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Factors Associated with Short-Term Transitions of Nondaily Smokers: Socio-demographic Characteristics and Other Tobacco Product Use

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ABSTRACT

Aims To examine the transitions in smoking status among nondaily smokers who transitioned to daily or former smokers or remained as nondaily smokers over a 12-month period. We analyzed factors associated with these transitions, including the use of cigars and smokeless tobacco (SLT).

Design Secondary data analyses using pooled data from the 2003, 2006/07 and 2010/11 Tobacco Use Supplements to the Current Population Survey (TUS-CPS).

Setting United States

Participants Self-respondents aged 18+ who have smoked for more than 5 years and were nondaily smokers 12 months before the interview (n = 13,673 or 14.5% of current smokers).

Measurements Multinomial logistic regression model to determine the correlates of nondaily-to-daily, stable nondaily, and nondaily-to-former smoking transitions among nondaily smokers at baseline. The model controlled for socio-demographic factors and the use of cigars and SLT.

Findings 2.6% of adults in our sample were nondaily smokers at baseline. Among these, 69.7% remained nondaily smokers (stable nondaily smokers), 18.4% became daily smokers (nondaily-to-daily smokers), and 11.9% quit smoking (nondaily-to-former smokers) after 12 months. The nondaily-to-daily vs. stable nondaily smoking transition was less likely among those who were aged 65+ (p=0.018), male (p<0.001), Hispanic (p<0.001), with income of \$25,000-49,999 or ≥\$75,000, and current users of SLT (p=0.003), but more likely among those without a college degree compared to the appropriate reference group. The nondaily-to-former vs. stable nondaily smoking transition was less likely among those aged 25+, male (p=0.013), non-Hispanic Asian (p=0.032), without a college degree, widowed/divorced/separated (p=0.013) or never married (p=0.011), and current users of cigars (p=0.003) compared to the appropriate reference group.

Conclusions While over two-thirds of nondaily smokers remain as such after 12 months, others become daily smokers or quit. The likelihood of transition from nondaily-to-daily, stable nondaily and nondaily-to-former smokers is associated with socio-demographics and current use of cigars and SLT.

Keywords: Transitions of nondaily smoking, cigars, smokeless tobacco, cigarettes

INTRODUCTION

Nondaily smoking is common in many countries. In Mexico, Ecuador, and Guatemala, at least two-thirds of smokers are nondaily smokers [1], while in China, 20% of male smokers and 46% of female smokers are nondaily smokers [1]. In the U.S., 3.9% of adults were nondaily smokers in 2014 [2].

Nondaily is becoming more common among current cigarette smokers in the U.S., increasing from 19.2% to 23.2% between 2005-2014 [2]. Studies have found that compared with daily smokers, nondaily smokers are likely to be younger, ethnic minorities, more educated, have higher income, and have stronger intentions to quit smoking [3-9]. Studies have also reported that nondaily smokers are more likely to concurrently use other tobacco products (OTP) than daily smokers [9-13]. For example, among U.S. men aged 25 years or older, 4.3% of nondaily smokers also used snuff, compared to 2.3% of daily smokers [10]. To understand the relationship between OTP use and nondaily smoking, it is useful to examine the association of OTP use with transitions of nondaily smokers to daily or former smokers.

Nondaily smoking may be a transitional stage for smokers who are either becoming daily smokers or in the process of quitting, or it may be a stable long-term behavior [14-17]. Several longitudinal studies investigated the patterns and socio-demographic predictors of the transitions of nondaily smokers over time by examining changes in smoking and quitting behaviors between baseline and follow-up.

However, most of these studies focused on college students or adolescents [16, 18, 19], women [20], working populations in a particular state [7], or populations in other countries including Sweden, Norway, and Mexico [17, 21, 22]. None of these studies focused on the entire population of U.S. adults or examined the role of cigar and smokeless tobacco (SLT) use in the transitions of nondaily smokers.

The aims of this study are to (1) examine the transitions in smoking status among U.S. adult nondaily cigarette smokers who become daily smokers, remain as nondaily smokers, or quit smoking 12 months later; (2) assess socio-demographic correlates of these transitions; and (3) analyze the associations of cigar use and SLT use with these transitions. We focus on smokers who have established a pattern of smoking, rather than those who may be in the early experimental stages.

METHODS

Study design

Secondary data from a large national U.S. survey were analyzed. Descriptive statistics were used to describe the characteristics of the three transition groups and a multivariate logistic regression model was estimated to analyze the factors associated with these transitions, including both socio-demographic characteristics and cigar and SLT use.

Data source

We analyzed pooled data from the latest three waves of the Tobacco Use Supplement to the Current Population Survey (TUS-CPS): 2003 (February, June, and November), 2006/07 (May and August, 2006; January, 2007), and 2010/11 (May and August, 2010; January, 2011). This survey is administered by the National Cancer Institute, the Centers for Disease Control and Prevention, and the U.S. Census Bureau. The TUS-CPS is a nationally representative survey employing a complex clustered sampling design. Approximately 60,000 U.S. households are selected using a multi-stage stratified area probability sampling design. In the first stage primary sampling units (PSUs) in the U.S. are

selected from strata with different probabilities, and in the second stage housing units within these PSUs are selected. A detailed explanation of the TUS-CPS sampling design is provided in the TUS-CPS technical documentation [23,25]. The survey includes questions about individual's cigarette smoking behavior and OTP use at the time of the interview. It also asks cigarette smokers about their smoking behaviors 12 months prior to the interview. This information allows us to retrospectively examine the change in cigarette smoking behaviors during a 12-month period for each smoker. The interview was conducted either in person or by telephone, and answered by either respondents themselves or proxy. Self-respondents were eligible to complete the entire supplement. However, proxy respondents were only eligible to answer a few questions related to current smoking status and current use of OTP, but were not eligible to answer the majority of survey questions such as smoking history 12 months before the interview [23-26]. Since this study aimed to examine the transitions in smoking status from 12 months before the interview to the interview date, proxy responses could not be included in the analyses. We included self-respondents aged 18+ (N=527,198) in this study. The response rates for self-respondents in the 2003, 2006/07, 2010/11 TUS were 63.6%, 62.0%, and 62.3%, respectively [23-25].

Measures

Baseline in this study refers to 12 months prior to the interview. *Follow-up* refers to the interview date, i.e. 12 months after baseline. According to answers to the TUS-CPS questions: “Have you smoked at least 100 cigarettes in your entire life?” and “Do you now smoke cigarettes every day, some days, or not at all?”, *daily*, *nondaily*, and *former smokers* were defined as follows: *Daily smokers* were respondents who had smoked at least 100 cigarettes in their lifetime and reported now smoking cigarettes every day. *Nondaily smokers* were respondents who had smoked at least 100 cigarettes in their lifetime and reported now smoking cigarettes some days. *Former smokers* were respondents who had smoked at least

100 cigarettes in their lifetime and indicated now smoking “not at all”. Daily or nondaily smokers and former smokers who quit cigarettes smoking less than 12 months ago were asked “Around this time 12 months ago, were you smoking cigarettes every day, some days, or not at all?” *Nondaily smokers at baseline* were respondents who answered “some days” to this question. Because this study focused on examining the smoking transition status of established nondaily smokers as opposed to those who may have only experimented with smoking, we further excluded those nondaily smokers who had not smoked for at least 5 years at baseline, a criterion used in previous studies [14, 27].

Outcome variable

The outcome variable is a categorical variable which consists of three smoking transition categories: nondaily-to-daily smoking, stable nondaily smoking, and nondaily-to-former smoking. These categories were defined according to the changes in smoking status between baseline and follow-up.

Nondaily-to-daily smokers are nondaily smokers at baseline who transitioned to *daily smokers* 12 months later (at the time of the interview).

Stable nondaily smokers are nondaily smokers at baseline who remained as *nondaily smokers* 12 months later.

Nondaily-to-former Smokers are nondaily smokers at baseline who quit smoking and thus transitioned to *former smokers* 12 months later.

Covariates

Covariates in our regression analysis include survey year, socio-demographic characteristics, and OTP use. The socio-demographic characteristics included were selected based on a review of the literature on nondaily smoking [7,14]. We conducted a variance inflation factor (VIF) analysis to analyze the impact

of covariates on multicollinearity [28] and found that all VIF factors were acceptably low, indicating that multicollinearity was not a problem. All covariates reflect status at the time of the interview. Socio-demographic variables included age (18-24, 25-44, 45-64, and 65+), gender (male and female), race/ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Non-Hispanic Asian, and Non-Hispanic Other), education, annual family income, marital status (married, widowed/divorced/separated, and never married), and census region of residence (Northeast, Midwest, South, and West). Education was categorized as less than high school, high school graduate (including General Education Development), some college (including an associate degree), and college graduate (including those with a postgraduate degree). Annual family income was categorized as less than \$25,000, \$25,000-49,999, \$50,000-74,999, \geq \$75,000, and unknown. Because we were concerned that income might not be missing at random, those who did not report their income (5.5% of nondaily smokers at baseline) were not excluded from our analysis but classified as “unknown”.

Two types of OTP were included in this study: cigars and smokeless tobacco (SLT), which is comprised of snuff and chewing tobacco. The use of snuff and chewing tobacco was collected separately in the 2003 and 2006/07 TUS-CPS, but the 2010/11 TUS-CPS questionnaire combined snuff and chewing tobacco into one category. To be consistent, we aggregated these two products into the category of SLT for 2003 and 2006/07. For each type of OTP, respondents were categorized as current users or non-current users. Current users were those who reported that they have ever used the product even one time, and used it every day or some days at the time of the interview. Non-current users were those who reported that they never used the product or those who have used the product once but did not use it at all at the time of the interview.

Statistical analysis

We estimated the prevalence of baseline nondaily smokers in the three smoking transitions categories among all adults and for subgroups stratified by each covariate. We tested the independence between each covariate and smoking transition group using bivariate analysis chi-square statistics. A multivariate multinomial logistic regression model which controlled for all covariates, was estimated to assess the associations of socio-demographic characteristics and OTP use with nondaily-to-daily smoking or nondaily-to-former smoking vs. stable nondaily smoking among baseline nondaily smokers.

We conducted several sensitivity analyses. The first was designed to understand whether the association between cigar/SLT use and smoking transitions varied across different socio-demographic subgroups. This was accomplished by adding interaction terms into the multinomial logistic regression model, including the interaction terms between age and cigar/SLT use, and the interaction terms between gender and cigar/SLT use. We also conducted a sensitivity analysis to determine the impact of including nondaily smokers aged 18-25. This was done by excluding nondaily smokers at baseline aged 18-25 and comparing the results with those obtained when the young group was included to examine whether this choice affects the results substantially or not. In addition, we conducted a sensitivity analysis to address the question of whether smokers who quit in the past 30 days were different from nondaily smokers who smoked a few days in the past 30 days, because both were classified as nondaily smokers according to our definition. To address this question, we excluded former smokers who quit in the last month, and compared the results to the findings when these recent quitters were included. Finally, we analyzed whether our results were sensitive to the inclusion of people who used both cigars and SLT, by excluding dual users from the regression analyses.

All analyses were conducted using the final self-response weights that adjust for nonresponse and unequal probability of sample selection. Because the TUS-CPS employs a complex multi-stage clustered survey design, variance estimates and 95% confidence intervals (CIs) were computed using the published replicate weights with Fay's balanced repeated replication [26, 29], which is one of the standard design-based approaches to estimate unbiased variances for complex survey data [30, 31]. All analyses were conducted using SAS 9.4. We computed prevalence rates using PROC SURVEYFREQ. For each multivariate multinomial logistic regression model, we estimated the adjusted odds ratios (AOR) and 95% CIs with PROC SURVEYLOGISTIC. We considered statistical significance as a two-tailed p-value <0.05.

Final study sample

The pooled TUS-CPS data contained 527,198 self-respondents. At baseline, there were 70,010 established daily smokers (i.e. with a 5 year history of smoking), 5,815 non-established daily smokers, 13,673 established nondaily smokers, and 2,668 non-established nondaily smokers. The final sample size for descriptive analyses was 13,673 nondaily smokers. The final sample size was 13,441 for multivariate multinomial logistic regression analyses after excluding respondents with missing values for cigar or SLT use (N=232, or 1.7% of the nondaily smokers at baseline).

RESULTS

Nondaily smokers at baseline represented 2.6% of adults. Among these nondaily smokers, more than half were aged 25-44 (51.8%), male (54.8%), and non-Hispanic White (61.5%). As shown in Table 1, 16.8% had less than a high school education, 30.8% had income less than \$25,000, almost half (45.4%)

were married, over one-third (36.3%) lived in the South, 5.8% were current users of cigars, and 3.3% were current users of SLT.

Prevalence of nondaily-to-daily, stable nondaily, and nondaily-to-former smoking transitions among nondaily smokers at baseline

Among 13,673 nondaily smokers at baseline, 69.7% remained nondaily smokers (stable nondaily smokers), 18.4% became daily smokers (nondaily-to-daily smokers), and 11.9% quit smoking (nondaily-to-former smokers) 12 months later (Table 1). These prevalence rates varied by survey year, all socio-demographic characteristics, cigar use, and SLT use. The prevalence of nondaily-to-daily smoking was 16.2% for males and 21.2% for females, while the prevalence of stable nondaily smoking was 72.4% for males and 66.4% for females. The prevalence of stable nondaily smoking was 75.2% for current users of cigars and 69.3% for non-current users of cigars, whereas the prevalence of nondaily-to-former smoking was 7.3% for current users of cigars and 12.2% for non-current users of cigars.

Correlates of nondaily-to-daily, stable nondaily, and nondaily-to-former smoking transitions

We specified stable nondaily smoking as the reference category of the smoking transition outcome variable in the multivariate multinomial logistic regression model for smoking transitions among nondaily smokers at baseline. Therefore, the AOR of nondaily-to-daily smoking transition and the AOR of nondaily-to-former smoking transition were both determined as relative to stable nondaily smoking status. However, for the simplicity of the description, we describe the AORs without repeating the reference category each time.

As shown in Table 2, the adjusted odds of nondaily-to-daily smoking transition were significantly lower among those who were aged 65+ vs. young adults aged 18-24 (AOR=0.65), males vs. females (AOR=0.74), Hispanics vs. non-Hispanic Whites (AOR=0.66), those with income of \$25,000-49,999 or \geq \$75,000 vs. those with less than \$25,000, and current users of SLT vs. non-current users of SLT (AOR=0.60). The adjusted odds were significantly higher among those without a college degree vs. college graduates.

The adjusted odds of nondaily-to-former smoking transition were significantly lower among those who were aged 25+ than young adults aged 18-24, males vs. female (AOR=0.85), non-Hispanic Asians vs. non-Hispanic Whites (AOR=0.64), those without a college degree vs. college graduates, those who were widowed/divorced/separated or never married vs. married, and current users of cigars vs. non-current users of cigars (AOR=0.56).

Sensitivity analyses

We did not find any significant results for any of the interaction terms between age and cigar/SLT use, and the interaction terms between gender and cigar/SLT use in terms of AOR, 95% confidence intervals, and P values. This indicates that the associations between cigar/SLT use and smoking transitions did not differ by age or gender.

After excluding 782 nondaily smokers at baseline aged 18-25, there were 12,891 nondaily smokers at baseline aged 26+. Compared with the results for nondaily smokers aged 18+ at baseline, the prevalence of the three transitions groups for nondaily smokers aged 26+ were very similar. The nondaily-to-daily smokers represented 18.4% of the group aged 18+ and 18.3% of those aged 26+. The

stable nondaily smokers were 69.4% and 70.2% of the 18+ and 26+ aged groups respectively, while the nondaily-to-former smokers were 11.9% and 11.5% of the 2 age groups. The multinomial logistic regression results for all covariates are also quite similar with the results for nondaily smokers at baseline for aged 18+ (except for age due to the different age population and reference age group in the two models). Therefore, our results were not sensitive to the inclusion of nondaily smokers at baseline aged 18-25.

Our results were also not sensitive to the exclusion or inclusion of former smokers who quit cigarette smoking in the past 30 days (n=150), or to the exclusion of dual cigar and SLT users (n=72).

DISCUSSION

This study investigated three groups of nondaily cigarette smokers and compared them according to their smoking behavior after 12 months: those who became daily smokers, those who quit smoking, and those remained as nondaily smokers. In addition to studying the role of socio-demographic characteristics in these transitions, we explored the association of cigar use and SLT use with these transitions.

Our finding that the majority of nondaily smokers remained as nondaily smokers 12 months later is consistent with other studies that have found that the majority of nondaily smokers remain as nondaily smokers after one or two years. [14, 15, 17, 32] We found that those with less than a college education were less likely than college graduates to quit rather than remain as nondaily smokers. These results are consistent with a previous study that examined the long-term smoking patterns of nondaily smokers among a Minnesota working population and found that those who had attained higher education levels

were more likely to have quit at follow-up [7]. We also found that compared with non-Hispanic Whites, Hispanics were more likely to remain as nondaily smokers rather than transition to daily smoking. This is consistent with a study which reported that Hispanics were significantly more likely than non-Hispanic Whites to be stable nondaily smokers [33].

Our findings add to the literature by analyzing the association between cigar/SLT use and smoking transitions. The result that concurrent use of SLT and cigarettes is associated with stable nondaily cigarette smoking behavior, while concurrent use of cigars and cigarettes might make quitting cigarette smoking more difficult for nondaily smokers, is important for the development of tobacco control policy, particularly in light of the changing market for tobacco products and the many new products currently being introduced.

The results of this study have other implications for policy. Our findings that less educated nondaily smokers were less likely to quit smoking after 12 months and more likely to transition to daily smoking, suggest that smoking cessation intervention programs should target less educated nondaily smokers to prevent them from becoming daily smokers and to motivate them to quit smoking. Our findings that nondaily smoking males (compared to females) and older adults aged 65+ (compared to young adults aged 18-24) were less likely to quit smoking after 12 months suggest that gender-specific and age-specific smoking interventions need to be designed to motivate more nondaily smokers, especially males and older adults, to quit smoking. Moreover, our finding that smoking transitions were associated with current use of cigars and SLT further points out the importance of implementing tobacco control programs that take into account the interrelationships in the use of different tobacco products.

Our study is subject to several limitations. First the TUS-CPS allows us to retrospectively examine the change in cigarette smoking behaviors over a 12 month period for each smoker, but all covariates were measured only at the interview. Therefore, this is not a longitudinal study and our results cannot be used to predict longer-term trends in smoking transition status. Although most socio-demographic characteristics are likely to remain unchanged over the 12-month period, some characteristics such as educational achievement, family income, marital status, or region of residence might change for some respondents during the 12-month period. Second, the TUS-CPS does not ask the frequency of lifetime use for each OTP, so we could not differentiate experimental vs. established users of OTP. Third, we did not differentiate former smokers who just quit cigarette smoking in the past 30 days from nondaily smokers who smoked a few days in 30 days. However, we conducted a sensitivity analysis excluding former smokers who quit within the past 30 days and the results were similar to our reported results. Fourth, the TUS-CPS does not ask about the use of emerging tobacco products such as e-cigarettes, or separate questions for cigars, cigarillos, and large cigars or for dry snuff, moist snuff, and snus. Therefore, we could not include or differentiate these products in the analyses. Fifth, tobacco use and smoking status were self-reported and may be subject to recall bias and social desirability bias. However, a previous study [34] found that self-reported tobacco smoking is a valid and reliable way to measure smoking habits in the population. Sixth, a small proportion of respondents (1.7%) had missing values for cigar use or and SLT use and were excluded from the regression analysis, which could result in selection bias. However, because these excluded respondents only accounted for a small percentage of the study sample, the bias would be negligible. Seventh, our study focused on smokers who had established a pattern of nondaily smoking. However, future research should look at the smoking transitions of non-established nondaily smokers, i.e. those who are just beginning to experiment with smoking. Finally, our results are based on survey data collected from the finite U.S. population and may

not be generalizable to other countries with different tobacco control policies, tobacco products, tobacco industry structure, and marketing strategies.

In conclusion, we found that transitions of nondaily smokers over 12 months are associated with socio-demographic characteristics and current use of cigars and SLT. Understanding the smoking behavior of this group of smokers can help inform the development of tobacco control programs that help nondaily smokers quit or prevent them from becoming daily smokers in order to reduce the negative impacts of smoking.

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Table 1: Sample distribution and 12-month smoking transitions by socio-demographic characteristics and other tobacco product use among U.S. adults who were nondaily smokers at baseline: Tobacco Use Supplements to the Current Population Survey - 2003, 2006/07, and 2010/11

	Nondaily smokers at baseline		Smoking transition status						Chi- Square test p- value
			Nondaily-to-Daily		Stable nondaily		Nondaily-to- Former		
			N	Row %	N	Row %	N	Row %	
Total	13,673	100.0	2,611	18.4	9,397	69.7	1,665	11.9	<.001
Year									
2003	4,987	34.1	1,082	21.4	3,367	68.3	538	10.4	
2006/07	4,391	32.9	747	16.6	3,085	71.6	559	11.9	
2010/11	4,295	33.1	782	17.3	2,945	69.4	568	13.4	<.001
Age									
18-24	504	5.0	121	20.9	288	62.3	95	16.8	
25-44	6,788	51.8	1,220	17.5	4,601	69.1	967	13.5	
45-64	5,115	35.5	1,039	19.7	3,614	71.6	462	8.8	<.001
65+	1,266	7.7	231	17.7	894	70.3	141	12.0	
Gender									
Male	6,635	54.8	1,129	16.2	4,709	72.4	797	11.4	
Female	7,038	45.2	1,482	21.2	4,688	66.4	868	12.4	<.001
Race									
Non-Hispanic White	9,329	61.5	1,757	18.4	6,359	68.9	1,213	12.8	
Non-Hispanic Black	1,723	15.5	391	22.0	1,193	70.1	139	8.0	
Hispanic	1,677	17.1	258	15.0	1,213	72.7	206	12.4	<.001
Non-Hispanic Asian	323	3.0	73	20.5	211	69.7	39	9.8	
Non-Hispanic Other	621	2.9	132	19.5	421	68.6	68	11.9	
Education									
Less than high school	2,108	16.8	478	21.3	1,445	70.2	185	8.5	<.001
High school graduate	4,488	32.7	1,029	22.4	2,983	67.5	476	10.1	
Some college	4,240	30.1	791	17.7	2,920	69.5	529	12.9	
College graduate	2,837	20.5	313	10.9	2,049	73.2	475	15.9	
Income									<.001
Less than \$25,000	4,188	30.8	975	22.6	2,807	67.8	406	9.6	
\$25,000-50,000	3,866	28.7	753	18.5	2,611	68.6	502	12.9	
\$50,000-75,000	2,348	16.3	410	17.8	1,626	69.5	312	12.8	
≥\$75,000	2,528	18.8	330	12.3	1,818	73.5	380	14.2	0.001
Unknown	743	5.5	143	17.5	535	74.0	65	8.5	
Marital status									
Married	6,274	45.4	1,143	17.7	4,305	69.4	826	12.9	
Widowed/Divorced/Separated	3,856	26.4	818	20.3	2,641	69.8	397	9.9	0.001
Never married	3,543	28.3	650	17.9	2,451	70.1	442	12.0	
Region									
Northeast	2,564	17.7	496	17.8	1,747	70.6	321	11.7	
Midwest	3,531	22.6	682	18.8	2,420	69.6	429	11.6	0.006
South	4,147	36.3	841	20.1	2,845	69.1	461	10.8	
West	3,431	23.4	592	16.0	2,385	70.1	454	13.9	
Cigar use status									
Current user	721	5.8	136	17.5	530	75.2	55	7.3	0.008
Non-current user	12,735	92.6	2,437	18.6	8,711	69.3	1,587	12.2	
Missing	217	1.6	38	15.4	156	74.4	23	10.2	
Smokeless tobacco use status									
Current users	443	3.3	58	11.6	324	73.8	61	14.6	0.008
Non-current users	13,009	95.2	2,517	18.7	8,913	69.5	1,579	11.8	
Missing	221	1.6	36	15.3	160	73.8	25	10.9	

Note: N = Unweight sample size. All the percentages are estimated from the weighted analysis; Bold results are statistically significant at $p < 0.05$, indicating that the row variable and smoking transition status are not independent. "Missing" category is excluded from the regression analysis.

Table 2: Multivariate multinomial logistic regression analysis of correlates associated with 12-month smoking transitions among U.S. adults who were nondaily smokers at baseline: Tobacco Use Supplements to the Current Population Survey - 2003, 2006/07, and 2010/11 (N=13,441)

	Nondaily-to-Daily		Nondaily-to-Former	
	AOR (95% CI)	P value	AOR (95% CI)	P value
Year				
2003	REF		REF	
2006/07	0.75 (0.66, 0.86)	<.001	1.11 (0.95, 1.30)	0.174
2010/11	0.78 (0.68, 0.89)	<.001	1.30 (1.12, 1.52)	0.001
Age				
18-24	REF		REF	
25-44	0.84 (0.61, 1.15)	0.267	0.64 (0.48, 0.86)	0.003
45-64	0.84 (0.61, 1.15)	0.270	0.41 (0.30, 0.55)	<.001
65+	0.65 (0.45, 0.93)	0.018	0.60 (0.43, 0.85)	0.004
Gender				
Male	0.74 (0.66, 0.82)	<.001	0.85 (0.74, 0.97)	0.013
Female	REF		REF	
Race				
Non-Hispanic White	REF		REF	
Non-Hispanic Black	0.93 (0.79, 1.10)	0.387	0.78 (0.62, 1.00)	0.045
Hispanic	0.66 (0.54, 0.80)	<.001	1.01 (0.81, 1.25)	0.944
Non-Hispanic Asian	1.42 (0.99, 2.04)	0.056	0.64 (0.42, 0.96)	0.032
Non-Hispanic Other	0.94 (0.70, 1.27)	0.685	0.95 (0.65, 1.39)	0.796
Education				
Less than high school	2.03 (1.61, 2.57)	<.001	0.57 (0.44, 0.74)	<.001
High school graduate	2.11 (1.74, 2.55)	<.001	0.69 (0.58, 0.81)	<.001
Some college	1.62 (1.34, 1.95)	<.001	0.83 (0.69, 0.98)	0.032
College graduate	REF		REF	
Income				
Less than \$25,000	REF		REF	
\$25,000-50,000	0.87 (0.75, 1.00)	0.043	1.14 (0.95, 1.36)	0.153
\$50,000-75,000	0.86 (0.72, 1.03)	0.098	1.06 (0.85, 1.32)	0.614
≥\$75,000	0.62(0.50,0.76)	<.001	1.06 (0.86, 1.31)	0.596
Unknown	0.73 (0.56, 0.96)	0.023	0.81 (0.56, 1.17)	0.259
Marital status				
Married	REF		REF	
Widowed/Divorced/Separated	1.00 (0.88, 1.14)	0.962	0.82 (0.69, 0.96)	0.013
Never married	0.96 (0.82, 1.11)	0.569	0.80 (0.67, 0.95)	0.011
Region				
Northeast	REF		REF	
Midwest	1.00 (0.84, 1.20)	0.964	0.99 (0.82, 1.21)	0.939
South	1.15 (0.98, 1.36)	0.087	1.01 (0.83, 1.21)	0.962
West	0.95 (0.78, 1.14)	0.566	1.20 (0.99, 1.47)	0.068
Cigar use status				
Current users	1.05 (0.82, 1.34)	0.706	0.56 (0.38, 0.81)	0.003
Non-current users	REF		REF	
Smokeless tobacco use status				
Current users	0.60 (0.43, 0.84)	0.003	1.21 (0.85, 1.72)	0.285
Non-current users	REF		REF	

Notes: Adjusted odds ratios (AOR) are adjusted for all the other variables in the table. Bold results are statistically significant at p<0.0.

CI = confidence interval. Higher AOR indicates more likely to make the transition.