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Original Investigation

Exploring the relationship between acculturation and smoking behavior within four Southeast Asian communities of Minnesota

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Abstract

Objectives: This study sought to measure the prevalence of smoking among the Hmong, Vietnamese, Lao, and Cambodian communities of Minnesota and explore the relationship between smoking and acculturation within these communities.

Methods: A community-based participatory research framework was used through all phases of this study. Standard as well as community-developed measures of acculturation were used. Data were obtained by face-to-face and telephone interviews with 1,628 respondents from July 2006 to March 2007.

Results: Vietnamese and Cambodian men smoke at higher rates than men in the U.S. general population (35% and 58% compared with 20%, respectively). Most men across the Vietnamese, Cambodian, and Lao populations started smoking prior to immigration to the United States, although most former smokers quit smoking after immigration to the United States. Most male Hmong respondents started smoking after immigration. Education was predictive of smoking status across genders, with less education associated with greater odds of being a smoker. Logistic regression found some acculturation measures to be predictive of smoking status across both genders: Less acculturated male respondents and more acculturated female respondents are more likely to be smokers.

Discussion: Results of this study suggest that the role of acculturation in tobacco use may not be straightforward as has been presented previously. Other factors, such as social norms and cultural or linguistic isolation, may also be playing a role in tobacco use patterns and may play different roles for different subgroups. Further research is needed within each population and subgroups within those populations to understand these relationships and how they affect smoking behavior

Introduction

The culture of tobacco use in many Southeast Asian (SEA) countries differs dramatically from that in the United States. Cigarette smoking is considered an expected behavior among men and an indicator of social status in SEA countries, whereas there is a cultural prohibition against female smoking in most SEA countries (Chollat-Traquet, 1992; King, Borelli, Black, Pinto, & Marcus, 1997; Waldron et al., 1988). These norms are reflected in the smoking prevalence rates in SEA countries; the smoking rate for men and women in Vietnam is 35.2% and 1.8%, respectively; in Cambodia, it is 31.0% and 4.7%, respectively; and in the Lao People's Democratic Republic, it is 57.9% and 12.3%, respectively (World Health Organization, 2008). In contrast, there is less disparity in smoking prevalence estimates in the general population of the United States across gender where the smoking rate for men is 20.3% and women is 16.7% (Centers for Disease Control and Prevention [CDC], 2008).

Prior research shows Asians to have the lowest reported rate of smoking among ethnic and racial subgroups within the United States (CDC, 2007), but concern is warranted for a number of reasons. Evidence suggests that as SEA immigrants become more acculturated, their smoking behavior moves toward that

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which is more consistent with the U.S. general population (An, Cochran, Mays, & McCarthy, 2008; Wewers, Dhatt, Moeschberger, Guthrie, & Kuun, 1995; Zhang & Wang, 2008). Although this translates to lower tobacco use among men, tobacco use among SEA women increases. Additionally, prevalence estimates for SEA communities vary considerably, ranging from estimates of 15%–50% for men and less than 1%–11% for women (An et al.; CDC, 2004; Ma et al., 2004). Much of this disparity may be attributable to the language the interview was conducted in. Studies within the SEA populations conducted in English only, such as the Behavioral Risk Factor Surveillance System and National Health Interview Survey, report lower smoking rates than those that are conducted in the language of the country of origin (Carabello et al., 2008; CDC, 2004, 2008; Moeschberger et al., 1997; Wiecha, Lee, & Hodgkins, 1998). Many (32%–45%) SEA households in the United States are linguistically isolated (Niedzwiecki & Duong, 2004); no member aged 14 years or over speaks English or speaks English very well. Therefore, English-only surveys are likely reaching a SEA population that is more acculturated and not necessarily representative of the SEA population living in the United States.

Acculturation may be defined as a process by which "individuals or groups accept, selectively, aspects of another culture, often a dominant one, that those individuals or groups intend to adopt without completely relinquishing their own" (Ma et al., 2004). Acculturation is believed to play a significant role in affecting the health-related beliefs and behavior (Choi, Rankin, Stewart, & Oka, 2008; Dana, 1996; Marin, Perez-Stable, & Marin, 1989) of many immigrant populations in the United States. Yet the literature specific to the role of acculturation on SEA populations is scarce. While there is considerable diversity of history, beliefs, and practice relative to tobacco use across different Asian populations, these populations are often aggregated by researchers into one grouping of Asian Americans (Tang, Shimizu, & Chen, 2005). This aggregation may serve to dilute an understanding of the role of acculturation on tobacco use within specific populations. Furthermore, while acculturation is a complex multidimensional concept, its measurement is often reduced to use of single dimensional proxies, such as generational status, length of time in the United States, and language use (Marin & Gamba, 1996; Wiecha et al., 1998).

This article reports the findings of a study focused on evaluation of acculturation and smoking behavior in four SEA populations of Minnesota: Hmong, Vietnamese, Cambodian, and Lao. Behind California and Texas, Minnesota has the largest SEA population in the United States (Niedzwiecki & Duong 2004). This study utilized a community-based participatory research model with substantial input from SEA community members. It is also built on findings from 3 years of qualitative research within these communities to inform the quantitative assessment of the relationship between acculturation and smoking behavior.

Methods

Representatives from each of the collaborating organizations: Clearway Minnesota, Blue Cross Blue Shield of Minnesota, the University of Minnesota, the Asian-Pacific Tobacco-Free Coalition, and the SEA Refugee Community Home, comprised the core research team. In addition, an advisory committee, comprised of representatives from community organizations, was involved in all stages of the research and was instrumental in the development of survey items to measure acculturation. The study was granted Institutional Review Board Human Subjects approval from the University of Minnesota.

Sampling design

Representatives from all four SEA populations each developed a list of surnames common to their specific community. These surnames, as well as surnames identified as population specific by Genesys Marketing Systems Group, were used to construct a sample. Data collection occurred from January 2006 to March 2007. Data collection was initially conducted utilizing a telephone screener for recruitment where a household member was selected at random from the household as the target for the study. This was followed up with a face-to-face interview in the community. An experiment to evaluate mode differences was built in to the project. A subsample of respondents were randomly assigned to complete an abbreviated version of the interview by telephone or face to face. The number of self-reported smokers was significantly lower in the face-to-face mode than in the telephone mode. In July 2006, data collection shifted to telephone mode only. A mode effect was not present in the final sample.

Study subjects

The enrollment criteria for the study were (a) any person born in or self-identifying as Hmong, Vietnamese, Cambodian, or Lao (n = 1,609) or (b) not self-identified but having parents or grandparents born in a qualifying country (n = 6). The study achieved a 71% response rate (American Association for Public Opinion Research [Response Rate 1], 2008).

Instrument

The survey instrument was translated from English into Hmong, Khmer, Lao, and Vietnamese through an approach involving a community review process, cognitive interviews with community members, as well as principles of translation/back translation. Cognitive interviewing with target population members is a widely used technique to evaluate how potential respondents understand, process, and respond to survey questions (Willis, 2005). The translation was an iterative process with the goal of developing a conceptually equivalent translation rather than a linguistically equivalent translation. The instrument was pretested in person and by phone. The study used bilingual interviewers who were fluent in both English and either Hmong, Khmer, Lao, or Vietnamese and who could also both read and write in the non-English language. To ensure quality of data collection, approximately 10% of randomly selected interviews conducted by each interviewer were monitored by survey center managers.

The data were weighted to account for a subject's a priori differential probabilities of selection based on stratum and number of adults living in the household. The poststratification weight was applied to the person weight to match known population distributions by age and gender of the Hmong, Vietnamese, Cambodian, and Lao populations in Minnesota based on 2000 Census data.

Measures

In addition to a standard gender and age demographics, marital status was coded as not married or married. Education is reported as a four level variable: less than high school, high school, some college, and college graduate.

Respondents who reported that they have ever smoked a cigarette, have smoked at least 100 cigarettes in their life, and now smoke every day or some days were classified as current smokers. Respondents who reported smoking at least 100 cigarettes in their life but have not smoked in the last 6 months were classified as former smokers. Frequency of smoking was based on the number of cigarettes smoked per day and coded into three groups: light smokers (less than 15 cigarettes on some days or all days), moderate smokers (least 15 but less than 24 cigarettes some days or all days), and heavy smokers (24 cigarettes/day or more).

Multiple acculturation indicators were used. Most tobacco use research with immigrant populations has relied on primary language, years of residence in the United States, or country of birth as proxies for an indication of level of acculturation (Bock, Niaura, Neighbors, Carmona-Barros, & Azam, 2005; Crespo, Smit, Carter-Pokras, & Anderson, 2001; Maher et al., 2005; Trinidad, Gilpin, Messer, White, & Pierce, 2006). The current study also employed language and country of birth as proxies for acculturation. Rather than the number of years lived in the U.S., a variable representing the percentage of life lived in the U.S. is included (a continuous variable, with the value for U.S. born respondents coded as 100%). This measure has been found to be a more sensitive indicator of acculturation than number of years lived in the United States (Anderson, Moeschberger, Chen, Kunn, & Guthrie, 1993).

In addition to standard measures of acculturation, our analysis utilized community identification measures. This research included development of a conceptualization of community identification consistent with data from the qualitative interviews and the literature on ethnicity and acculturation. Two core constructs emerged: cultural fluency and cultural orientation. Each construct was modeled to assess home country identification and U.S. identification. Cultural fluency was defined as acquired knowledge; cultural skills were acquired through socialization. Cultural orientation was defined as attitudes and behavior, identification with culture of origin and new culture, and participation in community institutions and activities. Home country identification requires high home country fluency and substantial to exclusive engagement in home country culture. U.S. identification allows for bicultural fluency and encompasses active engagement in U.S. culture with minimal to no involvement in home country culture. Fluency and orientation are separate axes in a multidimensional space of community identification.

A total of 21 question items regarding community and acculturation were included in this instrument. Using traditional psychometric techniques, we evaluated whether items could be grouped into latent variables (Nunnally & Bernstein, 1994). The development of the instrument was guided by a theoretical framework as well as qualitative information. Therefore, the first step in the evaluation was a confirmatory factor analysis. This analysis showed that some of the items were not loading as expected. An exploratory factor analysis was conducted to finalize the content of each of the latent variables. Two fluency variables and four orientation variables emerged. Of the two fluency variables, one is focused on U.S. culture and one on home country (for immigrants, this refers to the country they immigrated from. For SEA respondents born in the United States, this refers to the country their parents or grandparents immigrated from). Four variables represent different aspects of cultural orientation: change in behavior since immigration, comparison of self with a typical (White) Minnesotan, the relative importance of practicing home country ways in the home, and social embeddedness in the SEA community. One of the orientation variables is specific to immigrants only: change in behavior since immigration. Analysis involving this variable was restricted to immigrants only. The fluency and orientation variables used in the analysis are listed below.

Fluency 1: Fluency with U.S. culture.

Fluency 2: Fluency with home country culture.

Orientation 1: Change in behavior since immigration.

Orientation 2: Comparison of self to a "typical White Minnesotan" for behaviors.

Orientation 3: Importance of maintaining home country ways in home.

Orientation 4: Ethnicity of social network.

All six latent variables were scored such that a higher score indicates either greater fluency in U.S. culture (Fluency 1) or lower fluency in home country culture (Fluency 2) or greater orientation to U.S. culture (Orientation 1 and Orientation 2) or lower orientation to home country culture (Orientation 3 and Orientation 4). Therefore, higher scores are indicative of higher levels of acculturation.

Analysis

All analyses were gender specific. Based on past research, there was an expectation of differential effects of acculturation on smoking behavior across gender. Univariate and bivariate analysis by ethnicity included basic sociodemographic characteristics. Chi-square and *t* tests were used for bivariate comparison of sociodemographics, as well as acculturation indicators, and characteristics of smoking behavior across ethnicity. Logistic regression models were constructed to include predictors of current smoking. Smoking status was recoded into two groups: current smokers and nonsmokers, which included never-smokers as well as former smokers. Due to the low rates of smoking reported by female respondents, only one regression model was used for females, combining females across all four populations. Aggregating the SEA populations allows predictive ability that is not present in models of the individual SEA populations. Predictor variables included age as a continuous variable. Education was coded as a two-level variable for regression analysis: less than high school, and high school or greater. Percentage of life lived in United States was a continuous variable. Data were analyzed using the statistical software SAS v. 9.1, and a significance level of .05 or less was used.

Table 1. Demographics by ethnicity and gender. Values reported as percentage or mean (*SD*)

	Hmong ($n = 561$)			Vietnamese ($n = 353$)			Cambodian ($n = 351$)			Lao ($n = 350$)		
	Total	Male ($n = 200$)	Female ($n = 361$)	Total	Male ($n = 178$)	Female ($n = 175$)	Total	Male ($n = 143$)	Female ($n = 208$)	Total	Male ($n = 164$)	Female ($n = 186$)
Age (M, SD)[a]	39.6 (15.6)	40.4 (16.0)	38.9 (15.4)	47.1 (15.3)	46.2 (16.3)	48.5 (15.6)	49.5 (14.1)*	57.7 (16.4)	46.1 (13.1)	50.3 (13.0)*	52.3 (11.6)	48.3 (12.0)
Education (%)**												
Less than high school	52.5*	37.3	61.5	27.4*	17.2	37.6	66.3*	46.3	76.6	50.5*	35.3	64.2
High school	26.2	34.1	21.5	30.0	30.7	29.2	8.1	18.2	2.9	21.9	26.3	18.0
Some college	12.0	17.6	8.6	21.7	21.6	21.8	12.3	17.2	9.8	20.4	27.4	14.1
College graduates	9.3	11.0	8.4	20.9	30.5	11.4	13.3	18.4	10.7	7.2	11.0	3.7
Income**												
Less than $25,000 (%)	46.4*	39.5	50.8	18.9***	16.7	21.6	38.2*	29.7	43.8	28.3	27.0	29.4
$25–39,999 (%)	22.4	21.8	22.7	20.1	16.8	23.9	13.8	16.2	12.2	17.6	18.8	16.5
$40–75,000 (%)	19.7	22.8	17.8	34.0	33.1	35.0	22.7	19.7	24.7	30.6	31.2	30.1
More than $75,000 (%)	11.5	16.0	8.6	27.0	33.5	19.6	25.4	34.4	19.4	23.5	23.0	24.0
Marital status (% married)**	69.3	73.6	66.8	73.3	72.9	73.6	56.4	57.6	55.7	77.3	81.0	73.9
Primary language (% native)**	98.3	98.1	98.3	92.5	93.1	92.0	88.0*	75.0	96.6	99.6	99.9	99.4
Country of birth (% non-United States)**	91.1	91.3	90.9	97.9	97.9	97.9	98.3	97.9	98.4	97.8	97.8	97.7
% Life in United States (M, SD)[a]	50.7 (28.0)	52.6 (27.4)	49.5 (28.3)	37.3 (22.6)*	41.6 (23.0)	33.1 (21.4)	41.9 (15.8)	42.5 (14.6)	41.6 (16.6)	45.3* (15.6)	47.9 (14.2)	42.9 (16.4)

Note. [a]$F \leq .01$ by ethnicity (proc General Linear Model).

*$p \leq .01$ difference by gender (t test, chi-square); **$p \leq .01$ difference by ethnicity (chi-square); ***$p \leq .05$ difference by gender; ****$p \leq .05$ difference by ethnicity.

Results

Demographics

A total of 1,615 respondents completed the survey. As indicated in Table 1, respondent gender ranged from 46% (Vietnamese) to 64% woman (Hmong). Educational attainment differed significantly by both ethnicity and gender (for all ethnicities). Cambodians had the lowest rate of education completed, with more than 66% of respondents not having at least a high school education, whereas only 27% of Vietnamese interviewed had not completed at least high school. The rates of females who did not have at least a high school education were much higher than their male counterparts. Income was variable across ethnicity; 46% of Hmong incomes fall under $25,000 per year compared with 19% and 28% for Vietnamese and Lao, respectively. Interviews completed in a language other than English were high within all four SEA populations, with overall 95% of interviews conducted in the native language. The SEA sample presented a high percentage of immigrants (95%).

Community identification

As indicated in Table 2, the community identification variables demonstrated greater difference across ethnicity for both male and female respondents than across gender within ethnicity. The Hmong demonstrated the highest score for all variables except the variable representing "social network," indicating greater acculturation among the Hmong than any of the other three populations. The Lao demonstrated the lowest score across four of the six variables, indicating less acculturation than the other three populations.

Smoking prevalence and characteristics across populations

Hmong

Table 3 presents characteristics of smokers, including prevalence estimates by ethnicity and gender. The Hmong demonstrated the lowest prevalence rate across all the SEA populations. As expected, men had significantly higher rates than women (almost 12% compared with less than 1%). While most Hmong smokers were considered light smokers, some Hmong men qualified as moderate smokers. The only characteristic of smoking behavior that demonstrated statistical significance across ethnicity is the variable representing where respondent lived when they started smoking. The majority of Hmong smokers began smoking in the United States, whereas the overwhelming majority of smokers within the other three populations began smoking prior to living in the United States. Hmong women also started smoking at a much younger age (14 years) than males (21 years). While the rate of former smokers is three times that of current smokers among women, it is interesting to note that all former smokers (men and women) quit smoking while living in the United States.

Vietnamese

The Vietnamese had the highest overall smoking rate (21.6%) across the SEA populations in this study, with significantly higher rates among men (41.6%) than women (0.8%). The overwhelming majority of Vietnamese men qualified as light smokers, whereas the majority of female smokers qualified as moderate smokers. While the age of starting to smoke was much younger for women (13 years) than men (19 years), there were so few women who report themselves as smokers ($n = 2$) that characterization of any smoking behavior among women is meaningless.

Cambodian

The overall reported smoking prevalence of Cambodian respondents in this study was only 6.2%, but there was a significant difference across gender, with 14% of men being smokers compared with 1.5% of females. Most men were categorized as light smokers, and within age groups, the higher percentage of smokers were found in the 35+ groups. Cambodian men had the lowest age of starting to smoke (14 years), which was much younger than men from the other three populations. The

Table 2. Community identification measures by ethnicity and gender

	Hmong		Vietnamese		Cambodian		Lao	
	Male ($n = 200$)	Female ($n = 361$)	Male ($n = 178$)	Female ($n = 175$)	Male ($n = 143$)	Female ($n = 208$)	Male ($n = 164$)	Female ($n = 186$)
	Range *M* (*SD*)		Range *M* (*SD*)		Range *M* (*SD*)		Range *M* (*SD*)	
Fluency with U.S. culture*,***	1–4		1–4		1–4		1–4	
	2.53 (0.85)**	2.21 (0.83)	2.16 (0.79)**	1.82 (0.70)	2.37** (0.64)	1.81 (0.70)	2.25** (0.56)	1.76 (0.54)
Fluency with home country culture*,***	1–4		1–4		1–4		1–4	
	1.63**** (0.63)	1.76 (0.70)	1.51 (0.66)	1.50 (0.61)	1.63** (0.55)	3.37 (0.50)	1.21 (0.36)	1.25 (0.36)
Change since immigration*,***	1–4.3		1–4.3		1–4.3		1–4	
	3.23 (0.80)	3.25 (0.80)	2.38**** (0.94)	2.19 (0.74)	2.21** (0.71)	1.92 (0.63)	1.78 (0.55)	1.90 (0.60)
Comparison with Minnesotan*,***	1–6		1–6		1–6		1–6	
	2.97** (1.33)	2.69 (1.22)	2.76** (1.33)	2.28 (1.08)	2.26** (1.05)	1.76 (0.81)	2.22 (1.17)	2.10 (1.20)
Importance of home country ways*,***	1–4.7		1–4		1–4		1–4	
	1.98 (0.75)	1.99 (0.68	1.42 (0.46)	1.33 (0.48)	1.30 (0.39)	1.25 (0.34)	1.15 (0.37)	1.12 (0.28)
Social network*,***	1–5		1–5		1–5		1–5	
	2.28** (0.86)	2.82 (0.94)	2.77 (1.03)	2.93 (1.13)	2.88** (0.72)	3.15 (0.67)	2.27** (0.56)	2.55 (0.67)

Note. *$p \leq .01$ difference by ethnicity, male (proc General Linear Model); **$p \leq .01$ difference by gender (*t* test); ***$p \leq .01$ difference by ethnicity, female (proc General Linear Model); ****$p \leq .05$ difference by gender (*t* test).

Table 3. Smoking prevalence estimates, including traditional acculturation measures, by ethnicity and gender (%)

	Hmong		Vietnamese		Cambodian		Lao		All Southeast Asian	
	Male ($n = 200$)	Female ($n = 361$)	Male ($n = 178$)	Female ($n = 175$)	Male ($n = 143$)	Female ($n = 208$)	Male ($n = 164$)	Female ($n = 186$)	Male	Female
Prevalence rate*,****										
Never (%)	84.0	96.4	28.2	98.2	46.0	94.0	31.5	91.9	50.2	95.5
Former (%)	4.1	2.7	30.3	1.0	40.3	4.5	37.0	4.0	24.7	2.9
Current (%)	11.8	0.9	41.6	0.8	13.8	1.5	31.5	4.1	25.1	1.5
Number of cigarettes per day***										
Light (<15, %)	94.3	100	81.0	32.6	93.4	85.0	85.6	93.7	85.4	87.3
Moderate (≥ 15 ≤ 24, %)	5.7	0	19.0	67.4	0	15.0	14.4	0	14.0	9.7
Heavy (>24, %)	0	0	0	0	6.6	0	0	6.3	0.6	3.0
Age in years (% smoke in age group)*,****										
18–24	25.3	67.5	0.4	0	0	0	1.6	0	4.6	16.7
25–34	25.1	32.5	19.4	0	0.6	0	2.9	23.8	14.2	19.2
35–44	16.1	0	40.5	100	52.6	3.4	27.4	6.9	34.4	14.2
45–54	11.8	0	21.9	0	23.7	39.2	20.1	60.0	20.0	35.1
55–64	18.5	0	11.2	0	15.3	57.4	26.3	9.3	20.4	14.8
65+	3.1	0	6.6	0	7.9	0	13.3	0	6.4	0
Age started smoking (*M*, *SD*)	20.7 (8.2)	13.8 (1.1)	19.3 (9.8)	13.3 (1.1)	13.8 (4.8)	20.0 (1.2)	19.3 (6.7)	19.3 (5.4)	19.0 (8.2)	17.5 (4.2)
Where started (% United States)*	71.0	100	21.6	0	19.6	24.2	24.6	51.9	29.9	53.3
Where Quit (% United States)****	100	100	90.4	64.9	95.1	100	100	100	94.9	97.4

Note. *$p \leq .01$ difference by ethnicity, male (chi-square); **$p \leq .01$ difference by ethnicity, female (*t* test, chi-square); ***$p \leq .05$ difference by ethnicity, male (chi-square); ****$p \leq .05$ difference by ethnicity, female (*t* test, chi-square).

majority of smokers (77%) were smokers at the time of immigration to the United States. All female and almost all male respondents who reported being former smokers quit smoking while living in the United States.

Lao

Next to the Vietnamese, the Lao population represented in this study had the highest overall smoking rate (14.8%), with almost 32% of men and 4.1% of women being smokers, the highest prevalence rate reported by women across all four populations. The vast majority of smokers were categorized as light smokers (across gender), and the age groups representing the highest percentage of male smokers were in the 35+ categories. Almost 80% of Lao men started smoking prior to immigration to the United States.

Predictors of smoking by gender

Table 4 reports the odds ratios of being a smoker for men across all four ethnicities individually. The predictors of smoking for women are reported for the Hmong, Vietnamese, Cambodian, and Lao populations combined.

Men

Hmong men who have less than a high school education had almost six times the odds of being smokers than those with at least a high school education, and Vietnamese men without a high school education had almost five times the odds of being smokers. The percentage of life lived in the United States rather than country of origin was a significant predictor of smoking status for Hmong; for every 10% increment in amount of their life lived in the United States, Hmong men had almost one and a half times the odds of being smokers. Fluency with U.S. culture was significant as a predictor of smoking status among Vietnamese and Lao men, with those less fluent with U.S. culture having two and four times the odds, respectively, of being smokers. Social embeddedness was also predictive of smoking status for Lao, men with more social interaction with other Lao having four times the odds of being smokers.

Women

Women who have lived a greater percentage of their life in the United States rather than in their "home" country had almost two times the odds of being smokers. Social embeddedness was a significant predictor, with women who are more socially embedded in their ethnic community having two times the odds of being smokers.

Discussion

This study sample was highly home country oriented, with more than 95% of respondents being first generation and non-English speakers. The availability of interviewers who were able to speak with respondents in their native language was a factor in reaching segments of the ethnic populations that English-only surveys are not able to reach. Potentially, as a result of this, our smoking estimates differ from the estimates found by prior studies conducted in English, which typically find lower rates

Table 4. Logistic regression reported by ethnicity and gender. Values are estimates (unexponentiated *OR*) with *SE*s and adjusted odds ratios for probability of being a smoker, 95% *CI*

	Male						Female	
	Hmong		Vietnamese		Cambodian	Lao	Combined	
	Estimate (*SE*) *OR* (*CI*)		Estimate (*SE*) *OR* (*CI*)		Estimate (*SE*) *OR* (*CI*)	Estimate (*SE*) *OR* (*CI*)	Estimate (*SE*) *OR* (*CI*)	
Age (years)	−0.17 (0.21) 0.84 (0.56–1.28)		−0.35 (0.13)** 0.71 (0.54–0.92)		−0.07 (0.27) 0.93 (0.55–1.58)	−0.49 (0.26) 0.62 (0.37–1.03)	0.19 (0.29) 1.21 (0.68–2.15)	
Education	−1.74 (0.21)** 0.18 (0.05–0.59)		−1.55 (0.42)** 0.21 (0.09–0.49)		1.03 (0.77) 2.80 (0.62–12.57)	−0.01 (0.47) 1.00 (0.40–2.52)	−0.17 (0.89) 0.17 (0.03–1.01)	
% lived in United States	0.32 (0.13)** 1.37 (1.07–1.77)		−0.10 (0.09) 0.90 (0.75–1.08)		0.34 (0.20) 1.41 (0.95–2.09)	0.18 (0.20) 1.20 (0.81–1.78)	0.56 (0.22)** 1.75 (1.15–2.67)	
Fluency with U.S. culture	−0.24 (0.42) 0.79 (0.35–1.78)		−0.59 (0.31)* 0.55 (0.30–1.00)		−0.46 (0.50) 0.62 (0.24–1.67)	−1.45 (0.49)** 0.24 (0.09–0.61)	0.46 (0.48) 1.58 (0.61–4.01)	
Fluency with home country culture	−0.14 (0.47) 0.87 (0.35–2.18)		−0.43 (0.29) 0.65 (0.37–1.15)		−0.16 (0.58) 0.86 (0.27–2.66)	−1.47 (0.81) 0.23 (0.05–1.14)	−0.60 (0.57) 0.55 (0.18–1.67)	
Change since immigration	−0.14 (0.33) 0.87 (0.46–1.64)		−0.04 (0.21) 0.96 (0.63–1.47)		−0.27 (0.52) 0.76 (0.27–2.12)	−0.61 (0.38) 0.54 (0.26–1.14)	−0.74 (0.43)* 0.43 (0.19–0.99)	
Comparison with Minnesotan	0.25 (0.20) 1.29 (0.87–1.91)		0.10 (0.16) 1.10 (0.80–1.51)		0.43 (0.27) 1.53 (0.90–2.60)	0.08 (0.17) 1.09 (0.89–1.50)	−0.08 (0.23) 0.92 (0.59–1.44)	
Importance of home country ways	−0.69 (0.41) 0.50 (0.23–1.13)		0.04 (0.40) 1.04 (0.47–2.29)		−0.17 (0.72) 0.84 (0.21–3.50)	−0.50 (0.63) 0.61 (0.18–2.12)	0.09 (0.50) 1.10 (0.42–2.91)	
Social network	−0.04 (0.27) 1.04 (0.62–1.76)		−0.11 (0.17) 0.90 (0.64–1.25)		0.29 (0.50) 1.34 (0.51–3.56)	−1.39 (0.47)** 0.25 (0.10–0.63)	−0.69 (0.35)* 0.50 (0.25–0.99)	

Note. Model probability [smoker]. *OR* = odds ratio.

Binary variables are dummy coded (0 and1) with referent less than high school education. Percentage lived in United States coded in 10% increments. Age coded as 18–24 years in 10-year increments from 25–65+ years.

*$p < .05$; **$p < .01$.

for SEA men and higher rates for SEA women than reported here (Carabello et al., 2008; CDC, 2004, 2008).

There is a significant disparity in the current smoking estimates across ethnic groups, with the Vietnamese and Lao having much higher rates than Hmong and Cambodian. For the Hmong, this is probably due to the cultural use and history around tobacco in their home regions. While Vietnam, Lao, and Cambodia were all subject to French/European cultural influences of social acceptability around tobacco use, the Hmong people were not. This may explain why all non–U.S.-born Hmong smokers started smoking after immigration to the United States, where smoking is not as anomalous an activity as in the home country regions.

While the Cambodian and Lao smoking estimates, for both men and women, are lower than prevalence rates in the respective home countries, our estimates are actually higher for Vietnamese men than those reported in Vietnam. Given that all respondents to this study were immigrants to the United States, a different population may have been reached with this study than are represented in population-level studies in Vietnam. In addition, there may be effects of cultural insularity or acculturation affecting Vietnamese men differently than the other subpopulations represented in the study. In this study, having less than a high school education, being younger, and a lack of fluency with U.S. culture significantly increased the odds of being a smoker. These findings support prior work that suggests that acculturation for SEA men tends to reduce smoking prevalence. In this study, the men who are least acculturated (as measured by fluency with U.S. culture) are more likely to smoke.

The low smoking rate (0.4%) found within younger Vietnamese men (18–24 years) reflects cultural norms of Vietnam; smoking is widely accepted and expected for adult men but not teenage males. The pattern of fewer younger males smoking was repeated for the 25- to 34-year male age group (19%) compared with the 35- to 44-year age group (41%). Taken in conjunction with the low rate of Vietnamese men who initiate smoking while living in the United States (22%), this may also be indicative of greater social exposure of younger Vietnamese men to U.S. culture, including school-based smoking prevention programs and other messages about the harms of tobacco.

Although the smoking rates found by this study for women are low, a concern among female smokers is both the age of initiation to smoking, 13.8 years for Hmong and 13.3 years of age for Vietnamese women, as well as the number of cigarettes per day smoked by Vietnamese women (67% smoke 15–24 cigarettes/day). Both the Vietnamese and the Cambodian women smoke more cigarettes per day than their men counterparts. In addition, findings on tobacco use among women related to percent of life lived in the United States support prior research that indicates that greater acculturation leads to higher rates of tobacco use. However, findings that greater social embeddedness for women also leads to higher odds of smoking suggests that there may be other factors at play than just acculturation and points to the need for additional research.

A potential barrier for smoking prevention and cessation programs is linguistic isolation. More than three quarters of

respondents in this study speak a primary language other than English. Furthermore, the geographic residential patterns of the SEA communities of Minnesota, particularly recent immigrants, suggest that ethnic insularity will contribute toward maintenance of home country norms and values for men, including those specific to tobacco use.

Limitations of this study include reliance on self-reported tobacco use. Prior studies using saliva-based cotinine analysis have examined underreporting of smoking behavior among Vietnamese, Cambodian, and Lao populations in the United States. Among Vietnamese men and women, they found no underreporting of tobacco use, but within Cambodian men and women, the actual smoking estimates based on cotinine analysis ranged from 5% to 15% points higher, respectively. This phenomenon was also present among the Lao women, with actual smoking found to be more than 6% points higher than estimates based on self-report (Moeschberger et al., 1997; Wewers et al., 1995). Another limitation is the sample size for within group (ethnicity and gender) analysis of the role of acculturation in smoking behavior. In order to develop interventions that will be effective for the different subpopulations presented here, additional research needs to be done to more fully understand the complex interrelationships between acculturation, cultural and linguistic isolation, and social norms for the different subgroups.

The findings presented here have several implications for developing interventions for SEA immigrant populations. First, the variance of findings between community groups and subpopulations suggests the need to recognize the distinct nature of these communities in terms of their history and culture of tobacco use and the need to educate those working with these communities about these differences. Second, the process of acculturation—especially for younger generations—needs to be addressed in terms of developing prevention programs. And finally, the role of gender needs to be thought through carefully when designing interventions.

In conclusion, while much of the work presented here supports previous studies that indicate acculturation results in decreased tobacco use prevalence for men and increased prevalence for women, other findings suggest a more complex set of interrelationships. Furthermore, acculturation effects may be modified or mediated by other factors, such as social norms and cultural or linguistic isolation. In addition, those moderating or mediating factors may have differential effects on subpopulations within the SEA immigrant community. Successful development of interventions will depend on further research to carefully assess these subgroups and their tobacco use.

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