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Butt Why? Exploring Factors Associated with Cigarette Scavenging Behaviors among Adult Smokers Enrolling in a Clinical Trial for Smoking Cessation

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Abstract

Introduction—Cigarette smoking is associated with many adverse health effects and is an important public health concern. Increased understanding of smokers' behavior is central to developing effective interventions. Cigarette scavenging, a behavior that involves smoking shared or previously used cigarettes has thus far only been shown to be prevalent among homeless or incarcerated populations. The current study examines whether cigarette scavenging is prevalent in a more general population of adult smokers enrolling in a smoking cessation clinical trial, and whether engagement in this behavior is associated with demographic or smoking-related psychosocial factors.

Methods—Baseline data was obtained from adult smokers (N=227) enrolling in a randomized clinical trial for smoking cessation. Cigarette scavenging was assessed using three items: a) sharing a cigarette with a stranger; b) smoking a "found" cigarette and c) smoking a previously used cigarette "butt". Participants who endorsed engaging in at least one of these three behaviors were categorized as a scavenger.

Results—Approximately 32% of participants endorsed at least one cigarette scavenging behavior. A multiple logistic regression analysis found that scavengers were more likely to be:

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Contributors

Authors Bock, Jennings & Fava participated in the design of the parent study and wrote the protocol. Author Lantini conducted literature searches and provided summaries of previous research studies. Author Fava conducted the statistical analysis. Authors Lantini and Sillice wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

Conflicts of interest

All authors declare that they have no conflicts of interest.

men ($p < .001$), of younger age at smoking onset ($p = .012$), unemployed ($p = .003$), more likely to have used marijuana in the past 30 days ($p = .005$), single or living alone ($p = .003$), and to have experienced higher withdrawal symptoms during previous quit attempts ($p = .044$) as compared to non-scavengers.

Conclusions—Scavenging is common among adult smokers. Interventions that address cigarette scavenging behaviors may better meet the needs of this unique smoking subgroup.

Keywords

smoking; cigarette scavenging; nicotine dependence; nicotine addiction

1. Introduction

Despite increased knowledge of the negative health consequences of smoking, an estimated 36.5 million American adults, or 15.1%, currently smoke cigarettes (Jamal et al., 2016). As a result, smoking remains the leading cause of preventable death in the United States (USDHHS, 2014), with smoking prevalence highest among men, younger adults, those with lower levels education, lower incomes, and those with psychological comorbidity (Jamal et al., 2016).

Economic, social, and environmental changes occurring in U.S. society have made it more difficult for smokers to easily satisfy their nicotine cravings. These include a growing negative sentiment directed at smokers, stigmatizing and forcing them to smoke apart from nonsmokers, strict laws and workplace policies prohibiting smoking in many public spaces and the increased price of cigarettes through higher tobacco taxes places burdens on smokers with limited economic means.

One unintended consequence of increased tobacco taxes is that individuals with limited financial resources may engage in unconventional smoking behaviors to satisfy their nicotine craving. Such behaviors include smoking shared or previously used cigarettes, smoking discarded cigarettes (“butts”), and remaking cigarettes from portions of discarded cigarettes. While previous studies have used terms such as “sniping” (Tucker, Shadel, Golinelli, Mullins, & Ewing, 2015), “smoking used cigarettes” (Lantini et al., 2015) and “high-risk smoking” (Aloot, Vredevoe, & Brecht, 1993), we refer to these behaviors as “cigarette scavenging”, which more clearly describes these specific smoking behaviors. It has been suggested that engaging in these scavenging behaviors may be associated with additional health risks beyond those already posed by conventional smoking such as increased risk of toxin exposure, and/or increase risk of infectious disease transmission (e.g. Aloot et al. 1993), however, there are no extant studies showing this association.

Recent studies have suggested that engaging in these behaviors may also be associated with greater nicotine dependence (Lantini et al., 2015; Pettey, 2015; Tucker et al., 2015), and other factors previously demonstrated to be associated with greater nicotine dependence, such as lower income (Tucker et al., 2015), younger age of smoking onset (Lantini et al., 2015), and substance use (Pettey, 2015; Tucker et al., 2015). However, to our knowledge, studies examining these behaviors have only been conducted among homeless adults (Aloot

et al., 1993; Chen et al., 2016; Okuyemi et al., 2006), homeless youth (Tucker et al., 2015), and incarcerated populations (Lantini et al., 2015). It is unclear to what extent cigarette scavenging is prevalent among a more general population of smokers, and what factors underlie their engagement in these behaviors.

This study assesses the prevalence of cigarette scavenging in a population of adult smokers enrolling in a smoking cessation clinical trial, and explores whether scavenging is associated with certain demographic or psychosocial variables.

2. Method

2.1. Participants & Procedures

Participants were 227 smokers enrolled in a randomized clinical trial offering cognitive behavioral therapy for smoking cessation plus either yoga or wellness classes. Eligible individuals were at least age 18 years of age, who smoked at least 5 cigarettes per day and were in generally good health. Individuals were excluded if they had a BMI over 40, had untreated psychiatric illness, or had medical conditions that would make participation in light to moderate exercise either difficult or medically inadvisable. Eligible individuals attended an orientation session where the study was described in greater detail and trained research staff obtained informed consent. Consented individuals were then scheduled for a return visit to receive their randomization assignment and complete baseline assessments. All baseline data were collected by research staff prior to participant randomization. Study procedures were approved by the Miriam Hospital Institutional Review Board. A Full description of study procedures has been published elsewhere (Bock et al., 2014).

2.2 Measures

2.2.1. Demographics—Participants responded to demographic questions about their age, gender, race, ethnicity, marital and employment status, education, and annual income.

2.2.2. Smoking-Related Measures—Baseline surveys contained questions regarding participants smoking history, current smoking rate, nicotine dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerstrom, 1991), severity of nicotine withdrawal symptoms during previous quit attempts (Withdrawal Symptoms Questionnaire; Hughes & Hatsukami, 1986), and motivation, readiness and confidence to quit smoking assessed by 3 items using a 10-point scale from “not at all” to “extremely. Temptation to smoke under a variety of circumstances was measured using the 9-item Smoking Situations Temptations scale (SST; Velicer, Diclemente, Rossi, & Prochaska, 1990), which assesses temptations related to habit/addiction, negative affect, and social situations.

2.2.3. Psychosocial Measures—Factors known to influence smoking behavior were also assessed. Depressive symptoms were assessed using the 10-item Centers for Epidemiological Studies Depression Scale (CESD-10; Andresen, Malmgren, Carter, & Patrick, 1994). Anxiety was assessed using the 20-item State-Trait Anxiety Inventory (STAI-t; Spielberger, 2005; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Current positive affect (PA) and negative affect (NA) were measured using the 20-item Positive and

Negative Affect Questionnaire (PANAS; Watson, Clark, & Tellegen, 1988). Impulsiveness was assessed using the 30-item Barratt Impulsiveness Scale (BIS-11; Patton, Stanford, & Barratt, 1995), which assesses attentional impulsivity, motor impulsivity and non-planning impulsivity. Social support was assessed using the 12-item Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983).

2.2.4. Cigarette Scavenging Behaviors (CSB)—Using the 3-item CSB instrument (Lantini et al., 2015), participants responded “yes” or “no” to each of the following items: a) “Have you ever *shared* a cigarette with a stranger?” b) “Have you ever *smoked* a cigarette that you found?”, and c) “Have you ever *smoked* a cigarette that someone else has used (e.g., a cigarette butt)?” The three questions were examined in aggregate and also dichotomized as: (1) engaged in 1 or more behaviors, or (0) engaged in none of these behaviors. Anyone responding *yes* to at least one of the three questions was categorized as a scavenger.

2.3. Data Analysis

All statistical analyses were conducted using IBM SPSS Statistics for Windows, Release 20.0.0 (IBM Corp., 2011). We first conducted a descriptive analysis of the overall demographic characteristics of the study participants. We next identified participants who were cigarette scavengers and compared that group to non-scavengers. Group comparisons were conducted using either chi-square or analysis of variance (ANOVA) tests, depending on the characteristics (categorical or continuous) of the dependent variable examined. We calculated effect sizes, Cramer’s V for chi-square tests and Cohen’s d for mean group differences (Cohen, 1988). Lastly, we examined which of the variables that were significant ($p < .05$) or exhibited a trend ($p < .10$) in the group comparisons, would emerge as significant predictors of cigarette scavenging behavior when simultaneously included within a multiple logistic regression model. Results are reported based on Wald tests with associated odds ratios and their 95% confidence intervals.

3. Results

3.1. Participant Characteristics

The sample (Table 1) was 85.9% White, over half were female (55%), with a mean age of 46.2 years (range: 18 to 65; $SD=12.0$). Approximately 65.6% were employed and 27.2% reported annual household incomes below \$23,000.

3.2. Scavenging Frequency

Nearly one third (32%) of all participants ($N=72$) reported engaging in at least one scavenging behavior. Among those endorsing any scavenging behaviors, 48.6% ($N=35$) endorsed sharing a cigarette with a stranger, 65.2% ($N=47$) had smoked cigarettes they found, and 73.6% ($N=53$) had ever smoked a previously smoked cigarette butt. Additionally, 43.1% ($N=31$) engaged in only 1 of 3 scavenging behaviors, 26.4% ($N=19$) reported engaged in 2 of 3 scavenging behaviors, and 30.6% ($N=22$) reported engaging in all 3 scavenging behaviors.

3.3. Scavengers vs. Non-Scavengers

Scavengers were more likely than non-scavengers to be male ($\chi^2 [1] = 8.18, p=.004$), younger ($F [1, 225] = 7.86, p=.005$), unemployed ($\chi^2 [2] = 13.27, p=.001$), single/not cohabiting with a partner ($\chi^2 [1] = 9.10, p=.003$), have incomes $\leq \$23,000$ ($\chi^2 [2] = 10.52, p=.005$), and have used marijuana in the past month ($\chi^2 [2] = 9.57, p=.008$). Scavengers started smoking at a younger age ($F [1, 225] = 5.59, p=.019$), reported greater withdrawal symptoms during previous quit attempts ($F [1, 219] = 5.28, p=.023$), indicated less confidence in their ability to quit smoking ($F [1, 225] = 6.57, p=.011$), had greater temptation to smoke due to habit/addiction ($F [1, 225] = 3.85, p=.051$), and were less ready to quit smoking ($F [1, 225] = 3.50, p=.063$).

Scavengers had more depressive symptoms ($F [1, 224] = 3.99, p=.047$) and reported less social support ($F [1, 225] = 7.93, p=.005$) than non-scavengers. Scavengers also scored higher on overall impulsivity ($F [1, 202] = 12.16, p=.001$), and on each BIS sub-scales: Attentional ($F [1, 205] = 9.28, p=.003$), Motor ($F [1, 204] = 9.34, p=.003$), and Non-planning ($F [1, 204] = 7.39, p=.007$); See Table 1). However, the BIS-11 was not administered to the first study cohort of 19 participants, and was excluded from the overall multiple logistic regression model (Table 2).

In total, these analyses indicated 13 variables associated with scavenging (p values < 0.10). A multiple logistic regression analysis examined the simultaneous association of these variables on the likelihood of participants being scavengers versus non-scavengers. Six variables were found to be significant predictors of scavenging: gender, employment status, marital status, age of cigarette smoking onset, severity of withdrawal symptoms during previous quit attempts and marijuana use. The 3 strongest predictors of cigarette scavenging behaviors were: 1) gender ($OR = 4.21, 95\% CI = 1.96-9.05, p<.001$), 2) marijuana use ($OR = 4.01, 95\% CI = 1.52-10.59, p=.005$), and 3) marital status ($OR=3.37, 95\% CI = 1.50-7.59, p=.003$). Additional significant predictors included: employment status ($OR=3.07, 95\% CI = 1.08-8.73, p=.036$), withdrawal symptom severity ($OR=1.03, 95\% CI = 1.00-1.07, p=.044$), and age of smoking onset ($OR=0.91, 95\% CI = 0.85-0.98, p=.012$; See Table 2). No significant differences were observed for the other 7 predictors in the full model. Overall, the model had a Cox-Snell R^2 of .252 and a Nagelkerke R^2 equal to .352.

4. Discussion

Study results show that approximately one-third of our sample of adult smokers engaged in at least one cigarette scavenging behavior sometime in the past. Six factors were significantly predictive of engaging in scavenging: gender, employment status, marital status, age of cigarette smoking onset, severity of withdrawal symptoms during previous quit attempts and marijuana use.

Prior research found that nicotine dependence was related to cigarette scavenging in both a homeless (Tucker et al., 2015) and an incarcerated population (Lantini et al., 2015). While our study did not find such a relationship, results did show a relationship with other variables indicative of dependence on nicotine including early age of smoking onset, severity of tobacco withdrawal symptoms, and depressive symptoms (CESD-10). These findings are

consistent with past research showing that greater degrees of psychological distress, specifically depression (Fluharty, Taylor, Grabski, & Munafo, 2017), earlier age of smoking onset (e.g. Lanza & Vasilenko, 2015) and marijuana use (e.g. Schauer, Berg, Kegler, Donovan, & Windle, 2016) are associated with nicotine dependence.

The lack of significant association between nicotine dependence and cigarette scavenging in our study may be due to scavengers underestimating the number of cigarettes they smoke each day on the FTND. Scavengers may have difficulty remembering smoking cigarettes they did not purchase. Scavengers might also report smoking fewer cigarettes as a result of social, economic and/or environmental constraints that force them to smoke less than they desire. Currently, the FTND does not take such limitations into account and one of the strongest driving factors for the FTND total score remains the number of cigarettes smoked per day. Thus, FTND scores may be underestimating actual levels of nicotine dependence in certain subgroups of smokers. Thus researchers may have to develop alternative methods for assessing dependence among scavenging smokers.

Lower income (< \$23,000) was significantly associated with cigarette scavenging in the initial group analysis, but was not significant in the multiple logistical regression model. However, as income is typically a reflection of employment status, lack of employment was more strongly associated with cigarette scavenging behavior rather than income.

This is the first study to examine the prevalence of and factors associated with engaging in these scavenging behaviors among a sample of adult smokers seeking to quit smoking. Results suggest that future research on cigarette scavenging is needed to determine how engaging in these behaviors may affect short- and long-term health consequences. Additionally, future research should examine if increased frequency of engaging in these behaviors affects the short- and long-term health consequences. It is also important that future research examine whether scavenging may be predictive of difficulty in quitting smoking.

This study has some limitations. First, scavenging was measured only at baseline and questions were framed to ask if participants had “ever” engaged in these behaviors. To provide a richer view of scavenging over time, future research should consider assessing scavenging behaviors at specific time points (e.g., past 30 days, past year, etc.) rather than “ever”, and should attempt to quantify the frequency of engaging in these behaviors longitudinally and examine whether engaging in these behaviors poses additional health risks. Second, while it has been speculated that scavenging may pose additional health risks (Aloot et al. 1993; Tucker et al., 2015; Chen, Nguyen, Malesker, & Morrow, 2016) and may be an unintended consequence of tax policy that drives up the cost of cigarettes, it was beyond the scope of this study to examine the relationship between scavenging, health outcomes and tax policy. However, it is important that such work, be undertaken in the future to inform policy decisions and gain a greater understanding of the consequences of scavenging.

Nonetheless, the strength of this study is the introduction of the notion of cigarette scavenging behaviors among a more general population of adult smokers enrolled in a

smoking cessation study. The assessment of scavenging behaviors in this population is important given its implication for intervention efforts. The knowledge of different smoking behaviors is central to the development of new strategies for smoking cessation. This information may help inform future smoking cessation investigations by allowing researchers to identify subgroups of smokers with particular needs that may require unique interventions to achieve successful quits.

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Highlights

- Cigarette scavenging is a smoking behavior involving shared or previously used cigarettes.
- This behavior has not yet been assessed in a general population of adult smokers.
- 31.7% of study participants were classified as cigarette scavengers.
- Significant differences were observed between scavengers and non-scavengers.
- Interventions addressing these behaviors may meet the needs of this subgroup of smokers.

Table 1

Descriptive statistics comparing scavengers to non-scavengers on demographic, smoking-related and psychosocial variables at baseline.

Variable	Scavenger n = 72	Non-scavenger n = 155	p ^a	Effect Size ^b
Demographic Characteristics				
Age	43.0 (13.0)	47.7 (11.2)	.005 *	.39
Gender (% male)	58.3%	38.1%	.004 *	.19
Race/Ethnicity (% Non-Hispanic White)	81.9%	87.7%	.243	.08
Education (% 12 th grade or less)	29.2%	27.1%	.691	.06
Employed (% full or part-time)	51.4%	72.3%	.001 *	.24
Marital Status (% married or living with partner)	27.8%	49.0%	.003 *	.20
Household Income (% \$23,000)	38.9%	19.4%	.005 *	.22
Substance Use (% marijuana use only)	26.4%	11.0%	.008 *	.21
Smoking Related Characteristics				
# Cigarettes per day	16.1 (7.3)	17.4 (8.0)	.234	.17
Age started smoking	15.7 (3.7)	17.6 (6.5)	.019 *	.36
Nicotine Dependence: FTND	5.1 (1.9)	4.9 (2.1)	.344	.10
Readiness to quit	7.6 (1.9)	8.1 (1.7)	.063	.28
Confidence to quit	7.4 (2.0)	8.0 (1.8)	.011 *	.32
Motivation to quit	8.5 (1.4)	8.8 (1.5)	.245	.21
Withdrawal Symptoms	42.6 (13.1)	38.7 (11.4)	.023 *	.32
Smoking Temptation/Self-Efficacy	35.3 (5.7)	34.3 (5.7)	.194	.18
Habit Subscale	10.8 (2.6)	10.1 (2.7)	.051 *	.26
Social Subscale	12.0 (2.3)	11.9 (2.2)	.518	.04
Mood Subscale	12.5 (2.5)	12.4 (2.5)	.783	.04
Psychosocial Characteristics				
Depression: CES-D	9.6 (6.0)	7.9 (6.0)	.047 *	.28
Anxiety: STAI-t	2.0 (0.5)	1.9 (0.5)	.114	.20
Positive Affect: PANAS-PA	34.0 (8.0)	34.2 (8.2)	.840	.02
Negative Affect: PANAS-NA	18.0 (8.7)	16.7 (7.4)	.261	.16
Interpersonal Social Support: ISEL	37.0 (7.9)	39.9 (6.7)	.005 *	.40
Impulsiveness: BIS	65.8 (11.0)	60.5 (10.0)	.001 *	.50
Attentional Subscale	16.4 (4.5)	14.6 (3.8)	.003 *	.43
Motor Subscale	23.3 (4.4)	21.3 (3.8)	.003 *	.49
Non-planning Subscale	26.5 (4.4)	24.7 (4.3)	.007 *	.41

Note: FTND = Fagerstrom Test of Nicotine Dependence (range = 0–10); CES-D = Center for Epidemiologic Depression Scale (range = 0–30); STAI-t = State Trait Anxiety Inventory – Trait Subscale (range = 20–80); PANAS-PA = Positive Affect & Negative Affect-Positive Affectivity (range = 10–50); PANAS-NA = Positive and Negative Affect Schedule-Negative Affectivity (range = 10–50); ISEL = Interpersonal Support Evaluation List (range = 0–36); BIS-11 = Barratt Impulsiveness Scale (range = 30–120); Temptation = Smoking Temptation/Self-Efficacy (range = 0–36); Numbers in parentheses represent Standard Deviation values.

^a p values comparing scavengers to non-scavengers.

^b Effect size estimated represent Cohen d for continuous variables and Cramer V for categorical variables

*
p < .05

Table 2

Multiple Logistic Regression Model Predicting Scavenging Behavior with Variable Coefficients, Standard Errors, p-values, Odds Ratios and 95% Confidence Intervals.

	Beta (SE)	Odds Ratio	95 % CI		p-value	
			Lower	Upper	Lower	Upper
Demographic Characteristics						
Age	−0.03 (0.02)	0.98	0.95	1.01		.118
Gender						
Female	Ref.	Ref.	Ref.	Ref.		Ref.
Male	1.44 (0.39)	4.21	1.96	9.05		< .001 *
Employment						
Employed full or part-time	Ref.	Ref.	Ref.	Ref.		Ref.
Unemployed	1.12 (0.53)	3.07	1.08	8.73		.036 *
Retired/Other	0.75 (0.60)	2.11	0.66	6.78		.210
Marital Status						
Married/Living with Partner	Ref.	Ref.	Ref.	Ref.		Ref.
Single/Separated/Divorced/Widowed	1.22 (0.41)	3.37	1.50	7.59		.003 *
Household Income						
> \$23,000	Ref.	Ref.	Ref.	Ref.		Ref.
\$23,000	0.21 (0.12)	1.23	0.49	3.09		.657
Don't Know/Refused to Answer	−0.50 (0.76)	0.61	0.14	2.71		.513
Substance Use						
No Drug Use	Ref.	Ref.	Ref.	Ref.		Ref.
Marijuana Use Only	1.39 (0.50)	4.01	1.52	10.59		.005 *
Use of Other Drugs NOT Marijuana	0.31 (0.63)	1.36	0.39	4.70		.628
Smoking Related Characteristics						
Age of Smoking Onset	−0.09 (0.03)	0.91	0.85	0.98		.012 *
Withdrawal Symptoms	0.03 (0.02)	1.03	1.00	1.07		.044 *
Readiness to Quit	−0.02 (0.12)	0.98	0.77	1.24		.863
Confidence to Quit	−0.05 (0.11)	0.95	0.76	1.19		.665

	Beta (SE)	Odds Ratio	95 % CI		p-value
			Lower	Upper	p-value
Psychosocial Characteristics					
Depression: CESD	−0.02 (0.04)	0.98	0.91	1.05	.500
Interpersonal Social Support: ISEL	0.01 (0.03)	1.01	0.95	1.07	.780
Smoking Temptation: Habit Subscale	0.12 (0.07)	1.13	0.98	1.29	.083

* p < .05