Factors Associated with Cigarette Smoking in Homeless Adults: Findings From an Outpatient Counseling Clinic

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ABSTRACT

Background: Those who are homeless are 4 times more likely to smoke cigarettes than the general population in the United States. Though research has investigated smoking risk factors among homeless individuals, further investigation is needed to understand factors that can be addressed by smoking cessation programs. This study seeks to understand characteristics associated with cigarette use in clients of the counseling clinic at a Midwest homeless shelter, including whether homeless individuals who smoke demonstrate lower self-efficacy, greater social isolation, poorer perception of therapy, and greater levels of chronic homelessness than nonsmokers.

Methods: From 2014 through 2019, clients of the counseling clinic were invited to contribute to a data bank. Logistic regression was performed to determine predictors of smoking status.

Results: No association was identified between smoking status and self-efficacy, social isolation, perception of therapy, or chronic homelessness. Compared to those without a high school degree, odds of being a smoker were 95% lower for those with a high school degree or equivalent and 93% lower for those with more than a high school education. Those with 3 or more episodes of prior substance abuse treatment were more likely to be smokers.

Conclusion: This study demonstrates that cigarette use among the homeless population is associated with low education level and prior substance abuse treatment. Smoking cessation programs would benefit from tailoring information to the education level of their audience. Further study could determine whether use of other substances may contribute to cigarette use in the homeless population and how this may be addressed by smoking cessation programs.

INTRODUCTION

Those who are homeless are 4 times more likely to smoke than the general US population.[1] Factors associated with tobacco use in the general population include male gender, low socioeconomic status, unemployment, mental illness, immigrant status, single motherhood, and minority status,[2] as well as lower educational attainment[3-6] and past-year illicit substance abuse.[3] Factors associated with tobacco use in homeless adults include "out-of-home placement in childhood, victimization while homeless, past-year employment, prior illicit drug use, and problem alcohol use."[7]

Smoking cessation programs are valuable for reducing smoking prevalence, and such programs must not ignore how the homeless community is disproportionately affected by cigarette use.[1] Though some research has been done to investigate smoking risk factors among individuals who are homeless, further investigation is needed to understand factors that can be addressed by smoking cessation programs. This study sought to understand personal and health characteristics associated with smoking in clients of the counseling clinic at a Midwest homeless shelter.

Community Partnership

In 2014, researchers at a medical college joined with a local homeless shelter and service agency to assess client information and outcomes of the agency's counseling clinic. The data were obtained for purposes of quality improvement and clinical reporting, and all clients were offered the opportunity to also include their information in a data bank for research purposes. In addition, medical students conduct smoking cessation education sessions at the agency. Small groups of medical students facilitate conversations with individuals about their experiences with cigarette use and cessation. They provide education about the risks associated with cigarette use and information about smoking ces-

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sation resources. Understanding the factors affecting cigarette use in this homeless population could inform improvements to these classes.

Objectives

The objective of this study is to investigate the factors associated with cigarette use in homeless adults, including whether homeless individuals who smoke demonstrate lower self-efficacy, greater social isolation, poorer perception of therapy, and greater levels of chronic homelessness when compared with homeless individuals who do not smoke. The hope is to increase outreach for tobacco use prevention and cessation to homeless populations and inform improvements to smoking cessation programs.

METHODS

Participants and Data Collection

Data were collected at the agency's counseling clinic from July 17, 2014, through June 25, 2019. Clients completed 3 routine assessments – client characteristics, intake demographics, and monthly outcomes – and each was obtained by counselor interview. A total of 117 out of 198 individuals consented for their assessment data to be included in the data bank for future research. The study population (n = 97) consisted of those who indicated a history of homelessness. The 20 individuals excluded represented community referrals who had not experienced homelessness. Approval to analyze the data was granted by the Medical College of Wisconsin / Froedtert Hospital Institutional Review Board (Protocol Number PRO00037089).

Table 1. Variables Assessed Via Interviews of Individuals With History of Homelessness in a US Midwestern City

Variable	n (%)
Median Age (n = 97)	48.3
Sex (n = 97)	
Male	91 (94)
Female	6 (6)
Ethnicity (n = 96)	
Hispanic	10 (10)
Non-Hispanic	86 (90)
Race (n = 97)	
Black/African American	45 (46)
White/Caucasian	36 (37)
Other/no response	16 (16)
Highest education level (n = 97)	
Some high school or less	23 (24)
High school, GED, HSED	35 (36)
Technical training, some college or greater	39 (40)
Housing (n = 97)	
Yes	28 (29)
No	69 (71)
Chronic homelessness (n = 97)	
Yes	51 (53)
No	46 (47)
Employment (n = 97)	
Yes	33 (34)
No	64 (66)
Employment schedule (n = 33)	
Full-time	14 (42)
Part-time	13 (39)
Temporary (not an ongoing thing)	6 (18)
Employment status behavior (n = 62)	
Looking for work	21 (34)
Focusing on treatment	15 (24)
Applying for disability benefits	9 (15)
Receiving disability benefits	13 (21)
Not looking for another reason or don't want to work	4 (6)
Health insurance (n = 97)	
Yes	85 (88)
No	12 (12)
Currently smoke (n = 97)	
Yes	71 (73)
No	26 (27)
Psychiatric hospitalization (n = 97)	
Yes	11 (11)
No	86 (89)
Emergency department visits (n = 97)	
Yes	25 (26)
No	72 (74)
Previous substance abuse treatment (n = 97)	
No prior treatment	29 (30)
1–2	28 (29)
3+	40 (41)
Previous mental health treatment (n = 97)	
No prior treatment	38 (39)
1–2	37 (38)
3+	22 (23)
Time since last substance use (median in days) (n = 89)	
Substance use stage of change (n = 90)	
Precontemplation or contemplation	25 (28)
Preparation	19 (21)
Action or maintenance	34 (38)
Not currently being addressed	12 (13)
Mental health stage of change (n = 96)	
Precontemplation or contemplation	40 (42)
Preparation	23 (24)
Action or maintenance	18 (19)
Not currently being addressed	15 (16)
Perception of therapy (n = 95)	
Strongly agree	52 (55)
Agree	29 (31)
Neutral	14 (15)
Disagree	0 (0)
Strongly disagree	0 (0)
Mean social isolation score (n = 97)	56.97
Mean self-efficacy score (n = 97)	4.05

Abbreviations: GED, general education development; HSED, high school equivalency diploma.

Variables and Measurements

The list of the independent variables included in this study with corresponding questions and answer options as they appeared in the forms provided by the counseling clinic is provided in Appendix 1. Variables include information related to demographics, housing, employment, health care, and personal perceptions. Chronic homelessness was defined as being either homeless continuously for at least the last 12 months or homeless 4 or more times in the past 3 months. Perception of therapy refers to seeing the value in therapy. Mental health stage of change and substance use stage of change were assessed by the treating counselor and refer to behavior changes made as part of mental health or substance use treatment in the counseling clinic. Stages of change are described by the Transtheoretical Model of Behavior Change. For purposes of analysis, some variable categories were regrouped so that at least 10 participants fell into each variable category. Appendix 2 indicates how the categories were regrouped.

Social isolation was measured using the Patient-Reported Outcomes Measurement Information System (PROMIS) Short Form v2.0 – Social Isolation 4a.[8] In this context, social isolation is defined as the "perceptions of being avoided, excluded, detached, disconnected from, or unknown by others."[9] This short form was developed for adults and was presented in English. It consisted of 4 questions each, with 5 responses ranging from never to always. A raw score was calculated by summing the values associated with each response. Next, a scaled T-score was generated by using

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Table 2. Results of Univariate Logistic Regression Analysis With Odds Ratios for Whether a Given Independent Variable is Associated With Current Cigarette Use

Variable	Odds Ratio (95% CI)	*P* value
Age (n = 97)	1.02 (0.98 – 1.06)	0.27
Sex (n = 97)		
Male		
Female	1.89 (0.29 – 37.24)	0.57
Ethnicity (n = 96)		
Hispanic		
Non-Hispanic	1.17 (0.24 – 4.62)	0.83
Race (n = 97)		
Black/African American		
White/Caucasian	0.95 (0.35 – 2.57)	0.91
Other/No Response	1.09 (0.31 – 4.49)	0.90
Highest level of education (n = 97)		
Some high school or less		
High school, GED, HSED	0.09 (0.004 – 0.5)	0.02[a]
Technical training, some college or greater	0.09 (0.005 – 0.51)	0.03[a]
Housing (n = 97)		
Yes		
No	1.13 (0.41 – 2.97)	0.8
Chronic homelessness (n = 97)		
Yes	1.76 (0.71 – 4.45)	0.22
No		
Employment (n = 97)		
Yes	0.96 (0.38 – 2.56)	0.94
No		
Employment schedule (n = 33)		
Full-time		
Part-time	0.64 (1.21 – 3.21)	0.59
Employment status behavior (n = 62)		
Looking for work		
Focusing on treatment	1.1 (0.25 – 5.2)	0.9
Applying for disability benefits	3.2 (0.43 – 66.03)	0.32
Receiving disability benefits	1.33 (0.28 – 7.49)	0.72
Not looking for another reason or don't want to work	0.4 (0.04 – 3.96)	0.41
Health insurance (n = 97)		
Yes	0.22 (0.01 – 1.21)	0.16
No		
Psychiatric hospitalization (n = 97)		
Yes	4.1 (0.73 – 77.19)	0.19
No		
Emergency department visits (n = 97)		
Yes	2.31 (0.77 – 8.62)	0.16
No		
Previous substance abuse treatment (n = 97)		
No prior treatment		
1 – 2	2.59 (0.83 – 8.78)	0.11
3+	2.82 (0.98 – 8.52)	0.06
Previous mental health treatment (n = 97)		
No prior treatment		
1 – 2	1.44 (0.52 – 4.06)	0.49
3+	1.57 (0.49 – 5.66)	0.47
Time since last substance use (n = 89)	1 (1.0 – 1.0)	0.48
Substance use stage of change (n = 90)		
Precontemplation or contemplation		
Preparation	0.41 (0.09 – 1.72)	0.23
Action or maintenance	1.1 (0.25 – 4.67)	0.89
Not currently being addressed	0.19 (0.04 – 0.87)	0.04[a]
Mental health stage of change (n = 96)		
Precontemplation or contemplation		
Preparation	1.53 (0.5 – 5.02)	0.47
Action or maintenance	2.69 (0.73 – 13.05)	0.17
Not currently being addressed	2.15 (0.57 – 10.61)	0.29
Perception of therapy (n = 95)		
Strongly agree		
Agree	1.06 (0.39 – 3.03)	0.9
Neutral	1.49 (0.4 – 7.25)	0.58
Social isolation (n = 97)	0.98 (0.92 – 1.03)	0.44
Self-efficacy (n = 97)	1.09 (0.54 – 2.16)	0.8

Abbreviations: GED, general education development; HSED, high school equivalency diploma.
[a] Indicates significance level of $P < 0.05$.

a conversion table provided in the PROMIS Social Isolation Scoring Manual. A T-score of 50 is equal to the mean of the US general population, with 10 being 1 standard deviation from the mean. A high T-score indicated a greater degree of social isolation. Forms were scored only if they included responses to all 4 questions.

Self-efficacy was measured by using the New General Self-Efficacy Scale.[10] This scale has been used previously to compare self-efficacy between homeless and economically disadvantaged smokers.[11] General self-efficacy can be defined as "one's estimate of one's overall ability to perform successfully in a wide variety of achievement situations or how confident one is that she or he can perform effectively across different tasks and situations."[10] The scale consisted of 8 Likert-style questions, with responses ranging from strongly disagree to strongly agree. A score was calculated by taking the average of the values associated with each response. A low score indicated low self-efficacy. Forms were scored only if they included responses to all 8 questions.

Statistical Methods

Logistic regression was performed in RStudio using a generalized linear model. The independent predictor variables were the study variables provided in Appendix 1. The binary dependent variable was smoking status (meaning current smoker or nonsmoker). Univariate logistic regression was first performed with each predictor, and then a multivariate model was created to adjust for confounding. Per convention, a *P* value cutoff was used to determine variables that should be included in the multivariate model.[12] Variables were included in the multivariate model if they were explicitly associated with the study objective or had a *P* value of less than or equal to 0.2 and an odds ratio of less than 0.5 or greater than 2. Two variables – emergency department visits in the past month and psychiatric hospitalizations – were then removed to avoid overfitting the model.[13]

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RESULTS

Participant Characteristics

Demographic and participant characteristics are reported in Table 1. Participants who indicated that they belong to both Black/African American and Caucasian race categories were categorized as Other/No Response. The population was mostly male, mostly non-Hispanic, and had diverse racial and educational backgrounds. Twenty-nine percent of responders were currently housed. Seventy-three percent of the study population were current smokers.

Predictors of Smoking

Univariate and multivariate logistic regression results are included in Tables 2 and 3, respectively. Multivariate analysis demonstrated that the odds of being a current smoker decreased as education level increased, with the odds of being a smoker 95% lower for those with a high school degree or equivalent (OR 0.05; 95% CI, 0.002-0.39; $P=0.01$) and 93% lower for those with more than a high school education (OR 0.07; 95% CI, 0.003-0.49; $P=0.02$). Other demographic characteristics, including age, sex, race, and ethnicity were not found to have significant association with smoking status in this sample and were not included in multivariate analysis. Those with 3 or more episodes of prior substance abuse treatment were more likely to be current smokers (OR 4.17; 95% CI, 1.19-15.81; $P=0.03$). No significant association was identified between chronic homelessness, perception of therapy, social isolation, or self-efficacy and smoking status. The multivariate model had an Akaike information criterion of 108.41.

Table 3. Results of Multivariate Logistic Regression Analysis With Odds Ratios for Whether a Given Independent Variable is Associated With Current Cigarette Use

Variable	Odds Ratio (95% CI)	*P* value
Highest level of education (n = 97)		
Some high school or less		
High school, GED, HSED	0.05 (0.002 – 0.39)	0.01[a]
Technical training, some college or greater	0.07 (0.003 – 0.49)	0.02[a]
Chronic homelessness (n = 97)		
Yes	2.46 (0.79 – 8.02)	0.12
No		
Health insurance (n = 97)		
Yes	0.11 (0.005 – 0.91)	0.07
No		
Previous substance abuse treatment (n = 97)		
No prior treatment		
1 – 2	3.54 (0.90 – 15.27)	0.08
3+	4.17 (1.19 – 15.81)	0.03[a]
Perception of therapy (n = 95)		
Strongly agree		
Agree	2.18 0.41 – 16.28)	0.59
Neutral	2.18 (0.41 – 16.28)	0.40
Social isolation (n = 97)	1.02 (0.95 – 1.10)	0.56
Self-efficacy (n = 97)	1.41 (0.53 – 3.87)	0.49

Abbreviations: GED, general education development; HSED, high school equivalency diploma.
[a] Indicates significance level of $P<0.05$.

DISCUSSION

Logistic regression analysis suggests that factors associated with cigarette use in homeless adults include having less than a high school diploma and receiving prior substance abuse treatment. Chronic homelessness, health insurance, perception of therapy, social isolation, and general self-efficacy were not significantly associated with cigarette use in this study. Seventy-three percent of study participants were current smokers, which is consistent with the prevalence of smoking in the homeless population. Previous studies suggest a range of 57% to 80%.[7,14,15]

Education

This study found that the odds of being a smoker was greatest for those with a low level of education, and these results support findings from previous studies conducted in the general population.[3-6,14] Thus, smoking cessation programming for homeless populations should strongly consider health literacy in order to deliver content in an accessible manner for the audience.

Substance Abuse Treatment

The results of this study demonstrate that cigarette use is associated with prior substance abuse treatment. Tobacco use in the homeless population is associated with prior substance use,[7] and cigarette smoking has been associated with substance use disorder relapse.[16] Future studies should investigate how cigarette smoking may be a barrier to successful substance use treatment. Further study also is needed to determine whether use of other substances may contribute to cigarette use in the homeless population and how this information may be addressed by smoking cessation programs. If a causative relationship is found, smoking cessation programs for homeless adults could benefit from highlighting how smoking cessation may improve one's ability to quit using other substances. Similarly, treatment for nicotine dependence could be offered alongside treatment for other substance use disorders.

Perception of Therapy

This study population may have had a strong/positive perception of therapy because they were clients at a counseling clinic. However, it is encouraging that smoking status did not affect attitudes towards counseling in this population. Smoking cessation sessions could promote counseling as an important aspect of treatment, but these attitudes may not be a barrier to cessation.

Self-efficacy and Social Isolation

The study population had a high mean general self-efficacy score of 4.05 out of 5. Although the mean social isolation score was 56.97, which is above the mean of the general US population score of 50, it is still within 1 standard deviation. The fact that self-efficacy and social isolation were comparable for smokers and nonsmokers suggests that these characteristics are not major barriers to smoking cessation in this population. In fact, these results

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could suggest that these individuals may have strong readiness to quit[17] and may, therefore, be responsive to smoking cessation intervention. It is important to note that this study measured general self-efficacy, which—though positively influences specific self-efficacy[10]—is not specific to smoking cessation. Overall, these results can encourage implementation of smoking cessation initiatives targeting homeless smokers engaged in outpatient counseling programs.

A 2013 study conducted on both homeless and non-homeless smokers in Dallas, Texas found homeless smokers to have similar levels of general self-efficacy when compared with non-homeless smokers but lower motivation to quit and lower self-efficacy for quitting than non-homeless smokers.[11] Based on this current study and previous research, general self-efficacy may not differ based on homelessness or smoking status. Though homeless smokers may not lack general self-efficacy, more research is needed to understand how to support motivation to quit smoking in the homeless population.

Limitations and Generalizability

Social desirability bias may have affected respondents, particularly because their interviewers were also their behavioral health counselors. The results of this research can only be generalized to populations similar to that of this study. This research specifically studies homeless individuals engaged in outpatient counseling. A significant portion of the homeless population is not connected with these services, and this study cannot be generalized to those individuals. As such, this study includes a convenience sample of the homeless population. Participants were mostly male, English-speaking clients of a counseling clinic at a homeless shelter, and not all were currently homeless. Additionally, the sample size was modest, which contributed to less precise confidence intervals. Lastly, though this study was cross-sectional in its design, it combines data collected over a 6-year period. Changes that may have occurred over this time period are not captured.

Future Directions

To develop a deeper understanding of the factors that influence cigarette use and cessation in this population, next steps could include interviews of clients of the homeless shelter to investigate personal experiences with cigarette use and cessation and link quantitative and qualitative information. The results of a qualitative study may support results from this study and provide greater insight about how smoking cessation programs may be improved.

CONCLUSION

This study demonstrates that cigarette use among the homeless population is associated with low education level and prior substance abuse treatment. Smoking cessation programs would benefit from tailoring information to the education level of their audience. Further study could determine whether use of other substances may contribute to cigarette use in the homeless population and how this may be addressed by smoking cessation programs.

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