

Acculturation and Tobacco Use Among Chinese Americans

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Asian Americans and Pacific Islanders (AAPIs) constitute the most rapidly growing immigrant group in the United States, increasing from over 7 million in 1990 to almost 13 million in 2000, an increase of 72%.¹ Of the 8 cities in the United States with AAPI populations over 100 000, New York City has by far the largest AAPI population (872 000).¹ Chinese Americans are the single largest Asian subgroup, with a US population of over 2.7 million in 2000. In New York City, Chinese Americans number almost 400 000, with 78% of them foreign born.²

Regional surveys conducted in Asian languages indicate that Chinese men are at high risk for excess tobacco-related morbidity and mortality.^{3,4} A 1989 California survey of Chinese Americans reported a smoking prevalence of 28% in men and 1% in women.³ A 2002 survey of Chinese Americans in Chicago found a smoking prevalence of 34% for men and 2% for women.⁴ Although these rates are higher than those reported in the National Health Interview Survey and Behavioral Risk Factor Surveillance System (BRFSS), they are substantially lower than smoking rates among men in China (63%).⁵⁻⁷ Discrepancies between adult male smoking rates in mainland China and those for Chinese Americans indicate a process linking acculturation and tobacco use behavior.

Acculturation is the process by which foreign-born individuals adopt the values, customs, norms, attitudes, and behaviors of the mainstream culture.⁸⁻¹⁰ Early work by Gordon established a conceptual model of acculturation, focusing on 2 interactive dimensions: structure (social groups, institutions) and culture (language, behavior, values).¹¹ Subsequent studies of acculturation examined how cultural and structural variables, including language use and exposure to culturally familiar mass media, reflected degrees of acculturation.¹²⁻¹⁵ In most of these studies, language accounted for over 50% of the variation, indicating that language is the most important predictor of acculturation.^{13,16,17} More recently,

Objectives: We examined the relationship between acculturation and tobacco use behaviors among Chinese Americans.

Methods: Using a Chinese-language instrument based on validated questions from several national surveys, we conducted in-person, household-based interviews with 712 representative adults aged 18–74 years.

Results: Observed smoking prevalence was 29% for men and 4% for women. Predictors of smoking cessation included being 35 years and older and having a high level of tobacco-related knowledge. Acculturation was positively associated with a history of never smoking, as was being younger than 35 years and having a high level of tobacco-related knowledge.

Conclusions: Acculturation was positively associated with never smoking among men but not with smoking cessation. However, knowledge of tobacco-related health risks was associated with both. Results indicate a need for language-specific educational interventions. (*Am J Public Health.* 2004;94:300–307)

multidirectional relationships between health and acculturation have been investigated. As immigrants integrate into US culture, they may adopt both desirable and undesirable health behaviors common to the native population and acquire health risks and benefits associated with those behaviors.^{9,12}

Studies of tobacco use behavior and acculturation among different ethnic groups, using a variety of indicators, have produced mixed results.^{4,18-20} Although a multidimensional process, in practice, acculturation is often reduced to a single indicator, such as language fluency, immigrant status, or length of residence in the United States.

Acculturation scales have been created and validated for specific Hispanic and Asian subgroups.^{13,21,22} Among Hispanic and Southeastern Asian men, English language use was positively correlated with smoking.^{14,19,20,23} However, in 2 studies of Vietnamese and Chinese men, English language fluency did not predict current tobacco use.^{4,18}

A study of foreign-born Chinese American male restaurant workers in Massachusetts reported a smoking prevalence similar to that in China. Thirandam et al. also found a significant association between years in the United States and smoking prevalence among Chinese Americans.^{2,4,25} In contrast, 2 recent studies of AAPI adults did not find a similar link between years in the United States and tobacco

use.^{4,26} Current smoking in the latter 2 studies was associated with younger age, marital status, education, usual source of health care, and knowledge of cancer risk. Inconsistencies in findings may in part be explained by narrowly defined measures of acculturation, inconsistent adjustment for potential confounding variables, and small sample sizes. Alternatively, the effect of acculturation may be small compared with the interaction of other socioeconomic, environmental, and biological factors that determine patterns of tobacco use.⁵

Most studies of tobacco use among AAPIs have investigated risk factors for smoking, and several have included acculturation measures. However, few studies exist that have investigated correlates of smoking cessation in this population and, to our knowledge, none have studied Chinese Americans. For instance, in a population-based study of tobacco use among Chinese Americans, Yu et al. described correlates of current tobacco use among Chinese Americans but did not present data comparing current and former smokers.⁴

The purpose of our study was to describe tobacco use knowledge, attitudes, and behaviors among Chinese Americans living in New York City and to examine the association between patterns of tobacco use and acculturation. Our study built on previous work by providing the first data on predictors of smoking cessation

among Chinese American men. Our analysis is part of a baseline assessment to inform the development of a multilevel, community-based, and culturally and linguistically relevant tobacco control intervention in the Chinese community. A comprehensive analysis of smoking patterns among Chinese Americans that includes acculturation measures may help elucidate mediators of smoking cessation, forming the basis for more effective interventions.

METHODS

Study Design

The study design was cross-sectional and used data from the first 2 waves of a multistage probability sample of Chinese American residents in 2 communities in New York City.

Data Sources and Sample Selection

In-person, household-based interviews were conducted with 712 representative adults ages 18–74 years, constituting the largest probability-based sample of Chinese people in the United States. Trained bilingual interviewers from the community used a comprehensive questionnaire to conduct interviews in English, Mandarin, Cantonese, Fukinese, and other dialects. The questionnaire development was informed by focus groups. Questions were adapted from validated national tobacco and health survey instruments, translated into Chinese, back-translated, and piloted among 50 Chinese Americans.^{27–29}

Two New York City communities with a 100% increase in their Chinese populations over the past decade constituted the sampling frame: Sunset Park, Brooklyn, and Flushing, Queens. Eligible households were obtained from the Flushing and Sunset Park “white pages,” using a list of 867 unique Chinese spellings from 622 Chinese surnames identified in consultation with Chinese linguists. For sample selection, the list of Chinese surnames was ordered by zip code and by street name within zip code for the targeted communities. A stratified systematic sampling procedure was applied to represent the entire communities.

The sample selection and baseline survey were implemented in 2 stages. In the first stage, a representative sample cohort of Chinese American households was identified.

Following informed consent, data were gathered on the age, gender, and smoking habits of all adults within selected households. In the second stage, 3 sample groups of adults aged 18–64 years were selected for an extended interview: (1) a sample of current smokers, (2) a sample of nonsmoking men, and (3) a sample of women. Within eligible Chinese households, up to 2 persons were selected per household, with no more than 1 person from each of the 3 subgroups of interest—male smokers, male nonsmokers, and women. The unweighted data reported here represent a 65% response rate.

Analysis

Data were analyzed using SPSS 11.0 (SPSS, Inc., 1999, Chicago, Ill). Standard descriptive statistics were used to summarize data collected for demographic, health, and smoking characteristics. The χ^2 test for independence was used to determine significant differences in these characteristics between men and women. This test also was used to determine significant differences among smoking status (defined as current smoker, former smoker, never smoker), demographic variables, and tobacco-related knowledge and attitude characteristics. Because so few women were ever smokers ($n=18$), all analyses of smoking status were conducted with men only.

Logistic regression analyses were used to identify the potential predictor variables for categorical outcome variables: current versus former smokers and never versus ever smokers. Independent variables for both models included age, educational attainment, employment status, marital status, health status, health care use, knowledge of tobacco risks, and acculturation. Acculturation is measured by a composite of 2 categorical variables: speaks English in the home or reads English newspapers most or every day. Two models were tested, 1 for the full population of ever and never smokers and another for the population subgroup of current and former smokers. The first logistic regression analysis was used to test the independent effect of acculturation on smoking initiation, controlling for demographic, health, and tobacco-related knowledge characteristics. The dependent variable for this model is ever smoker (defined as hav-

ing smoked 100 or more cigarettes in a lifetime). The second logistic regression analysis tested the independent effect of acculturation on current tobacco use (defined as smoking every day or most days).

RESULTS

Total Sample Characteristics

Demographics. The overall sample of 712 respondents consisted of 402 men and 310 women (Table 1). The mean age of sample respondents was 44 for both men and women. Thirty-nine percent had less than a high school education, 21% graduated from high school, and 39% had more than a high school degree. Over 90% of respondents were foreign born: 81% in mainland China, 7% in Taiwan, and 6% in Hong Kong. A large proportion of respondents (68%) reported incomes of less than \$40 000. However there was a high rate of refusal for this question. Most respondents were married (82%) and employed (64%). Over 80% of men and women did not speak English at home.

We observed several significant differences in demographic and health characteristics and in attitudes toward smoking between men and women. Women were less likely to be employed (52% vs 74%, $P<.01$) and more likely than men to report fair or poor health status (36% vs 28%, $P<.05$) and to have seen a health provider in the past year (70% vs 57%, $P<.01$). We observed significant gender differences in alcohol use. Men were more likely to use alcohol at least once a month (59% vs 22%, $P<.01$).

Smoking Prevalence. Of the total sample, 226 persons (32%) have smoked 100 or more cigarettes in their lifetime (i.e., ever smokers). Less than half (43%) of these ever smokers have quit. The current smoking rate among men is 29% vs 4% among women ($P<.01$). While only 6% of women were ever smokers, the majority (72%) of these women were still current smokers, compared with 55% of ever smoking men who were still current smokers.

Knowledge and Attitudes. Seventy-nine percent of those surveyed agreed that smoking should not be allowed in workplaces, and 94% agreed that smoking should not be allowed in any public spaces (data not shown). We asked 8 questions to measure knowledge of the health risks

TABLE 1—Characteristics of Study Sample

Characteristic	All Sample		Men, % (n = 402)	Women, % (n = 310)	Acculturated, % (n = 176)	Nonacculturated, % (n = 536)
	(n = 712)	% ^a				
Smoking prevalence						
Never smoker ^b	486	68	48	94**	74	66*
Current smoker ^c	128	18	29	4**	17	19
Former smoker ^d	98	14	23	2**	9	15
Ever smoker ^e	226	32	52	6**	26	34*
Demographics						
Age, years						
18–34	174	24	25	24	44	19**
35–44	190	27	26	29	33	25**
45–54	184	26	27	25	16	29**
≥ 55	156	22	22	23	7	27**
Gender						
Male	402	57	63	55		
Female	301	44	38	46		
Education						
< 12 years	280	39	38	41	11	49**
High school graduate	153	21	19	26	17	23**
> 12 years	275	39	43	33	72	28**
Marital status						
Married	582	82	78	87**	71	85**
Not married	129	18	22	13**	29	15**
Employment						
Yes	455	64	74	52**	76	61**
No	249	35	26	47**	24	39**
Country of birth						
Mainland China	575	81	80	82	60	88**
Taiwan	51	7	7	7	13	5**
Hong Kong	44	6	7	6	13	4**
United States	20	3	4	2	9	1**
Other	22	3	3	3	5	2**
Income						
<\$10 000	125	18	16	20	7	21**
\$10 000–\$20 000	172	24	24	25	18	26**
\$20 000–\$40 000	182	26	27	24	25	26**
> \$40 000	133	19	27	24	40	12**
Health characteristics						
Insurance						
Insured	469	66	67	66	78	63**
Uninsured	234	33	33	34	22	37**
Health status						
Fair/poor	222	31	28	36*	17	36**
Excellent/good health	490	69	72	64*	83	64**
Saw health professional in past 12 months	445	63	57	70**	62	63**
Usual source of health care						
Western	325	73	42	51**	51	44
Chinese	37	8	6	5**	3	6
Both	83	19	10	16**	8	3
Drinks alcohol at least once a month	306	43	59	22**	47	42

Continued

of smoking and health benefits of quitting. Using a summary measure, 25% of those surveyed scored in the low knowledge range. No gender differences were observed.

Acculturation. According to our measure of acculturation, 25% of the population was acculturated, meaning that they speak English at home or read English newspapers every day or most days. Over 80% of the population reported using Chinese-language radio, TV, or newspaper all or most days. More specifically, over 74% read a Chinese newspaper most or all days.

Acculturated and nonacculturated Chinese Americans differed significantly on several demographic variables (Table 1). Acculturated individuals were more likely to have more than 12 years of education ($P \leq .01$) and to have been born in a country other than mainland China ($P \leq .01$). Acculturated Chinese Americans were more likely to have insurance and an income greater than \$40 000 ($P \leq .01$). We tested the correlation of acculturation with knowledge and did not find a significant association for the full population.

Characteristics by Smoking Status

Demographics. Demographic differences for men by smoking status are presented in Table 2. Age was positively and significantly associated with smoking cessation (i.e., being a former smoker and smoking initiation). Current and former smokers differed significantly by age, marital status, employment, and insurance status. Current smokers were younger (83% < 35 years of age, $P < .01$), less likely to be married ($P < .001$), more likely to be employed ($P < .001$), and less likely to have health insurance ($P < .05$). Having less than a high school education was associated with ever smoking relative to never smoking ($P < .05$).

Knowledge, Attitudes, and Acculturation. Results of analyses of tobacco-related knowledge by smoking status are presented in Table 3. Using the summary knowledge variable, current smokers were less likely to have a high degree of knowledge of smoking risk than former smokers ($P < .01$). Ever smokers relative to never smokers had a lower level of tobacco-related knowledge ($P < .05$). When the questions were analyzed separately, we found that current and former smokers agreed on the health consequences

TABLE 1—Continued

Acculturation characteristics						
Speaks English language at home						
Yes	91	13	12	13	NA	NA
No	621	87	88	87	NA	NA
English fluency						
Person in home fluent in English	405	57	58	56	NA	NA
No person in home fluent in English	307	43	42	44	NA	NA
Years of residence in the United States						
< 5 years	140	20	19	21	NA	NA
6–15 years	334	47	47	47	NA	NA
≥ 16	194	27	28	27	NA	NA
Born in the United States	20	3	4	2	NA	NA
Reads Chinese newspaper (at least once a week)	527	74	75	73	NA	NA
Listens to Chinese radio	311	56	43	44	NA	NA
Watches Chinese TV	405	57	63	53*	NA	NA
Language media preferred ^f						
Chinese media only	207	29	27	32	NA	NA
English media only	35	5	6	4	NA	NA
Both	459	65	61	61	NA	NA
Acculturated ^g	176	25	27	21	NA	NA
Knowledge ^h						
High level	263	37	35	39	35	38
Medium level	269	38	38	38	43	36
Low level	180	25	27	23	22	27

* $P < .05$; ** $P < .01$.

^aProportions may not add to 100% because of rounding error or exclusion of refusals. Refusal rates were negligible or 0 for all variables except income (14%).

^bNever smokers were respondents who had smoked fewer than 100 cigarettes in their lifetimes.

^cCurrent smokers were persons who reported having smoked at least 100 cigarettes during their lifetimes and who smoked every day or some days at the time of the interview.

^dFormer smokers were persons who had smoked at least 100 cigarettes during their lifetime but no longer smoked.

^eEver smokers are the sum of current and former smokers.

^f"Chinese only" is used if patient answers yes to at least once each week using a Chinese newspaper or Chinese radio or Chinese TV and answers no to using English radio or TV or newspaper at least once a week. English only if the answer is yes to at least once a week using English newspaper or English radio or English TV and no to any Chinese media.

^g"Acculturated" is a composite of 2 categorical variables regarding language and media: Speaks English in the home or reads English newspapers most or all days.

^h"High knowledge" is 5 or more correct answers to 8 tobacco-related knowledge questions on the health risks of smoking and the health benefits of quitting; moderate knowledge is 3–4 correct answers, and low knowledge is 0–2 correct. Knowledge questions were measured using a 4-point Likert scale ranging from strongly agree to strongly disagree. The statements were as follows: Most deaths from lung cancer are caused by smoking; smoking is 1 cause of heart disease; smoking causes Parkinson's disease; quitting smoking will improve one's health; there is no health benefit to quitting if one smoked for 20 years or more; people who smoke low-tar and low-nicotine cigarettes are less likely to get cancer; smoking is not addictive; inhaling smoke from someone else's cigarette may cause lung cancer in a nonsmoker. Strongly agree and agree were combined to reflect either a correct or incorrect answer, as were strongly disagree and disagree.

likely to live with an English-speaking person ($P < .05$). Ever smokers were significantly more likely to read Chinese newspapers ($P < .01$) and listen to Chinese radio than never smokers ($P < .05$; data not shown). Never smokers were more likely to use only English forms of media than ever smokers (73% vs 27%, $P < .05$). No differences in language-specific media were found between current and former smokers.

Health. Current smokers were significantly less likely to have seen a health professional in the past 12 months than former smokers ($P < .05$) (Table 2). Reports of health status did not differ between former and current smokers or ever and never smokers. Current smokers, although more likely to be employed, were significantly less likely to have health insurance ($P < .05$).

Tobacco Use Behavior of Current Smokers

Among current smokers, 77% had made at least 1 serious attempt to quit, and 56% had made a serious quit attempt in the past 12 months. Fifty-two percent of current smokers smoked fewer than 15 cigarettes per day, 49% smoked 16–24 per day, and 8% smoked more than 25 cigarettes per day. Most were daily smokers (79%). The most common method for quitting was gradually reducing the number of cigarettes (58%), followed by stopping cold turkey (53%) (respondents could choose more than 1 method). Only 12% of current smokers who had tried to quit used any type of pharmacotherapy. About half of smokers (52%) reported having seen a health care professional in the past year, and 34% recalled receiving advice to quit. In terms of readiness to quit, 35% were not interested in quitting, and 65% were contemplating quitting. Of those interested in quitting, 35% claimed they were ready to quit in the next 3 months.

Multivariate Analysis of Correlates of Tobacco Use

A logistic regression analysis was conducted to determine the independent variables that best predicted tobacco use and to test the independent effect of acculturation on tobacco use. We estimated multivariate models for ever and never smokers and for current and former male smokers (Table 4). Ac-

of smoking but differed significantly regarding other measures of knowledge. Current smokers were significantly less likely to agree that quitting would improve one's health ($P < .05$) and were more likely to believe that low-tar and nicotine cigarettes were associated with a lower risk of cancer ($P < .05$).

Being a former or a never smoker was significantly associated with agreeing with smoke-free-air policies in public spaces and workplaces ($P < .05$; data not shown).

Current smokers relative to former smokers were more likely to be recent immigrants (years in United States < 5, $P < .01$) and less

TABLE 2—Demographic Characteristics by Smoking Status

Characteristic	Male Smokers Only (n = 208)		All Men (n = 402)	
	Current Smoker, %	Former Smoker, %	Never Smoker, %	Ever Smoker, %
Age, years				
18–34	83	17**	64	36**
35–44	62	38	48	52
45–54	55	45	40	60
≥ 55	27	73	40	60
Education				
< 12 years	48	52	44	56*
High school graduate	66	34	41	60
> 12 years	58	42	55	45
Marital status				
Married	51	49**	46	54
Not married	76	24	57	43
Employment				
Yes	61	39**	47	53
No	38	62	48	52
Health status				
Fair/poor	56	44	47	53
Good/excellent	55	45	49	51
Country of birth				
Mainland China	53	47	45	55*
Other	69	31	60	40
Income				
< \$10 000	41	59	46	54
\$10 000–\$20 000	64	37	45	55
\$20 000–\$40 000	57	43	46	54
> \$40 000	49	51	58	42
Health care				
Insured	51	49*	48	52
Uninsured	66	34	48	52
Saw health professional in the past 12 months				
Yes	47	53*	50	50
No	65	35	46	54

* $P < .05$; ** $P < .01$

rate equations, we found no correlation between type of provider seen (Western vs Chinese) and smoking status. Age was the only demographic variable significantly associated with cessation; with increasing age, men were more likely to have quit smoking.

DISCUSSION

We report a smoking prevalence of 29% for Chinese American men living in New York City and a lifetime smoking rate of 52%, which is consistent with findings from a recent regional survey of Chinese Americans.⁴ This smoking prevalence is substantially higher than overall smoking rates reported for men in New York City (21.7% ± 4.1%) and higher than smoking rates reported in national surveys of AAPI men (21.6%).^{27,30} These results confirm the need to assess subgroups of AAPI independently to capture accurate measures of tobacco use behavior.³¹

Male smoking prevalence, although high by US standards, was less than half that of Chinese men living in China.⁷ The 1996 National Prevalence Survey in China found a smoking rate of 63% among men.⁷ Of ever smokers in China, less than 4% had quit.³² In contrast, 45% of male ever smokers in this study and 44% in the study by Yu et al. were former smokers.⁴ It appears that immigrating to the United States is associated with cessation. However, the mediating mechanisms of this observed phenomenon require further elucidation. Shifts in health risk behaviors among immigrant groups have been associated with adaptations to US culture and social structures.¹² Our analysis of this association, in relation to tobacco use, yielded inconsistent findings. Acculturation was not associated with smoking cessation (former vs current smoker) but was positively associated with never having smoked (never vs ever).

Acculturation effects are complex and divergent depending on age, years in the United States, and gender.^{9,10,12,20,33} Acculturation is positively associated with smoking among Hispanic and Korean women and predicts smoking onset among Chinese American adolescents, but among men, a traditional orientation is associated with current smoking.^{10,12,14,20,33} Traditional Chinese values, therefore, appear to protect youth and

culturation was negatively related to being an ever smoker and remained significant ($P < .05$, 1-tailed t test) after the addition of demographic variables (age, gender, education, marital status, employment status, regular source of care, insurance status, and knowledge). This was a robust model, and it performed similarly whether we estimated it with the full population of men and women or men only. There were no significant effects of demographics on smoking status apart from age and male gender, which were positively correlated with ever smoking. In addition

to acculturation, knowledge was a significant negative predictor of ever smoking. Of note, the regression analysis demonstrated a nonlinear dose response effect for knowledge; as knowledge increased, the likelihood of having never smoked almost doubled.

When we ran the model on male current and former smokers, acculturation did not predict cessation. Knowledge, however, remained highly correlated with cessation. Having seen a health care provider in the past year and length of residence were correlated with cessation, but not significantly. In sepa-

TABLE 3—Knowledge and Acculturation Characteristics by Smoking Status, Men Only

Characteristic	Male Smokers Only (n = 208)		All Men (n = 402)	
	Current Smoker, %	Former Smoker, %	Never Smoker, %	Ever Smoker, %
Usual source of health care in the past 12 months	47	53*	50	50
Western	52	48	49	51*
Chinese	38	63	30	70
Both	31	69	66	34
Speaks English language at home				
Yes	70	30	60	40
No	54	46	47	53
English fluency				
Person in home fluent in English	49	51*	51	49
No person in home fluent in English	63	37	45	55
Years of residence in the United States				
< 5 years	64	36**	41	59
6–15 years	97	103	98	102
≥ 16	53	47	51	50
Born in the United States	100	0	50	50
Language of media ^a				
Chinese media only	53	47	40	60*
US media only	100 ^b	0	73	27
Both	55	45	49	51
Neither	55	45	49	51
Acculturated ^b	63	37	61	39**
Knowledge ^c				
High	34	66**	60	40**
Moderate	51	49	50	50
Low	60	40	45	55

* $P < .05$; ** $P < .01$.

^a“Chinese only” was selected if the answer was yes to at least once each week using Chinese newspaper or Chinese radio or Chinese TV and answer was no to using English radio or TV or newspaper at least once a week. English only was chosen if the answer was yes to at least once a week using English newspaper or English radio or English TV and no to using any Chinese media.

^b“Acculturated” is a composite of 2 categorical variables regarding language and media: Speaks English in the home or reads English newspapers most or all days.

^c“High knowledge” is 5 or more correct answers to 8 tobacco-related knowledge questions on the health risks of smoking and the health benefits of quitting. Moderate is 3–4, and low is 0–2.

^dOnly 6 current and former smokers used English media only. All 6 were current smokers.

women but support smoking among foreign-born men.¹⁰ Our findings are consistent with this observation. Male ever smokers were less acculturated relative to never smokers. This effect was significant after controlling for demographics and health characteristics and indicates a protective effect of acculturation for foreign-born Chinese men.

Acculturation may not exert as strong an influence on smoking cessation. Acculturation was not related to current versus former smoking status. However, acculturation was associated with several demographic vari-

ables such as higher education and higher income. Current smokers relative to former smokers were more likely to be recent immigrants and to be from mainland China. After controlling for other variables, however, these differences did not persist. Several correlates of smoking cessation have been studied. According to the 2000 National Health Interview Survey, former smokers are more likely to be white, to be older, and to have higher income and education levels.³⁴ In this study, predictors of cessation were age greater than 35 years and a high level of

knowledge regarding tobacco-related health issues.

Differences in cessation activity among smokers also may reflect differences in levels of addiction. Pierce et al., building on the transtheoretical model of behavior change, has developed a predictive measure that combines intention to quit, history of quit attempts, and level of addiction to predict long-term cessation.³⁵ The predictive value of this model has not been tested in Chinese Americans in a longitudinal study. A follow-up survey of this cohort will investigate how this behavior change model interacts with other sociodemographic variables, access to health care, physician advice to quit, and a broader set of acculturation measures in predicting cessation.

Tobacco-related knowledge was highly correlated with tobacco use behavior, predicting both smoking cessation (current vs former) and never smoking (ever vs never). This finding confirms and extends results from Yu and colleagues' study of Chinese Americans in Chicago, which found a significant association between no knowledge of early cancer warnings and current smoking.⁴ Knowledge had strong predictive value for cessation and prevention; however, the level of overall knowledge in this population was low. Yet literacy levels are high, with over 70% of men and women in this population reading a Chinese newspaper at least once a week. Taken together, the educational opportunities are compelling and underscore the importance of language-specific health education in Chinese communities. They also provide an indication of the potential effectiveness and likely cost-effectiveness of educational interventions in tobacco-related disease prevention among Chinese American communities.

Several limitations of this study should be noted. First, the results are preliminary, to be confirmed by analysis of the full sample (n = 2500). Second, the sampling frame was based on subjects living in households with listed telephones and may therefore underestimate smoking rates.³⁶ Third, self-reports were not validated. Finally, additional acculturation variables may have allowed for a more complete examination of the relationship of acculturation and smoking cessation. Validation of a more comprehensive scale

TABLE 4—Multivariate Logistic Regression Analysis Results^a

	Odds Ratio	P value	95% Confidence Interval
Ever versus never ^a (n = 402)			
Age, years ^b			
35–44	1.825	.093	(.90, 3.69)
45–54	2.588	.014	(1.21, 5.54)
≥ 55	3.322	.005	(1.44, 7.66)
Education ^c			
High school	1.400	.277	(.76, 2.57)
> 12 years	.987	.960	(.58, 1.69)
Married ^d	.717	.334	(.37, 1.41)
Employed ^e	1.197	.529	(.68, 2.09)
Insured ^f	1.082	.754	(.66, 1.78)
Acculturation (English language or English newspaper) ^g	.631	.096	(.37, 1.09)
Knowledge ^h			
High (> 5 correct)	.298	.000	(.28, .83)
Moderate (3–4 correct)	.483	.008	(.17, .52)
Saw health professional in the past 12 months ⁱ	.756	.235	(.48, 1.20)
Constant	1.52	.319	
Current vs Former ^a (n = 208)			
Age, years			
35–44	.275	.046	(.08, .98)
45–54	.218	.024	(.06, .82)
≥ 55	.091	.001	(.02, .36)
Education			
High school	1.287	.554	(.56, 3.00)
> 12 years	1.166	.697	(.54, 2.53)
Married	1.015	.977	(.36, 2.86)
Employed	1.398	.469	(.57, 3.46)
Insured	.556	.117	(.27, 1.16)
Acculturation	.768	.558	(.32, 1.86)
Knowledge			
High	.368	.014	(.17, .82)
Moderate	.466	.042	(.22, .97)
Saw health professional in the past 12 months	1.028	.939	(.52, 2.05)
Constant	10.06	.002	

^aCurrent smokers and ever smokers coded as 1.

^bReferent is group aged 18–34 years.

^cReferent is education < 12 years.

^dReferent is “not married.”

^eReferent is “not employed.”

^fReferent is “uninsured.”

^gReferent is “not acculturated” (not English language at home or English newspaper).

^hReferent is “low knowledge” (correct answers 0–2).

ⁱReferent = Had not seen a health professional in the past 12 months.

that includes additional cultural and social dimensions is an area for further study.

CONCLUSION

This is the first study of tobacco use behavior among Chinese Americans in New

York City and the first to study correlates of cessation in this population. The patterns and predictors of smoking found in this analysis are consistent with results of previous studies of Chinese Americans and add to the growing literature characterizing tobacco use behavior in this population.^{3,4,24} Enhancing

tobacco control activities and identifying tobacco control opportunities for Chinese Americans requires understanding the factors that influence both initiation and cessation activity. The singularly powerful influence of knowledge regarding health risks of smoking and the health benefits of quitting, on both smoking cessation and initiation, is striking. Results point to unique educational opportunities to implement effective language-specific tobacco control interventions in the rapidly growing Chinese American communities. ■

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Contributors

D. Shelley and M. Fahs conceived of the study, directed development of the survey instrument, supervised all aspects of its implementation, and wrote the article. R. Scheinmann conducted the data analysis. S. Swain assisted in design of the instrument and data collection. J. Qu assisted in designing the survey instrument and in data collection. D. Burton assisted in designing the survey instrument and in writing the article.

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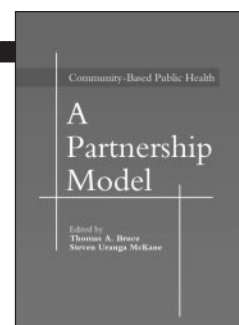
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Human Participant Protection

This study was approved by the institutional review board of the New School University, New York City.

References

- Barnes, JS and Bennet CE. *The Asian Population: 2000. Census 2000 Brief*. Washington DC, 2000.
- US Census Bureau. 1999 New York City Housing and Vacancy Survey. Available at: <http://www.census.gov/hhes/www/housing/nychvs/tabulations.pdf>. Accessed December 16, 2003.
- Centers for Disease Control and Prevention. Cigarette smoking among Chinese, Vietnamese, and Hispanics—California, 1989–1991. *MMWR Morb Mortal Wkly Rep*. 1992;41:362–367.
- Yu E, Chen E, Kim K, Abdulrahim S. Smoking among Chinese American: behavior, knowledge and beliefs. *Am J Public Health*. 2002;92(6):1007–1012.
- Tobacco Use Among US Racial/Ethnic Minority Groups—African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: a report of the Surgeon General*. Atlanta, GA: National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1998.
- Centers for Disease Control and Prevention. State-wide specific prevalence of current cigarette smoking among adults and policies and attitudes about second-hand smoke—United States 2000. *MMWR Morb Mortal Wkly Rep*. 2001;50:1101–1106.
- Yang G, Fan L, Tan J, et al. Smoking in China. *JAMA*. 1999;282(13):1247–1253.
- Redfield R, Linton R, Herskovits MT. Memorandum for the study of acculturation. *Am Anthropol*. 1936;38:149–152.
- Unger J, Cruz T, Rohrbach L, et al. English language use as a risk factor for smoking initiation among Hispanic and Asian American adolescents: evidence for mediation by tobacco-related beliefs and social norms. *Health Psychol*. 2000;19(5):403–410.
- Chen X, Unger J, Johnson C. Is acculturation a risk factor for early smoking initiation among Chinese American minors? A comparative perspective. *Tobacco Control*. 1999;8:402–410.
- Gordon MM. *Assimilation in American Life*. New York: Oxford University Press; 1964.
- Lee SK, Sobal J, Frongillo EA. Acculturation and health in Korean Americans. *Soc Sci Med* 2000;51:159–173.
- Marin G, Sabogal F, Marin BV. Development of a short acculturation scale for Hispanics. *Hisp J Behav Sci*. 1987;9:183–205.
- Moeschberger ML, Anderson J, Kuo YF, Chen MS, Wewers ME, Guthrie R. Multivariate profile of smoking in Southeast Asian men: a biochemical verified analysis. *Prev Med*. 1997;26:53–58.
- Mavreas V, Bebbington P, Der G. The structure and validity of acculturation: an analysis of an acculturation scale. *Soc Psychiatr Psychiatr Epidemiol*. 1989;24:233–240.
- Epstein JA, Botvin GJ, Dusenbury L, Diaz T. Validation of an acculturation measure for Hispanic adolescence. *Psychol Rep*. 79;1996:1075–1079.
- Olmedo EL. Acculturation: a psychometric perspective. *Am Psychol*. 1979;34:1061–1070.
- Wiecha J, Lee V, Hodgkins J. Patterns of smoking, risk factors for smoking, and smoking cessation among Vietnamese men in Massachusetts (United States). *Tobacco Control*. 1998;7:27–34.
- Marin G, Perez-Stable EJ, Marin BV. Cigarette smoking among San Francisco Hispanics: the role of acculturation and gender. *Am J Public Health*. 1989;79:196–199.
- Perez-Stable E, Ramirez A, Villareal R, et al. Cigarette smoking behavior among US Latino men and women from different countries of origin. *Am J Public Health*. 2001;91(9):1424–1430.
- Anderson J, Moeschberger M, Chen MS, Kunn P, Wewers ME, Guthrie R. An acculturation scale for Southeast Asians. *Psychiatr Epidemiol*. 1993;28:134–141.
- Deyo RA, Diehl A, Hazuda H, Stern MP. A simple acculturation scale for Mexican Americans: validation and application to health care research. *Am J Public Health*. 1985;75:51–55.
- Coreil J, Ray LA, Markides KS. Predictors of smoking among Mexican-Americans: findings from the Hispanic HHANES. *Prev Med*. 1991;20:508–517.
- Thirandam Y, Fong W, Jang M, Louie L, Forst M. A tobacco and alcohol use profile of San Francisco's Chinese community. *J Drug Education*. 1998;28:377–393.
- Averbach A, Lam D, Lam L, Sharfstein J, Cohen B, Koh H. Smoking behaviors and attitudes among male restaurant workers in Boston's Chinatown: pilot study. *Tobacco Control*. 2002;11:ii34–ii37.
- Ma G, Shive S, Tan Y, Toubbeh J. Prevalence and predictors of tobacco use among Asian Americans in the Delaware Valley region. *Am J Public Health*. 2002;92(6):1013–1020.
- Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 1997. *MMWR Morb Mortal Wkly Rep*. 1999;48(43):993–996.
- Royce JM, Corbett K, Sorensen G, Ockene J. Gender, social pressure and smoking cessation: the Community Intervention Trial for Smoking Cessation (COMMIT) at baseline. *Soc Sci Med*. 1997;44(3):359–170.
- Evaluation Resources page. California Department of Health Services Web site. Available at: http://www.dhs.ca.gov/ps/cdic/ccb/tcs/html/evaluation_resources.htm. Accessed December 16, 2003.
- Centers for Disease Control and Prevention. Cigarette smoking in 99 metropolitan areas—United States, 2000. *MMWR Morb Mortal Wkly Rep*. 2001;50(49):1107–1113.
- Baluja KF, Park J, Meyers D. Inclusion of immigrant status in smoking prevalence statistics. *Am J Public Health*. 2003;93:642–646.
- Yang G, Ma J, Chen A, et al. Smoking cessation in China: findings from the 1996 national prevalence survey. *Tobacco Control*. 2001;10:170–174.
- Chen X, Unger J, Cruz T, Johnson C. Smoking patterns of Asian-American youth in California and their relationship with acculturation. *J Adolesc Health*. 1999;24:321–328.
- Centers for Disease Control and Prevention. Cigarette smoking among adults—United States, 2000. *MMWR Morb Mortal Wkly Rep*. 2001;51(29):642–645.
- Pierce JP, Farkas AJ, Gilpin EA. Beyond stages of change: the quitting continuum measures progress towards successful smoking cessation. *Addiction*. 1998;93(2):277–286.
- Northridge ME, Morabia A, Ganz ML, et al. Contribution of smoking to excess mortality in Harlem. *Am J Epidemiol* 1998;147(3):250–258.



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