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Bars, Nightclubs, and Cancer Prevention: New Approaches to Reduce Young Adult Cigarette Smoking

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Abstract

Introduction—Tobacco contributes to multiple cancers, and it is largely preventable. As overall smoking prevalence in California declines, smoking has become concentrated among high-risk groups. Targeting social/cultural groups (i.e., "peer crowds") that share common values, aspirations, and activities in social venues like bars and nightclubs may reach high-risk young adult smokers. Lack of population data on young adult peer crowds limits the ability to assess the potential reach of such interventions.

Methods—This multimodal population-based household survey included young adults residing in San Francisco and Alameda counties. Data were collected in 2014 and analyzed in 2016. Multivariable logistic regressions assessed smoking by sociodemographic factors, attitudes, self-rated health, peer crowd affiliation, and bar/nightclub attendance.

Results—Smoking prevalence was 15.1% overall; 35.3% of respondents sometimes or frequently attended bars. In controlled analyses, bar attendance (AOR=2.13, 95% CI=1.00, 4.53) and binge drinking (AOR=3.17, 95% CI=1.59, 6.32) were associated with greater odds of smoking, as was affiliation with "Hip Hop" (AOR=4.32, 95% CI=1.48, 12.67) and "Country" (AOR=3.13, 95% CI=1.21, 8.09) peer crowds. Multivariable models controlling for demographics estimated a high probability of smoking among bar patrons affiliating with Hip Hop (47%) and Country (52%) peer crowds.

Conclusions—Bar attendance and affiliation with certain peer crowds confers significantly higher smoking risk. Interventions targeting Hip Hop and Country peer crowds could efficiently reach smokers, and peer crowd–tailored interventions have been associated with decreased

smoking and binge drinking. Targeted interventions in bars and nightclubs may be an efficient way to address these cancer risks.

INTRODUCTION

Decreasing tobacco use is important for cancer prevention.[1] In California, smoking declined from 23.7% to 11.6% between 1988 and 2014, and lung cancer rates have fallen twice as fast as the rest of the U.S.[2] As smoking declines overall, it is increasingly concentrated in high-risk subgroups, including those with low SES and racial/ethnic or sexual/gender minority groups.[2]

Young adults are important targets for cancer prevention. During young adulthood, most tobacco experimenters either quit or progress to regular smoking and addiction.[3] Tobacco marketing strategies entrench assumptions about tobacco use that consumers perceive to be "natural," such as links between drinking and smoking.[4–10] Tobacco marketing campaigns were designed to reinforce alcohol and tobacco co-use.[11,12] The tobacco industry also developed sophisticated strategies targeting young adults[13] with campaigns targeting their values, activities, aspirations, peer groups, and social environments.[14,15] Tobacco companies developed special marketing campaigns focused on young adult bar patrons because in addition to having higher smoking rates, they were regarded as key "trendsetters" influencing their peers.[16,17]

Tobacco marketing campaigns also increase disparities by encouraging use among vulnerable groups such as poor women[18]; rural men[19–22]; African Americans[23–26]; Hispanics[27]; Asians[28]; the working poor[29]; the military[30–32]; the lesbian, gay, bisexual, and transgender (LGBT) community[33–35]; or those with mental illness.[36] Additionally, tobacco companies target young people.[37–42] Thus, there is a critical need to counteract predatory tobacco marketing, particularly within high-risk subgroups.

One innovative tobacco prevention approach leverages targeted marketing strategies to develop targeted branded anti-tobacco interventions utilizing psychographic factors such as social affiliations, activities, and values.[13] Peer crowd affiliation is one way to approximate psychographic segmentation to identify high-risk subgroups of young adults and adolescents.[43,44] Distinct from one's personal networks, "peer crowds" reflect common values, activities, fashion, and influencers that link different social networks. Peer crowds, described in detail elsewhere,[45] include "Hipsters" (who value creativity and individuality, prefer indie rock music, and set trends); "Hip Hop" (who identify with having overcome disproportionate life challenges to succeed, express strength and success, prefer hip hop music, and value strength, honor, and respect); or "Young Professionals" (who value their careers, prioritize networking).

Peer crowd affiliation is associated with tobacco use, independent of demographics.[45] Peer crowds have not yet been studied in population-based samples of young adults. This population-based study in San Francisco and Alameda counties in 2014 describes the size of young adult peer crowds and the relationships among peer crowd affiliation, demographic characteristics, and smoking. The main hypothesis was that there would be significant

differences in smoking behavior based on peer crowd identification, independent of sociodemographic factors. Exploratory analyses also addressed if the combination of bar attendance and peer crowd affiliation could increase the efficiency of targeted interventions.

METHODS

Data Sample

Young adults are difficult to reach as they frequently move households, experience changing life circumstances (e.g., going to college, taking new jobs), and are less likely to have telephone landlines. Surveys using mobile phone numbers may not reflect respondents' actual location. Most population-based health surveys including young adults are national samples lacking sufficient numbers of young adults in a particular region. The 2014 San Francisco Bay Area Young Adult Health Survey, a unique multimode probabilistic household survey stratified by race/ethnicity of young adults in San Francisco and Alameda Counties, was conducted to facilitate local planning for tobacco control programs (analysis done in 2016).

Potential respondent households were identified from marketing address lists and Census data, identifying households with approximately 40% chance of a young adult occupant (N=15,000 addresses) and stratified into eight samples accounting for Asian and Hispanic ethnic surnames, racial/ethnic composition, and one random sample from the remaining population of young adults. Next, the 2009–2013 American Community Survey and 2010 decennial Census data were used in a multistage sampling design to identify Census blocks in which 15% of residents were either Hispanic, black, or non-Hispanic white and in the eligible age range to oversample black and Hispanic young adults. The survey utilized mail/web, telephone, and face-to-face interviews. All households were first contacted by letter; followed by postcard and letter reminders (three mailings); followed by phone calls to nonresponding households; followed by face-to-face visits. Most surveys were completed on paper or online (five respondents completed by phone, skipping the peer crowd measure). Phone calls primarily determined if there were no eligible young adults in the household. A random selection of addresses (*n*=1,240) from the households lacking either a mail or phone response were visited, as well as randomly selected housing units from the block sample, to attempt to complete surveys (*n*=1,636 housing units, a total of 2,876 households), resulting in 1,363 complete surveys (30% response rate). All survey protocols were approved by the IRB at the University of California, San Francisco.

Measures

Respondents reporting smoking cigarettes on 1–30 of the last 30 days were coded as current smokers. Age was measured continuously, subtracting respondent date of birth from date of survey administration. Sex was measured as male (1) or female (0). Race/ethnicity was measured with two items (*Are you of Hispanic, Latino, or Spanish origin?* and *What is your race?*), with 14 categories corresponding to American Community Survey.[46] Responses were combined to generate categories: Latino, non-Hispanic white, non-Hispanic black, non-Hispanic Asian/Pacific Islander, and non-Hispanic other race. Sexual orientation was measured with the question: *Do you think of yourself as… heterosexual or straight;*

homosexual, gay, lesbian, or queer; bisexual; transgender, or *other*, coded as LGBT (1) or straight (0). Education was measured with 16 categories ranging from *no school* to *doctorate degree*, and dichotomized as college educated (current enrollment in college or bachelor's degree or higher; 1) with others as (0).

The I-Base Survey™ was used to determine peer crowd affiliation. The measure includes a grid of images representing different peer crowds developed using extensive formative qualitative research described previously[43] where young people group images and describe the characteristics of different friend groups. The 72 images that were selected most consistently for each peer crowd were included on the grid. Survey respondents chose three male and three female photos that *best fit into your main group of friends*. Scoring is described in more detail elsewhere[45]; selected pictures scored 3, 2, or 1 points for their corresponding peer crowd based on rank. Participants also selected those who *least fit into your main group of friends*, scoring –1, –2, and –3, respectively. The total score for each peer crowd ranged from –12 to 12; respondents were categorized based on the crowd in which they scored highest. Seventy-eight (7%) respondents had tied high scores and were randomly assigned to one of the two tied peer crowds. The six peer crowds were named "Hipster," "Country," "Hip Hop," "Partier," "Homebody," and "Young Professional"; names are used for reporting here, but not in campaigns.

Perceived smoking prevalence was measured, asking respondents to estimate the percentage of people their age they perceived to smoke tobacco. Perception that smoking reduces stress was measured using agreement with *smoking cigarettes helps to reduce stress* on a Likert scale from *not at all* (1) to *extremely* (7). As in prior studies,[47] anti-tobacco attitudes were measured using agreement with three items: *I want to be involved in efforts to get rid of cigarette smoking; I would like to see the cigarette companies go out of business*; and *Taking a stand against smoking is important to me* on a 7-point Likert scale, calculating mean response across the three items.

Bar attendance was measured with *How often do you go to bars or clubs?* (*never*, *rarely*, *sometimes*, or *frequently*). Authors coded *sometimes* or *frequently* as bar patrons (1), and others not (0). Binge drinking was measured asking number of days in the past 30 when respondents had *five or more alcoholic drinks within a few hours*. Those drinking on at least 1 of the past 30 days, and consuming at least five drinks as specified were coded as binge drinkers (1).

Self-rated health was measured with *Would you say your health in general is… excellent; very good; good; fair; poor?* Respondents answering *excellent* or *very good* were coded dichotomously as high self-rated health (1).

Statistical Analysis

Of 1,363 total respondents, 1,151 (84%) provided information for peer crowd scores, and 1,344 provided sufficient information for imputation (Table 1). Multiple imputation in Stata, version 14, was used to estimate the missing values, and final models with and without the imputed values were checked for bias with imputation. Bivariate relationships between peer crowd affiliation and smoking were analyzed for the full sample and among bar patrons

(Table 2). Hierarchical logistic regressions on smoking first controlled for peer crowd and sociodemographic characteristics, then added self-rated health and tobacco attitudes (Table 3). The "margins" command in Stata measured the discrete probabilities associated with being a smoker and peer crowd affiliation, holding age, sex, race/ethnicity, LGBT identification, and education at their means. All results were weighted using person-level weights constructed following data collection. All analyses used the "svyset" command to adjust for the complex sampling design and clustering.

RESULTS

Sample characteristics are presented in Table 1. The overall smoking prevalence in the sample was 15.1%, higher than the 10.1% adult prevalence in San Francisco County.[2] The weighted sample had a mean age of 22.7 years, was 50% male, and racially and ethnically diverse, with approximately 32% non-Hispanic white, 28% non-Hispanic Asian, 24% Latino, and 10% non-Hispanic black individuals. Approximately 50% of respondents reported current enrollment in college, and 34% reported having a bachelor's degree or more. The peer crowds with low smoking rates made up a large proportion of the population: 36.5% and 35.4% reported strongest affiliation with Young Professional and Homebody peer crowds.

Though 35.3% of all respondents attended bars sometimes or frequently, 57% of smokers attended bars sometimes or frequently (Table 2). Smoking was higher among bar patrons (24%) versus 10% among those who rarely/never attended bars. Differences in smoking rates were even greater taking peer crowds into account: young adult bar patrons who affiliated with the Partier, Hip Hop, and Country peer crowds reported smoking rates of between 40% and 57%, whereas <10% of Young Professionals smoked (Figure 1). A large proportion of the smokers within the Country (72%); Partier (71%); and Hip Hop (66%) peer crowds attended bars.

In multivariable logistic regressions, peer crowd affiliation was independently associated with smoking, across both the first iteration of the model, controlling for sociodemographic factors and the second iteration of the model, which added attitudinal and health-related behaviors (Table 3). Hip Hop (AOR=5.58, 95% CI=2.24, 13.88) and Country (AOR=3.55, 95% CI=1.37, 9.19) peer crowd affiliation was associated with significantly greater odds of smoking, controlling for age, gender, race/ethnicity, sexual orientation, and education. This association remained significant in Model 2 for Hip Hop (AOR=4.42, 95% CI=1.51, 12.98) and Country (AOR=3.06, 95% CI=1.17, 7.99) affiliation, controlling for tobacco-related attitudes and risk behaviors. Binge drinking was also associated with smoking. Factors associated with lower odds of smoking included non-Hispanic Asian/Pacific Islander race, more education, strong anti-tobacco attitudes, and very good/excellent health (Table 3).

After specifying the multivariable models, the discrete probabilities of smoking given affiliation with a certain peer crowd and propensity to frequent bars were estimated, holding demographic factors (age, sex, race, sexual orientation, and education) at their means. The probability of reaching smokers through bars differed considerably by peer crowd. For example, Young Professionals (37.1% of the sample) have a low (8.2%) smoking rate, but

represent a large number of smokers ($n \approx 8,000$). Bars are not an efficient way to reach Young Professionals, as the probability of a Young Professional bar patron being a smoker is only 10% ($\approx 4,200$ smokers). By contrast, the Hip Hop peer crowd (8.4% of the sample) has a much higher smoking rate (39.2%), representing approximately 8,500 smokers. This model estimated the probability of smoking among Hip Hop bar patrons at 47% ($\approx 5,600$ smokers), suggesting that bars are an efficient way to reach Hip Hop smokers. Similarly, the probability of smoking among Country bar patrons was 52% ($\approx 2,900$ smokers).

DISCUSSION

This study is the first to estimate the potential reach of bar and nightclub interventions to different peer crowds within the young adult population in the San Francisco Bay Area. The results suggest that bars and nightclubs efficiently reach smokers, particularly those who identify with the Hip Hop and Country peer crowds. Additionally, a large number of young adult smokers do not frequent bars, and these reflect larger-size peer crowds with lower risk (e.g., Young Professionals). Campaigns such as the recent "Finish IT" campaign sponsored by the Truth Initiative® emphasizing low smoking prevalence and mobilizing nonsmokers to end the tobacco epidemic may appeal particularly to these lower-risk groups. However, members of peer crowds with substantially more smoking (e.g., Partier, Hip Hop, and Country) may not relate to messages highlighting low overall smoking rates. This study suggests that bars are an efficient way to reach these high-risk peer crowds, as 60%–70% of the smokers in these peer crowds attended bars and clubs. Furthermore, as bars cater to certain types of patrons that frequently align with the different peer crowds, bar-based interventions can be easily tailored to peer crowd.

Bars and nightclubs are a nexus for risk behavior among young adults. This may be due to the aggressive marketing of both tobacco and alcohol in bars,[11,48,49] reinforcing effects of tobacco and alcohol, which increases the risk of addiction,[50,51] or features of the physical and social environment that normalize risky behaviors (including other drug use, sexual risk taking).[52–56] Conversely, bars and clubs pose opportunities for cancer prevention, addressing the cancer risk afforded by both tobacco and alcohol use. Tobacco and alcohol co-use increases the risk of cancers of the mouth, throat, esophagus, and upper aerodigestive tract.[57–59] Public health interventions focused on one behavior may affect other risks: Anti-smoking interventions for young adult bar patrons have been associated with decreases in binge drinking.[60–62] This approach warrants further study.

More important, because peer crowds are connected to young adult social identities, lifestyles, and values, messages targeted to peer crowds may be more relevant. Adolescents who identified with the peer crowd in tailored advertisements reported stronger anti-smoking attitudes and lower levels of smoking susceptibility.[63] Young adult bar and nightclub interventions targeted to Hipsters,[62] Partiers,[61] and LGBT audiences[64] have shown significant decreases in smoking. These tailored messages differ in content and style depending on the peer crowd (Appendix Figure 1, available online). For example, messages appealing to the Hipster crowd frequently connected the issue of tobacco use, marketing, or production to social justice issues, such as the environment, tobacco production and world hunger, or animal testing. By contrast, messages for the Hip Hop peer crowd might address

how the tobacco industry has targeted communities of color with menthol or flavored little cigars/cigarillos.[23,39,65]

Peer crowds are also racially and ethnically diverse. In the San Francisco Bay Area Young Adult Health Survey, the Hip Hop peer crowd was 31.7% non-Hispanic black, 26.6% Hispanic, 15.7% non-Hispanic white, 15.6% non-Hispanic Asian/Pacific Islander, and 10.5% non-Hispanic other race/ethnicity. Although it may be difficult to reach Asian smokers by targeting the general population (Asians made up 27.7% of the sample, with a smoking prevalence of 8.6%, representing 7,338 smokers), by targeting the Hip Hop peer crowd one could reach approximately 1,600 (22%) Asian smokers.

Public health programs frequently need to balance the objective to reach a large part of the population with the efficiency of spending limited resources. For example, assume a hypothetical situation where the San Francisco health department has a budget of $100,000 for a local media campaign, and for simplicity, it costs $1 to reach a young adult one time. It would cost approximately $96,000 to reach the approximately 8,000 Young Professional smokers. To reach almost the same number of 8,500 Hip Hop smokers, it would cost approximately $22,000 (because of the high prevalence of smoking in this peer group). For a budget of $100,000, one could choose to reach Young Professional smokers once, or Hip Hop smokers four to five times. By concentrating on Hip Hop bar patrons, one could spend approximately $11,000 to reach approximately two thirds of the Hip Hop smokers, and that a budget of $100,000 would reach this high-risk group almost ten times. In this sample, approximately 70% of the population identified with Young Professional or Homebody peer crowds, including about half of the smokers, whereas the other half of smokers were in the 30% of the population identifying with high-risk peer crowds (Partier, Hipster, Hip Hop, and Country). Addressing smoking among high-risk peer crowds reaches smokers more efficiently, as smoking rates were 20%–40% in the high-risk peer crowds versus 8%–14% in the low-risk peer crowds.

Limitations

Though the study sampling and weighting enabled population estimates, t he overall response rate for the survey was relatively low (30%) and so may include nonresponse bias. The study sample may not generalize beyond the two studied counties. The sample was not large enough to estimate both smoking and race/ethnicity within peer crowds for all groups. Pictorial peer crowd measures used in this study were not compared to prior measures, which utilize lists of crowd names.[66–68] More research validating peer crowd measures is needed,[69] but peer crowd affiliation has been recognized as a powerful strategy for tailored interventions.[70] All measures were self-reported without biochemical validation of smoking status.

CONCLUSIONS

This is the first study of peer crowds in a population-based sample of young adults. Bar attendance and affiliation with high-risk peer crowds can reach smokers more efficiently, increasing the probability of reaching a smoker from 15% in the general population to 40%–50% by targeting Hip Hop, Partier, and Country bar patrons. Targeting high-risk peer crowds

can reach half of the young adult smokers in San Francisco with greater efficiency. Targeting high-risk peer crowds also preferentially reaches disproportionately affected groups of young adult smokers and may be a valuable tool to address disparities in tobacco-related cancer risk and morbidity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.
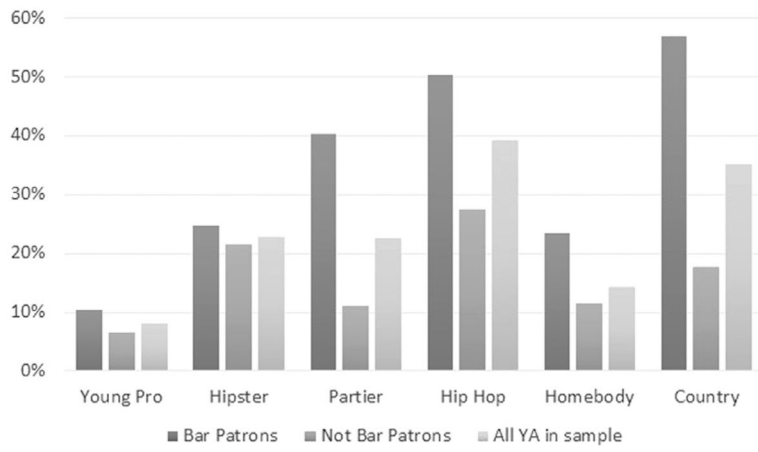
Acknowledgments

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Figure 1.
Smoking prevalence by peer crowd in total sample and among bar patrons.

Table 1

Sample Characteristics, 2014 Bay Area Young Adult Health Survey

Variable	% (SD) or M
Unweighted population, n	1,344
Weighted population, n	306,625
Weighted population with peer crowd scores, n	259,407
Bar-going population	107,274
Current smoker	15.2 (0.36)
Peer crowds	
Young Professional (ref)	36.5 (0.48)
Hipster	8.0 (0.27)
Partier	8.9 (0.28)
Hip Hop	8.2 (0.27)
Homebody	35.4 (0.48)
Country	5.8 (0.23)
Age	22.7 (2.47)
Male	50.0 (0.50)
Race/ethnicity	
NH white (ref)	31.9 (0.47)
Hispanic/Latino	23.8 (0.43)
NH black	10.1 (0.30)
NH API	27.7 (0.45)
NH other	6.5 (0.25)
LGBT	10.3 (0.30)
College (currently enrolled or graduate)	83.2 (0.37)
Perceived prevalence of smoking	34.1 (0.21)
Agrees that smoking reduces stress	2.4 (1.72)
Anti-industry attitudes	4.1 (1.86)
Attends bars sometimes/frequently	35.3 (0.48)
Binge drinking in past month	30.0 (0.46)
Very good/excellent self-rated health	59.4 (0.49)

API, Asian/Pacific Islander; LGBT, lesbian, gay, bisexual, transgender; NH, non-Hispanic.

Table 2

Population Represented by Each Peer Crowd in the Total Sample and Among Bar Patrons

Peer crowd	Estimated proportion of population represented by each peer crowd among total population					Estimated proportion of population by peer crowd among bar patrons					
	%	Population representation	Smoking rate, %	Smokers		%	Population representation	Smoking rate, %	Smokers	Smokers attending bars, %
Young Professional	37.1	96,181	8.2	7,839		43.0	40,219	10.3	4,155	53.0
Homebody	34.2	88,608	14.2	12,565		21.4	20,038	23.4	4,697	37.4
Partier	8.9	23,022	22.6	5,196		9.8	9,135	40.1	3,667	70.6
Hip Hop	8.4	21,779	39.2	8,546		12.0	11,201	50.3	5,632	65.9
Hipster	7.1	18,407	22.8	4,200		8.4	7,799	24.7	1,924	45.8
Country	4.4	11,410	35.0	3,996		5.4	5,058	56.8	2,874	71.9
Total	100.0	259,407		42,342		100.0	93,450		22,948	54.2

Table 3

Peer Crowd Affiliation and Current Smoking Among Bay Area Young Adults, 2014

| | Logistic regression results, current smoker (imputed sample, *n*=1,344) | | | |
| | Model 1 | | Model 2 | |
Variable	AOR (95% CI)	SE	AOR (95% CI)	SE
Peer crowd affiliation				
Young professional (ref)			—	—
Hipster	2.56 (0.98, 6.72)	1.26	2.12 (0.75, 6.01)	1.13
Partier	2.34 (0.90, 6.06)	1.13	1.04 (0.40, 2.73)	0.51
Hip Hop	**5.58 (2.24, 13.88***)**	**2.59**	**4.42 (1.51, 12.98**)**	**2.43**
Homebody	1.57 (0.80, 3.10)	0.54	1.71 (0.82, 3.55)	0.64
Country	**3.55 (1.37, 9.19**)**	**1.72**	**3.06 (1.17, 7.99*)**	**1.50**
Sociodemographic characteristics				
Age	0.99 (0.89, 1.12)	0.06	0.89 (0.78, 1.02)	0.06
Male	**1.67 (1.02, 2.73*)**	**0.42**	1.10 (0.58, 2.12)	0.37
Race/ethnicity				
NH white (ref)			—	—
Hispanic/Latino	0.74 (0.39, 1.39)	0.24	0.55 (0.27, 1.09)	0.19
NH black	0.75 (0.30, 1.87)	0.35	0.63 (0.19, 2.08)	0.38
NH API	**0.41 (0.21, 0.80**)**	**0.14**	**0.41 (0.19, 0.89*)**	**0.16**
NH other	0.59 (0.13, 2.64)	0.45	0.26 (0.03, 1.97)	0.27
LGBT	1.07 (0.50, 2.30)	0.42	0.60 (0.21, 1.69)	0.32
College	**0.47 (0.27, 0.84*)**	**0.14**	**0.45 (0.24, 0.85*)**	**0.15**
Tobacco attitudes and health status				
Perceived prevalence of smoking			1.77 (0.54, 5.77)	1.07
Agrees that smoking reduces stress			**1.59 (1.36, 1.86***)**	**0.13**
Anti-industry attitudes			**0.76 (0.63, 0.91**)**	**0.07**
Attends bars sometimes/frequently			2.08 (0.98, 4.43)	0.80
Binge drinking in past month			**3.17 (1.59, 6.32***)**	**1.12**

	Logistic regression results, current smoker (imputed sample, *n*=1,344)			
	Model 1		Model 2	
Variable	**AOR (95% CI)**	**SE**	**AOR (95% CI)**	**SE**
Very good/excellent self-rated health			**0.33 (0.18, 0.58***)**	**0.10**

Note: Boldface indicates statistical significance (*p<0.05; **p<0.01; ***p<0.001).

API, Asian/Pacific Islander; LGBT, lesbian, gay, bisexual, transgender; NH, non-Hispanic.