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A Prospective Study of Cigarette Smoking Initiation During College: Chinese and Korean-American Students

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Abstract

Objective—The present study was a prospective investigation of baseline influences on initial smoking and transition to established smoking among college students who had not smoked prior to college.

Design—Included were 267 participants in a longitudinal study of tobacco use. Students of Chinese (52%) or Korean (48%) descent were enrolled during their freshman year in college. Data for the present study were collected during four annual in-person interviews. Main outcome measures: 1) Initial use of a cigarette reflected having first smoked a cigarette (more than a puff) during college. 2) Established smoking was defined as having smoked at least 100 cigarettes.

Results—Over the course of the study 25% of baseline never-smokers tried their first cigarette and 9% became established smokers. Overall, men were significantly more likely to experiment and progress to established smoking. Baseline alcohol and drug use, behavioral undercontrol and parental smoking predicted smoking experimentation but not established smoking. Students of Korean ethnicity were more likely to become established smokers. However, acculturation was not a significant predictor of experimentation or established smoking after accounting for the effects of other predictors.

Conclusion—These findings suggest a need for efforts to prevent smoking uptake among Asian-American college students.

Keywords

Risk factors; etiology; smoking initiation; college students; prospective study

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Accumulating evidence suggests recent increases in cigarette smoking rates among college students (Johnston, O'Malley, Bachman, & Schulenberg, 2006; Pierce et al., 1991; Wechsler, Rigotti, Gledhill-Hoyt, & Lee, 1998; Wetter et al., 2004). In general, both smoking experimentation and progression to regular smoking among young adults in the U.S. appear to have increased since the mid-1990's (Gilpin, Lee, & Pierce, 2005; Green et al., 2007). National survey data reveal that of full-time college students in 2005, about one-fourth were current (past 30 day) cigarette smokers and 12% smoked daily (Johnston et al., 2006). This extrapolates to approximately 2.5 million current and 1.25 million daily smoking college students in the U.S. (National Center for Education Statistics, 2006). Of particular concern, the majority of college smokers continue this behavior after graduating (Kenford et al., 2005).

To date, few research and public health efforts have been targeted toward cigarette use in young adults and college students (Backinger, Fagan, Matthews, & Grana, 2003; Patterson, Lerman, Kaufmann, & Audrain-McGovern, 2004). However, evidence of recent increases in young adult smoking along with growing tobacco industry marketing efforts focused on young adults highlights the vulnerability of this population to smoking (Ling & Glantz, 2004; Rigotti, Moran, & Wechsler, 2005). Several authors have emphasized the need for college-based smoking interventions (Emmons, Wechsler, Dowdall, & Abraham, 1998; Patterson et al., 2004; Pierce et al., 1991; Rigotti, Lee, & Wechsler, 2000; Wetter et al., 2004), yet great variability exists across universities with respect to smoking restrictions and programs (Wechsler, Kelley, Seibring, Kuo, & Rigotti, 2001).

Few studies have examined the extent to which smoking begins during the college years, hampering the design of college-based prevention programs. Cross-sectional data indicate that about 11% of college students reported smoking their first cigarette at age 19 years or later (Everett et al., 1999; Wechsler et al., 1998). In a prospective study of smoking transitions, 11.5% of students who had never smoked before their freshman year reported occasional smoking four years later (Wetter et al., 2004). More recently, Costa and her colleagues (2007) reported that 22% of students who reported having never smoked when assessed in the fall semester of their freshman year had begun smoking when reassessed in spring of their sophomore year. Furthermore, a recently published longitudinal study of a high school cohort found that 25% of participants who never smoked during high school started smoking in the year following graduation (Tercyak, Rodriguez, & Audrain-McGovern, 2007). The majority of starters (94%) attended college in that year, demonstrating the relevance of these findings to college students. Thus, a growing body of evidence suggests that smoking uptake during college appears to have increased in recent years indicating a need for further attention to this issue.

Studies reporting on smoking initiation among U.S. college students have been conducted with predominantly white samples (Costa, Jessor, & Turbin, 2007; Wetter et al., 2004). Thus, little is known regarding initiation among ethnic minority college students, for whom predictors and rates of smoking onset may differ. Studies suggest that Asian-American youth may be particularly vulnerable to smoking uptake in later adolescence or young adulthood (Chen & Unger, 1999). In particular, approximately two-thirds of Asian-American adult smokers reported initiating during adulthood (Trinidad, Gilpin, Lee, & Pierce, 2004). Yet we were unable to identify any studies that prospectively examined smoking uptake in early adulthood among Asian Americans.

Empirical and theoretical research on tobacco use etiology suggests various global factors (i.e., factors found to influence smoking across ethnic groups) may predict college smoking initiation. Social learning theory based models, such as problem behavior theory (Jessor, 1991) and the social influence model (Flay, 1999), are frequently invoked in studies of tobacco and other substance use etiology. Problem behavior theory identifies perceived peer and

parental attitudes and behaviors, personal attitudes and values regarding problem behaviors, and involvement in problem and conventional behaviors (e.g., substance use, delinquent behavior, church attendance, academics) as key influences on proneness to engage in problem behaviors. A substantive body of work supports the predictions of problem behavior theory with respect to adolescent smoking onset and progression (e.g., Chassin, Presson, Morgan-Lopez, & Sherman, 2007; Chassin, Presson, Sherman, Corty, & Olshavsky, 1984).

Consistent with problem-behavior theory, studies of college smoking consistently have found that use of alcohol and other drugs was a significant correlate or predictor of smoking onset during college (Costa et al., 2007; Emmons et al., 1998; Reed, Wang, Shillington, Clapp, & Lange, 2007; Tercyak et al., 2007; Wetter et al., 2004). Also, greater personal value on academic achievement and religiosity have been found protective of smoking (Costa et al., 2007; Emmons et al., 1998). In addition, impulsive personality traits associated with problem behaviors (e.g., rebelliousness, behavioral undercontrol), have been found predictive of smoking in college students (Choi, Harris, Okuyemi, & Ahluwalia, 2003).

The social influence model focuses on the role of environmental influences, particularly parental and peer behaviors and attitudes, on the process of smoking initiation (Flay, 1999). Consistent evidence supports the role of parental and peer influences on adolescent smoking initiation (Flay, 1999). However, studies of college student smoking have yielded mixed findings with respect to social influences, with some finding no association (Reed et al., 2007; Wetter et al., 2004) and others reporting a significant effect (Costa et al., 2007; Tercyak et al., 2007).

The Asian-American ethnic category encompasses a broad range of nationalities, potentially masking subgroup differences in smoking behavior. An analysis of data from the 2001 California Health Interview Survey found that among subgroups in California, the prevalence of current smoking among Korean adults in California was highest at approximately 21%, while the rate among Chinese adults was lowest at approximately 10% (Tang, Shimizu, & Chen, 2005). For all Asian-American subgroups, rates for males were substantially higher than those for females. Similarly, examination of data from the 1990–1996 California Tobacco Survey revealed wide variability in smoking patterns between subgroups of Asian-American youth, with Koreans reporting greater prevalence than Chinese (Chen, Unger, Boley Cruz, & Johnson, 1999). As with data for adults, smoking prevalence was significantly higher among males than among females for both Koreans and Chinese. California state reports on smoking by Chinese and Korean residents revealed that among Chinese college graduates, ever smoking among males was 32.1% compared to 6.7% among females (Carr, Beers, Kassebaum, & Chen, 2005a). In contrast, the male ever-smoking rate among Korean college graduates (Carr, Beers, Kassebaum, & Chen, 2005b), was 69.5% compared to 7.6% among females. Thus, smoking rates appear to consistently differ between Chinese and Korean Americans who comprise two of the largest Asian subgroups in the U.S. (Barnes & Bennett, 2002).

Differences in smoking rates across ethnic groups may reflect ethnic specific as well as global factors. Acculturation, the process by which a minority group adjusts to the culture of a dominant group, is the ethnic specific factor most frequently examined with respect to smoking in Asian-American youth. Several studies have found that proxy measures of acculturation were associated with smoking in ethnic minority adolescents in the U.S., such that smoking increased with greater use of English and more years lived in the U.S. (Chen, Unger, Boley Cruz et al., 1999; Chen, Unger, & Johnson, 1999; Unger et al., 2000). Investigations with adult Asian Americans suggest gender differences in the influence of acculturation on smoking. As Asian-American women acculturate, their smoking rates increase to more closely resemble those of white women (Maxwell, Bernaards, & McCarthy, 2005; Tang et al., 2005). In contrast, smoking rates for Asian-American men are more similar to white males across levels of

acculturation (Maxwell et al., 2005; Tang et al., 2005). Finally, a recent study indicated that the link between acculturation and smoking may reflect differences related to country of origin for Asian-American adolescents (Unger, Trinidad, Weiss, & Rohrbach, 2004). Given that the studies cited above used proxy measures of acculturation, the extent to which findings would be similar when employing a more broadly defined assessment of this construct is unknown. Overall, these findings support the importance of examining the role of acculturation, and its interaction with gender and country of origin in smoking initiation for Asian-American college students.

In summary, there is a dearth of longitudinal research on college smoking initiation, with scant information available for Asian Americans. To address this issue, the current study examined the predictive utility of previously identified global and ethnic specific risk and protective factors on smoking initiation in Chinese and Korean-American college students who reported never having smoked a cigarette at baseline assessment. Investigators have operationalized smoking initiation in various ways, ranging from any smoking among former never smokers (Ellickson, McGuigan, & Klein, 2001; Tercyak et al., 2007) to the onset of regular smoking (Bricker et al., 2006; Hill, Hawkins, Catalano, Abbott, & Guo, 2005). Consistent with the approach employed by Choi and his colleagues (Choi, Gilpin, Farkas, & Pierce, 2001), we elected to investigate initiation to smoking by separately examining the two major behavioral transitions in the smoking uptake process: from never-smoker to experimenter, and from experimenter to established smoker. We investigated baseline predictors to identify those students most vulnerable to smoking uptake upon college entry. Participants were initially interviewed freshman year and followed up annually through their fourth year in college.

For global influences, we examined the role of the following potential predictors of initiation to smoking experimentation during the college years: problem behaviors (alcohol and other drug use), behavioral undercontrol, personal values (importance of religion and academics) and social influences (peer and parental smoking). We hypothesized that participants who at baseline reported greater alcohol and drug use, behavioral undercontrol, and smoking-related social influences would be more likely to initiate smoking during college. Students who placed more importance on religion and academics were predicted as less likely to initiate smoking during college. For ethnic specific influences we examined the role of national origin and acculturation. We hypothesized that Korean participants who were more acculturated at baseline would be more likely to initiate smoking during college. In addition, we predicted that acculturation would be associated with higher rates of initiation for women and lower rates for men (Carr et al., 2005a, 2005b).

Method

Participants

Included in the present study were 433 college student participants in a longitudinal study of tobacco use. Students at a public university in the southwestern U.S. who reported being entirely of Chinese (52%) or Korean (48%) descent (i.e., all four grandparents were Chinese or Korean, respectively) were enrolled during their freshman year in college. Approximately half of both the Chinese (51%) and Korean (52%) participants were female, and were on average 18.1 years of age ($SD = 0.32$) at baseline. The sample was recruited to include equal representation by gender and ethnic origin. Participants represented 15.6% of all entering Chinese and 31.5% of all entering Korean students during the two years of study enrollment. Differences in recruitment rates reflect the higher number of Chinese students who matriculate at the university.

Procedure

Participants were recruited using campus flyers and newspaper advertisements; advertisements did not state that the study concerned tobacco use. Inclusion criteria were 1) a first-year college student, 2) of Chinese or Korean descent, and 3) 18 or 19 years of age. Data for the present study were collected during four annual in-person interviews. Trained professional research assistants conducted all assessments in private research offices. The initial interview was conducted during the first half of freshman year in college, the second year interview took place 15 months later, and the final two interviews occurred at 12-month intervals. Participants were reimbursed \$30 for completing the baseline interview, \$40 for the second year interview, and \$50 each for the third and fourth year interviews.

Measures

Cigarette-smoking status—Prior cigarette-smoking was assessed at each interview as part of a structured interview on tobacco use derived from the Customary Drinking and Drug Use Record (CDDR; (Brown et al., 1998). Cigarette-smoking history was assessed at baseline by asking whether each participant had smoked prior to the freshman year interview (i.e., how old when you first smoked a cigarette? (more than a puff)). Initial use of a cigarette during college was assessed at each follow-up by asking participants if they had smoked their first cigarette (more than a puff) since the previous interview. To identify established smokers, participants were asked whether they had smoked 100 cigarettes in their lifetime.

Acculturation—Level of acculturation was assessed with the Suinn-Lew Asian Self-Identity Acculturation Scale (SL-ASIA; (Suinn, Ahuna, & Khoo, 1992). The SL-ASIA is a multidimensional measure developed to evaluate acculturation in individuals of Asian heritage. The SL-ASIA consists of 21 Likert-scale items ranging from 1 to 5. This measure is found to have adequate reliability (Suinn et al., 1992; Suinn, Rickard-Figueroa, Lew, & Vigil, 1987), and good concurrent validity (Suinn et al., 1992). The full SL-ASIA scale demonstrated good internal reliability in the present sample (Cronbach's $\alpha = .87$ across gender and ethnic groups).

Alcohol and other drug use—Past 90 day alcohol and other drug use was assessed at each interview using the Timeline Followback procedure (TLFB; (Sobell & Sobell, 1992). Alcohol use quantity (number of standard drinks consumed) was recorded for each day on which drinking was reported. Standard drinks were quantified as one drink = 12 ounces of beer; 4 ounces of wine; a 1 ounce shot of hard liquor or 1 mixed drink. Frequency of use, or number of days on which use occurred, was recorded for marijuana, cocaine, amphetamines, club drugs, opiates and hallucinogens. The TLFB has been shown to have good reliability and validity with college student alcohol use (Sobell, Sobell, Klajner, Pavan, & Basian, 1986). For the present study, current drinking (any alcohol in the past 30 days) and current other drug use (any use in the past 30 days) at the baseline interview were employed as indicators of problem behaviors.

Behavioral undercontrol—Behavioral undercontrol was assessed at baseline, using a 20-item questionnaire (Stice, Myers, & Brown, 1998) adapted from the Disinhibition scale of the General Temperament Survey (Watson & Clark, 1993). Items are scored on a 4-point Likert type scale, with 1= true, 2= mostly true, 3= mostly false, 4= false. Total score is calculated as the mean of all item scores. The adapted scale measures lack of foresight, delay of gratification, impulsivity, sensation seeking, disorganization, irresponsibility and unconventionality. Previous research has shown the adapted scale possesses good internal consistency, test-retest reliability, and convergent and discriminant validity (Stice et al., 1998; Watson & Clark, 1992). Internal consistency in the present study was satisfactory ($\alpha = 0.81$).

Parental smoking—Parental smoking was assessed separately for mother and father using a single item (Does your mother/father smoke cigarettes regularly?). Participants who reported that one or both parents currently smoked regularly were classified as having smoking parents.

Peer smoking—Baseline exposure to peer smoking was assessed with a single item indicating the proportion of participant's friends who smoke (from 0 to 100%).

Importance of academics and religion—Importance of religion and academics were each assessed with a single item rated on a 4-point scale from 1= not important to 4 = very important. These items have previously been employed in studies of college student substance use (Wechsler, Dowdall, Davenport, & Castillo, 1995).

Analysis plan

Predictors were examined using hierarchical logistic regression in two separate analyses. The first analysis examined predictors of initial smoking among all baseline never-smokers. Because studies consistently indicate Asian-American men are more likely to smoke than women (Chen, Unger, Boley Cruz et al., 1999), gender was entered on the first step as a control variable. Global variables were entered in a second step to examine the contribution of commonly identified risk and protective factors across ethnic groups. Ethnic specific variables were entered on the third and final step to evaluate whether these predicted experimentation above and beyond the global variables. Standardized residuals for the logistic regression model were examined to determine the presence of outlying cases (Tabachnick & Fidell, 2001). The gender by acculturation moderating variable was constructed following recommended procedures for analyzing categorical by continuous variable interactions (West, Aiken, & Krull, 1996). The second analysis examined the same predictors of progression to established smoking among those who first smoked during college. Because of the small number of subjects for this analysis (n=65) we elected to first conduct univariate analyses to reduce the number of variables entered into the logistic regression. Table 1 shows the predictor variables and experimentation rates by ethnicity.

Results

Experimentation

Of the 433 participants enrolled at baseline, 136 reported having previously smoked (24% of Chinese versus 37% of Korean-American students), while 297 (69%) reported having never smoked a cigarette. Of the full sample (N=433) 419 (97%) completed year 2 interviews, 380 (88%) completed year 3 interviews and 368 (85%) completed year 4 interviews. Sufficient follow-up data were available to classify experimentation status for 267 of the original 297 never-smokers (90%). By fourth year assessment 67/267 (25.1%) reported smoking experimentation, with 28 (10.5%) smoking their first cigarette between the first and second year assessment, 22 (8.2%) between the second and third year assessment, and 17 (6.4%) between third and fourth year assessments. Comparison of transition to experimentation rates by gender over time indicated that men were significantly more likely than women to initiate between the first and second years in college (20.2% versus 4.3%, respectively; $X^2 [1, N = 267] = 17.09, p < .001$), but not at later intervals (9.6% versus 9.0%, and 9.3% versus 7.0%, respectively; p 's > .50). The majority of men who started smoking (58%) did so prior to the second year interview, while for most women (77%) initial use occurred during the final two assessment periods.

Predictors of experimentation

In the hierarchical logistic regression model (see Table 2) the first step assessing the influence of gender was significant, with men about twice as likely to first smoke during college (OR =

2.25; 95% CI = 1.29, 3.96; $p = .004$). The second step including global variables added significantly to the model. Participants who reported any drinking in the 30 days prior to baseline assessment were more than three times as likely to smoke their first cigarette during college than those who reported no drinking during that period (OR = 3.65; 95% CI = 1.84, 7.25; $p = .001$). Similarly, those who indicated any use of illicit drugs during the past 30 days were about five times more likely to experiment with smoking during college (OR = 5.11; 95% CI = 1.27, 20.54; $p = .021$). Behavioral undercontrol was also associated with experimentation, such that each one-point increase in the mean item score nearly tripled the probability of smoking a first cigarette (OR = 2.76; 95% CI = 1.03, 7.40; $p = .043$). Finally, students with parents who smoked were twice as likely to experiment with smoking (OR = 2.25; 95% CI = 1.03, 4.92; $p = .042$). Peer smoking, importance of religion and importance of academics were not significant predictors of smoking experimentation. Step 3, which included the ethnic specific variables (acculturation, nationality, gender by acculturation interaction), did not significantly add to the model ($p = .10$).

Established smoking

Of the 67 participants who started smoking during college, sufficient data were available to classify established smoking status for 65. Of these, 24 (36.9%) progressed to at least 100 lifetime cigarettes by the fourth year assessment. Of the established smokers, 12 reached 100 lifetime cigarettes by the second year assessment, five by the third year, and seven by the fourth year. The majority of those who progressed ($n = 16$; 67%) reported reaching established smoking during the same assessment period for which they reported first smoking.

Predictors of established smoking

Univariate analyses revealed significant effects only for gender ($p = .002$; 16.1% of females versus 55.9% of males progressed) and ethnicity ($p = .01$; 23.7% of Chinese versus 55.6% of Koreans progressed). None of the global risk factors (alcohol and drug use, behavioral undercontrol, importance of religion and academics peer and parental smoking), acculturation or the acculturation by gender interaction were significant (all p 's $> .08$). The hierarchical logistic regression model predicting smoking progression thus included only these predictors. Males were nearly seven times more likely to progress than females (OR = 6.56; 95% CI = 2.04, 21.67), $p = .002$ and Koreans were six times more likely to progress relative to Chinese students (OR = 6.09; 95% CI = 1.68, 22.12, $p = .006$). Chinese females had the lowest rate of progression to established smoking (1/18; 5.6%), with Korean males the highest (11/14; 78.6%).

Discussion

The present study examined prospective predictors of smoking initiation during the college years in a sample of Chinese and Korean-American students. Both global and ethnic specific factors were examined as predictors of initial smoking experimentation. Twenty five percent of baseline never-smokers tried their first cigarette during the course of the study. Overall, men were about twice as likely to smoke their first cigarette than were women. Of the global factors, most variables found to predict initial smoking were associated with problem behavior theory. Ethnic specific variables did not add significantly to the prediction of experimentation after accounting for the effects of gender and global variables. Of those who tried their first cigarette during college, about one-third (37%) progressed to established smoking. Men were almost seven times as likely to progress to established smoking as were women. Of the global and ethnic specific variables examined, only ethnicity was a significant predictor of established smoking, indicating that Koreans were six times more likely to progress than were Chinese.

Findings from the present investigation are consistent with studies suggesting recent increases in rates of initial smoking during college (Costa et al., 2007; Tercyak et al., 2007). Twenty five percent of those who had not smoked before the initial interview reported trying their first cigarette while in college. Most experimentation was initiated between the baseline and second year assessments (between first half of freshmen year to second half of sophomore year). Of those who progressed to established smoking, the majority (67%) did so within 15 months of smoking their first cigarette, a more rapid rate than reported for adolescents (Choi et al., 2001). To our knowledge this is the first study to demonstrate a high rate of initiation to smoking in an ethnic minority sample of college students. These data underscore the need for efforts to prevent smoking uptake among Asian-American students.

As anticipated from prior reports of gender differences in smoking rates for Asian-American youth (Chen, Unger, Boley Cruz et al., 1999), men were at elevated risk of initial smoking during college, especially progression to established smoking. In contrast, prospective studies of college smoking experimentation with predominantly white samples have found no effect of gender on experimentation rates (Costa et al., 2007; Tercyak et al., 2007; Wetter et al., 2004). Further, the temporal pattern of initial smoking experimentation varied by gender in the present sample. While most men had their first cigarette during freshman and sophomore years, over three quarters of women who started smoking in college did so during their junior and senior years. It may be that the delayed onset of experimentation and lower rates of progression observed for women reflect cultural factors unique to Asian Americans. For example, previous research has suggested that Asian female youth perceive more negative consequences from smoking (Mermelstein, 1999), which might serve to delay or reduce experimentation. Additionally, a recent study from Taiwan found a later age of smoking onset for women, and indicated that compared with men, the smoking behavior of women was less sensitive to social influences (Tsai, Tsai, Yang, & Kuo, 2008). Since college smoking frequently occurs in social settings, this difference may also have contributed to the observed gender differences.

The present findings suggest that among Chinese and Korean-American students, males may be especially important targets for smoking prevention, particularly during their first two years in college. Identifying factors that influence the observed gender differences in onset of experimentation will be important for informing primary prevention programs.

A number of variables suggested by problem behavior theory were found to predict smoking experimentation but not progression to established smoking. Consistent with previous studies, recent alcohol and other drug use at baseline were both strongly associated with initial smoking. Evidence for the strong proximal association of cigarette and alcohol use in college students (Weitzman & Chen, 2005) suggests that alcohol use may provide a context in which students are exposed to cigarette use and may provide social impetus for experimentation. Although occurring at much lower rates, illicit drug use may similarly provide exposure to smoking in a social context. Behavioral undercontrol, a temperamental trait reflecting impulsivity, sensation seeking, and disinhibition, is frequently associated with problem behaviors and has been identified as an etiological factor underlying tobacco, alcohol and other substance use. Given that individuals highest on this trait would have been expected to begin smoking prior to college, it is noteworthy that behavioral undercontrol significantly predicts experimentation in the current sample. In addition, the effect of behavioral undercontrol remained significant when entered in a model including alcohol and illicit drug use, behaviors with which this trait is highly associated. These findings thus suggest that behavioral undercontrol has a unique influence on smoking experimentation above any shared influence with alcohol and other drug use. Overall, variables suggested by problem behavior theory found to predict smoking experimentation onset in white youth were also the primary predictors of smoking experimentation among Asian-American college students. This finding suggests that those most likely to try smoking may also be at risk for elevated involvement with alcohol and other

drug use. That these variables did not predict progression may reflect that problem behaviors play a greater role in the transition to experimentation than to established smoking. Alternately, the failure to discriminate those most at risk for established smoking may reflect a restricted range of global risk variables among those who started smoking in college or the small sample size. It may also be that indicators of heavier alcohol and other drug use would better predict progression.

Social influence variables showed limited effect on smoking experimentation in the present sample. Parental smoking was a significant predictor of experimentation before accounting for the effects of ethnic specific variables. The lack of significance in the full model (which included ethnic origin) may reflect the different rates of parental smoking between Chinese and Korean participants. That parental but not peer smoking was significantly associated with initial smoking may reflect cultural differences, as suggested by evidence that parental smoking has a greater effect on smoking uptake for Asian than white youth (Choi et al., 2001). Similarly, studies find that peer smoking explained less variance in smoking behavior of Asian-American than for white youth (Landrine, Richardson, Klonoff, & Flay, 1994; Siddiqui, Mott, Anderson, & Flay, 1999).

That peer influences did not predict experimentation in the present sample may also reflect that assessment typically occurred in the first term of college, and as such friendships may not have been established and/or participants may have responded with respect to their high school friends. Further, peer smoking was assessed broadly and did not consider the closeness of friendships. In addition, all on-campus residences were non-smoking, which may have attenuated the influence of roommates who smoked. Previous prospective studies on college smoking uptake did not consistently find an effect for peer influences (Costa et al., 2007; Tercyak et al., 2007; Wetter et al., 2004). Despite limited support for the social influence model, it seems likely that social factors play an important role in college smoking uptake. As noted above, the influence of alcohol and other drug use may operate through exposure to smoking in social settings. One study of smoking context reported that a significant proportion of college cigarette use occurs exclusively in the presence of others (Moran, Wechsler, & Rigotti, 2004). For example, the influence of peer smoking may be mediated through substance use. As such, further study of the social context and proximal influences is warranted to more clearly understand the role of social influences on college smoking experimentation among Asian-American students.

Our examination of ethnic specific factors yielded few significant predictors. Only nationality predicted initiation in the present sample. Specifically, Korean nationality predicted progression to established smoking, but not initial experimentation. The lack of prediction for experimentation may reflect that Koreans were significantly more likely to have smoked prior to college than were Chinese students (37% versus 24%, respectively). When viewed in context with the finding that Koreans were more likely to progress to established smoking, these findings are consistent with California population-level estimates showing higher rates of smoking in college educated Koreans than Chinese (Carr et al., 2005a, 2005b).

That acculturation was not associated with experimentation in the present study may be due to a number of factors. For example, studies with high school samples may have been more broadly representative of the populations examined, since many high school students do not go on to college (Green & Forster, 2003) and smoking is much more common for non-college attending youth (Green et al., 2007; Johnston et al., 2006). Further, the present participants were drawn from a single university, and may not represent all Chinese and Korean-American college students. Additionally, previous research has found that the relationship between acculturation and smoking was mediated by risk factors such as smoking related attitudes and peer smoking (Unger et al., 2000). This type of relationship with global predictors of

experimentation, which was not considered in the present analysis, may have obscured the effect of acculturation. Another consideration is that the present study focused only on acculturation at initial assessment. Because the acculturative process likely continues during the college years, it may be that changes in acculturation bear a stronger relationship to smoking acquisition than baseline levels. Finally, methodological differences from prior studies, such as utilizing a broad based assessment of acculturation rather than proxy measures, considering Chinese and Korean ethnicities separately rather than classified together as “Asian Americans”, and examination of longitudinal rather than cross-sectional data, may account for the discrepant findings.

Nonetheless, clear ethnic effects are apparent in the present findings. Consistent with population estimates, Koreans were at substantially greater risk for progression to established smoking than were Chinese students. In addition, the observed gender differences are consistent with differences in smoking rates observed between whites and several ethnic minority populations. These findings indicate the need for smoking prevention programs aimed at Asian-American students to target males in general and Koreans in particular.

It is of interest to note that global risk factors, but not nationality, predicted initial smoking experimentation, while the opposite pattern was observed for smoking progression. Although baseline risk and protective factors differed by nationality, the cumulative risk for initiation may have been similar. For example, while Chinese students were more likely to drink alcohol they also reported less exposure to smoking from peers and parents. Conversely, Korean students reported more exposure to peer and parental smoking. The greater smoking progression observed among Koreans may reflect an erosion of protective factors after beginning smoking (e.g., increased alcohol consumption). Future studies examining changes in global risk factors over time in relation to ethnicity, and whether these reflect additive or moderating mechanisms of influence, are needed to better understand the observed patterns of smoking.

The present findings must be considered within the limitations of this study. First, the variables examined represent only a subset of potential influences on initiation to smoking. The role of other influences clearly bears examination. In particular, the focus in this study was on baseline predictors in order to identify risk factors among incoming college freshmen. However, temporal changes in certain variables (e.g., smoking related attitudes, exposure to smoking, alcohol and other drug use) may also influence the initiation process. In addition, the relatively small number of experimenters and moderate overall sample size may have limited statistical power to detect smaller effects. In particular, a larger sample size may have yielded significant effects for ethnic specific variables and permitted more detailed examination of gender differences. Also, the inclusion of only Chinese and Korean students does not permit direct comparison with predictors of experimentation for students of other ethnic groups, precluding inferences regarding similarities or differences across groups. It is important to note that participants in the present study were self-selected and as such may not be representative of the larger population of Chinese and Korean-American college students. In addition, some participants could have been international students, a group that may be an important target for smoking prevention since studies indicate that over 40% of Chinese and over half of Korean male college students are smokers (Jeong, Lee, Kim, Park, & Sung, 1999; Zhu, Feng, Wong, Choi, & Zhu, 2004). These limitations highlight the importance of replicating the current findings with independent samples of Chinese and Korean American college students.

Results of the present study serve to show that initiation to smoking during college is a growing concern. These findings indicate the potential value of targeted interventions for at-risk subgroups such as Asian Americans. Furthermore, the current findings serve to reinforce the powerful association between smoking and alcohol use on college campuses. While shown

here for the first time among Chinese and Korean Americans, this association has been previously demonstrated in prospective and cross-sectional reports of college smoking uptake (e.g., Costa et al., 2007; Reed et al., 2007; Tercyak et al., 2007). The observed associations of cigarette and alcohol use indicate the potential value of addressing Asian-American cigarette smoking in the context of college campus-based alcohol use prevention programs. These results also serve to highlight more generally the importance of investigations into contextual factors to enhance our understanding of the relationship between alcohol use and the smoking initiation process during the college years.

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Table 1
Ethnic Specific and Global Factors and Smoking Initiation by Ethnicity (N=267).

Variable	Chinese N=156	Korean (N=111)
Gender (% female)	58.3	64.9
Ethnic specific:		
Acculturation (<i>M(SD)</i>)	3.01 (.48)	2.94 (.48)
Global		
Current alcohol use (% drank past month) †	46.2	35.1
Current drug use (% used past month)	6.4	4.5
Behavioral undercontrol (<i>M(SD)</i>) (1 = low undercontrol; 4 = high undercontrol)	2.06 (.36)	2.02 (.34)
Importance of academics (<i>M(SD)</i>)	3.70 (.53)	3.71 (.49)
Importance of religion (<i>M(SD)</i>) **	2.14 (1.17)	3.13 (1.00)
Parental smoking (% yes) **	13.5	27.0
Proportion of smoking friends (<i>M(SD)</i>) ** (from 0 to 100%)	12.14 (20.29)	19.75 (25.34)
Initiated smoking during college		
Smoked first cigarette (% yes)	25.0	25.2
* Smoked first cigarette and progressed to established smoking (% yes)	5.8	13.8

† Note: $p < .10$;

* $p < .05$;

** $p < .01$

Table 2
Logistic regression model predicting the probability of initial smoking experimentation during college.

Variable	Coefficient*	Values for step that variable entered		Values for full model		
		Standard Error	OR (95% c.i.)	p	OR (95% c.i.)	p
Step 1: $X^2(1) = 8.22, p < .01$						
Gender (female)	.81	.29	2.25 (1.29, 3.96)	<.01	.04 (.01, 3.27)	.15
Step 2: $X^2(1) = 52.06, p < .001$						
Drank past 30 days (no)	1.30	.35	3.65 (1.84, 7.25)	<.01	4.03 (1.96, 8.27)	<.01
Used other drugs in past 30 days (no)	1.63	.71	5.11 (1.27, 20.54)	.02	4.35 (1.04, 18.23)	.05
Behavioral undercontrol	1.02	.50	2.76 (1.03, 7.40)	.04	2.81 (1.02, 7.79)	.05
Peer smoking	-.01	.01	.99 (.98, 1.01)	.27	.99 (.97, 1.01)	.16
Parental smoking (no)	.81	.40	2.25 (1.03, 4.92)	.04	1.98 (.87, 4.52)	.10
Importance of religion	-.24	.14	0.79 (0.60, 1.03)	.08	.71 (.52, .98)	.03
Importance of academics	-.09	.32	.91 (.49, 1.70)	.78	.94 (.50, 1.77)	.85
Step 3: $X^2(1) = 6.24, p = .010$						
Nationality (Chinese)	.66	.39	1.98 (.87, 4.51)	.10	--	--
Acculturation	2.21	1.21	9.08 (.85, 96.80)	.07	--	--
Gender × Acculturation	-1.31	.74	.27 (.06, 1.14)	.07	--	--

Note: for categorical variables, the reference group is identified in parentheses

* Unstandardized regression coefficient.