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Smoking among Patients in Substance Use Disorders Treatment: Associations with Tobacco Advertising, Anti-tobacco Messages and Perceived Health Risk

Barbara K. Campbell[1], **Thao Le**[2], **K. Blakely Andrews**[2], **Sowmya Pramod**[2], and **Joseph Guydish**[2]

[1] OHSU/PSU School of Public Health, Oregon Health and Sciences University, 3181 SW Sam Jackson Park Road, Portland, OR 97239-3098

[2] Philip R. Lee Institute for Health Policy Studies, University of California San Francisco, 3333 California St., Ste. 265, San Francisco, CA 94118

Abstract

Background—Although tobacco control efforts have contributed to an overall decline in smoking, individuals with substance use disorders (SUDs) continue to smoke at high rates and remain targets of advertising to vulnerable groups, including those with mental health disorders and SUDs.

Objective—We examined associations of tobacco advertising exposure and receptivity, anti-tobacco message awareness, and health-risk perception with smoking status and cigarettes-per-day (CPD) in a national sample of SUD treatment patients.

Method—Patients (N=1,113) in 24 programs chosen randomly, stratified by program type, from among publicly funded, adult treatment programs within the National Drug Abuse Treatment Clinical Trials Network completed surveys of smoking, advertising exposure and receptivity, anti-tobacco message awareness and perceived health risks.

Results—Current smokers (77.9% of the sample) smoked a daily median of 10 cigarettes (IQR= 13). Participants reporting daily advertising exposure were 1.41 times more likely to be smokers (p=0.019) than others. Those highly receptive to advertising were 2.34 times more likely to be smokers (p<0.001) than those with low/moderate receptivity. Higher perceived health risk was associated with lower odds of smoking (OR=0.99, 95% CI: 0.98- 0.99, p<0.001). CPD for smokers highly receptive to advertising was 11.1% (95% CI: 2.8%-20.0%) higher than for smokers with low/moderate advertising receptivity. Anti-tobacco message awareness was not associated with smoking status or CPD.

Conclusion—The high rate of smoking among SUD treatment patients is associated with daily exposure and high receptivity to tobacco advertisements, and lower perception of health-related, smoking risks. Tobacco control efforts should target this vulnerable population.

Corresponding Author: Barbara K. Campbell, Ph.D., OHSU/PSU School of Public Health, Oregon Health and Sciences University, 3181 SW Sam Jackson Park Road, Portland, OR 97239-3098, Phone: 503-221-7074, drbarbaracampbell@earthlink.net.

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INTRODUCTION

Tobacco control efforts have contributed to a dramatic decline in smoking prevalence in the United States, from approximately 40% in 1965 to 17.8% in 2013 (1, 2). This public health success story has excluded certain vulnerable populations including the poor, the less educated, and those with mental illness and/or substance use disorders. Smoking rates among individuals with substance use disorders (SUD) remain stubbornly high, with aggregated yearly prevalence rates ranging from 65% to 87% among those SUD treatment (3). In addition to high smoking prevalence, those with SUDs smoke more heavily (4), have more difficulty quitting (5), and have higher tobacco-related illness and mortality (6). Tobacco marketing has targeted vulnerable populations (7, 8) while tobacco control interventions have not (9). Disparities in smoking rates have been described as a social justice issue (10) and it has been argued that smokers with substance use and mental health disorders should be considered health disparity groups that receive focused public health attention (9).

Tobacco Advertising and Smoking

A body of literature documents the effectiveness of tobacco advertising (11). Advertising exposure has been strongly associated with smoking initiation (12-15). Advertising receptivity, measured via use of promotional items and brand preference, appears to be a robust predictor of smoking initiation and maintenance, reflecting brand promotion as an effective marketing strategy (12). Moreover, tobacco companies have specifically marketed to marginalized groups with higher smoking rates (7, 8). Currently, most tobacco advertising occurs at point-of-sale locations such as convenience stores (8), and is concentrated in poor neighborhoods (13, 16). It is likely that individuals with SUDs are among those who frequent locations with a high concentration of tobacco ads and promotional item marketing.

Anti-tobacco Campaigns and Smoking

There is evidence that media campaigns to prevent smoking initiation and promote quitting are successful, although numerous variables such as degree of exposure, and type and duration of message affect outcomes (17-19). Messages focusing on negative health effects of tobacco use may be those most effective in changing attitudes, increasing awareness of risks and facilitating quitting behavior (19). The Food and Drug Administration (FDA) launched its first national campaign in 2014 aimed at reducing youth smoking. “Real Cost” educates about smoking harms, particularly loss of control due to addiction, the mix of dangerous chemicals in cigarette smoke and the “cost” of negative health consequences. Despite evidence for the effectiveness of anti-smoking campaigns overall, none have been developed that target vulnerable populations, such as those with mental health and/or substance use disorders, and little is known about the effectiveness of general campaigns with these populations. We identified one relevant study; findings indicated that, despite high exposure to anti–smoking campaigns, smoking rates among the mentally ill were unaffected (20). Clearly, it is important to identify tobacco-related, risk and protective factors for vulnerable populations, including the influence of tobacco advertising and the effectiveness of anti-tobacco campaigns. This information may inform the development of

tobacco control efforts which focus on reducing the high rate of smoking among those with SUDs.

Current Study

The current study examines information from a United States (US) national survey of patients in SUD treatment investigating use of tobacco products, reasons for use, and perceived health risks of use. In addition, we examined respondents' exposure and receptivity to tobacco advertising, their awareness of the FDA, Real Cost campaign and of cigarette warning labels. We assessed the relationships of these variables with respondents' smoking status (i.e., smoker vs. nonsmoker) and smoking intensity (i. e., cigarettes per day) in a primary analysis of survey data.

METHODS

Program Selection and Participants

The survey was conducted with 1113 participants enrolled in 24 publicly funded, adult SUD treatment programs (10 residential/inpatient, 7 methadone maintenance, and 7 outpatient clinics) affiliated with the National Drug Abuse Treatment Clinical Trials Network (CTN), a network of 13 research centers and affiliated addiction treatment programs within the US conducting community-based research to improve the treatment of SUDs. Participating programs were a nationally representative sample, randomly selected from among 47 possible programs, stratified by program type (residential, methadone maintenance, outpatient). We began with a pool of 59 publicly funded programs, from which we excluded 12 programs with fewer than 60 active patients in order to increase the likelihood of achieving recruitment of 40 patients per program. Each participating program received a $2,000 program incentive following the survey site visit. All patients enrolled in treatment for at least 10 days and present the day the survey was conducted were eligible to participate. The number of participants recruited from each clinic ranged from 28 to 53. Participants provided informed consent, completed surveys, and received a $20.00 gift card following survey completion. Procedures were approved by the Institutional Review Board of the University of California, San Francisco.

Procedure and Measures

Participants completed self-administered surveys using iPads linked to a secure university server where data were stored. Items used for the current analysis included demographic questions assessing age, gender, race/ethnicity, marital status, employment status, education, and primary drug. Individuals identified as current, former, or never a cigarette smoker. Current smoking status was defined as reporting current smoking and lifetime smoking of at least 100 cigarettes. Current smokers also reported the number of cigarettes smoked per day (CPD). Receptivity to tobacco advertising was measured using the Pierce Advertising Scale, a 4-item measure of advertising receptivity, which has been shown to be predictive of progression to smoking in adolescents (21, 22). Questions ask about receipt of tobacco promotional items (e.g., cap or t-shirt), willingness to use an item, naming a favorite brand advertisement, and the cigarette brand the respondent has seen the most. Respondents who had either received or were willing to use a promotional item were classified as highly

receptive to tobacco advertising. Gilpin and colleagues (22) classified individuals who gave affirmative responses to naming a favorite brand as moderately receptive and those only naming a brand seen the most as having low receptivity. In our study, 5% of respondents fell in the low receptivity category; we combined low and moderate into one category. To measure advertising exposure, respondents were asked whether they had seen cigarette advertisements in the past 30 days, and, if so, how often (daily, weekly, or less then weekly), which we collapsed to “daily” and “less than daily” for analyses.

To assess awareness of anti-tobacco messages, participants were shown frame shots from television commercials of the FDA, Real Cost campaign and asked whether and how often they had seen them in the past 30 days (daily, weekly, less than once a week, not at all). Additionally, participants who were smokers were asked how often they noticed cigarette package warning labels (never, occasionally, often, always, don't know).

Participants estimated health risk associated with smoking using a standard scenario (i.e., “Tom is a current smoker. He has smoked 1 pack of cigarettes per day for the last 15 years. As a current smoker what is the chance (0-100%) he will ...?”). Four negative health outcomes were assessed (e.g., get lung cancer, have trouble catching breath, have heart attack, get mouth or lip cancer). Risk perception items have been shown to discriminate risks among different types of smokers (23) and smoking experience (24). The mean of these four items was calculated for each participant to obtain one score for perceived health risk. This 4-item, perceived health risk scale demonstrated a high internal consistency (Cronbach's Coefficient Alpha = 0.84).

Analyses

Demographic and primary drug characteristics—Standard descriptive statistics (mean, standard deviation) were used to summarize continuous variables. Frequencies and percentages were used to summarize categorical variables. Differences between smokers and nonsmokers were compared using chi-square tests for categorical variables and t-tests for continuous variables.

Smoking status—Logistic regression models were applied to assess univariate relationships between each independent variable (advertising receptivity, advertising exposure, Real Cost campaign awareness, perceived health risk) and smoking status (smoker vs. nonsmoker) using data from all participants. Most study variables had either zero or one missing value, except the perceived health risk variable, which had 12 missing values (1.08%). The number of missing cases was small relative to sample size; no sensitivity analysis was performed. Variables associated with smoking at $p \leq 0.10$ in univariate analyses were included in the multivariable model. Both univariate and multivariable models controlled for demographic variables (age, gender, race, education, marital status, employment status) and use of primary drug. Because data were collected from 24 clinics, the models also accounted for nesting clients within clinic.

Smoking Intensity—This analysis assessed the variables associated with number of cigarettes per day (CPD) among current smokers. Dispersion examined for the dependent variable (CPD), which was count data, showed that CPD was over dispersed. We applied

negative binomial models for univariate and multivariable analysis. An additional variable, awareness of warning labels, asked only of smokers in our survey, was added to this analysis. Thus, independent variables were advertising receptivity, advertising exposure, Real Cost campaign awareness, awareness of warning labels, and perceived health risk. Variables associated with CPD at $p \leq 0.10$ in the univariate models were included in the multivariable regression model. All models controlled for age, gender, race, education, marital status, employment status, primary drug, and accounted for nesting clients within clinic. All analyses were performed using SAS 9.3.

RESULTS

Demographics characteristics

Participants (N=1113) were 49.4% female (N=549) with an average age of 38.3 (s.d. = 11.74). They were primarily Caucasian (55. 3%) or African-American (19.0%), with 11.9% reporting as Hispanic. Education levels included 24.2% who reported less than a high school education, 32.6% reporting high school completion or General Education Development (GED; high school equivalence), and 43.2% reporting more than high school completion. Most (74.0%) were unemployed. A minority (14.7%) were married, although 22.8% reported being unmarried but in a long-term relationship. Others reported divorced/ separated/widowed status (30.1%) or never married (32.4%). Opioids were reported as the primary drug by 45.5 %, followed by stimulants (21.2%), alcohol (19.5%), and other drugs (13.8%).

Smoking status

Among the 1113 participants, 77.9% (N=867) reported currently smoking, 14.3% (N=159) identified as former smokers, and 7.8% (N=87) reported they had never smoked. Among current smokers, the median number of cigarettes smoked per day was 10 (IQR= 13). Table 1 shows demographic and primary drug characteristics for smokers and nonsmokers

Variables associated with smoking status

Table 2 shows the results of univariate and multivariable analysis for smoking status (smoker vs. nonsmoker). Three independent variables, advertising receptivity, advertising exposure, and perceived health risk, were significant in both univariate and multivariable analyses, while Real Cost campaign awareness was not. Participants who were highly receptive to advertising were 2.34 times more likely to be smokers (95% CI: 1.78- 3.09, $p<0.001$) than those who had low/moderate receptivity to advertising. Participants who reported daily exposure to cigarette advertising also had higher odds of smoking than others (OR=1.41, 95% CI: 1.06-1.87, p= 0.019). Higher perceived health risk was associated with lower odds of smoking (OR= 0.99, 95% CI: 0.98- 0.99, $p<0.001$). Age, marital status, employment status, and primary drug use were also significantly associated with smoking. Those reporting opioids (OR= 2.47, 95%CI: 1.61- 3.80, $p<0.001$) or stimulants (OR= 1.79, 95%CI: 1.14- 2.83, p= 0.012) relative to alcohol were more likely to be smokers.

Variables associated with smoking intensity

As shown in Table 3, advertising receptivity and awareness of cigarette package warning labels were significant in both univariate and multivariable analyses of smoking intensity. Advertising exposure, Real Cost campaign awareness and perceived health risk were not significantly associated with this outcome variable. The expected CPD for smokers who were highly receptive to tobacco advertising was 11.1% (95% CI: 2.8%-20.0%, p=0.007) higher than that of smokers with low/moderate receptivity to advertising. Smokers answering “don't know” regarding awareness of warning labels smoked an average of 10.4 CPD; the mean for those reporting never seeing warning labels was 13.8 CPD. In the multivariable analysis, expected CPD among smokers who answered “don't know” was 26.6% (95% CI: 14.1%- 37.3%, p<0.001) lower than that among smokers who reported never noticing warning labels. Age, gender, and race were also significantly associated with CPD. Heavier smoking was associated with being male, older and white. Regarding primary drug, the expected CPD was 19.3% (95% CI: 2.9%- 33%, p<0.023) lower for clients reporting “other” (cannabis, sedatives, hallucinogens, inhalants and other) as primary drug relative to alcohol.

DISCUSSION

The smoking rate of 77.9% in the current study is similar to other reports documenting a disturbingly high rate of smoking among patients in SUD treatment (25). Our study found that daily exposure to tobacco ads and high receptivity to tobacco advertising were significantly associated with smoking status. Advertising receptivity was also associated heavier smoking. Comparisons with the general population are limited, partly because research on the effects of advertising exposure and receptivity has focused largely on smoking initiation among adolescents. Nevertheless, our findings suggest that the association of these variables with smoking status for individuals with SUDs is at least as strong as that among youth in the general population. For example, young adults highly receptive to advertising were 1.84 times more likely to be established smokers than those with minimal/low advertising receptivity (22) and 1.71 times more likely to progress to established smoking (26). Described as the development of a positive affective response to a branded item or communication, advertising receptivity has been a marketing strategy heavily employed by the tobacco industry (21, 27). Current findings strengthen the argument for limiting advertising and banning this marketing method, legislative action that was taken under the 2009 Tobacco Control Act (28). A legal challenge by the tobacco industry (*American Snuff Co. v. United States, 2013*) was rejected by the U.S Supreme Court, clearing the way for FDA action. Findings on ad receptivity also lend support to anti-tobacco campaign strategies that “denormalize” tobacco industry behavior and highlight the intent of tobacco marketing to increase smoking among youth and vulnerable populations (29).

Results of the current study support findings of the association of perceived health risk with smoking initiation and prevalence among youth in the general population (30). In our study, perceived health risk distinguished non-smokers from smokers, although this variable was not associated smoking intensity. The most effective education about the dangers of smoking, particularly with vulnerable populations, remains an important research area. Our

results failed to find an association of Real Cost campaign awareness, (anti-tobacco messaging including health risk information) with smoking status or intensity. It is important to note that we assessed awareness of the Real Cost campaign (based on FDA permission to use images and information about the campaign) with a sample of adults. However, the campaign was developed to target adolescent smoking, which may have contributed to its lack of impact in our study. Additionally, among smokers in our sample, those who didn't know whether they'd seen warning labels were lighter smokers than those reporting they never saw warning labels. Although this finding is difficult to interpret, the observation that smokers who smoked a mean 10.4 CPD reported not remembering whether they'd seen warning labels and smokers who smoked a mean 13.8 CPD reported they never saw warning labels adds weight to the intention of the FDA to implement, within constitutional limits, the use of graphic warning labels, found to be effective elsewhere (31).

A significant control variable in our study is noteworthy. Results showed that odds of being a smoker were higher among individuals who reported stimulants or opioids as their primary drug than for those reporting alcohol as primary. Interestingly, Frosch and colleagues (32) found smoking status was a more powerful predictor of stimulant or opioid use than methadone dose among clients in methadone maintenance. These findings suggest the importance of standardizing the assessment of tobacco use and the routine inclusion of smoking cessation interventions in SUD treatment, particularly for stimulants, in methadone programs, and in other medication treatment for opioid dependence.

To our knowledge, our study is the first to examine associations of tobacco advertising and anti-tobacco messaging with smoking in a large, national sample of SUD patients, a vulnerable, high smoking population. However, it is important to note several study limitations. We are not able to conclude anything about causal relationships among our variables from our cross-sectional design. Reciprocal relationships may exist. For example, tobacco marketing may promote smoking and heavier smoking in this high-risk population, but those who already smoke may pay greater attention to tobacco advertising. In addition, our finding regarding the relationship of advertising receptivity to heavier smoking was highly significant ($p = 0.007$), yet had a relatively large confidence interval, approximately 10% on either side of the estimate, thus should be interpreted with this caveat. Our study is limited by the absence of identification of psychiatric comorbidity. Since substance use, psychiatric disorders and smoking often co-occur (33), it will be helpful to refine our understanding of the characteristics of those with the highest smoking risks, thus most in need of targeted tobacco control efforts and cessation interventions. Concerns related to our sample selection should also be noted. We did not have information regarding demographic characteristics of the entire population of patients within our selected programs, nor of all CTN-affiliated programs. As a result, we are unable to ascertain whether our sample was fully representative of this population. Moreover, we chose a sample of publicly funded programs within the CTN, which have more unemployed patients on Medicaid than non-CTN programs (34). Smoking rates among patients in for-profit, addictions treatment, who are more likely to be employed and insured, may be lower and associations with tobacco advertising and anti-tobacco campaigns may differ. Finally, we assessed the association of smoking in adults with SUDs with awareness of Real Cost, an anti-tobacco campaign geared towards youth. Future research with should examine the impact of adult-oriented campaigns,

such as the Centers for Disease Control and Prevention (CDC) *Tips from Former Smokers (Tips)* which was found to increase population-level quit attempts across the U.S. (35). Consideration should also be given to the development and empirical testing of campaigns focused on high smoking, and typically underserved, populations, the poor, the mentally ill and those with substance use disorders.

In summary, results of our study with this vulnerable population support the intent of the Tobacco Control Act to further restrict tobacco advertising. Moreover, results support the identification of individuals with SUDs as a health disparities group meriting resources for targeted tobacco control efforts, prevention and treatment services. Finally, it is clear that tobacco use assessment and cessation treatment should be standard practice in SUD treatment programs.

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Table 1

Demographic and Primary Drug Characteristics for Smokers and Nonsmokers: Substance Use Disorders Patient Survey

	Total (N=1,113)	Smoker (N=867)	Non-smoker (N=246)	p
Gender				0.490
Male	558 (50.2%)	434 (50.1%)	124 (50.4%)	
Female	549 (49.4%)	427 (49.3%)	122 (49.6%)	
Age	38.3 (11.74)	37.9 (11.48)	39.9 (12.49)	0.015
Race				0.153
Hispanic	132 (11.9%)	96 (11.1%)	36 (14.6%)	
Black/African American	211 (19.0%)	160 (18.5%)	51 (20.7%)	
White	615 (55.3%)	494 (57.0%)	121 (49.2%)	
Other	154 (13.9%)	116 (13.4%)	38 (15.5%)	
Education				0.101
Less than HS/GED[1]	269 (24.2%)	222 (25.6%)	47 (19.2%)	
HS/GED[1]	363 (32.6%)	281 (32.4%)	82 (33.5%)	
More than HS/GED[1]	480 (43.2%)	364 (42.0%)	116 (47.3%)	
Marital status				<.001
Married	163 (14.7%)	106 (12.2%)	57 (23.3%)	
Divorced/Separated/Widowed	335 (30.1%)	271 (31.3%)	64 (26.1%)	
Not married but in long term relationship	254 (22.8%)	204 (23.5%)	50 (20.4%)	
Never married	360 (32.4%)	286 (33.0%)	74 (30.2%)	
Currently employed	289 (26.0%)	209 (24.1%)	80 (32.5%)	0.008
Primary drug of use				<.001
Alcohol	217 (19.5%)	143 (16.5%)	74 (30.1%)	
Stimulants	236 (21.2%)	186 (21.5%)	50 (20.3%)	
Opioids	506 (45.5%)	432 (49.9%)	74 (30.1%)	
Other	153 (13.8%)	105 (12.1%)	48 (19.5%)	

[1] HS/GED refers to high school/General Educational Development certificate

Table 2

Logistic Regression Analysis of Variables Associated with Smoking Cigarettes in Substance Use Disorders Treatment [1]

	Univariate Analysis Unadjusted OR (95%CI)	p	Multivariate Analysis Adjusted OR (95%CI)	p
Tobacco advertising receptivity				
Moderate/Low (Ref)	1		1	
High	2.27 (1.81- 2.84)	<0.001	2.34 (1.78- 3.09)	<0.001
Tobacco advertising exposure				
Less than daily (Ref)	1		1	
Daily	1.36 (1.07- 1.73)	0.013	1.41 (1.06- 1.87)	0.019
Real Cost campaign awareness				
Not at all (Ref)	1		1	
Daily	1.22 (0.86- 1.74)	0.268	1.20 (0.84- 1.73)	0.315
Weekly	1.34 (0.98- 1.82)	0.064	1.16 (0.78- 1.73)	0.472
Less than once a week	0.91 (0.69- 1.19)	0.487	0.84 (0.62- 1.13)	0.239
Perceived health risk	0.99 (0.98- 1.00)	0.004	0.99 (0.98- 0.99)	<0.001
Age	0.98 (0.97- 1.00)	0.104	0.98 (0.97- 0.99)	<0.001
Gender				
Male (Ref)	1		1	
Female	1.00 (0.95- 1.06)	0.869	0.93 (0.67- 1.29)	0.646
Race				
Hispanic (Ref)	1		1	
Black/African American	1.16 (0.67- 2.00)	0.596	1.54 (0.82- 2.87)	0.176
White	1.47 (0.88- 2.47)	0.140	1.39 (0.84- 2.29)	0.197
Other	1.21 (0.55- 2.64)	0.632	1.41 (0.55- 3.62)	0.477
Education				
More than HS[2] (Ref)	1		1	
Less than HS[2]	1.40 (0.88- 2.22)	0.152	1.64 (0.97- 2.78)	0.064
High school/GED[2]	1.07 (0.76- 1.52)	0.687	1.07 (0.75- 1.53)	0.699
Marital status				
Married (Ref)	1		1	
Divorced/Separated/Widowed	2.13 (1.25- 3.63)	0.005	2.87 (1.72- 4.80)	<0.001
Not married but in long term relationship	2.01 (1.17- 3.45)	0.012	1.69 (1.09- 2.62)	0.019
Never married	1.87 (1.09- 3.21)	0.023	2.16 (1.35- 3.45)	0.001
Currently employed				
Yes (Ref)	1		1	
No	1.45 (1.08- 1.96)	0.015	1.43 (1.04- 1.97)	0.030
Primary use of drug				
Alcohol (Ref)	1		1	
Stimulants	1.94 (1.19- 3.15)	0.008	1.79 (1.14- 2.83)	0.012

	Univariate Analysis Unadjusted OR (95%CI)	p	Multivariate Analysis Adjusted OR (95%CI)	p
Opioids	2.83 (1.80- 4.45)	<0.001	2.47 (1.61- 3.80)	<0.001
Other	1.14 (0.78- 1.68)	0.498	1.09 (0.71- 1.69)	0.682

[1] Logistic regression with clients nested within clinic

[2] HS refers to high school. GED refers to General Educational Development certificate

Table 3

Regression Analysis of Variables Associated with Number of Cigarettes Per Day among Smokers in Substance Use Disorders Treatment[1]

	Univariate Analysis Mean estimate (95% CI)	p	Multivariate Analysis Mean estimate (95% CI)	p
Tobacco advertising receptivity				
Moderate/Low (Ref)	1		1	
High	1.185 (1.085- 1.294)	<0.001	1.111 (1.028 - 1.200)	0.007
Tobacco advertising exposure				
Less than daily (Ref)	1			
Daily	1.059 (0.979- 1.145)	0.153		
Real Cost campaign awareness				
Not at all (Ref)	1			
Daily	0.916 (0.797- 1.053)	0.219		
Weekly	0.987 (0.887- 1.099)	0.814		
Less than once a week	1.011 (0.926- 1.105)	0.805		
Warning labels awareness				
Never (Ref)	1		1	
Occasionally	0.988 (0.873- 1.118)	0.848	0.980 (0.872- 1.102)	0.738
Often	0.932 (0.819- 1.061)	0.286	0.977 (0.864- 1.104)	0.705
Always	0.873 (0.777- 0.982)	0.023	0.931 (0.840- 1.033)	0.177
Don't know	0.732 (0.594- 0.902)	0.003	0.734 (0.627- 0.859)	<0.001
Perceived health risk	0.999 (0.997- 1.002)	0.522		
Age	1.005 (1.001- 1.009)	0.011	1.005 (1.001 - 1.008)	0.007
Gender				
Male (Ref)	1		1	
Female	0.855 (0.788- 0.929)	<0.001	0.851 (0.786 - 0.922)	<0.001
Race				
Hispanic (Ref)	1			
Black/African American	0.852 (0.746- 0.974)	0.019	0.901 (0.780 - 1.040)	0.153
White	1.330 (1.187- 1.490)	<0.001	1.328 (1.205 - 1.464)	<0.001
Other	0.932 (0.782- 1.110)	0.429	0.982 (0.819 - 1.177)	0.842
Education				
More than HS[2] (Ref)	1		1	
Less than HS[2]	1.014 (0.910- 1.130)	0.803	1.083 (0.979 - 1.198)	0.123
High school/GED[2]	1.016 (0.939- 1.099)	0.694	1.031 (0.954 - 1.115)	0.438
Marital status				
Married	1		1	
Divorced/Separated/Widowed	1.075 (0.956- 1.208)	0.230	1.052 (0.929- 1.192)	0.427
Not married, in long term relationship	0.907 (0.772- 1.067)	0.239	0.956 (0.848- 1.078)	0.463
Never married	0.909 (0.784- 1.054)	0.207	0.929 (0.828- 1.044)	0.215
Currently employed				

	Univariate Analysis Mean estimate (95% CI)	p	Multivariate Analysis Mean estimate (95% CI)	p
Yes	1		1	
No	0.995 (0.879- 1.127)	0.940	1.015 (0.918- 1.123)	0.770
Primary use of drug				
Alcohol (Ref)	1		1	
Stimulants	0.908 (0.804- 1.025)	0.118	1.030 (0.933 - 1.138)	0.552
Opioids	1.106 (0.937- 1.306)	0.235	1.094 (0.942 - 1.270)	0.239
Other	0.732 (0.598- 0.895)	0.002	0.807 (0.670 - 0.971)	0.023

[1] Negative binominal model with clients nested within clinic

[2] HS refers to high school. GED refers to General Educational Development certificate