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Is Smoking Cessation Associated with Worse Comorbid Substance Use Outcomes among Homeless Adults?

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Abstract

Background and Aims—Smoking prevalence among homeless adults is exceedingly high, and high rates of comorbid substance use are among the barriers to abstinence experienced by this group. The extent to which smoking cessation might engender an escalation in comorbid substance use could be a concern prohibiting treatment provision and engagement. This study examined whether smoking abstinence status was associated with alcohol and substance use at 26 weeks post-randomization among homeless smokers in a smoking cessation trial.

Design—The current study was a secondary analysis of randomized smoking cessation intervention trial data.

Setting—The parent study was conducted in the Minneapolis/St. Paul area of Minnesota, USA.

Participants—Participants were 427 homeless adult smokers interested in quitting smoking.

Measurements—Covariates collected at baseline included alcohol, cocaine, marijuana/hashish, heroin, and “any” drug use, age, sex, race/ethnicity, education, tobacco dependence, length of time homeless, and treatment group. Biochemically-verified smoking abstinence and self-reported alcohol and substance use were collected at 26 weeks post-randomization.

Findings—Smoking abstinence was associated with fewer drinking days ($p=.03$), fewer drinks consumed on drinking days ($p=.01$), and lower odds of heavy drinking ($p=.05$), but not with differences in the number of days of cocaine, marijuana/hashish, heroin, or any drug use.

Conclusions—In homeless smokers, achieving smoking abstinence may be associated with a reduction in alcohol consumption but appears not to be associated with a substantial change in other drug use.

Keywords

homeless; smoking cessation; alcohol abuse; drug abuse; compensatory substance use

Introduction

Cigarette smoking among the homeless is a major public health issue, with estimates suggesting that 3 out of every 4 homeless adults is a current smoker (1–7). This is almost 4 times the smoking prevalence in the general population and more than double that found among low income adults (8, 9). Moreover, homeless smokers may smoke more cigarettes per day than the general population of smokers (10, 11). Consequently, smoking-attributable deaths are disproportionately high among the homeless (4, 9), even when health insurance coverage for the treatment of chronic smoking-related diseases is provided (7). However, studies suggest that anywhere between a third to three-quarters of homeless smokers are interested in quitting smoking (6, 10, 12, 13) and are receptive to getting assistance from healthcare professionals to do so (10). Unfortunately, lifetime quit rates among the homeless are very low (~9%)(1), with data from one study suggesting that the majority of homeless smokers who try to quit, even during an aided quit attempt, are unable to maintain abstinence for longer than 24 hours (14).

The reasons cited by homeless smokers regarding their low quit rates include the numerous barriers they face in trying to quit and maintain abstinence, including high rates of comorbid substance use (15). The perception of comorbid substance use as a barrier to quitting is echoed among healthcare professionals as well. For example, in a nationwide study conducted among 231 clinicians who serve the homeless, the majority of practitioners (86.9%) cited comorbid substance abuse as an important or very important barrier to smoking cessation among the homeless (2). Moreover, comorbid use of alcohol, one of the most common non-nicotine substances consumed among smokers, has been empirically linked with reduced odds of cessation (16) and a greater likelihood of smoking relapse (albeit among domiciled [i.e., not homeless] smokers)(17).

Unfortunately, the prevalence of comorbid substance use is high among the homeless. For example, a large smoking cessation trial indicated that more than 80% of the sample reported a lifetime history of drug abuse or dependence and 55% reported a lifetime history of alcohol abuse or dependence (18). Similarly, one national study indicated that 95% of non-treatment seeking homeless smokers endorsed a lifetime history of problematic alcohol or illicit substance use (1). Another study that followed 254 homeless adults over the period of a year found that over half yielded a positive urine test for any illicit drug during that time, the majority of which was attributable to crack/cocaine (19). Self-reported alcohol use was also prevalent within that sample, with slightly less than half of participants reporting use within the last month (19). In another study, focus groups with homeless smokers indicated that cigarette smoking was often intentionally combined with illicit drug or alcohol

use to enhance the synergistic effect of nicotine plus the drug of choice (15). In fact, smoking and comorbid substance use were perceived as so entangled with one another that homeless smokers reported that one potential motive to quit smoking was to avoid relapsing back to drug or alcohol dependence (15).

Although it is largely established that comorbid substance use is a barrier for smoking cessation, little is known about how a successful smoking cessation attempt might affect changes in non-nicotine substance use (i.e., alcohol, illicit drugs) among the homeless. However, the extent to which smoking cessation might engender an escalation in non-nicotine substance use could be a concern prohibiting treatment provision by clinicians, support for cessation by other health providers, and treatment engagement among homeless adults. For example, quitting smoking might lead to compensatory non-nicotine substance use behaviors to modulate affective symptomatology, or it may simply free up monetary resources to obtain other substances. On the other hand, evidence supporting that smoking cessation does not lead to an increase in comorbid substance use would provide support for addressing smoking cessation within a homeless population and would potentially alleviate concerns about how cessation might affect comorbid drug and alcohol use. To our knowledge, there have been no previous studies examining this issue among homeless smokers. The purpose of the current study was to redress this gap by examining whether smoking abstinence status was associated with alcohol and substance use at 26 weeks post-randomization among homeless smokers in a smoking cessation trial.

Methods

Participants and Procedures

Data for the current study were collected as part of a randomized clinical trial designed to examine the efficacy of a motivational interviewing (MI) based cessation intervention among homeless smokers in the Minneapolis/St. Paul, Minnesota area (18, 20). Recruitment and enrollment for this study was from May 2009 to August 2010 and was accomplished via promotion at health fairs, staff education sessions, and flyers posted at eight homeless shelters (21). Inclusion criteria were: being homeless [see (20) for more information on qualifications], a current daily cigarette smoker (100 cigarettes smoked in lifetime, 1 cigarette smoked daily over the preceding week) with expired carbon monoxide (CO) levels of 5 ppm, 18 years or older, willing to use the nicotine patch for 8 weeks and participate in counseling sessions, living in the Twin Cities (Minneapolis/St Paul metro area) for at least 6 months, planning to stay in the Twin Cities for the next 6 months, not currently pregnant and willing to use birth control (women only), and willing to complete scheduled appointments over the 6 month study period. Exclusion criteria were: use of another tobacco cessation aid in the previous 30 days, cognitive impairment, suicidal ideation in the last 14 days, a major medical incident (heart attack or stroke) occurring during the prior month, scoring >5 on psychotic symptoms from the Mini International Neuropsychiatric Interview (22).

Written informed consent was obtained prior to study enrollment. The enrolled sample consisted of 430 adult smokers who were randomly assigned to the MI condition (n=216) or to the standard treatment condition (n=214). Information about treatment conditions are detailed elsewhere (20), and treatment condition was treated as a covariate in the current

study. Data used in the current study were collected in-person from participants prior to the quit attempt and intervention provision (baseline) and at 26 weeks following randomization. All participants were provided with cessation aids (e.g., Nicotine Replacement Therapy, a 23-page printed cessation guide, counseling/advice) beginning at baseline, but following the collection of baseline data. Participants were instructed to make a smoking quit attempt following the baseline visit, and all formal cessation intervention ended by 8 weeks post-randomization.

Measures

Sociodemographics—Sociodemographic variables collected at baseline included age, sex, race/ethnicity, education, and the length of time of homelessness (“how long have you been without a regular or permanent place to live?”). Three participants were missing data on sociodemographics and were excluded from the current study.

Tobacco Dependence—Tobacco dependence was measured by the time to the first cigarette of the day: 5 minutes versus >5 minutes after waking.

Number of Drinking Days—Participants were asked to report the number of days of the previous 30 days that they had 1 or more alcoholic beverages, defined as at least “1 can or bottle of beer, 1 glass of wine, 1 bottle of wine cooler, 1 cocktail, or 1 shot of liquor.” Participants were also shown a cue card by research staff that contained pictorial references of the quantities described. The number of drinking days of the last 30 was measured at baseline and 26 weeks following randomization.

Number of Drinks Per Day on Drinking Days—Participants endorsing 1 drinking days were asked how many drinks they usually had each day over the past 30 days, and were again shown the alcohol cue card. The number of drinks per day was measured at baseline and 26 weeks following randomization. A value of 0 drinks was imputed for participants who endorsed 0 drinking days over the previous 30 days.

Heavy Drinking—Heavy drinking was an investigator-created variable consistent with the National Institute on Alcohol Abuse and Alcoholism definition (24), and consisted of endorsement of drinking, on average, >4 drinks per drinking day over the past 30 days for men or >3 drinks per drinking day over the past 30 days for women. Heavy drinking was calculated at baseline and 26 weeks following randomization.

Number of Cocaine Use Days—Participants were asked to report on how many days of the previous 30 days they had used cocaine, including all the different forms of cocaine (e.g., powder, crack, free base, and coca paste). The number of cocaine use days of the last 30 was measured at baseline and 26 weeks following randomization.

Number of Marijuana/Hashish Use Days—Participants were asked to report on how many days of the previous 30 days they had used marijuana or hashish, including pot or grass or hash oil, in a joint or pipe or cooked in food. The number of marijuana/hashish use days of the last 30 was measured at baseline and 26 weeks following randomization.

Number of Heroin Use Days—Participants were asked to report on how many days of the previous 30 days they had used heroin. The number of heroin use days of the last 30 was measured at baseline and 26 weeks following randomization.

Number of Days of Any Drug Use—An additional investigator-created variable assessed the number of days of any drug use by combining the aforementioned drug use variables

Smoking Abstinence—Point prevalence abstinence was indicated by a self-report of no smoking over the previous 7 days (not even a puff) and biochemically-verified using expired CO levels of ≤ 10 ppm. Smoking abstinence was measured at 26 weeks post-randomization. An intent-to-treat approach was taken whereby missing data were categorized as non-abstinent (n=120 cases).

Data Analysis

Frequency and descriptive statistics were run for all variables with inspection for outliers. Differences in participant characteristics by smoking status were assessed using t-tests and chi-square tests. Differences in comorbid substance use from baseline to Week 26, irrespective of abstinence status, were assessed using unadjusted paired sample t-tests and McNemar's tests. Main analyses consisted of a series of linear/logistic regressions to examine whether rates of substance use differed based on smoking abstinence status at 26 weeks post-randomization. These analyses controlled for the respective substance use variable at baseline as well as age, sex, race/ethnicity, education, length of time homeless, tobacco dependence, and treatment group. All analyses were performed using SAS, version 9.3.

Results

The analyzable sample comprised 427 homeless adults (75% male) due to the aforementioned participants with missing sociodemographics (n=3). Participants' ages ranged from 18–67 (mean age = 44), and the racial/ethnic composition of the sample was 35% White and 65% African American/other (56% African American, 4% Hispanic, and 5% Asian). Participant characteristics are detailed in Table 1. The CO-verified abstinence rate at 26 weeks post-randomization within the sample (irrespective of treatment group) was 8.9%. There were no significant differences in participant characteristics by abstinence status at week 26, as detailed in Table 1.

A single outlier for drinks per day was adjusted to missing due to an unlikely endorsement (N=50 drinks). Following this modification, baseline rates of non-nicotine substance use in the sample as a whole were as follows: 245 (57.4%) participants endorsed alcohol use, 251 (58.8%) endorsed cocaine use, 369 (86.4%) endorsed marijuana/hashish use, and 61 (14.3%) endorsed heroin use over the previous 30 days. In general, alcohol consumption was more prevalent than drug use (e.g., mean number of drinking days at baseline = 4.8 versus mean number of marijuana/hashish use days = 3.1), as shown in Table 1. Irrespective of smoking abstinence status, the mean values for comorbid substance use outcomes were lower at Week 26 than at the baseline assessment (data not shown, available upon request). These

differences were statistically significant for the number of drinking days and the number of cocaine use days (drinking days = 4.8 versus 3.6, $t=2.31$, $p=.02$; cocaine use days = 0.4 versus 0.2, $t=2.01$, $p=.05$).

Results of adjusted regression analyses indicated that smoking abstinence was associated with a fewer drinking days ($p=.03$), fewer drinks consumed on drinking days ($p=.01$), and a lower odds of heavy drinking ($p=.05$). Smoking abstinence was not associated with a change in the number of days of cocaine ($p=.39$), marijuana/hashish ($p=.87$), heroin use ($p=.76$), or any drug use ($p=.93$). See Table 2.

Discussion

The current study was the first, to our knowledge, to characterize comorbid substance use patterns by smoking status at week 26 among a sample of homeless smokers undergoing a planned smoking quit attempt. Smoking is under-addressed among the homeless (9), and the extent to which smoking cessation might engender an escalation in comorbid substance use could be a concern prohibiting cessation treatment provision and smokers' engagement in treatment (2, 15). Results from the current study indicate that smoking abstinence 26 weeks following an aided quit attempt was not significantly associated with an increase in the number of drinking days, the number of drinks consumed on drinking days, the number of binge drinking days, the odds of heavy drinking, or the number of days of cocaine, marijuana/hashish, heroin, or any drug use over the course of the parent smoking cessation intervention trial. Although replication in other samples is necessary, findings from this study suggest that clinical interventions to address smoking among the homeless do not lead to compensatory increases in comorbid substance use. Therefore, clinical interventions to assess and address smoking should be routinely implemented in health care encounters as well as in other settings in which homeless smokers are prevalent (e.g., homeless shelters) without significant concern about that smoking cessation will engender the escalated use of other non-nicotine substances of abuse.

In this sample, smoking abstinence at 26 weeks post-randomization was associated with a fewer drinking days, fewer drinks consumed on drinking days, and lower odds of heavy drinking. In their work with domiciled adults, Tsoi and colleagues found that smoking cessation was associated with greater odds of drug and alcohol use abstinence over the previous year among a sample of smokers receiving treatment for non-nicotine substance abuse/dependence (25). Moreover, they reported that smoking cessation a year following intake for non-nicotine substance abuse problems was associated with more favorable non-nicotine substance outcomes up to 9 years later (25). These effects may be attributable to common biopsychosocial mechanisms that underlie addictions, whereby abstinence from one substance facilitates the ability to abstain from another (26) and increased exposure to one substance engenders increased craving for another (27). Results of the current study add to the extant literature in this area supporting that quitting smoking does not result in increased use of non-nicotine substances, and may facilitate a reduction in drinking outcomes without direct intervention. Moreover, the current study extends this line of research to homeless smokers, who represent an underserved and vulnerable population of highly recalcitrant smokers at increased risk of health disparities.

Additional research is needed to develop more efficacious cessation interventions for homeless smokers to increase their low quit rates. Future studies might also examine the efficacy of interventions dually aimed at (or dually provided for) smoking cessation and concurrent non-nicotine substance reduction inasmuch as they might capitalize on shared mechanisms that reduce substance-related cravings. Research suggests that homeless individuals who smoke and use alcohol/drugs are interested in addressing both behaviors simultaneously (10, 13, 28). However, whether these interventions should be provided sequentially or concurrently is important to investigate, as at least one study conducted among domiciled alcohol dependent smokers indicated that concurrent intervention was associated with worse alcohol outcomes (29). In the current sample, however, the mean endorsements of substance use were lower at Week 26 than at baseline, regardless of abstinence status at 26 weeks. Moreover, these reductions were statistically significant for the number of drinking days and the number of cocaine use days. These data may suggest that intervening to facilitate smoking cessation among the homeless (even unsuccessfully) might be a catalyst for a reduction in non-nicotine substance use as well. Such interventions may be especially critical given recent evidence that drug use has replaced HIV as the leading cause of mortality among homeless individuals in at least one area of the country (30).

Limitations of the current study include sample characteristics, including that the sample comprised treatment-seeking smokers from the mid-West. Results may not generalize to non-treatment-seeking smokers, to homeless smokers from other areas of the nation, or to smokers who differ from the current sample in other substantive ways. In addition, the substance use outcomes included in the current study relied on participants' self-report and may not be accurate as a result of recall bias, reluctance to report illegal behaviors (in the case of illicit drug use), or social desirability effects. At least one previous study assessing substance use among a homeless sample found lower rates of self-reported use than use confirmed by biochemical assessment (urine testing)(19). In addition, smoking abstinence rates at Week 26 were exceedingly low (9%). While low abstinence rates are commonplace in smoking intervention studies among the homeless (see also 31), replication among other samples is necessary to better ascertain the generalizability of results. Finally, the current study was limited to the variables collected in the parent trial. As a result, future studies might target outcomes not assessed in this study, including changes in the quantities of illicit drug use consumption following a smoking quit attempt.

In summary, although smoking rates are exceedingly high among homeless adults, tobacco use is not routinely addressed by clinical and healthcare providers (1). Consequently, smoking among the homeless has been deemed a "neglected addiction" (9), despite its significant contribution to the health disparities experienced by this population (4, 7, 9). Previous studies suggest that both homeless smokers as well as their treatment providers consider comorbid substance use a barrier to smoking cessation (1, 15). However, results from the current study suggest that smoking cessation itself is not associated with an escalation in comorbid substance use, and may possibly facilitate a reduction in drinking outcomes even without direct intervention. Therefore, reluctance on the part of homeless smokers to make a quit attempt, or by healthcare or clinical providers to address smoking among the homeless, should not be based upon fear of compensatory addictive behaviors.

To the contrary, facilitating smoking cessation among the homeless should be promoted and encouraged as an important goal to improve health and to potentially preserve what limited monetary resources these individuals possess.

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Table 1

Participant Characteristics with Differences in Smoking Abstinence Status at Week 26

Covariates	All (N=427) M[SD]/N(%)	Relapsed (N=389) M[SD]/N(%)	Abstinent (N=38) M[SD]/N(%)	Group Differences <i>p</i> value
Age	43.81 [10.0]	43.60 [9.9]	45.53 [0.3]	0.266
Sex				0.149
Male	318 (74.5)	286 (73.5)	32 (84.2)	
Female	109 (25.5)	103 (26.5)	6 (15.8)	
Race/ethnicity				0.129
African American/Other	278 (65.1)	249 (64.0)	29 (76.3)	
Non-Hispanic White	149 (34.9)	140 (36.0)	9 (23.7)	
Education				0.728
< High school degree	100 (23.4)	93 (23.9)	7 (18.4)	
High school degree	196 (45.9)	178 (45.8)	18 (47.4)	
> High school degree	131 (30.7)	118 (30.3)	13 (34.2)	
Length of time homeless				0.177
<1 year	214 (50.1)	191 (49.1)	23 (60.5)	
1-3 years	150 (35.1)	137 (35.2)	13 (34.2)	
>3 years	63 (14.8)	61 (15.7)	2 (5.3)	
Tobacco dependence				0.510
>5 min after waking	224 (52.5)	206 (53.0)	18 (47.4)	
≤5 min after waking	203 (47.5)	183 (47.0)	20 (52.6)	
Treatment group				0.315
Motivational Interviewing	214 (50.1)	192 (49.4)	22 (57.9)	
Standard Treatment	213 (49.9)	197 (50.6)	16 (42.1)	
Baseline Substance Use				
# of drinking days	4.83 [7.8]	4.74 [7.7]	5.76 [9.3]	0.441
# drinks/day	2.59 [3.9]	2.64 [4.0]	2.08 [2.7]	0.406
Heavy drinking				0.440
No	335 (78.8)	304 (78.4)	31 (83.8)	
Yes	90 (21.2)	84 (21.7)	6 (16.2)	
# cocaine days	0.41 [2.1]	0.44 [2.2]	0.08 [0.5]	0.320
# marijuana/hashish days	3.09 [7.0]	2.95 [6.8]	4.58 [9.0]	0.173
# heroin days	0.02 [0.2]	0.02 [0.2]	0.00 [0.0]	0.507
# any drug use days	3.52 [7.5]	3.40 [7.4]	4.66 [9.0]	0.328

Note: Differences in smoking status at Week 26 by participant characteristics were assessed using t-tests and chi-square tests.

Table 2

Adjusted Relations of Week 26 Smoking Abstinence and Substance Use

Substance Use Outcome	Parameter Estimate / (95% CI) or Odds Ratio [95% CI]	N	p value
# drinking days	-2.16 (-4.04, -0.28)	321	0.025
# drinks/day	-1.33 (-2.33, -0.32)	319	0.010
Heavy drinking	0.27 [0.08, 0.99]	319	0.049
# cocaine days	-0.15 (-0.48, 0.19)	320	0.393
# marijuana/hashish days	-0.17 (-2.26, 1.92)	320	0.872
# heroin days	-0.01 (-0.06, 0.04)	319	0.764
# any drug use days	-0.09 (-2.22, 2.04)	321	0.933

Note: Differences in substance use outcomes by smoking abstinence status were evaluated using linear and logistic regressions. All analyses were adjusted for age, sex, race/ethnicity, education, length of time homeless, tobacco dependence, and treatment group. Interactions between covariates and Week 26 smoking status were examined for all models. Both age and education interacted with smoking status for marijuana use and any drug use days (results available upon request).