



Prevalence and Correlates of Cultural Smokeless Tobacco Products among South Asian Americans in New York City

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Abstract

Despite the high prevalence of smokeless tobacco (SLT) use in South Asia, little is known about the use of cultural smokeless tobacco among South Asians in the United States (US). This study examines the prevalence and correlates of SLT products among South Asians living in New York City (NYC). A total of 602 South Asians living in NYC completed a community health needs and resource assessment and answered questions about the use of SLT. Multivariable logistic regression models were run to examine predictors of SLT use (ever and current use). A total of 28.2% South Asian individuals reported ever use of SLT (35.9% among men and 21.5% among women) and a total of 12.9% reported current use of SLT (16.5% among men and 9.7% among women). Logistic regression models were stratified by sex. Among men, factors associated with ever or current use included: Bangladeshi and Himalayan ethnic subgroup, speaking English very well, attending a religious service a few times a year (ever use only), and current or former cigarette smoking. Among women, factors associated with ever use included: Bangladeshi ethnic subgroup, self-reporting condition of mouth and teeth as fair/poor, and at risk for depression. No factors were significant among women for current use. Overall, prevalence of current and ever use of SLT is high, and important differences exist by sex. Future studies are needed to better understand SLT use patterns in South Asian communities in the US and to inform culturally relevant interventions aiming to decrease overall tobacco use.

Keywords Asian Americans · Smokeless tobacco · Community health · Community-based participatory research

Introduction

Tobacco products used in a way other than smoking are called smokeless tobacco (SLT) products. SLT use in South Asia is among the highest in the world [1], where its use is culturally and socially acceptable. SLT products that are common in South Asian include paan, paan masala, gutka, gul, and supari [2–4]. According to the World Health

Organization (WHO), it is approximated that 90% of SLT users live in the WHO South-East Asia region, with the highest SLT prevalence found in Myanmar (Burma), India, Nepal, Bangladesh, Sri Lanka, and Bhutan [5]. Additionally, prevalence is generally higher among males than among females, although females display higher rates of SLT use when compared to cigarette smoking [3, 5, 6]. While smoking is taboo for women in many communities in South Asia, this is not the case for SLT. Many women serve it to guests in cultural celebrations, and SLT use is incorporated in spirituality and traditional beliefs [7, 8]. Data from the California Asian Indian Tobacco Use Survey find some differences in SLT use by gender [9], which needs to be further explored.

In many South Asian countries, people generally think that chewing SLT is not as hazardous as smoked cigarettes and products [2]. SLT use in South Asia and the United States has been strongly linked with prevalence of oral cancer [10–12]. There are more than 25 compounds in SLT that have cancer-causing activity, including formaldehyde, cadmium, and lead [11]. The WHO South-Asia region carries

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the highest burden of oral cancer, with over 95,000 oral cancer cases yearly [5]. In addition to oral cancer, SLT is also associated with other oral health problems including oral potentially malignant disorders (which are potentially precursors to oral cancer) [13], as well as myocardial infarction and stroke [14].

South Asians are the second largest Asian group in the United States (US), and are one of the fastest growing racial/ethnic groups [15]. While the prevalence of SLT among South Asians in the US is largely unknown and potentially underestimated, often because traditional health surveillance measures for tobacco do not capture traditional Asian products [16], the current published prevalence rates remain high [16–19]. However, a limited number of studies have focused on SLT use among the large South Asian communities in New York City [20–22], despite some suggestion of its high prevalence [16]. In comparison, prevalence of cigarette smoking for the South Asian American population is often low compared to other racial/ethnic groups [23], thus researchers often consider that the risk of certain cancers among this population would also be low. Given the health risks of SLT use and the limited data of its use among South Asian communities in New York City (NYC), the objective of our study was to determine prevalence and correlates of both lifetime and current use of SLT among a sample of self-identified South Asians living in NYC.

Methods

We used cross-sectional data from the Community Health Resources and Needs Assessment (CHRNA), which were surveys collected by the NYU Center for the Study of Asian American Health (CSAAH). Participants of Asian descent were recruited using community-based convenience sampling in partnership with Asian American-serving community organizations. The survey was community-based and was administered in-language using convenience sampling methods among individuals self-identifying as Asian American. Surveys were conducted during community events such as festivals, health fairs, and informational events. Participants were 18–85 years of age and residents of the NYC metropolitan area. Survey methods have previously been described [24, 25].

Use of SLT was asked among Asian subgroups that generally use these products (Asian Indian, Bangladeshi, Pakistani, Himalayan, Sri Lankan, Filipino, Indo-Caribbean, and Indonesian). However, prevalence was very low among non-South Asian subgroups (Filipino, 2.6%; Indo-Caribbean, 2.1%, Indonesian, 2.2%), and analysis was limited to the remaining South Asian subgroups. Individuals were first asked: “Have you ever used paan/paan masala/zarda/kathi/supari in your entire life, with or without tobacco?”

followed by “If yes, do you now chew every day, some days, or not at all?” Participants were then asked the same questions specific to chewing gutka. Participants were categorized as ever using SLT (answering “yes” to using paan/paan masala/zarda/kathi/supari and/or answering “yes” to chewing gutka); and as currently using SLT (answering “every day” or “some days” to either SLT question).

Demographic and health-related variables included: age, sex, self-identified Asian ethnic group, years lived in the US, percentage of time lived in the US, spoken English fluency, education, income, employment, self-reported oral health, self-reported health issues (high cholesterol, diabetes, hypertension, oral/dental problems, depression), cigarette smoking status, depression risk using the Patient Health Questionnaire-2 (score ≥ 3 indicates depression risk), religion, and attendance at religious services [26].

Univariate and bivariate analysis was first run to present overall descriptive statistics of the South Asian population, stratified by sex. Chi square tests assess group differences by sex with significance set at $p < 0.05$. Prevalence of ever use and current use of SLT was run across socio-demographic and health-related variables, overall and stratified by sex. Finally, multivariable logistic regression models assessed the associations between potential determinants of SLT ever and current use while stratifying by sex; potential determinants were based on the literature and on bivariate analysis (not presented). Significance was set at $p < 0.05$. All analyses were performed using IBM SPSS, Version 23.0 (Armonk, NY: IBM Corp).

Results

Of the initial 632 self-identified South Asians surveyed, 602 were included for lifetime use and 598 for current use, due to missing data on smokeless tobacco. Table 1 presents sample characteristics, stratified by gender. Fifty-five percent of the sample was aged 18–44 and 53.3% was female. Respondents were largely foreign-born (92.2%), had varying levels of English fluency, and 37.6% were highly college educated.

Table 2 presents prevalence of smokeless tobacco use, stratified by sex, in order to inform regression analyses. Overall, 28.2% reported ever use and 12.9% reported current use. Prevalence was higher among males: 35.9% reported ever use and 16.5% reported current use, compared with 21.5% and 9.7% among women, respectively. Overall, individuals aged 25–64 had the highest prevalence of smokeless tobacco use, regardless of sex. Among men, Bangladeshis and Himalayans had the highest prevalence of smokeless tobacco use, while among women, Bangladeshis and Pakistanis had the highest prevalence of smokeless tobacco use. Additional differences were noted by gender: lower English spoken fluency, lower education, unemployment, a diagnosis

Table 1 Characteristics of the South Asian sample, overall and by sex, n (%)

	Total sample (n = 602)	Males (n = 281)	Females (n = 321)	p value
Age group, years				<0.001
18–24	73 (12.3)	39 (14.0)	34 (10.8)	
25–44	254 (42.8)	96 (34.5)	158 (50.0)	
45–64	213 (35.8)	107 (38.5)	106 (33.5)	
65+	54 (9.1)	36 (12.9)	18 (5.7)	
Asian ethnic group				0.004
Asian Indian	104 (17.3)	49 (17.4)	55 (17.1)	
Bangladeshi	157 (26.1)	53 (18.9)	104 (32.4)	
Pakistani	110 (18.3)	57 (20.3)	53 (16.5)	
Himalayan	138 (22.9)	71 (25.3)	67 (20.9)	
Sri Lankan	93 (15.4)	51 (18.1)	42 (13.1)	
Years lived in US				0.177
5 years or less	144 (25.0)	66 (25.0)	78 (24.9)	
6–10 years	145 (25.1)	64 (24.2)	81 (25.9)	
11–20 years	148 (25.6)	61 (23.1)	87 (27.8)	
> 20 years	95 (16.5)	54 (20.5)	41 (13.1)	
US-born	45 (7.8)	19 (7.2)	26 (8.3)	
English fluency				0.010
Very well	198 (32.9)	101 (35.9)	97 (30.3)	
Well	237 (39.4)	119 (42.3)	118 (36.9)	
Not Well/Not at all	166 (27.6)	61 (21.7)	105 (32.8)	
Education				0.129
< High school	165 (27.5)	69 (24.6)	96 (30.0)	
High school/some college	210 (34.9)	95 (33.8)	115 (35.9)	
College graduate	226 (37.6)	117 (41.6)	109 (34.1)	
Employment				<0.001
Working	366 (61.0)	204 (72.6)	162 (50.8)	
Not working	234 (39.0)	77 (27.4)	157 (49.2)	
Income				0.004
< \$25,000	190 (31.6)	99 (35.2)	91 (28.3)	
\$25,000–\$55,000	161 (26.7)	71 (25.3)	90 (28.0)	
> \$55,000	114 (18.9)	63 (22.4)	51 (15.9)	
Don't know/Refused	137 (22.8)	48 (17.1)	89 (27.7)	
Self-reported condition of mouth and teeth				0.282
Very good/good	324 (54.7)	157 (57.1)	167 (52.7)	
Fair/poor	268 (45.3)	118 (42.9)	150 (47.3)	
Have you ever been told by a health care provider that you have				
High cholesterol	146 (24.7)	76 (27.6)	70 (22.1)	0.118
Diabetes	96 (16.4)	54 (19.9)	42 (13.4)	0.033
Hypertension	111 (18.8)	58 (20.9)	53 (16.9)	0.207
Oral/dental problems	114 (19.4)	44 (16.0)	70 (22.3)	0.054
Depression/mental health	21 (3.6)	9 (3.3)	12 (3.8)	0.715
Religion				0.056
Buddhism	122 (20.3)	59 (21.1)	63 (19.7)	
Hinduism	143 (23.8)	73 (26.1)	70 (21.9)	
Islam	269 (44.8)	111 (39.6)	158 (49.4)	
Sikhism	36 (6.0)	17 (6.1)	19 (5.9)	
Other/None	30 (5.0)	20 (7.1)	10 (3.1)	
Attends religious services				<0.001
Never/Seldom	102 (17.8)	30 (11.3)	72 (23.5)	

Table 1 (continued)

	Total sample (n=602)	Males (n=281)	Females (n=321)	p value
A few times a week/once or twice a month	168 (29.3)	78 (29.3)	90 (29.3)	
Once a week or more	303 (52.9)	158 (59.4)	145 (47.2)	
Cigarette smoking status				<0.001
Current smoker	57 (9.6)	51 (18.5)	6 (1.9)	
Former smoker	33 (5.6)	30 (10.9)	3 (0.9)	
Never smoker	502 (84.8)	194 (70.5)	308 (97.2)	
PHQ-2 Scale				0.021
At risk (≥ 3)	54 (9.5)	17 (6.4)	37 (12.1)	
Not at risk (< 3)	515 (90.5)	247 (93.6)	268 (87.9)	

of diabetes, and depression (by self-report and by the PHQ-2 scale) were associated with a higher prevalence of smokeless tobacco use among females. Conversely, better English spoken fluency was associated with smokeless tobacco use among males. Additional results are presented in Table 2.

Adjusted Logistic Regression

Table 3 provides adjusted logistic regression models for ever and current use, stratified by sex. Factors significantly associated with ever use among males included: self-identified Bangladeshi or Himalayan Asian ethnic subgroup, better English spoken fluency current or former cigarette smoking, and attending religious services a few times a year or once/twice a month. Similarly, factors significantly associated with current use among males included: self-identified Bangladeshi or Himalayan Asian ethnic subgroup, better English spoken fluency, and current cigarette smoking.

Factors significantly associated with ever use among females included: self-identified Bangladeshi Asian ethnic subgroup, longer percentage of time lived in the US, self-reported fair or poor condition of the mouth and teeth, and at-risk for depression. No factors were significantly associated with current use among females.

Discussion

The use of SLT products was high among this community-based sample of South Asian Americans living in NYC, with the highest prevalence of current use found among Bangladeshis and Himalayans. This is not surprising, given the ease and availability of these products in the NYC metropolitan area [20]. Additionally, several correlates for SLT were identified, which included higher English fluency and current cigarette smoking among men, and longer time lived in the US, risk of depression, and fair/poor condition of mouth and teeth among women. These factors may help to inform future

studies on smokeless tobacco use patterns and develop interventions to decrease the use of smokeless tobacco.

Past research has found males to have higher prevalence or odds of SLT use when compared to women [18, 19, 27], and our study was no exception. In our study, a longer percentage of time lived in the US was significantly associated with ever use of SLT among females, and speaking English very well was significantly associated with ever and current use of SLT among males. Similarly, a previous study in California found that longer percentage of time lived in the US was significantly associated with traditional tobacco product use among women [19], while another found an association with cultural tobacco use overall (not stratifying by gender) [18]. In New Jersey, a qualitative study found mixed feelings about how smokeless tobacco products served as a connection to a culture or homeland among a small sample of South Asians [28]. Further investigation into understanding how SLT use may be affected by acculturation in the US is warranted.

Past studies have also shown an association between religiosity and SLT use among South Asians. In particular, individuals practicing the Sikh religion are less likely to engage in SLT behaviours than those practicing other religions such as Islam, Buddhism, or Hinduism [18, 19]. This is understandable, because Sikhism strongly discourages the use of tobacco, while use of such products is more integral to other religious faiths. Additionally, our findings showed an association with attendance of religious services among males (the more moderate attendance category as compared to attending at least weekly; while no significance was shown among females. A scale measuring religiosity may have been better suited to our analysis [18, 19], as women are less likely to attend religious services and more likely to practice at home.

Previous research, including a study among South Asian immigrants in NYC, has found a general lack of information about the harm associated with SLT use, as well as perceived beneficial properties of certain SLT products [21, 29]. Given that an association between poor condition of mouth and teeth and ever use of SLT was seen among women, this may

Table 2 Prevalence of ever use and current use of smokeless tobacco products, overall and by sex, n (%)

	Ever use of SLT			Current use of SLT		
	Overall (n = 602)	Men (n = 281)	Women (n = 321)	Overall (n = 598)	Men (n = 278)	Women (n = 320)
Overall prevalence	170 (28.2)	101 (35.9)	69 (21.5)	77 (12.9)	46 (16.5)	31 (9.7)
Age group, years						
18–24	17 (23.3)	11 (28.2)	6 (17.6)	8 (11.0)	5 (12.8)	3 (8.8)
25–44	77 (30.3)	43 (44.8)	34 (21.5)	33 (13.1)	19 (20.0)	14 (8.9)
45–64	63 (29.6)	38 (35.5)	25 (23.6)	29 (13.7)	18 (17.1)	11 (10.4)
65+	11 (20.4)	9 (25.0)	2 (11.1)	5 (9.3)	4 (11.1)	1 (5.6)
Asian ethnic group						
Asian Indian	21 (20.2)	17 (34.7)	4 (7.3)	11 (10.6)	9 (18.4)	2 (3.6)
Bangladeshi	62 (39.5)	26 (49.1)	36 (34.6)	37 (23.7)	18 (34.0)	19 (18.4)
Pakistani	18 (16.4)	6 (10.5)	12 (22.6)	8 (7.3)	2 (3.5)	6 (11.3)
Himalayan	52 (37.7)	40 (56.3)	12 (17.9)	18 (13.3)	15 (22.1)	3 (4.5)
Sri Lankan	17 (18.3)	12 (23.5)	5 (11.9)	3 (3.2)	2 (3.9)	1 (2.4)
Years lived in US						
5 years or less	54 (37.5)	33 (50.0)	21 (26.9)	27 (19.1)	13 (20.6)	14 (17.9)
6–10 years	37 (25.5)	24 (37.5)	13 (16.0)	20 (13.8)	13 (20.3)	7 (8.6)
11–20 years	38 (25.7)	20 (32.8)	18 (20.7)	13 (8.8)	8 (13.1)	5 (5.8)
> 20 years	28 (29.5)	17 (31.5)	11 (26.8)	14 (14.7)	10 (18.5)	4 (9.8)
US-born	10 (22.2)	5 (26.3)	5 (19.2)	2 (4.4)	1 (5.3)	1 (3.8)
English fluency						
Very well	52 (26.3)	37 (36.6)	15 (15.5)	25 (12.6)	20 (19.8)	5 (5.2)
Well	70 (29.5)	44 (37.0)	26 (22.0)	29 (12.4)	18 (15.4)	11 (9.4)
Not Well/Not at all	48 (28.9)	20 (32.8)	28 (26.7)	23 (13.9)	8 (13.3)	15 (14.3)
Education						
< High school	51 (30.9)	26 (37.7)	25 (26.0)	23 (14.0)	11 (16.2)	12 (12.5)
High school/some college	52 (24.8)	31 (32.6)	21 (18.3)	25 (12.0)	14 (14.9)	11 (9.6)
College graduate	67 (29.6)	44 (37.6)	23 (21.1)	29 (12.9)	21 (18.1)	8 (7.4)
Employment						
Working	101 (27.6)	72 (35.3)	29 (17.9)	45 (12.4)	32 (15.8)	13 (8.1)
Not working	68 (29.1)	29 (37.7)	39 (24.8)	32 (13.7)	14 (18.4)	18 (11.5)
Self-reported oral health						
Very good/Good	72 (22.2)	46 (29.3)	26 (15.6)	35 (10.8)	24 (15.3)	11 (6.6)
Fair/poor	96 (35.8)	53 (44.9)	43 (28.7)	41 (15.5)	21 (18.3)	20 (13.4)
Have you ever been told by a health care provider that you have						
High cholesterol						
Yes	49 (33.6)	28 (36.8)	21 (30.0)	24 (16.7)	12 (16.2)	12 (17.1)
No	117 (26.2)	70 (35.2)	47 (19.0)	50 (11.3)	32 (16.2)	18 (7.3)
Diabetes						
Yes	27 (28.1)	16 (29.6)	11 (26.2)	14 (14.6)	6 (11.1)	8 (19.0)
No	138 (28.2)	82 (37.8)	56 (20.6)	60 (12.4)	38 (17.8)	22 (8.1)
Hypertension						
Yes	35 (31.5)	22 (37.9)	13 (24.5)	19 (17.3)	12 (21.1)	7 (13.2)
No	132 (27.5)	77 (35.2)	55 (21.1)	56 (11.7)	33 (15.2)	23 (8.8)
Oral/dental problems						
Yes	43 (37.7)	23 (52.3)	20 (28.6)	21 (18.6)	11 (25.6)	10 (14.3)
No	125 (26.3)	77 (33.3)	48 (19.7)	54 (11.4)	34 (14.8)	20 (8.2)
Depression/mental health						
Yes	5 (23.8)	2 (22.2)	3 (25.0)	3 (14.3)	1 (11.1)	2 (16.7)
No	161 (28.5)	96 (36.2)	65 (21.7)	71 (12.7)	43 (16.4)	28 (9.4)

Table 2 (continued)

	Ever use of SLT			Current use of SLT		
	Overall (n=602)	Men (n=281)	Women (n=321)	Overall (n=598)	Men (n=278)	Women (n=320)
Religion						
Buddhism	36 (29.5)	25 (42.4)	11 (17.5)	9 (7.4)	7 (12.1)	2 (3.2)
Hinduism	41 (28.7)	33 (45.2)	8 (11.4)	19 (13.5)	16 (22.5)	3 (4.3)
Islam	83 (30.9)	34 (30.6)	49 (31.0)	45 (16.8)	19 (17.1)	26 (16.6)
Sikhism	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Other/none	9 (30.0)	8 (40.0)	1 (10.0)	3 (10.0)	3 (15.0)	0 (0.0)
Attends religious services						
Never/seldom	35 (34.3)	15 (50.0)	20 (27.8)	6 (11.3)	7 (23.3)	12 (16.7)
A few times a year/once or twice a month	58 (34.5)	38 (48.7)	20 (22.2)	11 (12.0)	14 (18.4)	6 (6.7)
Once a week or more	71 (23.4)	44 (27.8)	27 (18.6)	57 (13.3)	24 (15.2)	11 (7.6)
Cigarette smoking status						
Current smoker	31 (54.4)	30 (58.8)	1 (16.7)	20 (35.1)	19 (37.3)	1 (16.7)
Former smoker	20 (60.6)	19 (63.3)	1 (33.3)	9 (27.3)	9 (30.0)	0 (0.0)
Never smoker	115 (22.9)	48 (24.7)	67 (21.8)	48 (9.6)	18 (9.3)	30 (9.8)
PHQ-2 scale						
At risk (≥ 3)	22 (40.7)	8 (47.1)	14 (37.8)	7 (13.0)	2 (11.8)	5 (13.5)
Not at risk (< 3)	141 (27.4)	89 (36.0)	52 (19.4)	67 (13.1)	42 (17.2)	25 (9.4)

represent an important opportunity to better educate South Asian individuals on the impact and consequences of SLT use. Additionally, the association of SLT use and current cigarette smoking, particularly among men is alarming. The combined use of smokeless tobacco with cigarette smoking increases the risk for adverse health outcomes [30]. Targeted interventions need to focus on South Asian men who use SLT products and should place the risks of both SLT and cigarette smoking in a health context. More research is needed to better understand characteristics associated with concurrent use to decrease tobacco exposure for this population. Finally, respondents were asked about paan/paan masala/zarda/kathi/supari use with and without tobacco because some individuals purchase pre-packaged products and are unsure if it includes tobacco. However, since paan (betel leaf and betel nut quid) even without tobacco is associated with oral and oesophageal malignancies [31], the health risks remain even without tobacco. Therefore, South Asian communities need to be informed of the risks of these products even without the presence of tobacco.

This study has several limitations. First, the survey results are based on self-reported information and therefore subject to recall and social-desirability bias. Second, while a large number of South Asian Americans are included, the number of subgroups is small and therefore

limits meaningful comparisons. Third, certain variables could not be included in analysis; alcohol questions were not asked of all the ethnic subgroups due to cultural or religious factors, and income contained a large number of missing or “don’t know” responses, limiting meaningful information. Finally, this sample was limited to individuals living in NYC and may not be representative of other South Asian American populations, such as those living in New Jersey or California.

Despite these limitations, this study is able to characterize use of SLT among a diverse group of South Asian Americans living in NYC. Only a few studies have examined SLT among Asians in the NYC metropolitan area [21, 28], and we are able to add to the growing literature available by adding current prevalence data.

In conclusion, the use of SLT was common among a sample of South Asian Americans living in NYC. This study highlights the need to better understand SLT use among South Asian Americans and the need to develop culturally-relevant public health interventions for cessation in this community, as tobacco use often does not encompass SLT use on national and local health surveys. In particular, acculturation, religion, and South Asian ethnic group should be taken to account when developing future research and interventions.

Table 3 Results of logistic regression models for factors associated with ever use and current use of SLT, by sex

	Ever use of SLT				Current use of SLT			
	Men		Women		Men		Women	
	aOR (95% CI)	p value	aOR (95% CI)	p value	aOR (95% CI)	p value	aOR (95% CI)	p value
Age, years	1.00 (0.97–1.02)	0.736	1.02 (0.99–1.05)	0.157	1.02 (0.99–1.05)	0.237	1.02 (0.98–1.06)	0.339
Asian ethnic group								
Asian Indian	2.4 (0.8–7.73)	0.128	0.3 (0.1–1.7)	0.176	4.2 (0.8–23.5)	0.102	1.1 (0.1–14.8)	0.939
Bangladeshi	3.6 (1.2–11.4)	0.027	4.4 (1.3–14.4)	0.015	10.8 (2.0–58.6)	0.006	6.3 (0.7–57.1)	0.100
Pakistani	0.4 (0.1–1.5)	0.174	1.7 (0.5–6.2)	0.439	0.6 (0.1–4.9)	0.617	3.7 (0.3–38.9)	0.280
Himalayan	3.3 (1.1–9.8)	0.035	1.0 (0.2–4.1)	0.996	6.0 (1.1–33.9)	0.043	0.6 (0.0–7.9)	0.681
Sri Lankan	Ref		Ref		Ref		Ref	
Percentage of time in the US	0.4 (0.1–1.9)	0.241	13.8 (2.3–83.8)	0.004	0.3 (0.1–2.4)	0.279	1.6 (0.1–19.0)	0.713
English fluency								
Very well	2.6 (1.0–6.5)	0.041	0.5 (0.2–1.4)	0.175	4.3 (1.5–12.6)	0.007	0.5 (0.1–2.4)	0.397
Well/Not Well/Not at all	Ref		Ref		Ref		Ref	
Education								
< High school	Ref		Ref		Ref		Ref	
High school/some college	1.1 (0.4–2.7)	0.901	2.5 (1.0–6.7)	0.063	0.9 (0.3–2.9)	0.654	3.1 (0.9–10.5)	0.075
College graduate	1.0 (0.4–2.2)	0.934	0.7 (0.3–1.5)	0.328	1.4 (0.5–3.9)	0.487	1.2 (0.4–4.0)	0.722
Condition of mouth and teeth								
Very good/Good	Ref		Ref		Ref		Ref	
Fair/Poor	1.8 (0.9–3.5)	0.102	2.2 (1.1–4.4)	0.024	0.8 (0.4–1.8)	0.598	1.6 (0.7–4.2)	0.291
Attends religious services								
Never/Seldom	2.1 (0.6–7.2)	0.223	1.3 (0.6–3.0)	0.545	1.4 (0.3–5.9)	0.639	1.8 (0.6–5.3)	0.289
A few times a year/once or twice a month	2.6 (1.2–5.8)	0.017	1.3 (0.6–3.1)	0.497	1.0 (0.4–2.8)	0.972	0.9 (0.2–3.5)	0.926
Once a week or more	Ref		Ref		Ref		Ref	
Cigarette smoking status								
Current smoker	3.6 (1.5–8.8)	0.004	1.0 (0.1–11.3)	0.971	5.7 (2.1–15.2)	0.001	3.0 (0.2–40.3)	0.398
Former smoker	4.2 (1.5–11.0)	0.005	2.4 (0.2–35.0)	0.523	2.3 (0.8–6.8)	0.147	0.0 (0.0–0.0)	n/a
Never smoker	Ref		Ref		Ref		Ref	
PHQ-2 Scale								
At risk (≥ 3)	1.7 (0.5–6.2)	0.387	3.8 (1.5–9.8)	0.006	0.3 (0.1–1.8)	0.187	1.2 (0.3–3.8)	0.813
Not at risk (< 3)	Ref		Ref		Ref		Ref	

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Compliance with Ethical Standards

Conflict of interest The authors declare no conflict of interest.

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