

# Comparison of tobacco use knowledge, attitude and practice among college students in China and the United States

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## SUMMARY

*The purpose of this study was to compare the knowledge, attitudes and practice regarding tobacco use of college students in China and the United States (US). A modified existing questionnaire originally developed for use in the US was adopted. A Chinese version of the final questionnaire was approved by a bilingual panel of scholars. American participants were students at a large Midwestern University, while Chinese participants were selected from a large south-east China university. A total of 2131 usable surveys were collected. Both descriptive and inferential*

*statistical tests were employed in data analysis. Compared with Chinese college students, American students scored higher in knowledge but lower on the attitude scale of the questionnaire. American respondents also were more likely to smoke cigarettes and use other tobacco products. Chinese students, on the other hand, had a higher rate of starting smoking at age 13 years or younger and were less likely to have tried to quit. The findings should provide exploratory information for health educators in understanding tobacco use and its prevention.*

*Key words:* college students; cross-cultural; tobacco use

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## INTRODUCTION

Prolonged smoking is a leading behavioral cause of premature mortality and disability, resulting in approximately four million deaths annually worldwide [World Health Organization (WHO), 1999]. Although smoking kills more people than AIDS, alcohol, drug abuse, car crashes, murders, suicides and fires combined each year [Centers for Disease Control and Prevention (CDC), 2001], approximately one-third of the global adult population, or 1.1 billion people, have chosen to smoke. This astonishing figure includes many young and school-aged users. According to CDC, in the United States (US) ~80% of adult smokers started smoking before the age of 18 years and nearly 3000 young people in the same age-bracket

become regular smokers every day (CDC, 2001). If nothing is done to stop current trends, more than 5 million children living today will die prematurely because of a decision they will make to smoke cigarettes when they are adolescents.

According to a WHO report (WHO, 1997), the US and China are the leading consumers of tobacco products. The college students of these two countries live in different socio-economic systems with different cultural values and beliefs, which often influence their attitudes and behaviors regarding tobacco use (Bandura, 1986; Coleman, 1995). Over the last two decades, a large body of research has focused on tobacco use and its health consequences among American

youth (CDC, 1994; Hu *et al.*, 1995; Greening, 1997; Sax, 1997), and nationwide monitoring of tobacco use behaviors among college students has been conducted (Johnston *et al.*, 1996; Krupka, 1996; Naquin and Gilbert, 1996; Wechsler *et al.*, 1998), but few of these studies are cross-national or cross-cultural.

Regarding tobacco use behaviors among American college students, the 1995 National College Health Risk Behavior Survey (Douglas *et al.*, 1997) provides the most recent, representative and comprehensive research results to date. These results showed that: nearly three-quarters (74.8%) of college students nationwide had tried cigarette smoking ('lifetime cigarette use'); almost one-third (31.3%) had smoked at least one cigarette every day for at least 30 days ('lifetime daily cigarette use'); more than one-quarter (29.0%) had smoked cigarettes on at least 1 of the 30 days preceding the survey ('current cigarette use'); and 16.5% had smoked cigarettes on more than 20 of the 30 days preceding the survey ('current frequent cigarette use') [US Department of Health and Human Services (USDHHS), 1997].

The 1995 National College Health Risk Behavior Survey also compared American college students' tobacco use behaviors between gender, between those aged >25 and 18–24 years old, and between those from 2-year and 4-year institutions of higher learning. Of the measures listed above, tobacco use was at a higher level among older, male, and 2-year institution students (USDHHS, 1997).

China is a leading consumer of cigarettes in the world. One in three cigarettes smoked in the world today are smoked in China, where there are currently ~300 million smokers, or approximately the same number as in all the developed countries combined (Du and Wang, 1996; WHO, 1997). It is predicted that in China, ~200 million (67%) males now aged 0–29 years will become smokers. Of the 200 million, about half will eventually be killed by tobacco-related diseases. According to WHO (WHO, 1997), 63% of men and 4% of women in China are lifetime smokers. Currently, ~750 000 deaths a year in China are associated with tobacco use. Lung cancer is the leading cause of cancer death in cities where the population is >1 million (Chen, 1997). Meanwhile, a majority (83%) of smokers have no interest in quitting (WHO, 1997).

Chinese smoking prevalence data were available via various American library databases

and Chinese publications. However, those findings were mostly drawn from local surveys conducted by individual researchers. There was no available literature or authority source that could indicate the existence of any nationwide surveillance system in China in monitoring its tobacco use patterns and trends. The various surveys reported that the lifetime cigarette use rate among Chinese college students was between 37.6 and 70.9%, the monthly use rate was 33.0%, and the daily use rate 3.0% (Wang *et al.*, 1996; Hu, 1997; Ding *et al.*, 1999).

The purpose of this study was to examine differences between American and Chinese college students' knowledge, attitudes and practices with regard to tobacco use. To study the health behaviors of college students is important because this group is in transition between adolescence and adulthood. Unhealthy behaviors developed at this stage may be malleable or consolidated into lifetime patterns (Gray, 1993). The information provided by this study may help health educators and researchers to better understand tobacco use cross-culturally and aid in the development of more effective tobacco education intervention programming, which could lead to reducing or preventing tobacco use in both countries.

## METHODS

### Instrument

This study used one questionnaire in two languages due to the nature of the study population; a Chinese version was used in China, and an English version in the US. Both versions of the questionnaire were developed based on the questionnaire used by the Indiana Prevention Resource Center entitled 'Alcohol, Tobacco, and Other Drug Use among Indiana Children and Adolescents Survey' (Indiana Prevention Resource Center, 1999), and the Tobacco Use Attitude Scale developed by Meier (Meier, 1991). A total of 55 question items were included, among which nine were demographics, 11 were about tobacco use knowledge, 18 tobacco use attitudes, and 17 tobacco use behaviors. The knowledge questions were in a multiple choice format, with one correct answer for each question, while the attitude scale consisted of five-point Likert type items.

The first draft of the questionnaire was in English and was reviewed by a jury of professionals

in the applied health science discipline. Its content and construct validity was examined. Suggestions were obtained with respect to necessary additions, deletions and changes in wording to clarify any ambiguity, and to fit the understanding level of the participants. Revisions were made accordingly. A final English questionnaire was then translated into Chinese by the research team. This Chinese questionnaire, along with a copy of the original English questionnaire, was submitted to a panel of bilingual graduate students and scholars in both health and non-health majors to validate the accuracy and appropriateness of the translation, and to examine the consistency in measurement of the English and Chinese questionnaires. To assure the accuracy of the translation, the Chinese questionnaire was translated back into English. Improper translation from English to Chinese was then corrected, and a final questionnaire in Chinese was established.

### Subjects

Participants were students enrolled in their respective university at the time the survey was administered, and were recruited by availability. The fundamental criteria for sample selection included: (i) undergraduate students; (ii) aged 18–24 years; and (iii) one group of American and one group of Chinese students. An attempt was made to include representative proportions of male/female and freshman/senior students in both samples. To ensure consistency, student samples in both countries were administered questionnaires in their native languages. A total of 2138 students (1535 in China, 603 in the US) were surveyed, and 2131 surveys (1534 from China, 597 from the US) were retained for data analysis. Chinese data were entered into a computer in China and the data files were mailed to key investigators in the US for management and analysis.

### Data collection

The survey was administrated at a major Mid-western university in the US and a large south-east university in China. Prior to the survey, both universities were contacted for approval of participation. Upon receiving approval for human subjects conduct, the survey schedule, potential participants and supervisors, and the procedures of data collection were discussed with the

coordinators at both universities. Data were collected in classroom settings at both universities. All student participants were assured of anonymity and confidentiality.

### Data analysis

Data were analyzed by using the Statistical Package for Social Sciences (SPSS, 1999) computer program (version 10.0). Reliability analysis was conducted for testing the reliability of knowledge and attitude scales. Internal consistency of these sections of the questionnaire was calculated by using Cronbach alpha techniques. Descriptive statistics was applied to portray the current status of tobacco use knowledge, attitudes and practice among the subjects. Tobacco use knowledge was evaluated using the total scores for each subject on knowledge questions, with one point for each correct answer and zero points for each incorrect answer, to a maximum of 11 potential points if one answered all knowledge questions correctly. Attitude toward tobacco use was measured by summing obtained scores on attitude items for each subject. After the adjustment for attitudinal question items in terms of coding direction, each item was scored from five points for the most positive (against smoking) and one point for the most negative (favorable to smoking) attitude. With a total of 18 attitudinal question items, the possible total attitude score for each subject ranged from 18 to 90. The  $\chi^2$  test was employed to test the association between tobacco use and country orientation. Multivariate analysis of variance (MANOVA) was applied to detect the statistical differences in tobacco use knowledge and attitudes between genders and countries. Statistical significance was defined as  $P < 0.05$ .

## RESULTS

### Respondent characteristics

A total of 2131 (99.7%) usable surveys were included in the data analysis. Of the 2131 surveys, 1534 (72%) were Chinese (39.7% females, 60.3% males) and 597 (28%) were Americans (62.1% females, 37.9% males). Approximately half of the American participants (49.6%) were aged 19–20 years at the time of data collection; the rest were 21–22 years (21.8%),  $\leq 18$  years (18.1%), 23–24 years (6.2%) or  $\geq 25$  years (4.2%) of age. Among Chinese participants, the majority

(82.2%) were 19–22 years of age; the rest were 19–20 years (42.4%), 21–22 years (39.8%), 23–24 years (11.4%),  $\leq 18$  years (5.6%) and  $\geq 25$  years (0.7%). Participants in the two countries had a similar class standing, with 27% of the respondents enrolled as freshmen (year 1), 28% as sophomore (year 2), 24% as juniors (year 3) and 20% as seniors (year 4). Approximately 47% of the American respondents came from a suburban area, 28.0% from a small town, 15.9% from an urban area, and 9.0% from a rural area. Among Chinese students, one-third (33.9%) were from a rural area, 33.8% from an urban area, 18.1% from a small town, and 14.2% from a suburban area.

In terms of marital status, the majority of respondents from both countries, 99.3% Chinese and 93.8% Americans, were single. When subjects were asked to rate their health status, 67.0% of American and 83.5% of Chinese students rated themselves as ‘healthy’ or ‘very healthy’, 30.5% of American and 14.5% of Chinese students answered ‘average’, and <2% of each group perceived themselves as

‘unhealthy’ or ‘very unhealthy’. When asked about their perceived stress of daily life, 13.6% of American students and 5.3% of Chinese students responded ‘very stressful’, 83.4% of Americans and 66.9% of Chinese reported ‘not too stressful’ or ‘somewhat stressful’, and 2.8% of American and 25% of Chinese reported ‘not stressful at all’.

The overall reliability coefficient for the attitude scale for both groups was 0.82. The reliability coefficient for the knowledge test was 0.54. This knowledge test is not a norm reliability test and its reliability is acceptable since it relied heavily on the criteria. These data are presented in Table 1.

The smoking status data for both the American and Chinese college students are presented in Table 2.

As Table 2 shows, a higher percentage of US female students have ever smoked, annually smoked or monthly smoked compared with their Chinese counterparts. The magnitude of difference is quite substantial. The same pattern holds true for male US students compared with their male Chinese counterparts, but the difference is not substantial. Table 2 also shows a similar pattern for smokeless tobacco use. It is clear at this time that the use of snuff is far more prevalent among American students for both genders than Chinese students. The use of cigars is also not prevalent among Chinese males or females. Similar to cigars, pipe smoking is far more prevalent among US male students than their Chinese counterparts.

A description of students by age of first cigarette use is presented in Table 3.

As Table 3 shows, a greater percentage of Chinese students start smoking prior to the age

**Table 1:** Internal consistency of tobacco use knowledge and attitude items by country

	Knowledge items		Attitude items	
	No. of usable surveys	$R^a$	No. of usable surveys	$R^a$
China	1534	0.4151	1470	0.8239
US	597	0.6214	572	0.8457
Overall	2131	0.5357	2042	0.8241

<sup>a</sup>Adjusted internal consistency coefficient.

**Table 2:** Patterns of tobacco use among American and Chinese college students by gender (percentages)

	Female		Male	
	US ( $n = 371$ )	China ( $n = 609$ )	US ( $n = 226$ )	China ( $n = 925$ )
Ever smoked cigarettes	76.0	14.5	80.5	71.1
Annual smoking	62.3	4.1	63.3	51.9
Monthly smoking	42.9	1.5	48.2	37.0
Ever snuffed	15.9	0.7	55.3	2.4
Annual snuffing	3.8	0.5	33.6	1.8
Monthly snuffing	2.2	0.5	17.3	1.6
Ever smoked cigar	39.1	1.2	71.2	12.1
Annual cigar use	24.3	0.5	53.5	6.0
Monthly cigar use	6.5	0.3	24.3	2.6
Ever smoked pipe	7.6	0.7	33.2	3.7
Annual pipe use	1.9	–	14.6	2.4
Monthly pipe use	1.1	–	6.2	1.8

**Table 3:** Age of first-time cigarette use among American and Chinese college students who have ever smoked cigarettes<sup>a</sup> (percentages)

Age (years)	US ( <i>n</i> = 463)	China ( <i>n</i> = 742)
≤13	17.9	37.6
14–15	22.5	14.7
16–17	35.4	14.3
18–19	19.4	17.1
≥20	4.8	16.3

<sup>a</sup> $\chi^2 = 136.3$ ,  $P < 0.01$ .

**Table 4:** Quitting smoking experiences among American and Chinese college smokers<sup>a</sup> (percentages)

	US ( <i>n</i> = 435)	China ( <i>n</i> = 665)
Have ever tried quitting smoking	45.7	23.6
Have been abstinent for >1 year	10.3	2.3
Have not tried quitting smoking	43.9	74.6

<sup>a</sup> $\chi^2 = 113.0$ ,  $P < 0.01$ .

of 13 years compared with their US counterparts (37.6 versus 17.9%, respectively). Then, at an older age, more American students start smoking than Chinese students. These patterns of association are statistically significant ( $\chi^2 = 136.3$ ,  $P < 0.05$ ).

The comparisons of experiences quitting smoking between Chinese and American college students are presented in Table 4. As the table shows, a greater percentage of American students have tried to quit smoking compared with their Chinese counterparts (45.7 versus 23.6%, respectively). The association between quitting smoking and country is statistically significant ( $\chi^2 = 113.0$ ,  $P < 0.05$ ).

The comparisons of mean total knowledge scores between Chinese and American students according to gender are presented in Table 5. As the table shows, both male and female American students had higher mean scores on the tobacco knowledge test when compared with their Chinese counterparts (8.32 versus 6.79 and 8.58 versus 7.25, respectively). However, the MANOVA test indicated that there was no significant interaction between gender and country, while there were significant differences in the mean scores between American and Chinese students (8.76 versus 6.84, respectively).

**Table 5:** Mean total scores of tobacco use knowledge items by country and gender<sup>a</sup>

	US	China
Male		
<i>n</i>	221	872
Mean	8.32	6.79
SD	1.78	1.79
Female		
<i>n</i>	352	581
Mean	8.58	7.25
SD	1.35	1.56
Overall <sup>b</sup>		
<i>n</i>	597	1534
Mean	8.76	6.84
SD	1.91	1.79

<sup>a</sup>Eleven tobacco use knowledge items; total item scores range from 0 to 11.

<sup>b</sup>MANOVA test; the mean score difference between two countries was significant ( $F = 409.38$ ,  $P < 0.01$ ).

**Table 6:** Mean total scores of tobacco use attitude items by country and gender<sup>a</sup>

	US	China
Male		
<i>n</i>	223	922
Mean	63.73	64.36
SD	10.45	11.77
Female		
<i>n</i>	365	606
Mean	66.84	69.49
SD	9.82	9.68
Overall <sup>b</sup>		
<i>n</i>	588	1528
Mean	65.66	66.4
SD	10.17	11.27

<sup>a</sup>Eighteen tobacco use attitudinal items; total item scores range from 18 to 90. A lower score indicates an attitude that is favorable to cigarette smoking, or a negative attitude.

<sup>b</sup>MANOVA test; mean score difference between the two countries was significant ( $F = 9.37$ ,  $P < 0.01$ ).

The comparisons of mean total attitude scores related to tobacco use for both groups are presented in Table 6. As shown, male and female Chinese students have higher mean total attitude scores than their American counterparts (64.36 versus 63.73 and 69.49 versus 66.84, respectively). The MANOVA test showed no significant interaction between gender and country, but the difference of mean scores between Chinese and American students (66.40 versus 65.66) was significant.

## DISCUSSION

As an exploratory approach, this study attempted to compare a sample of American and Chinese college students with regard to their smoking status, attitudes and knowledge related to tobacco use. Every attempt was made to find a comparable university so a better understanding of tobacco use and its trends among college students from two cultures could be explored. One of the big challenges of the cross-cultural study was accuracy in the translation of the instruments in different cultural contexts. The use of a bilingual jury of experts was essential for providing evidence of comparability of the two versions of the questionnaire. It is interesting to note that there are more American student smokers than their Chinese counterparts. While smokeless tobacco is not a major problem in the Chinese culture, through globalization and the commercialization of tobacco, along with worldwide advertisements by the tobacco industry, the pattern of smokeless tobacco is expected to change. If interventions do not occur, it is suspected that more Chinese students will become victims of smokeless tobacco use. This same interpretation is true for the use of cigars and pipes. While there are no serious problems at this time among college Chinese students who smoke cigars and pipes, this trend is expected to change as well.

The age of first-time cigarette use is significantly associated with country orientation, with a higher proportion of Chinese students starting smoking before the age of 13 years. It seems that tobacco use may be more accepted for children in the Chinese culture than in the American society. There is another distinction between the two samples. A higher percentage of American students than Chinese students had ever tried quitting smoking. This may be due to the fact that American students had a higher knowledge score regarding tobacco use compared with their Chinese counterparts. Another explanation may be that US public health agencies, along with voluntary health organizations, have worked diligently during the past several decades in advocacy efforts against tobacco use and the restriction of cigarette smoking in public places. One example is the major campaigns using mass media for promoting public awareness against tobacco use in the US. Obviously, health educators, within the context of school health education, have covered

tobacco units to some extent while disseminating information on the hazards of tobacco use among students throughout the country. These trends, to some extent, may explain why a higher percentage of American students than their Chinese counterparts have ever tried to quit smoking and have a higher knowledge score regarding tobacco use.

The findings of this study should be interpreted in the light of some of the limitations, i.e. the samples may not be representative of college students from the two countries. Due to the nature of self-reporting, it is possible that students from either culture could have over- or underestimated their tobacco use status. Regardless of any difference, it is clear that tobacco use is a problem worldwide. Due to the lack of any restriction on tobacco advertising and warnings about the effect of tobacco use, it is expected that tobacco use may get worse in China before it gets any better. Researchers, educators and policy-makers should work collaboratively and collectively to promote comprehensive tobacco education among the younger populations, since tobacco use is usually initiated at a young age. Furthermore, a major thrust should be to work together for an advocacy mission to promote a worldwide smoke-free environment.

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