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Influence of American acculturation on cigarette smoking behaviors among Asian American subpopulations in California

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Using combined data from the population-based 2001 and 2003 California Health Interview Surveys, we examined ethnic and gender-specific smoking behaviors and the effect of three acculturation indicators on cigarette smoking behavior and quitting status among 8,192 Chinese, Filipino, South Asian, Japanese, Korean, and Vietnamese American men and women. After adjustment for potential confounders, current smoking prevalence was higher and the quit rate was lower for Korean, Filipino, and Vietnamese American men compared with Chinese American men. Women's current smoking prevalence was lower than men's in all six Asian American subgroups. South Asian and Korean American women reported lower quit rates than women from other ethnic subgroups. Asian American men who reported using only English at home had lower current smoking prevalence and higher quit rates, except for Filipino and South Asian American men. Asian American women who reported using only English at home had higher current smoking prevalence except for Japanese women. Being a second or later generation immigrant was associated with lower smoking prevalence among all Asian American subgroups of men. Less educated men and women had higher smoking prevalence and lower quit rates. In conclusion, both current smoking prevalence and quit rates vary distinctively across gender and ethnic subgroups among Asian Americans in California. Acculturation appears to increase the risk of cigarette smoking for Asian American women. Future tobacco-control programs should target at high-risk Asian American subgroups, defined by ethnicity, acculturation status, and gender.

Introduction

As the leading cause of preventable death in the United States, smoking causes more than 438,000 deaths annually (Armour, Woollery, Malarcher, Pechacek, & Husten, 2005). Smoking among Asian Americans remains understudied because, in part, of its overall relatively low prevalence compared with the general U.S. population (13.3% vs. 22.5%) (Centers for Disease Control and Prevention, 2004). While the rate of smoking appears low when examined for Asian Americans as a whole, this approach may obscure the subgroup differences based on the heterogeneity of this population in immigrant history, U.S. acculturation, socioeconomic status, and other cultural characteristics, many of which documentably affect health behavior practices (U.S. Census Bureau, 2003). The limited scientific literature on tobacco use by Asian Americans has indicated varying smoking prevalence for Asian American subgroups (Lew & Tanjasiri, 2003; Ma, Shive, Tan, & Toubbeh, 2002; Shelley et al., 2004). Recent research also indicates that smoking disparities accounted for much of the disparities in cancer death rates among the Asian and Pacific Islander subpopulations in the United States (Leistikow, Chen, & Tsodikov, 2006). Closer examination of smoking prevalence and its predictors in Asian American subgroups may reveal potential

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modifiable risk factors for tobacco use and help to design tobacco interventions that are culturally appropriate for the subgroups at higher risk.

The impact of acculturation on immigrants' health has gained increasing attention in public health research (Arends-Toth & van de Vijver, 2006). The effect of acculturation on cigarette smoking has been studied among Hispanic and selected Asian American immigrants in the United States in recent years (Ji et al., 2005; Ma et al., 2004; Perez-Stable et al., 2001; Tang, Shimizu, & Chen, 2005). However, the strength and direction of acculturation effects vary from study to study because of differences in measurement of acculturation, study populations, and study methods. A review of recent studies among Hispanic Americans found that 7 out of 11 selected studies used acculturation scales and the rest used language spoken and/or country of birth to measure acculturation status (Bethel & Schenker, 2005). A positive association between acculturation and smoking among women was found in nine of these studies and a negative association was found in one study. Among seven acculturation and smoking studies focusing on specific Asian American subgroups, acculturation was measured using diverse instruments. One study used an acculturation scale (Moeschberger et al., 1997). The remaining studies used either one or a combination of the following measures: English language skills/preference, preference for traditional food, length of stay in the United States, and country of birth (Juon, Kim, Han, Ryu, & Han, 2003; Ma et al., 2004; Maxwell, Bernaards, & McCarthy, 2005; Rahman et al., 2005; Shelley et al., 2004; Tang et al., 2005). Despite the diversity of acculturation measures, most of these studies found a negative association between acculturation and smoking among men. A trend towards a positive association among women was found by several studies but the results did not reach statistical significance (Ma et al., 2004; Maxwell et al., 2005). The majority of these studies examined only Southeast Asian, Chinese, Filipino, or Korean American women and men. Little information is available for other large ethnic subgroups.

To better inform our study of the effect of acculturation on smoking, we elaborate below the concept of acculturation and discuss limitations of commonly used acculturation measures. The acculturation concept originated in anthropology and has evolved in other disciplines such as sociology and psychology. In epidemiology, acculturation is usually described as the process by which each individual's norms, values, attitudes, beliefs and behaviors change during his/her continuously direct contact with different cultures (Ma et al., 2004). Measures of acculturation tend to be a combination of measures from other disciplines (Salant & Lauderdale, 2003). Acculturation conditions refer to social contextual and individual factors that can affect the acculturation process. These factors include characteristics of the society of origin (home culture) and the receiving society (host culture), type of immigration, length of stay, generation status, and socioeconomic status (Arends-Toth & van de Vijver, 2006). These acculturation conditions not only can influence the pace and orientations of the acculturation process but also affect acculturation-related outcomes. Acculturation orientations can be categorized into one of three classifications: unidimensional model, bidimensional model, and fusion model. The unidimensional model assumes that the acculturation process is a shift from maintenance of the home culture to full adaptation to the host culture (Gordon, 1964). Most smoking related research has adopted this unidimensional model. The bidimensional model treats cultural maintenance and adaptation as two independent dimensions and suggests four acculturation orientations: separation (high maintenance and low adaptation), integration (high maintenance and high adaptation), marginalization (low maintenance and low adaptation), and assimilation (low maintenance and high adaptation) (Berry, 1997). Each orientation may have different effects on individuals' health. The fusion model assumes an individual mixes both home and host cultures in a new "integrated culture." The validity of this model is not certain. Different Asian American ethnic subgroups have different acculturation conditions such as differences in exposure to English and to Western influences prior to immigrating to the United States. Therefore, it is likely that different Asian American subgroups have different acculturation orientations and outcomes. Examining the ethnic subgroup-specific effect of acculturation on smoking is therefore desirable among Asian Americans.

With reference to acculturation measures, some researchers have tried to capture every aspect of acculturation in one acculturation scale and used a single comprehensive score to summarize individuals' overall acculturation status. A major criticism of using this method is that while extreme scores may be interpretable, middle scores may not be. Different acculturation conditions and orientations may have different effects on specific study outcomes (e.g., psychological distress, smoking status) and yet generate similar middle scores. A middle score may therefore not be helpful in predicting a specific acculturation outcome (Arends-Toth & van de Vijver, 2006). Other researchers go to another extreme and use a single narrowly defined proxy indicator to measure acculturation status, such as English proficiency. A single measure may not be able to capture the larger picture of the acculturation process and its potential impact on health behaviors

and may not be equally valid for different ethnic subgroups. Most Asian Indian immigrants, for example, are already well schooled in English prior to immigrating whereas most Korean immigrants are not but they may be equally unacculturated. Given the limited information about acculturation included in the California Health Interview Surveys, we propose to use a combination of three commonly used single acculturation measures, in an effort to capture the diverse acculturation conditions experienced by different Asian American subgroups.

The current study had three goals: (a) to estimate the independent effects of multiple acculturation indicators on both current smoking and quitting behaviors for the six largest Asian American subgroups separately; (b) to compare gender- and ethnic subgroup-specific current smoking prevalence and quit rates; (c) to examine the independent effects of other potential predictors of smoking behavior for both men and women in these subgroups.

Methods

Data source and sample

We used data from the 2001 and 2003 California Health Interview Survey (CHIS), a biennial cross-sectional population-based telephone interview health survey of individuals residing in households in California. Because differences in smoking behaviors in the 2001 and 2003 CHIS data were negligible, we combined the two waves of data for the current analysis to maximize statistical power when testing for ethnic subgroup differences, in accordance with previous research (Chen, Unger, Cruz, & Johnson, 1999). To assure an adequate sample size for major racial/ethnic minority groups, the CHIS used two sampling strategies. The first involved a two-stage, geographically stratified random-digit-dial (RDD) sample design. Chinese, Filipino, South Asian, and Japanese samples were obtained from this RDD sample. The second oversampled, in part, Korean, and Vietnamese Americans, which were combined with the RDD sample to generate a sample that was representative of Asian Americans in California in terms of ethnic distribution and household income (UCLA Center for Health Policy Research, 2005). Six languages were used by CHIS interviewers: Chinese (Mandarin), Korean, Khmer, Vietnamese, Spanish, and English. New survey weights released by the CHIS research group in 2005 were used for the current analysis (UCLA Center for Health Policy Research, 2005).

Study measures

Cigarette smoking. Respondents' smoking status was classified into one of three categories: lifetime nonsmokers (smoked fewer than 100 cigarettes in lifetime), former smokers (smoked more than 100 cigarettes in lifetime but currently not smoking any cigarettes), and current smokers (smoked 100 cigarettes in lifetime and was currently smoking at least some days in the past month). To assess quitting behavior, we used the following definition of "quit rate": quit rate=number of former smokers/(number of current smokers+number of former smokers) × 100%.

U.S. acculturation. Three acculturation indicators that have been shown to be sensitive to capturing major features of acculturation conditions among Asian American subgroups were used: generational status (first generation: born in foreign countries; second generation and above: born in the United States), years of living in the United States (less than 15 years; 15 or more years), and language spoken at home (English only; partly English; other language only).

Alcohol drinking. Alcohol drinking has been shown to be highly correlated with smoking in many studies and therefore, was included in our analysis (Faeh, Viswanathan, Chiolero, Warren, & Bovet, 2006; Friedman, Tekawa, Klatsky, Sidney, & Armstrong, 1991). Drinking status was dichotomized as at least one alcoholic drink in the month prior to interview vs. none.

Access to health care and health insurance status. Access to health care and health insurance status have been shown previously to be associated with both smoking behaviors and acculturation status and were therefore included in our analysis. (Stone, Longo, Phillips, Hewett, & Riley, 2002). Access to health care was measured by "having a usual health care place to go (yes; no)." Health insurance status was measured by "insurance coverage status during the 12 months prior to interview (always insured; ever insured; currently uninsured)."

Demographic characteristics. The surveys also measured respondents' self-reported ethnicity, gender, age, education, marital status, and family income, all of which are possible correlates of tobacco use (Juon et al., 2003; Kaholokula, Braun, Kana'iaupuni, Grandinetti, & Chang, 2006). Family income was coded into two categories according to the official Federal Poverty Level (FPL) in 1999 for CHIS 2001 and the FPL in 2002 for CHIS 2003: 0–199% of the Federal Poverty Level (FPL) and 200% FPL and above (California Health Interview Survey, 2002).

Data analysis

Data were analyzed using STATA 9.2 (StataCorp, 2006). To assure representativeness, all analyses were

weighted to account for CHIS's complex sampling design. For univariate comparisons, we used Pearson chi-square tests. We first compared the distribution of demographic characteristics and acculturation measures between the six ethnic subgroups. Consistent gender differences in patterns of smoking behaviors and the effect of acculturation on smoking behaviors were indicated by both previous literature and our exploratory analysis (Ma et al., 2004; Tang et al., 2005). Therefore, we examined the ethnic differences in prevalence of current smoking and quitting as well as the crude association between acculturation measures and smoking behaviors for each ethnic subgroup by gender. For multivariate comparisons, we used multivariate logistic regression to examine the independent effect of acculturation, ethnicity, and other predictors on smoking behaviors, separately by gender. The three acculturation indicators were incorporated into each model separately. We tried two sets of analyses for the multivariate comparisons. First, we did gender- and ethnic subgroup-specific multivariate analyses to examine the independent effect of acculturation indicators. Second, we conducted multivariate analyses in the general Asian American sample by gender and included ethnic subgroup affiliation as a covariate. We found similar patterns of association in both sets of analyses. Therefore, the reported multivariate results that were based on the general Asian American sample (Table 4) but univariate results were interpreted in terms of ethnic subgroup-specific trends (Tables 2 and 3). When examining the independent effect of subgroup affiliation on smoking behaviors, Chinese Americans were used as the reference group because of the large sample size and low smoking prevalence. Adjusted odds ratios (*OR*) and 95% confidence intervals (*CI*) were given in Table 4. An alpha level of 0.05 was used for statistical significance. This study received approval from the UCLA Human Subjects Protection Committee.

Table 1. Characteristics by ethnicity for CHIS 2001 and 2003 Asian American sample (weighted %, [*SE*][a]).

Characteristics	Chinese (*n*=2,491)	Filipino (*n*=1,520)	South Asian (*n*=781)	Japanese (*n*=828)	Korean (*n*=1,281)	Vietnamese (*n*=1,291)
Male gender**	43.8 (1.0)	46.4 (1.4)	59.7 (2.0)	40.4 (2.1)	42.7 (1.4)	50.6 (1.4)
Age, years**						
18–24	13.7 (0.9)	16.3 (1.4)	11.9 (1.5)	8.7 (1.5)	14.9 (1.6)	18.9 (1.5)
25–34	19.3 (1.1)	20.3 (1.3)	40.6 (2.0)	11.3 (1.7)	21.7 (1.3)	19.4 (1.6)
35–44	22.3 (1.1)	20.5 (1.1)	24.9 (1.4)	18.0 (1.7)	22.8 (1.1)	22.9 (1.4)
45–54	19.8 (0.8)	18.6 (1.2)	13.4 (1.5)	16.7 (1.3)	16.2 (1.2)	18.2 (1.3)
55–64	9.9 (0.7)	11.2 (0.9)	5.1 (0.9)	10.3 (1.4)	14.0 (1.2)	11.7 (0.9)
65–85	15.0 (0.3)	13.2 (0.6)	4.0 (0.8)	35.0 (1.7)	10.4 (0.1)	9.0 (0.4)
Highest level of education**						
High school or less	32.9 (1.3)	23.8 (1.5)	12.2 (1.8)	28.5 (2.0)	31.1 (2.0)	54.7 (1.9)
Some college	18.7 (0.9)	26.6 (1.5)	10.9 (1.2)	27.9 (1.7)	15.1 (1.5)	22.5 (1.6)
4-year college degree	28.3 (1.2)	41.3 (1.4)	35.2 (2.1)	29.9 (1.9)	38.9 (1.7)	16.9 (1.3)
Graduate study	20.2 (1.0)	8.2 (0.9)	41.8 (1.8)	13.7 (1.4)	14.9 (1.3)	5.9 (0.8)
Marital status**						
Married	62.8 (1.2)	60.1 (1.7)	73.5 (1.8)	59.3 (2.4)	64.9 (1.7)	57.2 (2.0)
Other marital status	19.5 (1.2)	19.8 (1.5)	14.2 (1.8)	18.2 (1.7)	18.2 (1.5)	20.8 (1.6)
Never married	17.7 (0.9)	20.1 (1.4)	12.3 (1.5)	22.5 (2.1)	17.0 (1.1)	22.0 (1.4)
Ever drank alcohol in past 12 months**	42.1 (1.2)	44.9 (1.4)	45.8 (1.9)	47.0 (2.1)	52.8 (1.9)	39.8 (2.0)
Poverty level**						
0–199% FPL[b]	33.3 (1.4)	26.0 (1.5)	18.3 (1.8)	19.4 (2.1)	32.2 (1.8)	56.4 (1.8)
200% and above FPL[b]	66.7 (1.4)	74.0 (1.5)	81.7 (1.8)	80.6 (2.1)	67.8 (1.8)	43.6 (1.8)
Have usual health care place to go**	86.9 (0.9)	91.7 (1.0)	86.5 (1.7)	91.1 (1.1)	70.0 (1.7)	85.8 (1.6)
Health insurance in past 12 months**						
Always Insured	81.7 (1.1)	85.4 (1.2)	87.3 (1.5)	92.4 (1.1)	61.6 (1.9)	74.7 (2.0)
Ever/currently uninsured	18.3 (0.1)	14.6 (1.2)	12.7 (1.5)	7.6 (1.1)	38.4 (1.9)	25.3 (2.0)
Language spoken at home**						
Other language only	47.4 (1.2)	17.3 (1.3)	14.9 (1.7)	5.1 (0.9)	38.6 (1.8)	54.6 (1.8)
Part English	36.7 (1.3)	58.0 (1.6)	73.4 (2.2)	27.3 (2.0)	53.8 (1.8)	43.1 (1.8)
Only English	15.9 (1.0)	24.7 (1.2)	11.7 (2.6)	67.6 (2.2)	7.6 (1.0)	2.3 (0.6)
Generation**						
First	91.1 (0.6)	89.5 (1.0)	95.6 (0.9)	61.2 (1.9)	94.0 (0.9)	97.8 (0.7)
Second and above	8.9 (0.6)	10.5 (1.0)	4.4 (0.9)	38.8 (1.9)	6.0 (0.9)	2.2 (0.7)
Years living in U.S.**						
Less than 15	39.6 (1.1)	30.1 (1.6)	61.0 (2.2)	9.2 (1.1)	40.2 (1.8)	53.3 (2.0)
15 and above	60.4 (1.1)	69.9 (1.6)	39.0 (2.2)	90.8 (1.1)	59.8 (1.8)	46.7 (2.0)

Note. We used the survey weights released by CHIS in 2005, which were based on the 2001 and 2003 population projections for the state and counties from the California Department of Finance for all tables in this paper. **Ethnic differences in each variable are statistically significant at α=.01 level. [a]*SE*, standard error. [b]FPL, Federal Poverty Level, derived from the 1999 Federal Poverty Guideline for CHIS 2001 data and the 2002 Federal Poverty Guideline for CHIS 2003 data.

Table 2. Current smoking prevalence estimates across acculturation indicator levels, by ethnicity and gender (weighted %, [*SE*][a]).

Acculturation indicators	Chinese	Filipino	South Asian	Japanese	Korean	Vietnamese
Men	(*n*=1,033)	(*n*=626)	(*n*=420)	(*n*=328)	(*n*=503)	(*n*=648)
Overall smoking rate**	14.6 (1.3)	24.5 (2.2)	15.6 (2.2)	15.0 (2.2)	36.7 (3.7)	32.4 (2.4)
Language spoken at home						
Other language only	18.3 (2.2)*	20.7 (5.3)	13.6 (5.0)	28.0 (12.7)	38.2 (4.2)	38.1 (3.6)
Part English	12.8 (2.0)	25.1 (2.7)	15.9 (2.7)	17.7 (5.9)	37.0 (4.4)	26.5 (3.0)
Only English	8.4 (2.5)	25.5 (5.0)	16.7 (6.3)	13.4 (2.6)	18.2 (7.8)	24.9 (18.9)
Generation						
First	15.2 (1.5)	25.0 (2.3)*	15.7 (2.3)	19.5 (3.6)	36.9 (3.2)	32.5 (2.4)
Second and above	8.0 (3.2)	20.3 (6.4)	13.3 (8.9)	9.7 (2.1)	31.6 (10.3)	28.6 (20.4)
Years living in U.S.						
Less than 15	19.8 (2.5)*	25.5 (4.6)	15.2 (3.1)	26.0 (10.3)	44.1 (4.4)**	32.9 (3.3)
15 and above	11.5 (1.6)	24.0 (2.5)	16.2 (4.0)	14.1 (2.3)	31.7 (4.0)	31.8 (3.5)
Women	(*n*=1 458)	(*n*=894)	(*n*=361)	(*n*=500)	(*n*=778)	(*n*=643)
Overall smoking rate**	3.8 (0.6)	7.7 (1.0)	3.1 (1.2)	13.2 (2.2)	9.0 (1.4)	1.7 (1.0)
Language spoken at home						
Other language only	3.0 (0.8)	5.3 (2.2)*	0	14.9 (7.0)	6.5 (2.0)**	0.7 (0.4)
Part English	4.3 (0.8)	6.2 (1.1)	1.4 (0.5)	10.3 (3.5)	9.7 (1.8)	3.3 (2.5)
Only English	5.5 (2.7)	12.9 (2.8)	18.6 (8.9)	14.7 (3.1)	14.9 (5.7)	0.4 (0.4)
Generation						
First	2.8 (0.5)**	7.3 (1.0)	3.0 (1.1)	15.8 (3.1)	8.6 (1.3)	1.7 (1.0)
Second and above	14.8 (4.9)	12.0 (3.3)	4.9 (5.3)	8.3 (2.8)	14.5 (10.2)	0
Years living in U.S.						
Less than 15	2.7 (0.7)**	5.7 (1.6)	2.2 (1.4)	23.8 (8.1)	9.7 (2.0)	0.3 (0.2)
15 and above	4.7 (0.8)	8.6 (1.3)	4.5 (2.1)	12.2 (2.3)	8.5 (1.7)	3.7 (2.4)

*Statistically significant at α=.05 level. **Statistically significant at α=.01 level. [a]*SE*, standard error.

Results

Characteristics of the sample

This study included 3,558 men and 4,634 women of Asian ancestry. They differed significantly in age, education, marital status, drinking behavior, poverty level, and health care access across ethnic subgroups (Table 1). For example, nearly 80% of South Asian adults had a college degree or above, compared with 22% of the Vietnamese.

Cigarette smoking patterns

Current smoking prevalence (Table 2) varied from 14.6% to 36.7% among men and from 1.7% to 13.2% among women. Men of Korean, Vietnamese, and

Table 3. Quit rate estimates across acculturation indicator levels, by ethnicity and gender (Weighted %, [*SE*][a]).

Acculturation indicators	Chinese	Filipino	South Asian	Japanese	Korean	Vietnamese
Men	(*n*=398)	(*n*=329)	(*n*=113)	(*n*=161)	(*n*=338)	(*n*=380)
Overall quit rate**	60.5 (3.0)	49.7 (3.2)	46.0 (5.3)	70.7 (3.7)	45.6 (3.7)	39.0 (3.0)
Language spoken at home						
Other language only	56.7 (4.2)	66.5 (8.2)*	39.2 (14.0)	44.6 (19.3)	43.5 (4.7)	36.4 (4.3)
Part English	63.8 (5.0)	48.9 (4.1)	44.8 (7.3)	73.2 (8.9)	46.4 (5.2)	42.8 (4.9)
Only English	67.9 (8.3)	34.2 (6.1)	56.5 (13.8)	71.9 (4.4)	57.1 (17.7)	33.6 (32.2)
Generation						
First	60.1 (3.2)	51.2 (3.4)	46.1 (5.5)	62.6 (5.5)*	46.1 (3.7)	39.7 (3.1)
Second and above	67.2 (10.5)	30.6 (11.9)	43.1 (34.7)	80.5 (4.5)	30.1 (14.3)	NA
Years living in U.S.						
Less than 15	52.3 (4.5)*	50.2 (7.0)	42.2 (7.5)	46.7 (16.7)	37.9 (5.6)	36.7 (4.0)
15 and above	66.4 (4.0)	49.4 (3.7)	51.0 (8.6)	72.4 (4.0)	51.2 (5.0)	40.9 (4.4)
Women	(*n*=124)	(*n*=182)	(*n*=26)	(*n*=154)	(*n*=153)	(*n*=22)
Overall quit rate	50.7 (4.9)	54.5 (5.0)	48.3 (12.3)	55.6 (5.1)	48.4 (5.6)	52.3 (25.8)
Language spoken at home						
Other language only	46.5 (9.6)	62.0 (13.9)	NA	52.5 (19.8)	44.9 (9.9)	71.4 (44.5)
Part English	49.3 (7.1)	56.1 (7.0)	64.7 (11.1)	65.0 (9.6)	47.9 (7.1)	39.5 (35.6)
Only English	58.9 (13.1)	49.6 (8.2)	30.4 (17.3)	50.7 (6.5)	54.8 (12.2)	81.0 (23.8)
Generation						
First	57.7 (6.2)*	55.9 (5.4)	44.8 (12.1)	50.6 (6.3)	47.8 (5.6)	52.3 (25.8)
Second and above	27.2 (9.2)	43.7 (11.4)	70.8 (31.0)	67.7 (8.9)	52.5 (27.6)	NA
Years living in U.S.						
Less than 15	42.8 (9.2)	61.0 (10.9)	52.1 (16.8)	30.1 (13.1)	39.0 (8.4)	86.0 (37.6)
15 and above	53.3 (5.9)	52.3 (5.4)	41.5 (18.8)	58.8 (5.6)	53.9 (6.8)	36.7 (27.8)

Note. Quit rate=former smokers/(current smokers+former smokers) $\times$ 100%. NA refers to categories with total number of respondents less than 5 and where calculation of a proportion is considered too unstable to be meaningful. *Statistically significant at α=.05. [a]*SE*, standard error.

Table 4. Multivariate logistic regression analyses of selected sociodemographic determinants and acculturation measures on current smoking and quitting, by gender (weighted and adjusted odds ratio, *OR*, estimates).

	Current vs. nonsmokers				Former vs. current smokers			
	Men		Women		Men		Women	
Predictors	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]	*OR*	95% *CI*[a]
Highest education level[c]								
⩽High school	1		1		1		1	
Some college	0.72	(0.47–1.08)	0.95	(0.59–1.51)	1.27	(0.81–1.97)	0.99	(0.53–1.88)
College degree	0.45	(0.31–0.66)	0.58	(0.37–0.92)	1.72	(1.11–2.68)	1.54	(0.80–2.57)
Graduate	0.19	(0.12–0.31)	0.35	(0.17–0.72)	2.63	(1.57–4.41)	1.11	(0.47–2.62)
Marital status[c]								
Current married	1		1		1		1	
Other marital status	1.48	(1.04–2.12)	2.16	(1.33–3.53)	0.54	(0.35–0.82)	0.44	(0.24–0.82)
Never married	1.19	(0.85–1.67)	2.78	(1.79–4.32)	0.72	(0.47–1.12)	0.75	(0.39–1.46)
Ever drank alcohol past 12 months[b,c]	2.92	(2.29–3.73)	2.96	(2.12–4.11)	0.66	(0.50–0.87)	1.12	(0.69–1.83)
Poverty level[b,c]	1.50	(1.10–2.05)	0.82	(0.51–1.31)	0.68	(0.49–0.94)	1.21	(0.67–2.20)
Have usual health care place[b,c]	1.42	(1.04–1.94)	1.19	(0.72–1.97)	0.60	(0.40–0.91)	0.80	(0.42–1.51)
Ever uninsured in past 12 months or currently uninsured[b,c]	1.43	(0.99–2.05)	0.94	(0.58–1.54)	0.91	(0.61–1.35)	1.29	(0.73–2.29)
Language spoken at home[d]								
Other language only	1		1		1		1	
Part English	0.84	(0.65–1.09)	1.33	(0.82–2.14)	1.41	(1.01–1.96)	0.92	(0.44–1.95)
Only English	0.64	(0.43–0.96)	2.19	(1.23–3.91)	1.87	(1.11–3.13)	1.25	(0.95–2.41)
Second generation and above[b,d]	0.59	(0.38–0.91)	1.15	(0.71–1.84)	1.58	(1.01–2.45)	1.23	(0.71–2.13)
Living in U.S. for 15 years and above[b,d]	0.84	(0.64–1.11)	1.52	(1.03–2.26)	1.02	(0.76–1.37)	1.16	(0.69–1.96)
Ethnicity[e]								
Chinese	1		1		1		1	
Filipino	2.10	(1.47–3.01)	1.93	(1.23–3.03)	0.57	(0.39–0.85)	1.37	(0.73–2.57)
South Asian	1.29	(0.78–2.16)	0.87	(0.36–2.11)	0.44	(0.25–0.79)	1.49	(0.51–4.36)
Japanese	1.71	(0.97–3.02)	3.79	(2.09–6.87)	0.67	(0.38–1.19)	0.97	(0.53–1.77)
Korean	4.17	(2.76–6.28)	2.44	(1.54–3.86)	0.67	(0.41–1.08)	0.99	(0.56–1.73)
Vietnamese	1.98	(1.40–2.81)	0.44	(0.08–2.51)	0.55	(0.37–0.84)	1.36	(0.33–5.64)

[a]95% *CI*, 95% confidence interval. [b]Reference groups are nondrinker, 200% FPL and above, have usual source for health care, always insured in the past 12 months, first generation, and less than 15 years respectively. [c]Adjusted for age and other demographic variables listed in the table. [d]Three acculturation indicators were enrolled in the model separately by adjusting for age and all other predictors listed in the table. [e]Adjusted for age and all demographic and acculturation predictors listed in the table.

Filipino descent reported higher smoking prevalence than men from other Asian ethnic subgroups. Women of Japanese descent reported the highest smoking prevalence compared with women of other Asian American subgroups. Quit rates (Table 3) varied from 39.0% to 70.7% among men and from 48.3% to 55.6% among women. Korean and Vietnamese American ever-smoking men reported lower quit rates than men from other ethnic subgroups. Korean and South Asian American ever-smoking women reported lower quit rates compared with women from other ethnic subgroups.

Associations between potential predictors and smoking behaviors

Acculturation status. In univariate comparisons (Tables 2 and 3), English language preference was negatively associated with men's current smoking behavior among Chinese, Japanese, Korean, and Vietnamese Americans but was not associated with smoking among Filipino and South Asian American men. Men who were second generation or above had a lower current smoking prevalence across all Asian ethnic subgroups. Similarly, increasing years lived in the United States was associated with a lower smoking prevalence among Chinese, Japanese, Korean, and Vietnamese American men but not among Filipino and South Asian American men. By contrast, more acculturated women, reflected by speaking only English at home, or being second generation or above, or having lived in the United States at least 15 years, had a higher smoking prevalence across ethnic subgroups, except among Japanese women. Quit rates also differed across acculturation levels for men. Men who spoke only English at home had a higher quit rate in all Asian subgroups except Filipino men. A significant positive effect of generational status on quitting was also found, but only among Japanese American men. Years lived in the United States also had a positive effect on quitting among Asian American men but

was significant only for men of Chinese descent. We did not find a consistent and stable relationship between acculturation indicators and quitting among ethnic-specific subgroup of women, probably because the number of female smokers was small.

Multivariate analyses, with adjustment for major demographic characteristics, indicated that English language preference at home and higher immigrant generational status were associated with reduced male current smoking prevalence and an increased quit rate. By contrast, speaking only English at home was associated with a higher current smoking prevalence among women. No other acculturation measures predicted women's smoking status.

Individual characteristics. Some demographic characteristics were associated with smoking behaviors among Asian American men and women (Table 4). Having a lower educational level, reporting recent alcohol consumption, and reporting a marital status other than being currently married were associated with a higher current smoking prevalence among both men and women. On the other hand, possessing more education was associated with higher quit rates among both genders. Not having a usual place of health care was associated with a higher current smoking prevalence and a lower quit rate among men.

Ethnicity. After adjusting for demographic characteristics and acculturation indicators, ethnic subgroup differences in current smoking and quitting still existed for both genders (Table 4). Compared with Chinese American men, Korean, Vietnamese, and Filipino American men were more likely to be current smokers. Chinese male smokers also had the highest quit rate among all subgroups. Compared with Chinese American women, women of Filipino, Japanese, and Korean ancestry had a greater risk of being a current smoker. There were no significant ethnic subgroup differences in quit rates among women.

Discussion

Consistent with previous studies (Koch-Weser, Grigg-Saito, & Liang, 2004; Lew et al., 2001; Ma et al., 2002; Shelley et al., 2004; Yu, Chen, Kim, & Abdulrahim, 2002), our findings indicate gender and ethnic differences in cigarette smoking patterns among the six largest Asian American subgroups in California. Men's current smoking prevalence was uniformly higher than women's, especially in the first generation. Korean, Vietnamese, and Filipino American men had higher current smoking prevalence than other ethnic subgroups of men. Japanese, Koran, and Filipino American women had higher smoking prevalence than other ethnic subgroups of women. Additionally, the quit rates of men of Korean, Vietnamese, Filipino, and South Asian descent and of women of South Asian and Korean descent were lower than quit rates in the U.S. general population (Centers for Disease Control and Prevention, 2004). These results are noteworthy in light of the many excess cancer deaths ascribable to tobacco use in the subgroups shown to have higher smoking prevalence (Leistikow et al., 2006). Reducing the smoking prevalence among these Asian American subpopulations should therefore be a public health priority in California.

Our findings also show that the effect of acculturation indicators on smoking behaviors varied across gender and ethnic groups. Among men, English language preference was associated with a lower smoking prevalence and a higher quit rate in most ethnic subgroups except Filipino and South Asian Americans. Higher generational status was associated with a lower current smoking prevalence among men in all ethnic subgroups. Among women, by contrast, English language preference was associated with a higher smoking prevalence among most ethnic subgroups except Japanese Americans but had little effect on quitting. Preferred language spoken at home and generational status were found to be stronger predictors of smoking status than years lived in the United States. Despite a few exceptions, these findings corroborate and extend existing literature on the effects of acculturation on Asian American tobacco use. For example, researchers recently found that English language proficiency was associated with lower smoking prevalence among Chinese men and Asian American men as a whole (Fu, Ma, Tu, Siu, & Metlay, 2003; Tang et al., 2005) and with higher smoking prevalence among Asian American women (Tang et al., 2005). Juon and colleagues found that living in the United States for more than 20 years was associated with lower smoking prevalence among Korean American men (Juon et al., 2003), consistent with our findings. Other researchers, however, found a negative effect of acculturation on quit rates among Korean American men and women, contrary to our findings (Ji et al., 2005). Different measurements of acculturation status used between studies may explain this discrepancy.

We reviewed possible explanations for our findings. First, there are significant differences in the smoking-related social norms between Asian countries and the United States. The sex role-specific smoking-related norms of their countries of origin may continue to influence Asian immigrants' smoking behaviors in the United States. For example, in most Asian countries smoking by men, but not

women, is socially acceptable. Male smoking prevalence in these countries is therefore high; female smoking prevalence is very low except among Japanese women (Khang & Cho, 2006; Sato, Araki, & Yokoyama, 2000; Yang et al., 1999). By contrast, even though smoking is less tolerated overall in California, women's smoking is more socially tolerated in the state than in most Asian countries. In California, the anti-smoking environment may not be strong enough to completely offset the greater tolerance of women's smoking that Asian American women find in the United States. This results in a convergence of men's and women's smoking rates over time with increasing acculturation. In addition, smoking prevalence was relatively high among women in Japan than in other Asian countries. The smoking prevalence among Japanese women ranged from 22% (20–29 years) to 14.1% (40–49 years) in 1995, suggesting greater social acceptance of women's smoking in Japan than in other Asian countries (Sato et al., 2000). As a result, more acculturated Japanese American women in California smoke less than their less acculturated peers. This pattern is contrary to that observed for women from other Asian subgroups but consistent with the suppressive effect that California's anti-smoking norms appear to have on immigrants whose country-of-origin peers smoke at high rates.

Second, different acculturation conditions including type of immigration and unique cultural characteristics of their home countries may contribute to the inconsistent impact of different acculturation indicators on smoking behaviors in specific ethnic subgroups. The finding of no decreased smoking with increasing English language preference in Filipino and South Asian American men is consistent with the view that each Asian subgroup's immigrant history has to be examined separately for insight into that group's risk of smoking in the United States. Unlike other ethnic subgroups, Filipino and South Asian American immigrants come from countries with long colonial histories influenced by western countries. Most Filipinos and South Asians had been already deeply exposed to western culture, religion, and language even before they came to the United States. Thus American acculturation, as reflected exclusively by English language skills, may be less relevant as a proxy for acculturation in these subgroups, even though it is highly useful as a marker for acculturation in other Asian subgroups.

Third, the acculturation indicator, "years living in the U.S.," has a weaker and less consistent effect on smoking status than English language preference and generational status. One common hypothesis is that the longer an immigrant stays in a host culture, the more likely the person will adopt the host culture's social norms and language. Our data showed an insignificant correlation between years living in the United States and English language preference. This weaker effect of duration in the United States on smoking may reflect the experience that many first generation immigrants live in the United States for many years but live in linguistically isolated enclaves such as Koreatown in Los Angeles. In such enclaves, they can do well economically without learning to speak English and learning U.S. social conventions. The tendency for first generation immigrants from some Asian subgroups to settle in enclaves of Asian communities may thereby blunt the effect of duration in the United States on changing their social norms and smoking behaviors.

The results reported here are subject to important limitations. First, some Asian groups, notably South Asian American women, use smokeless tobacco primarily rather than cigarettes. However, the CHIS questionnaire excluded questions about smokeless tobacco use. Thus, the relatively low rates of smoking among South Asian women could be an underestimate of their total tobacco use. Second, our data were cross-sectional. A true test of the causal effects of acculturation on smoking would require prospective data. Our study was designed to reveal potential causal associations between acculturation and smoking but to leave the more rigorous hypothesis-testing of causal direction to future longitudinal research efforts. Third, the use of existing data constrained the investigators' measures of acculturation. The available measures did not do justice to the multidimensional nature of acculturation.

Our findings have important implications for implementing tobacco control programs as well as helping policy makers determine which Asian American subgroups might be at greater risk for smoking related illnesses. First, future tobacco-control programs in California need to focus on higher-risk Asian American subgroups such as Japanese women and Filipino men (regardless of acculturation), less acculturated Korean and Vietnamese men and more acculturated Chinese, Korean, and Filipino women. Second, anti-smoking social norms should be strengthened in all ethnic subgroups. This strategy may carry even greater significance for those ethnic subgroup immigrants who live in relatively segregated ethnic communities that lack anti-smoking social norms. Third, culturally competent strategies are called for, especially for less acculturated Asian American men and women. Multilingual, culturally tailored anti-smoking health education materials and quitting services are needed. Additionally, further exploration of specific determinants of quitting in ethnic subgroups could help to better target interventions so that sustained abstinence could be achieved. Fourth, future studies

should explore the use of more comprehensive measures of acculturation in order to capture different acculturation dimensions and conditions and their effects on health-related behaviors.

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References

Arends-Toth, J., & van de Vijver, F. J. R. (2006). Issues in the conceptualization and assessment of acculturation. In: M. H. Bornstein, & L. R. Cote (Eds.), *Acculturation and parent–child relationships: Measurement and development* (p. 355). Mahwah, NJ: Lawrence Erlbaum Associates.

Armour, B. S., Woollery, T., Malarcher, A., Pechacek, T. F., & Husten, C. (2005). Annual smoking-attributable mortality, years of potential life lost, and productivity losses in the United States, 1997–2001. *Morbidity and Mortality Weekly Report*, *54*, 625–628.

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology*, *46*, 5–34.

Bethel, J. W., & Schenker, M. B. (2005). Acculturation and smoking patterns among Hispanics: A review. *American Journal of Preventive Medicine*, *29*(2), 143–148.

California Health Interview Survey. (2002). *CHIS 2001 Methodology Series: Report 1—Sample design methods*. Los Angeles, CA: UCLA Center for Health Policy Research.

Centers for Disease Control and Prevention. (2004). Cigarette smoking among adults in the United States, 2002. *Morbidity and Mortality Weekly Report*, *53*(20), 427–431.

Chen, X., Unger, J. B., Cruz, T. B., & Johnson, C. A. (1999). Smoking patterns of Asian-American youth in California and their relationship with acculturation. *Journal of Adolescent Health*, *24*(5), 321–328.

Faeh, D., Viswanathan, B., Chiolero, A., Warren, W., & Bovet, P. (2006). Clustering of smoking, alcohol drinking and cannabis use in adolescents in a rapidly developing country. *BMC Public Health*, *6*, 169.

Friedman, G. D., Tekawa, I., Klatsky, A. L., Sidney, S., & Armstrong, M. A. (1991). Alcohol drinking and cigarette smoking: An exploration of the association in middle-aged men and women. *Drug and Alcohol Dependence*, *27*(3), 283–290.

Fu, S. S., Ma, G. X., Tu, X. M., Siu, P. T., & Metlay, J. P. (2003). Cigarette smoking among Chinese Americans and the influence of linguistic acculturation. *Nicotine & Tobacco Research*, *5*(6), 803–811.

Gordon, M. M. (1964). *Assimilation in American life*. New York: Oxford University Press.

Ji, M., Hofstetter, C. R., Hovell, M., Irvin, V., Song, Y. J., & Lee, J., et al. (2005). Smoking cessation patterns and predictors among adult Californians of Korean descent. *Nicotine & Tobacco Research*, *7*(1), 59–69.

Juon, H. S., Kim, M., Han, H., Ryu, J. P., & Han, W. (2003). Acculturation and cigarette smoking among Korean American men. *Yonsei Medical Journal*, *44*(5), 875–882.

Kaholokula, J. K., Braun, K. L., Kana'iaupuni, S., Grandinetti, A., & Chang, H. K. (2006). Ethnic-by-gender differences in cigarette smoking among Asian and Pacific Islanders. *Nicotine & Tobacco Research*, *8*(2), 275–286.

Khang, Y. H., & Cho, H. J. (2006). Socioeconomic inequality in cigarette smoking: Trends by gender, age, and socioeconomic position in South Korea, 1989–2003. *Preventive Medicine*, *42*(6), 415–422.

Koch-Weser, S., Grigg-Saito, D., & Liang, S. (2004). Health status of Cambodians and Vietnamese in selected communities, United States, 2001–2002. *Journal of American Medical Association*, *292*, 2208–2210.

Leistikow, B. N., Chen, M., & Tsodikov, A. (2006). Tobacco smoke overload and ethnic, state, gender, and temporal cancer mortality disparities in Asian-Americans and Pacific Islander-Americans. *Preventive Medicine*, *42*(6), 430–434.

Lew, R., Moskowitz, J. M., Wismer, B. A., Min, K., Kang, S. H., & Chen, A. M., et al. (2001). Correlates of cigarette smoking among Korean American adults in Alameda County, California. *Asian American and Pacific Islander Journal of Health*, *9*(1), 49–60.

Lew, R., & Tanjasiri, S. P. (2003). Slowing the epidemic of tobacco use among Asian Americans and Pacific Islanders. *American Journal of Public Health*, *93*(5), 764–768.

Ma, G. X., Shive, S., Tan, Y., & Toubbeh, J. (2002). Prevalence and predictors of tobacco use among Asian Americans in the Delaware Valley region. *American Journal of Public Health*, *92*(6), 1013–1020.

Ma, G. X., Tan, Y., Toubbeh, J. I., Su, X., Shive, S. E., & Lan, Y. (2004). Acculturation and smoking behavior in Asian-American populations. *Health Education Research*, *19*(6), 615–625.

Maxwell, A. E., Bernaards, C. A., & McCarthy, W. J. (2005). Smoking prevalence and correlates among Chinese- and Filipino-American adults: Findings from the 2001 California Health Interview Survey. *Preventive Medicine*, *41*(2), 693–699.

Moeschberger, M. L., Anderson, J., Kuo, Y. F., Chen, M. S., Jr., Wewers, M. E., & Guthrie, R. (1997). Multivariate profile of smoking in Southeast Asian men: A biochemically verified analysis. *Preventive Medicine*, *26*(1), 53–58.

Pérez-Stable, E. J., Ramirez, A., Villareal, R., Talavera, G. A., Trapido, E., & Suarez, L., et al. (2001). Cigarette smoking behavior among US Latino men and women from different countries of origin. *American Journal of Public Health*, *91*(9), 1424–1430.

Rahman, M. M., Luong, N. T., Divan, H. A., Jesser, C., Golz, S. D., & Thirumalai, K., et al. (2005). Prevalence and predictors of smoking behavior among Vietnamese men living in California. *Nicotine & Tobacco Research*, *7*(1), 103–109.

Salant, T., & Lauderdale, D. S. (2003). Measuring culture: A critical review of acculturation and health in Asian immigrant populations. *Social Science Medicine*, *57*(1), 71–90.

Sato, H., Araki, S., & Yokoyama, K. (2000). Influence of monopoly privatization and market liberalization on smoking prevalence in Japan: Trends of smoking prevalence in Japan in 1975–1995. *Addiction*, *95*(7), 1079–1088.

Shelley, D., Fahs, M., Scheinmann, R., Swain, S., Qu, J., & Burton, D. (2004). Acculturation and tobacco use among Chinese Americans. *American Journal of Public Health*, *94*(2), 300–307.

StataCorp. (2006). *STATA Statistics/Data Analysis Special Edition 9.2*. College Station, TX: StataCorp.

Stone, T. T., Longo, D. R., Phillips, R. L., Jr., Hewett, J. E., & Riley, S. L. (2002). Health care system and insurer support for smoking cessation guideline implementation. *Journal of Health Care Finance*, *29*(2), 78–86.

Tang, H., Shimizu, R., & Chen, M. S., Jr. (2005). English language proficiency and smoking prevalence among California's Asian Americans. *Cancer*, *104*(12 Suppl), 2982–2988.

U.S. Census Bureau. (2003). Asian Pacific American Heritage Month: May 2003. http://www.census.gov/Press-Release/www/2003/cb03-ff05.html

UCLA Center for Health Policy Research. (2005). California Health Interview Survey. CHIS 2001 Adult Public Use File, Release 4 [computer file]. (February).

Yang, G., Fan, L., Tan, J., Qi, G., Zhang, Y., & Samet, J. M., et al. (1999). Smoking in China: Findings of the 1996 National Prevalence Survey. *Journal of American Medical Association*, *282*(13), 1247–1253.

Yu, E. S., Chen, E. H., Kim, K. K., & Abdulrahim, S. (2002). Smoking among Chinese Americans: Behavior, knowledge, and beliefs. *American Journal of Public Health*, *92*(6), 1007–1012.