = .09
Race/ethnicity[c]							
Black non-Hispanic	B = −0.01	B = 0.10	B = 0.14	B = 0.03	**B = −0.20**	B = 0.07	B = −0.03
	P = .93	P = .12	P = .06	P = .70	**P = .03**	P = .32	P = .70
Other non-Hispanic	B = −0.08	B = −0.06	B = 0.06	B = −0.01	B = −0.02	B = 0.05	B = −0.01
	P = .22	P = .43	P = .16	P = .87	P = .66	P = .29	P = .81
Hispanic	B = −0.01	B = 0.05	B = 0.14	B = 0.09	B = −0.11	B = −0.02	B = −0.04
	P = .83	P = .40	P = .05	P = .19	P = .20	P = .75	P = .60
Fair or poor health	B = 0.08	B = −0.07	B = 0.02	B = 0.04	**B = 0.22**	**B = 0.19**	B = 0.11
	P = .11	P = .38	P = .75	P = .50	**P = .001**	**P = .001**	P = .17
COPD	B = −0.02	B = 0.08	B = 0.04	B = 0.09	B = −0.09	B = 0.10	B = −0.01
	P = .82	P = .22	P = .48	P = .15	P = .25	P = .14	P = .89
Hallucinations, past month	B = −0.04	B = −0.005	B = 0.001	B = 0.11	B = 0.05	**B = 0.11**	B = −0.01
	P = .47	P = .91	P = .99	P = .13	P = .45	**P = .04**	P = .83
Drug use severity[d]	B = 0.05	B = 0.01	B = −0.04	B = 0.11	B = 0.11	**B = 0.08**	B = 0.06
	P = .07	P = .83	P = .53	P = .09	P = .10	**P = .04**	P = .37
Alcohol use severity[d]	B = 0.04	B = 0.07	B = 0.11	B = 0.10	**B = 0.15**	B = 0.09	B = 0.05
	P = .33	P = .32	P = .07	P = .17	**P = .01**	P = .10	P = .53
Cigarette dependence[e]	**B = 0.29**	**B = 0.24**	**B = 0.28**	B = 0.08	B = 0.10	B = 0.09	B = −0.06
	P < .001	**P = .001**	**P < .001**	P = .29	P = .11	P = .16	P = .34

COPD = chronic obstructive pulmonary disease; PTSD = posttraumatic stress disorder. The table displays standardized regression coefficients (*B*) obtained using linear regression to fit a multivariable model for each outcome expectancy.

[a]Positive and negative outcome expectancies were assessed with the 33-item Smoking Effects Questionnaire.[50]

[b]PTSD screening status was based on the six-item PTSD Checklist—Civilian version, using a cutoff score of ≥14.[43] Individuals with scores <14 were the reference group.

[c]White non-Hispanic is the reference group.

[d]Based on the Addiction Severity Index—Fifth Edition drug and alcohol use composite scores.[36]

[e]Based on the Fagerstrom Test of Nicotine Dependence.[40]

score and outcome expectancies suggests that the PCL-C was likely tapping a distinct domain of trauma-related symptoms.

Conclusions

Symptoms of posttraumatic stress are common among homeless smokers and strongly associated with positive smoking outcome expectancies. These findings suggest that smoking cessation programs for homeless smokers should incorporate PTSD screening, be sensitive to the needs and vulnerabilities of trauma survivors, and incorporate behavioral counseling approaches that attempt to identify and address the potential linkages between posttraumatic stress symptoms and smoking behavior in a fashion that emphasizes autonomy and control.[57] In some cases, homeless smokers with particularly severe symptoms of PTSD may first require trauma-focused treatment and stabilization. Intervention strategies that have shown promise in smokers with PTSD[58] may merit testing in this population.

Supplementary Material

Supplementary Material can be found online at http://www.ntr.oxfordjournals.org

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Declaration of Interests

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