Correlates of Cigarette Smoking among Male Chinese College Students in China- A Preliminary Study

Kaigang Li, M.S., CHES, PhDc[1]; Noy S. Kay, H.S.D.[2]

Author[1] is affiliated with the Department of Applied Health Science at Indiana University. Author[2] is affiliated with the Department of Applied Health Science, Indiana University. **Contact author:** Kaigang Li, Indiana University, 1025 E. 7th Street, Bloomington, IN, 47405; **Phone:** 812-345-2486; **Fax:** 812 855 3936; **Email:** kaili@indiana.edu.

Submitted September 16, 2008; Revised and Accepted March 31, 2009

Abstract

The main purpose of this preliminary study was to examine the association between four constructs of the Health Belief Model (HBM) (i.e. perceived severity of smoking-related health problems, perceived susceptibility to smoking-health related problems, perceived barriers to non-smoking and perceived benefits of non-smoking) and cigarette smoking among male Chinese college students. Cross-sectional data were originally collected from 521 Chinese college students at one university in Wuhu, People's Republic of China, but only 253 students' data were used for analysis. Results of t-test showed that there were significant differences in perceived severity ($t_{(249)} = -2.16$, $p = .03$), barriers ($t_{(249)} = 2.49$, $p = .01$), and benefits ($t_{(246)} = -2.51$, $p = .01$) between male smokers and non-smokers. Results of multivariate logistic regression analysis also indicated that perceived barriers (adjusted OR = 1.81, CI = 1.09 - 3.02) and benefits (adjusted OR = 0.61, CI = 0.41 - 0.92) toward non-smoking were good correlates ($p<.05$) of non-smoking behavior. These results suggested that constructs of HBM can be incorporated when examining the predictors of cigarette smoking and developing smoking prevention programs among Chinese college students. However, the constructs should be considered in a more comprehensive prevention model. In addition, gender difference should be taken into consideration when designing and implementing prevention programs to reduce smoking among college students in China.

***Key Words**: Chinese College students, Smoking, Health Belief Model.*

Introduction

The adverse health effects of cigarette smoking have been widely studied and determined. Cigarette smoking is the major cause of many chronic and deadly diseases, such as heart disease, stroke, chronic obstructive pulmonary disease, peripheral vascular disease, periodontal disease, pneumonia, and many cancers.[1-3]

Despite a dramatic reduction in smoking prevalence in some countries,[4] there is still a high prevalence among adults, young adults and even adolescents in China. Of the 1.28 billion people in China, 60.2% men and 6.9% women were smokers in 2001.[5] Sixteen percent of 13 to 18 year old adolescents (25.7% boys, 5.4% girls) reported having ever smoked.[6] Twenty-four percent and 9% of school adolescents in another study reported having smoked in the past and in the last 30 days, respectively.[7] Furthermore, 12.1% male nonsmokers and 51.3% female nonsmokers were suffering from environmental tobacco smoking (ETS) exposure at home, 26.7% male and 26.2% female exposed to ETS at worksites,[7] and 53.0% of young people were exposed to passive smoking at home.[8] A 1990 survey demonstrated that 13% of all deaths in Chinese men over 35 years old were attributable to smoking.[9] Analysis by Niu et al.[10] predicted that the situation would get much worse by 2030, resulting in a 33% rise in the Chinese male mortality rate.

Although smoking prevalence (37.7%) of male college students was lower than the overall smoking rate (63%) among Chinese adult males,[11,12] special attention should be given to college students due to their vulnerability during this important transition period in the development of lifetime smoking habits. The college years appear to be a critical time for the transformation and development of lifetime unhealthy behaviors from adolescence among Chinese students. For example, some students who had never tried smoking in the past started to experiment with cigarettes and those who smoked occasionally in high school were more likely to become frequent and heavier smokers when they are in college.[13] In order to prevent college students from potential adverse health consequences from smoking and improve healthy lifestyles, it would be important to understand the factors that may impact the students' smoking behavior.

Predictors and correlates of cigarette smoking among college students have been studied and examined in the United States and other western countries. Many factors associated with cigarette smoking among college students have been studied, including depression, social normative beliefs, being men, high-risk behaviors (e.g. marijuana use), lifestyles choices (e.g. nonparticipation in athletics), family and peer smoking, being students in public schools, low socioeconomic status (SES), and poor academic performance at school. [4,6,14-16]

Despite the high and increasing prevalence of cigarette smoking in China, little attention has been paid to the examination of influential factors of cigarette smoking among college students. In two studies, stress, curiosity, and loneliness were reported being associated with smoking initiation among medical students in Wuhan, China[11] and perceived benefits of smoking were associated with cigarette smoking among Chinese college students in three cities.[17] However, these studies did not address important factors that may significantly correlated with cigarette smoking.[18] For example, in the most recent study, Mao et al.[18] explored the association between cigarette smoking and a number of individual and psychosocial correlates including subjective norms of family and peer smoking, personal attitudes and perception toward smoking, depressive symptoms, social relations, and engagement in other health risk behaviors. Although this study was comprehensive, some issues were still unaddressed or underdeveloped. Some predictors (e.g. depression), which had been shown to have significant associations with smoking in previous studies[11,17] were not statistically associated with smoking in this study.[18] This inconsistency needs to be reexamined. Also, the study mentioned that there was a significant association between personal attitudes and other health risk behaviors after controlling for "potential confounders" in logistic regression, but it is unclear what were the "potential confounders" identified in the study.[18] Additionally, the Mao et al.[18] studied some constructs of Health Belief Model (HBM) including perceived benefits of smoking, perceived cost (barriers) of non-smoking, self-efficacy, but did not include other constructs, such as perceived severity of and perceived susceptibility to cigarette smoking.

The HBM is one of the most widely used health behavior models.[29] HBM was first conceptualized to promote preventive health behaviors and was then expanded to also address illness and sick-role behaviors later.[27,30] Studies in the area of smoking cessation examined both health behavior and sick-role behavior and it was found that constructs of HBM can be used to predict both behaviors. Von Ah et al.'s findings in 2004 indicated that perceived

barriers as well as self efficacy could play important roles in predicting health behaviors including smoking in college students.[31] HBM has also been used in evaluating compliance behavior related to smoking. In 1995, Strencher et al.[32] reported that only high level of perceived susceptibility along with high self-efficacy would be more likely to cause patients to reduce smoking. A number of researchers have claimed that HBM should be incorporated into other models, e.g. Theory of Reasoned Action, in order to better understand a complex behavior such as cigarette smoking. However, HBM has been shown to be good predictors for smoking behavior among smokers, ex-smokers, and non-smokers with inclusion of both health beliefs and social factors.[29] Very few studies have been conducted to examine beliefs about cigarette smoking among Chinese college students using HBM.[18]

Purpose of Study

This study was conducted to examine the correlates of cigarette smoking behaviors among male Chinese college students. Specifically, this study examined psychological correlates (i.e. health beliefs) of cigarette smoking among Chinese college students based on four constructs of the HBM. It is hypothesized that students who had high scores on perceived severity of smoking-related health problems, perceived susceptibility to smoking-related health problems, and perceived benefits of non-smoking were more likely to be non-smokers. On the other hand, those who had high scores on perceived barriers to non-smoking were more likely to be current smokers.

Methods

Instrument

The instrument was developed by the researchers based on an existing questionnaire,[20] and previous studies.[21,22] The questionnaire was originally developed in English and then translated into Chinese. The questionnaire consisted of demographics and four HBM construct measures, namely perceived susceptibility of smoking-related health problems, perceived severity of smoking-related health problems, perceived benefits of non-smoking, and perceived barriers to non- smoking. Both English and Chinese versions of the survey were reviewed by a panel of experts consisted of two American professors in health science and two Chinese professors (one with expertise in research methods and statistics and the other one with expertise in health science) to ensure the validity of the survey and accuracy of the translation. A pilot study was conducted among a sample of 50 students at each university to help establish the validity and reliability. Some items were revised and refined based on results of the pilot study. The Cronbach's alpha values were .995 for perceived severity, .904 for perceived susceptibility, .763 for perceived barriers, and .840 for perceived benefits respectively. These results indicated the items in each of the four constructs were internally consistent.[28] The variables included in the instrument are discussed below under Measures.

Participants and Procedure

Participants were recruited from a convenience sample at a university in Wuhu, People's Republic of China. Wuhu is a moderately developed city located in southeastern China. The University is a comprehensive college with students from all over the country. Twenty classes were randomly selected first and 15 of these classes (75%) consented to participate in the study. Self-reported questionnaires were distributed to a total of 550 students in the 15 classes about 20 minutes before the end of class. A passive consent letter was attached to the top of the questionnaire to ensure voluntary and anonymous participation. The trained survey administrators informed the students that their participation was voluntary, that data would remain confidential, and would only be reported by group. The students were permitted to leave if they were not interested in participating in this study. This study protocol was first approved by the Institutional Review Board (IRB) at the principal research site – Indiana University, and then was submitted and approved by the University in China.

Measures

Outcome variable. The outcome variable, cigarette smoking, was a dichotomous variable (1 = current smoking; 0 = non-smoking). To classify smoking status, students were asked the standard question "Have you ever smoked at least 100 cigarettes in your entire life?" Students responding "no" were directed to the rest of the survey. Students who indicated that they had smoked 100 or more cigarettes were then asked "Do you NOW smoke every day, some days, or not at all?" Those responding "yes" were classified as current cigarette smokers and those responding "no" were classified as former smokers.[23] In this study, students who had ever smoked at least 100 cigarettes and reported still

smoking every day or some days were assigned as current smokers. Those who had not ever smoked at least 100 cigarettes and former smokers (those who had ever smoked at least 100 cigarettes but reported not smoking at all now) were assigned as non-smokers.

Demographic Variables. Demographic variables included age, college year, residence, average annual household income, and smoking status of family members. Original scales of those variables were recoded to dichotomous scales. These included age group (1 = 22 through 28 years; 0 = 18 through 21 years), college year (1 = junior, senior or graduate; 0 = freshman or sophomore), residence (1 = urban; 0 = rural), and smoking status of family members (1 = one or more smokers; 0 = no smokers) except the average household income. Average monthly household income per family member was re-coded to a categorical variable with four categories (1 = Less than ¥ 500; 2 = ¥500 - ¥ 999; 3 = ¥ 1,000 - ¥ 1,999; 4 = ¥ 2,000 or more.) *HBM Constructs.* Four HBM constructs were assessed in this study. There were perceived severity of smoking- related health problems, perceived susceptibility of smoking-related health problems, perceived barriers to non-smoking, and perceived benefits of non-smoking. Perceived severity of smoking- related health problems consisted of 10 items, which assessed students' opinions on "Smoking could increase the risk of 10 smoking-related health problems, including lung cancer, asthma, emphysema, coronary heart disease (CHD), bronchitis, stroke, circulation problems, breathlessness, cough, and angina." The Cronbach's alpha of perceived severity was 0.995 for the study sample. Perceived susceptibility of of smoking- related health problems was measured using 11 items, which assessed students' opinions on "I am worried about getting some health problems in the future, including lung cancer, CHD, asthma, emphysema, bronchitis, stroke, circulation problem, wheeze, cough, angina, and being unable to enjoy exercise." The Cronbach's alpha of perceived susceptibility was 0.904 for the study sample. Perceived barriers to non-smoking were measured using 7 items which measured students' opinions on 8 statements, i.e., "Buying cigarettes is not a high cost for me," "Students who don't smoke could be estranged from friends who smoke around," "Non-smoking could make it harder to start and hold a conversation with a smoker," "Non-smoking could limit my social activities (parties, bars, coffee shops, etc.)," "Non-smoking could lead to loss (current smokers) or lack of one's identity," "Smoking is a critical way to handle the stress from study," and "Smoking is an effective way to handle one's mood when getting upset." The Cronbach's alpha of perceived barriers to non-smoking was 0.763 for the study sample. Perceived benefits of non-smoking were measured using 6 items, which were "Non-smoking can save me much money for buying books and other foods, doing other things I want," "Non-smoking can help me keep out of contracting some serious diseases like lung cancer, asthma, CHD, etc," "Non-smoking can help me cast off some physical discomfort (cough, throat, bronchitis, and so on)," "Non-smoking can help me keep physical stamina for enjoying exercises I like," "Non-smoking can make me attractive to those who dislike the smell of smoking," and "My girlfriend (boyfriend) dislikes the smell of smoking." The Cronbach's alpha of perceived benefit of non-smoking was 0.840 for the study sample. These four HBM constructs were measured on 5-point Likert scales from 1 to 5 (i.e., 1="strongly disagree," 5="strongly agree").

Data description and statistical analysis

Ninety five percent of recruited participants (521) including 326 males and 195 females returned their completed questionnaires to unmonitored boxes. Of the 195 female students, none of them reported smoking cigarettes, so the total number of observations used in the statistical analysis was only 326 male students. Seventy three (all reported nonsmokers) out of the 326 male students quit the survey after completing the demographic questions. As a result, only 253 male students completed the whole survey. Fourteen percent of the 253 students (n = 46) were identified as current smokers according to the study criteria.

Statistical analyses were carried out using two statistical programs, SPSS 15.0[24] and Mplus.[25] Cross-tabulation was first created to display characteristics of participants according to smoking status. The chi-square test was applied to identify any significant association between smoking status and demographic variables. The predictor variables that showed a statistically significant bivariate relationship at the .10 level in the chi-square test were included in the multivariate logistic regression models. The independent t-tests were used to compare the difference of measurements of HBM constructs between smokers and nonsmokers. In addition, the binary logistic regressions were used to measure the relationships (Crude odds ratios, ORs) between the outcome variable and each of the correlates. Finally, multivariate logistic regressions were used to test the relationships (Adjusted odds ratios, AORs) between the outcome variable and each candidate correlate adjusting for age and family member smoking status

(determined from chi-square tests). ORs and AORs of cigarette smoking were computed at the 95% confidence intervals. Full information maximum likelihood (FIML) estimation was used in logistic regression analyses to deal with the missing values.[25,26]

Results

Bivariate Association between Individual Characteristics and Cigarette Smoking

Of the 326 male students, 46 (14.1%) reported being current smokers. After excluding the 73 students who did not finish the questionnaire, Chi-square analyses were carried out based on the remaining 253 observations. As shown in Table 1, smoking status was significantly associated with smoking status of family members ($\chi^2_{(1)} = 4.94$, *p=0.03*) and marginally associated with age group ($\chi^2_{(1)} = 3.62$, *p=0.06*) and year in college ($\chi^2_{(1)} = 3.16$, *p=0.08*). No significant associations were found between smoking status and average household income ($\chi^2_{(1)} = 1.80$, *p=0.62*) and residence ($\chi^2_{(1)} = 2.19$, *p=0.14*). Results of Chi-square tests indicated that older students (22-28 years, 22%), students in higher classifications (junior/senior/graduate, 21%), and students with at least one smoker in the family (22%) were more likely to be current smokers compared to their counterparts, i.e. younger students (18-21 years, 13%), students with lower classifications (freshman/sophomore, 10%), and students with no smoker in the family. The three variables with significant bivariate relationships at the .10 level were used as controlling variables in the multivariate logistic regression models. Age and college year classifications were highly correlated ($\chi^2_{(1)} = 30.84$; $p<0.001$), so only age and smoking status of family members were used as controlling variables.

Mean Differences in Four HBM Constructs between Current Smokers and Non-smokers

As shown in Table 2, current smokers had significantly higher scores on perceived severity of smoking-related health problems ($t_{(249)} = -2.16$, $p = .03$) and perceived benefits of non-smoking ($t_{(249)} = 2.49$, $p = .01$), and lower scores on perceived barriers to non-smoking ($t_{(246)} = -2.51$, $p = .01$) compared to non-smokers. There was no significant difference in the scores of perceived susceptibility ($t_{(249)} = -0.53$, $p = .60$) between current smokers and non-smokers.

Logistic Regression Analyses

Logistic regression analyses showed that smoking status was negatively associated with perceived severity of smoking related health problems and benefits of non-smoking and positively associated with perceived barriers to non-smoking without adjusting for age and smoking status of family members. After adjusting for age and family member smoking status, the significant association between smoking status and perceived severity disappeared. However, the significant negative associations between smoking status and perceived benefits of non-smoking ($p<.05$) and significant positive association between smoking status and perceived barriers to non-smoking ($p<.05$) continued to exist (β coefficients were not shown in Table 3). As shown in Table 3, for a one-unit increase in perceived barriers to non-smoking and perceived benefits of non-smoking, the odds of students reporting current smoking would increase by a factor of 1.85 (adjusted OR=1.85) and decrease by a factor of 0.65 (adjusted OR=0.65) respectively, after adjusting for age and family member smoking.

Since the four constructs were composite predictors, the predictive effect of each single item of the four constructs on cigarette smoking was also examined using binary and multivariate logistic regressions. In the perceived severity of smoking related health problems, all six single items related to lung cancer, asthma, emphysema, bronchitis, breathlessness, and cough were significant at the 0.05 level. After adjusting for age and family member smoking status, items on asthma and emphysema were not significant as predictor. After adjusting for age and family member smoking status, three items under the perceived barriers to non-smoking (lack of identity, handling stress, and handling mood) were significant predictors at the 0.05 level. However, only one item in the perceived benefits of non-smoking (keeping physical stamina with adjusted OR=0.56) was significant after adjusting for age and family member smoking status. No items of perceived susceptibility of smoking related health problems were significant at the 0.05 level before and after controlling for age and family member smoking status.

Discussion

Reports of smoking rates among college students in China varied, particularly among male students. For example, some studies reported 37.7%[11] and 49%[18] were current smokers among male college students and 5%[18] among female college students. However, the national prevalence survey of smoking in China

reported lower rates at 18.47% and .75% for male and female college students respectively.[12] Results of smoking rates in the present study were similar to the national prevalence study with no reported smokers among female college students and 14% among male students. The low smoking rates among females may be attributed to culture- and social norms in China. For example, traditional norms against female smoking, especially young women smoking before marriage.[11,17] In China, females are not expected to smoke.[33,34] The gender difference in social norms for smoking behaviors were confirmed in a national survey (63% of males vs. 3.8% of females smoking)[35] and a survey using college students as samples (40.7% of males versus 4.4% of females among medical college students; 45.1% of males versus 6.0% of females among other college students).[17] Because no female students reported smoking in the present study, the results can only be applied to male students.

Results of data analysis also supported that older students, students at a higher year in college, and those having at least one smoker in the family were more likely to report current smoking behavior.[11,14] Consequently, the four HBM constructs and their sub-components were submitted to logistic regression analysis adjusting for the differences of age and smking status of the family members.

The HBM- based hypotheses that perceived severity and perceived susceptibility to smoking-related health problems were significantly associated with smoking status were partially supported in the present study. The data analysis showed that there was a significant difference in overall perceived severity about smoking-related health problems between current smokers and non-smokers among college students (Table 2). This may indicate that college students have good overall knowledge about the risk of cigarette smoking. But the overall perceived severity of smoking-related health problems did not predict smoking behavior after adjusting for age and family member smoking status. It is also evident that perceived severity of smoking-related health problems such as cancer, bronchitis, breathlessness, and cough, was able to predict the smoking behavior (Table 3). This indicates that the more informed a person is about the potential risk of a health problem caused by cigarette smoking, the more likely he will be influenced to make an informed decision to not smoke. But, this speculation was not supported by the findings of perceived susceptibility to smoking related health problems. Good knowledge about the smoking related health problems did not lead to perceived risk of contracting a smoking related disease because no significant difference was found in perceived susceptibility between current smokers and non-smokers. These results were also maintained after adjusting for age and family member smoking (Table 3). These data confirmed the findings of a previous study, which indicated that disseminating smoking cessation knowledge and smoking hazard materials did not make college students stop or reduce smoking.[11] Another study[17] also showed similar results indicating that medical students who have received compresenive smoking education did not have higher perceived susceptibility to smoking-related health problems when compared to their counterparts in the college. It appears that perceived susceptibility to smoking- related health problems may not be sufficient enough to predict smoking behavior. Other strategies may be combined for a greater effect.[36]

The hypotheses that the perceived barriers to non-smoking and the perceived benefits of non-smoking were significantly associated with smoking status were confirmed in the present study. The positive association (AOR=1.85>1.0) between perceived barriers to non-smoking and current smoking indicated that those having higher scores in perceived barriers to non-smoking were more likely to have smoking behavior. The odds of current smoking increased by a factor of 1.71 for a one-unit increase in perceived barriers. However, the items within the construct of perceived barrier to non-smoking contributed to the composite of perceived barrier in a differing degree. After controlling age and family member smoking status, one-unit increase in items of identity, handling stress, and handling upset mood, the odds of cigarette smoking would increase by factors of 1.56, 1.81, and 2.12, respectively. The predictive effects of these three items further affirmed the findings of previous studies.[14,15]

The negative association (AOR = 0.65<1.0) between perceived benefits of non-smoking and current smoking status indicated that students who had a higher score in perceived benefits of non-smoking were less likely to be current smokers. After adjusting for age and family member smoking, only one item (non-smoking can help me keep physical stamina) was significantly associated with smoking status (AOR = 0.58).

There are several implications for intervention could be considered from these findings. First, the content of health promotion and intervention needs to be gender specific because of substantial gender difference in smoking rates, potential cultural conformity and normative adherence concerning

smoking between males and females. For female students, the main purpose of smoking related health promotion is to prevent initiating smoking and encourage adherence to non-smoking culture. For male students, the health promotion efforts should incorporate both individual and social factors using multifaceted approaches to change the social norms and promote an anti-smoking cultural environment.[18] Second, unique interventions should be designed for students with different biological, social, familial, environmental backgrounds. For example, the students who were older, at higher college year, and with smoking family members should be considered at-risk populations. Third, prevention-oriented education[38] and psychological counseling services should be promoted in preventing Chinese college students from initiating smoking and reducing current smoking. Fourth, the weakness of association between perceived severity of smoking and perceived susceptibility to smoking-related health problems may suggest that the Health Belief Model alone is not sufficient in explaining and predicting a complex health behavior such as smoking. It appears that understanding smoking behavior relies not only on health beliefs but also other biological, psychological, social, familial and environmental factors.[29,37] It may be helpful to incorporate HBM into other comprehensive models, such as the Theory of Planned Behavior/ Reasoned Action[29,38] in examining the predictors of cigarette smoking among Chinese college students in the future.

There are some limitations in this study. First, convenience sample and small sample size might limit the generalization of the findings to all Chinese college students. This preliminary study could be used as a basis for future study in China. Second, the data were collected based on self-reporting, which might be subject to reporting bias. Third, causal relationships should not be inferred from the present findings since this study used a cross-sectional survey design. Fourth, the exclusion of 73 observations that only had values on demographic questions might affect the results of the analysis. But the concern was reduced by examining binary association (chi-square test) before excluding the 73 observations. These results did not display any dramatic difference from the results of this study (see the footnotes in Table 1) except that the analysis power in the current study was trivially decreased.

Conclusion

This study intended to examine the association between four constructs of the Health belief Model (HBM) (i.e. perceived severity of smoking-related health problems, perceived susceptibility to smoking-related health problems, perceived barriers to non-smoking and perceived benefits of non-smoking) and cigarette smoking among male Chinese college students. Results indicated there were significant differences in perceived severity, perceived barriers, and perceived benefits between male smokers and non-smokers. Moreover, perceived barriers and perceived benefits were good correlates of non-smoking behavior. Knowledge learned from this preliminary study may help Chinese college administrators in designing and implementing prevention-oriented education programs to reduce student smoking. Also, the constructs of Health Belief Model can be used when examining the predictors of cigarette smoking and developing smoking prevention programs among Chinese college students. However, it would be more helpful if HBM could be incorporated into other comprehensive behavior models for better results. Stronger policies, such as restriction of tobacco distribution, prohibition of tobacco sales, and prohibition of smoking in residences, may also need to be considered and incorporated in education-oriented smoking prevention programs to establish smoke-free Chinese campuses in future research.

References

1. McGinnis JM, Foege WH. Actual causes of death in the United States. *JAMA.* 1993;270,2207-2212.

2. Ockene IS, Miller NH. Cigarette smoking, cardiovascular disease, and stroke. *Circulation.* 1997;96,3243-3247.

3. Wald NJ, Hackshaw AK. Cigarette smoking: an epidemiological overview. *British Medical Bulletin*. 1996;52,3-11.

4. Wechsler H, Rigotti NA, Gledhill-Hoyt J, et al. Increased levels of cigarette use among college students a cause for national concern. *JAMA.* 1998;280,1673-1678.

5. Gu DF, Wu XG, Reynolds K, et al. Cigarette smoking and exposure to environmental

tobacco smoke in China: The international collaborative study of cardiovascular disease in Asia. *American Journal of Public Health.* 2004;94(11),1972-1976.

6. Hestick H, Perrino SC, Rhodes WA, et al. Trial and lifetime smoking risks among African American college students. *Journal of American College Health.* 2002;49,213–9.

7. Weiss JW, Donna SM, Paula P, et al. Smoking among adolescents in China: An analysis based upon the meanings of smoking theory. *American Journal of Health Promotion.* 2006;20(3),171-178.

8. Murray CJ, Lopez AD, Jamison DT. The global burden of disease in 1990: Summary results, sensitivity analysis and future directions. *Bulletin of the World Health Organization*. 1994;72,495-509.

9. Liu BQ, Chen ZM**,** Boreham J, et al. Emerging tobacco hazards in China: 1. Retrospective proportional mortality study of one million deaths. *British Medical Journal.* 1998;317,1411– 1422.

10. Niu SR, Yang GH, Chen ZM, et al. Emerging tobacco hazards in China: 2. Early mortality results from a prospective study. *British Medical Journal.* 1998;317,1423–1424.

11. Xiang HY, Wang ZZ, Stallones L, et al. Cigarette smoking among medical college students in Wuhan, People's Republic of China. *Preventive Medicine.* 1999;29,210–215.

12. Yang GH, Fan LX, Tan J, et al. Smoking in China: Findings of the 1996 National Prevalence Survey. *The Journal of the American Medical Association*. 1999;282,1247-1253.

13. Hines D, Fretz AC, Nollen NL. Regular and occasional smoking by college students: personality attributions of smokers and nonsmokers. *Psychological Reports.* 1998;83,1299-1306.

14. Emmons KM, Wechsler H, Dowdall G, et al. Predictors of smoking among US college students. *American Journal of Public Health*. 1998;88,104-107.

15. Kear ME. Psychosocial determinants of cigarette smoking among college students. *Journal of Community Health Nursing*. 2002;19,245–57.

16. Morrell HER, Cohen LM, Bacchi D, et al. Predictors of smoking and smokeless tobacco use in college students: A preliminary study using web-based survey methodology. *Journal of American College Health*. 2005;54(2),108-115.

17. Zhu T, Feng B, Wong S, et al. A comparison of smoking behaviors among medical and other college students in China. *Health Promotion International*. 2004;19,189–96.

18. Mao R, Li X, Stanton B, et al. Psychosocial correlates of cigarette smoking among college students in China. *Health Education Research*. Access published February 16, 2008,DOI:10.1093/her/cyn002.

19. Mullen PD, Herse, JC. Iverson DD. Health behavior models compared. *Social Science & Medicine*. 1987;24,973-981.

20. Gassman R, Jun MK, Samuel S, et al. *Alcohol, tobacco, and other drug use by Indiana children and adolescents: The Indiana Prevention Resource Center Survey – 2006* (IDAP Monograph No. 06-01). Bloomington, IN: Indiana Prevention Resource Center; 2006.

21. Meier KS. Tobacco truths: the impact of role models on children's attitudes toward smoking: *Health Education Quarterly*.1991;18,173-182.

22. Seguire M, Chalmers K. Addressing the 'costs of quitting' smoking: a health promotion issue for adolescent girls in Canada. *Health Promotion International*. 2000;15(3),227-235.

23. Centers for Disease Control and Prevention (CDC). Cigarette smoking among adults

– United States, 2002. *Morbidity and Mortality Weekly Report.* 2004;53(20),427-431.

24. SPSS Inc. *SPSS_ base 15.0 user's guide*. Chicago, IL: SPSS Inc; 2006.

25. Muthén LK, Muthén BO. *Mplus User's Guide*. Fifth edition.Los Angeles, CA: Muthén & Muthén; 1998-2007.

26. Acock AC. Working with missing values. *Journal of Marriage and Family.* 2005;6,1012–1028.

27. Becker MH. and Maiman LA. Socio-behavioral determinants of compliance with health and medical care recommendations. *Medical Care.* 1975;13,10-24.

28. DeVellis RF. *Scale development: Theory and applications*. (2nd ed.). Thousand Oaks, CA: Sage Publications; 2003.

29. Galvin KT. A critical review of the health belief model in relation to cigarette smoking behavior *Journal of Clinical Nursing.* 1992;1:13-18.

30. Kelly R, Zyzanski SJ, Alemagno SA. Prediction of motivation behavior change following health promotion: role of health beliefs, social support and self-efficacy. *Social Science Medicine*. 1991;32(3):311-320.

31. Von AhD, Ebert S, Ngamvitroj A, Park N, Kang DH. Predictors of health behaviours in college students. *Journal of Advanced Nursing*. 2004;48(5):463-474.

32. Strencher VJ, Becker MH, Kirscht JP, Eraker SA, Graham-Tomasi RP. Psychosocial aspects of changes in cigarette-smoking behavior. *Patient Education and Counseling*. 1985;7(3):249-62.

33. Cheng TO. Teenage smoking in China. *Journal of Adolescence*. 1999;22:607–620.

34. Cui L. Smoking control: tough but necessary. *Beijing Review.* 1998;41:9–11.

35. Yang GH, Fan LX, Tan J, Qi GM, Zhang YF, Samet JM. et al. *Smoking and Health in China -1996 National Prevalence Survey of Smoking Patterns.Chinese Science and Technology Press*, Beijing; 1997.

36. Borders TF, Xu KT, Bacchi D, Cohen L, SoRelle-Miner D. College campus smoking policies and programs and students' smoking behaviors. *BMC Public Health.* 2005,5:74-79.

37. Li HZ, Fish D, Zhou X. Increase in cigarette smoking and decline of anti-smoking counselling among Chinese physicians: 1987-1996. *Health Promotion International.* 1999;14(2):123-131.

38. Godin G, Valois P, Lepage L, Desharnais R. Predictors of smoking behaviour: an application of Ajzen's theory of planned behaviour. *British Journal of Addiction*. 1992;87:1335-1343.

Table 1. Demographic Characteristics (n = 253) [a]

	Non-smoking		Current smoking		χ^2	*Df*	*p*
	N	%	N	%			
Age Group							
18 - 21	109	87.2	16	12.8	3.62	1	.06
22 - 28	96	78.0	27	22.0			
College year							
Freshman/sophomore	52	89.7	6	10.3	3.16	1	.08
Junior/senior/graduate	154	79.4	40	20.6			
Average Home Income							
Less than ¥ 500	58	82.9	12	17.1	1.80	3	.62
¥500 - ¥ 999	60	82.2	13	17.8			
¥ 1,000 - ¥ 1,999	43	76.8	13	23.2			
¥ 2,000 or more	45	86.5	7	13.5			
Home residence							
Urban	148	84.1	28	15.9	2.19	1	.14
Rural	54	76.1	17	23.9			
Family member smoking							
Yes	126	77.8	36	22.2	4.94	1	.03
No	81	89.0	10	11.0			

¥: Chinese monetary unit.

[a] The results of the χ^2 test before excluding the 73 observations: Age group ($\chi^2_{(1)}$=6.35, p =.012), College year ($\chi^2_{(1)}$=16.22, p<.001), Average home income ($\chi^2_{(3)}$=1.76, p =.62), Home residence ($\chi^2_{(1)}$=0.80, p=.37), and Family member smoking ($\chi^2_{(1)}$=7.12, p=.008).

Table 2. Difference between Current Smokers and Non-smokers

	Current smoker			Non-smoker			t^a	*df*	*p*
	n	Mean	SD	n	Mean	SD			
Perceived severity of smoking-related health problems	45	3.78	1.00	206	4.09	0.82	-2.16	249	0.03*
Perceived susceptibility of smoking- related health problems	46	3.05	1.12	205	3.15	1.13	-0.53	249	0.60
Perceived barriers to non-smoking	45	3.11	0.80	206	2.81	0.70	2.49	249	0.01**
Perceived benefits of non-smoking	44	3.20	0.87	204	3.54	0.82	-2.51	246	0.01**

[a] $p>.05$ for Levene's test for equality of variances in all comparisons so the assumption of homogeneity of variance was not violated.
* $p<.05$, ** $p<.01$.

Table 3. Multivariate Logistic Regression Analysis of Correlates of Cigarette Smoking

Variables	Smoking status (current smoking = 46 vs. non-smoking = 207)			
	OR	95% CI	AOR [a]	95%CI
Perceived severity of smoking-related health problems	0.70*	0.50-0.98	0.72	0.49-1.04
Cancer	0.67**	0.52-0.88	0.68**	0.52-0.89
Asthma	0.72*	0.55-0.96	0.75	0.56-1.02
Emphysema	0.73*	0.54-0.98	0.75	0.55-1.03
Coronary heart disease	0.94	0.70-1.28	1.00	0.72-1.41
Bronchitis	0.64**	0.48-0.85	0.67**	0.49-0.90
Stroke	0.81	0.59-1.11	0.81	0.59-1.13
Circulation problems	0.84	0.64-1.10	0.86	0.64-1.16
Breathlessness	0.72*	0.54-0.96	0.72*	0.53-0.99
Cough	0.70*	0.53-0.92	0.70*	0.52-0.94
Angina	0.78	0.61-1.01	0.80	0.60-1.06
Perceived susceptibility of smoking-related health problems [b]	0.93	0.70-1.23	0.96	0.71-1.31
Perceived barriers to non-smoking	1.71*	1.09-2.66	1.85*	1.11-3.09
High cost	0.87	0.70-1.09	0.89	0.70-1.14
Estrangement	1.10	0.83-1.47	1.28	1.08-1.49
Conversation	1.25	0.89-1.75	1.28	0.90-1.82
Social	1.31*	0.99-1.74	1.30	0.96-1.74
Identity	1.53**	1.18-2.00	1.56**	1.16-2.09
Handle stress	1.74***	1.31-2.31	1.81***	1.33-2.47
Handle mood	2.00***	1.43-2.81	2.12***	1.45-3.08
Perceived benefits of non-smoking	0.62*	0.43-0.90	0.65*	0.43-0.96
Save money	0.82	0.65-1.05	0.87	0.67-1.12
Away from diseases	0.84	0.66-1.07	0.85	0.65-1.10
Uncomfortableness	0.84	0.66-1.06	0.84	0.66-1.08
Keep physical stamina	0.57***	0.43-0.76	0.58***	0.44-0.77
People dislike smell	0.80	0.58-1.09	0.86	0.62-1.18
Girl/boy friend dislikes smell	0.71*	0.52-0.98	0.73	0.51-1.04

Note. OR=crude odds ratio; AOR adjusted odds ration; CI=confidence interval.

[a] Adjusted for age group and family member smoking.

[b] The results of sub-component of perceived susceptibility were omitted because none was significant at the 0.05 level.

*p<.05, ** p <.01, *** p <.001.