Core Human Values and Their Interactions with Pro-Tobacco Factors on Cigarette Smoking: The Role of Factors not Explicitly Related to a Risk Behavior

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Abstract

More effective tobacco control requires new data on factors that are not explicitly related to smoking but are influential, such as "Terminal Values" regarding desirable end-states of existence and "Instrumental Values" regarding desirable modes of conduct. Association analysis was conducted among 36 Core Values (18 Terminal and 18 Instrumental) derived from Rokeach's Value Survey, three risk factors (pro-tobacco media, smoking peers and sensation-seeking), and cigarette smoking using data collected from a sample of 334 medical students in China.

The participants were 18 to 24 years old (47% female) and 18.4% of them smoked in the past 30 days. Multivariate analysis indicated that cigarette smoking was negatively associated with nine Terminal Values (e.g., a Sense of Accomplishment and Self-Respect) and ten Instrumental Values (e.g., Clean and Self-Controlled). As expected, when the endorsed number of values/total value scores increased from low to high, the 30-day smoking rate declined from 32.6% - 75.0% to 13.5% - 15.9% (p < .01). The odds ratios (OR) for the endorsed Terminal Values and the total value scores were 0.50 (p < .01) and 0.64 (p < .01) respectively, and the ORs for the endorsed Instrumental Values and the total value scores were 0.42 (p < .01) and 0.44 (p<.01), respectively. Furthermore, the two Value Systems significantly mitigated the effect of pro-tobacco media and peer influences on smoking. Core Values that promote individual development and societal harmony may protect people from smoking either directly or through their moderation effect on pro-smoking risk factors. Findings from this study suggest inclusion of value education as part of the standard tobacco control practice.

Keywords: Human Values, Tobacco use, Moderation effect, China

Introduction

Challenges to Tobacco Control
Each year tobacco use causes approximately 5 million deaths in the world (CDC, 2004). Although declining in some industrialized nations, smoking rates remain high and even appear to be increasing in some developing nations such as India, Thailand, and Mongolia (Andreeva & Krasovsky, 2007; CDC, 2004; Chen, Li, Stanton, Mao et al., 2004; Jindal et al., 2006; Reddy, Perry, Stigler, & Arora, 2006; Rudatsikira, Muula, Siziya, & Mataya, 2008; Shafey, Dolwick, & Guindon, 2003; Yang et al., 2004). Tobacco use is also prevalent in China, especially among men (Wang, 2006). Data from the latest national survey indicate that among individuals 18 years of age and above in China,

63% of men and 4% of women smoke currently (Yang et al., 1999). Surveys of college students in China indicate that 38% to 49% of males and 0% to 5% of females are current smokers (Chen, Li, Stanton, Mao et al., 2004). A group of school-based surveys of middle and high school students indicated that approximately 47% to 70% have tried smoking and 10% to 21% have smoked at least one day in the past 30 days with a mean age of smoking initiation of 11 to 12 years (Chen et al., 2001; Gong et al., 2006; Johnson et al., 2006; Weiss et al., 2008; Yang et al., 2004).

Evidence-based behavioral intervention efforts have resulted in declines in tobacco use, but

further advancement of existing tobacco prevention strategies requires new knowledge regarding both protective and risk factors (CDC, 2004; US DHHS, 2000). Theoretical models for tobacco use prevention since the 1970s are based primarily on factors that are explicitly related to smoking (CDC, 2004; US DHHS, 2000). The Theory of Reasoned Action and Planned Behavior guides development of interventions that explicitly target tobacco-related beliefs, attitudes and norms that affect smoking (Ajzen, 1987; Guo et al., 2007; McGahee, Kemp, & Tingen, 2000). The Affective Education Model, although targeting several intrapersonal factors that are not explicitly related to smoking such as low self-esteem and poor interpersonal skills, emphasizes the strengthening of positive values and correction of inaccurate perceptions regarding smoking. The Social Influences Model posits that pro-smoking media, smoking norms, and smoking peers lead people to smoke (DHHS, 1991).

Smoking prevention programs based on these theories have shown significant effects in reducing tobacco use, such as Project TNT (Towards No Tobacco Use) (Sussman et al., 1993); Project SHOUT (Students Helping Others Understand Tobacco); the Life Skills Training Program; the Minnesota Smoking Prevention Program (Arkin, Roemhild, Johnson, Luepker, & Murray, 1981; Murray, Johnson, Luepker, & Mittelmark, 1984); the Midwestern Prevention Project (Pentz et al., 1989); and the national youth smoking prevention "truth" campaign by the American Legacy Foundation (Farrelly, Davis, Haviland, Messeri, & Healton, 2005). For example, as the first national anti-tobacco media campaign, the "truth" campaign contributed to more than a 20% decline in adolescent smoking from 1999 to 2002 (Farrelly et al., 2005). However, none of the intervention programs described above contains any component that addresses basic human values, a factor that may significantly affect the likelihood of smoking, although it is not explicitly related to tobacco.

Core Human Values and Behavior

Human values are considered to be the durable beliefs upon which people are motivated to act by preference (Allport, 1961), because values embody people's convictions about what they believe is important and desirable. Examples of human values include health, beauty, wealth, love, freedom, independence, etc. Although individuals may ascribe to or endorse numerous values, researchers have demonstrated that a limited number of values are possessed by individuals across the globe (Rokeach, 1973; Schwartz, 1992; Schwartz et al., 2001; Schwartz & Sagie, 2000). These values will be referred to as "Core Values." For example, pursuing world peace, preferring a green environment, and becoming a capable person can be considered as three Core Values because they are endorsed by many people all over the world. Furthermore, the Core Values endorsed by individual persons may be organized into systems, guiding people's behavior (Rokeach, 1973; Schwartz, 1992). With the concept of organized Core Value Systems, Rokeach (1973) derived 36 Core Values from a compiled list of 555 words (Anderson, 1968). These words were based on 18,000 words originally compiled to characterize human individuals (Allport & Odbert, 1936). Rokeach then organized the 36 Core Values into two Core Value Systems: the 18 Terminal Values concern the desirable end-states of that a person strongly wants to achieve (e.g., A Comfortable Life, A World at Peace, Inner Harmony, Salvation); and the 18 Instrumental Values concern the desirable modes of conduct (e.g., Ambitious Broadminded, Courageous, Polite, Responsible) or the means leading to Terminal Values. Instrumental values are durable beliefs that help people to achieve their terminal values (Rokeach, 1973). The 36 Core Values are listed in Table 2 (Appendix A).

Core Values are posited to transcend all other values, attitudes, norms, and judgments to form an organized belief system that determines our behavior (Allport, 1961; Rokeach, 1973; Watson, 1966). There are at least three mechanisms by which Core Values may affect people's behavior. Core Values may serve as criteria or standards that guide people's behavior, including self-presentation to others. Core Values may also serve as intrinsic resources for decision-making to choose

between alternative behaviors. Finally, Core Values may function as learned plans and strategies to resolve value conflicts by satisfying Core Values first and to rationalize preferred behaviors with reference to the Core Values (Rokeach, 1973, 1979). Research on these mechanisms may provide new data for tobacco use prevention.

Empirical Studies on Core Values and Tobacco Use

A limited number of studies have addressed the impact of some Core Values on illegal drug use (Brook & Whitehead, 1983; Carman, 1974; Goff & Goddard, 1999; Hindelang & Carman, 1980; Kimlicka & Cross, 1978), alcohol consumption (Akiba & Klug, 1999; Chernoff & Davison, 1999; Goff & Goddard, 1999; Martini & Brook, 1978; Mayton & Furnham, 1994; Toler, 1975), and tobacco use (Goff & Goddard, 1999; Kristiansen, 1985a, 1985b; Nagel, Mayton, & Walner, 1995) and cessation (Conroy, 1979). One early intervention study indicated that the value "Broadminded" was positively related to smoking and negatively related to quitting; while the value "Self-Discipline" was negatively associated with smoking and positively associated with quitting (Conroy, 1979).

Another study among a sample of 5,128 seventh through twelfth graders from rural Washington and Idaho indicated that compared to smokers, nonsmokers gave significantly higher priorities to six Terminal Values (e.g., A Peaceful World, A Sense of Accomplishment, Family Security, Health, National Security, and Salvation) and significantly lower priorities to four Core Values (A Comfortable Life, An Exciting Life, Mature Love, and Pleasure) (Nagel et al., 1995). Findings from these studies provide suggestive data on Core Values and smoking, implying the need for further research on individual Core Values as well as value systems.

Potential Moderation Effect of Core Values on other Risk Factors

Although empirical data support the role of Core Values in protecting people from smoking, there is a lack of study on mechanisms by which Core Values affect such behavior. Data from reported studies indicates three risk factors (e.g., pro-

tobacco media, peer influences and the sensation seeking trait) that are consistently related to increased risk of smoking. Adolescents who are exposed to pro-tobacco media (Chen, Cruz, Schuster, Unger, & Johnson, 2002; Gilpin, Pierce, & Rosbrook, 1997; Pierce et al., 1998), or have smoking peers (Cheng, 2004; Duncan, Tildesley, Duncan, & Hops, 1995; Hoffman, Sussman, Unger, & Valente, 2006), or possess a sensation seeking trait (Yanovitzky, 2005; Zuckerman, 1994b) are more likely to use tobacco. Core Human Values, particularly when these values act together as integrated systems, may interact with these risk factors to change the likelihood of smoking. For example, tobacco smoking may be seen as a socially undesirable behavior after decades of tobacco control activities in many countries, including the United States and China. It is possible that people in these countries who hold a greater number of Core Values and/or rate the Core Values highly simply reject smoking. This is because subscribing to the Core Values guides people toward socially desirable behaviors (Rokeach, 1973, 1979) and smoking may be perceived to be socially undesirable. Consequently, we can hypothesize that people who endorse more Core Values and/or rate these values highly will be less susceptible to pro-smoking risk factors from both intrapersonal (e.g., sensation seeking trait) and environmental (e.g., smoking peers and pro-tobacco media) sources as described above.

Purpose of this Study

In this analysis, we focused on the 36 Core Values included in the Rokeach Value Survey to address the following three questions: (1) How many and which of the 36 Core Values are associated with smoking? (2) When the 18 Terminal Values and the 18 Instrumental Values are combined into two Core Value Systems, how are these two systems correlated with smoking? (3) Can the Terminal Values and the Instrumental Values modify the effect of pro-smoking factors (e.g., tobacco marketing, smoking peers and sensation seeking trait) on smoking? We used data collected among a sample of students from a medical college in China to test these hypotheses.

Methods

Participants and Procedure

Data used for this analysis were derived from a project to assess the mental and behavioral health status of medical students in Hainan Medical College, China. Hainan Medial College is a provincial level school, offering formal three-year to five-year undergraduate medical education programs. Students who attend this school are from Hainan and other provinces across China. Eleven classes from the school were randomly selected among the total 15 sophomore classes to participate in the study. All 357 students in the selected classes were invited and all 334 (93.5%) students who attended class on the day of survey agreed to participate by signing the written informed consent form. The survey was anonymous and the students completed the questionnaire in a classroom setting within approximately one hour. Data collection was completed in mid-May 2005. Approval of the research project and the data collection protocol was obtained from the Department of Research Administration at Hainan Medical College, China and approval of the use of the data was obtained from the Human Investigation Committee at Wayne State University, the United States.

Measurement of the Core Values

We assessed the 36 Core Human Values taken from the Rokeach's Value Survey, including 18 Terminal Values (for instance, "A Sense of Accomplishment," "A World of Beauty," " Family Security," "Freedom") and 18 Instrumental Values (for instance, "Clean," "Independent," "Responsible," "Self-Controlled") (Rokeach, 1973). These Core Values have been used in research in diverse cultural settings (Braithwaite & Law, 1985; Rokeach, 1973, 1979; Schwartz, 1992, 1994). The 36 Core Values were translated from English into Chinese (Mandarin) independently by three Chinese-English bilingual researchers. A single Chinese version was developed based on the three translated versions through group discussion. This Chinese version was then back-translated independently by another Chinese-English bilingual researcher to ensure the accuracy of the Chinese translation. The

verified Chinese version was pilot-tested among a group of subjects (faculty members, visiting scholars, and students) before it was used for data collection. The participants were asked to respond to the two questions: "Among the following 18 Terminal (or highest) Values, how important is each of them to you?" and "Among the following 18 Instrumental values (values that lead to Terminal Values), how important is each of them to you?" Individual values were scored as 1 = "not important", 2 = "important" and 3 = "very important" and used in statistical analysis. After psychometric evaluation of the scale, an index score (ranging from a minimum of 18 points to a maximum of 54 points) was created for the Terminal Value System (Cronbach alpha = 0.88) and the Instrumental Value System (Cronbach alpha = 0.90) respectively by summing up the corresponding individual Core Value scores, with a higher score indicating a greater importance of a Value System.

Measurement of Smoking Behavior

Questions used to measure smoking behavior were based on our previous research in China (Chen, Li, Stanton, Fang et al., 2004; Chen, Li, Stanton, Mao et al., 2004; Crace & Brown, 1996) and with reference to questions used in surveys in the United States (e.g., the National Survey on Drug Use and Health and the California Youth Tobacco Survey) (Pierce et al., 1998; US DHHS Substance Abuse and Mental Health Services Administration, 2003). Four smoking indicators included in this analysis were (1) lifetime smoking, (2) age of smoking onset, (3) frequency of past 30-day smoking, and (4) average number of cigarettes smoked on one day during the past 30 days. Lifetime smokers were defined as those who reported having ever smoked part or all of a cigarette in their life. Age of smoking onset was assessed based on the self-reported age when a participant smoked part or all of a cigarette for the first time in their life. Participants who reported having smoked at least on one day during the 30 days preceding the survey were coded as 30-day smokers, based on their responses to the question, "Think about the past 30 days (one month). On how many of these days did you smoke?" Response options were 1 = none, 2 = 1 to 2 days, 3 = 3 to 5 days, 4 = 6 to 9 days, 5 = 10

to 14 days, 6 = 15 to 24 days, and 7 = 25 or more days. For those who smoked in the past 30 days, data were also collected on the average number of cigarettes smoked per day. The four smoking behavior measures were used to describe the levels and patterns of cigarette smoking. To assess the associations between the Core Values and smoking, only the 30-day smoking was used as the dependent variable to minimize potential reverse impact of cigarette smoking on the Core Values.

Measurement of Risk Factors for Smoking
To assess a potential moderation effect of the Core Values, three risk factors for smoking were included: (1) being exposed to pro-tobacco media, (2) having peers who smoke, and (3) sensation-seeking trait. We selected these three variables because of their close relationship with adolescent smoking as has been described in section 1.4 above. Exposure to pro-tobacco media was assessed based on the responses to the four questions asking whether he or she: (a) recalled any tobacco brands advertised (1 = yes, 0 = no); (2) had a preference for any advertised tobacco brands (1 = yes, 0 = no); (3) had received any promotional items (1 = yes, 0 = no); and (4) had not definitely eliminated the possibility (or was willing) to use any free promotional items (1 = yes, 0 = no). An index score (ranging from 0 to 4) was created by summing responses to these four questions (Cronbach alpha = 0.58) such that a greater value indicated a higher level of exposure to pro-tobacco media. This index was based on previous studies regarding receptivity to pro-tobacco media and smoking among youth from different ethnic backgrounds (Chen et al., 2002; Gilpin et al., 1997).

Having smoking peers in the proximal social environment was selected as a risk factor. This variable was assessed based on the responses of a participant to four questions asking how many of their 10 close friends (male and female separately) and how many of their 10 peers in general (male and female separately) were smokers. Response options to these questions were: 0 = none smoked, 1 = one or two out of 10 smoked, 2 = three or four out of 10 smoked, 3 = five or six out of 10 smoked, 4 = seven or eight

out of 10 smoked, 5 = nine out of 10 or all of them smoked. An exploration of the collected data indicated that most participants gave an answer of either 0 or 1 to the four questions; therefore responses to these questions were dichotomized such that 0 = no one was a smoker and 1 = at least one was a smoker (Cronbach alpha = 0.60). An index score was created by adding up the recoded responses such that a higher value indicated a greater number of peers who smoked.

Sensation-seeking trait was assessed using the Zukerman's Sensation Seeking Scale – Form V (SSS-V) (Zuckerman, 1994a). Correlation analysis indicated adequate reliability of the scale for the study sample (Cronbach alpha = . 71). A summed score was created by adding up the item scores (ranging from 0 to 40) such that a higher value indicated a stronger tendency toward sensation-seeking.

Covariates
Although participants of the study were all sophomore-year students, there were other confounding factors, including age (in years), gender (1 = male and 2 = female), and race/ethnicity (1 = Han and 2 = other). Since empirical data indicates that smoking behavior in China differed by age, gender and race (Chen, Li, Stanton, Fang et al., 2004; Chen, Li, Stanton, Mao et al., 2004; Li, Hu, Zhou, & Zheng, 1988; Xiang et al., 1999), they were included as covariates to assess the association between the Core Values on smoking and the moderation effect of the Core Values on the pro-tobacco risk factors.

Data Analysis
Descriptive statistics such as means and percentages were used to summarize the characteristics of the study sample, to present the patterns and prevalence levels of cigarette smoking, and to assess the age of smoking onset. Correlation analysis was used to assess the internal consistency of all the measurement instruments, including the Terminal and Instrumental Value Systems and the three risk factors. Confirmatory Factor Analysis was used to assess the structure of the Core Values and its two Value Systems (constructs). A categorical

bivariate method was used to assess the associations between individual Core Values and 30-day smoking status, and multiple logistic regression was used to verify the results from the bivariate analyses by controlling such covariates as age, gender, and race. Eight multiple logistic regression models were constructed to test the moderation effect of the Core Values on pro-smoking risk factors. The likelihood ratio test was used (with p < .05 as the evidence) to assess the goodness-of-fit of a constructed model to the data. In addition, adjusted R^2 (greater than 0.10 or at least 10% of the variance in cigarette smoking be explained) was included in assessing the goodness-of-fit. Survey data were manually entered into computer. Double entry procedure was used for data quality assurance and any discrepancies were resolved by checking with the original data from the completed questionnaires. Data processing and statistical analyses were completed on computer using the commercial software SAS version 9.1 (SAS Institute, Cary, NC).

Results

Sample Statistics and Smoking Behavior

Among the 334 participants (18 through 24 years old, mean age = 20.7, SD = 1.0), 177 (47%) were female and 303 (91%) were Han Chinese and 9% were ethnic minority Chinese. Among the total sample, 60.0% had ever smoked and 18.4% had smoked at least on one day in the past 30 days. Among those who smoked in the past month, 81.9 % had smoked 1 to 5 cigarettes per day and 18.1% had smoked more than 5 cigarettes per day. As expected, a higher smoking prevalence and a greater number of cigarettes smoked per day were observed among males than among females (Table 1). The mean age of smoking onset (smoked part or all of a cigarette the for the first time) was 12.0 (SD = 4.5) years; a few smokers reported that they tried smoking for the first time when they were as young as four or five years old.

Core Values and Core Value Systems

Responses to the value survey and the mean score of the 36 Core Values by gender are

presented in Table 2 (Appendix A). Among all the Core Values, 16 Terminal Values and 10 Instrumental Values were rated as "very important" by over 50% of the sample, and rated as "not important" by less than 10% of the sample. Family Security (mean = 2.74, SD = 0.51) for males and Happiness for females (mean = 2.82, SD = 0.40) were rated the highest among the 18 Terminal Values; Intellectual for males (mean = 2.58, SD = 0.63) and Responsible for females (mean = 2.75, SD = 0.45) were rated the highest among the 18 Instrumental Values. Correlation analysis indicated an adequate internal consistency of both the Terminal Value System and the Instrumental Value System. The correlation r of individual item scores to the total scale scores varied from 0.20 to 0.65 for the individual Terminal Values, and Cronbach's alpha = 0.88 for the Terminal Value System; the correlation r ranged from 0.43 to 0.67 for the individual Instrumental Values and Cronbach's alpha = 0.90 for the Instrumental Value System.

Table 1. Characteristics of the Study Sample–Students from a Medical College

	Total	Male	Female
Sample size	334 (100%)	177 (53%)	157 (47%)
Race/Ethnicity			
Han Chinese	303 (91%)	164 (93%)	139 (88%)
Other Chinese	40 (9%)	13 (7%)	18 (12%)
Age (in years)			
Range	18-24	19-23	18-24
Mean (SD)	20.7 (1.0)	20.9 (1.0)	20.5 (0.9)
Cigarette smoking			
Lifetime smoking	60.0%	76.0%	41.9%**
Frequency of 30-Day smoking			
Smoked at least on one day	18.4%	31.0%	3.9%*
Smoked on 10 or more days	6.4%	11.5%	0.7%
#s of cigarettes smoke among 30-day smokers			
Less than 5 cigarettes per day	81.9%	81.5%	83.3%
More than 5 cigarettes per day	18.1%	18.5%	16.7%
Age of onset (years)			
Range	4-22	4-22	4-20
Mean (SD)	12.0 (4.5)	13.0 (4.2)	10.0 (4.4)

Note: Gender differences: *: p<.05 and **: p<.01 from chi square test.

Confirmatory Factor Analysis using the SAS procedure PROC CALIS (method = general least square) indicated that a two-factor model (the 18 Terminal Values and the 18 Instrumental Values each as two separate factors) satisfactorily fit the data (GFI = 0.81, RMSEA = 0.05, and the ratio of chi-square/df = 1.8). Results from the measurement model indicate the 18 Terminal Values and the 18 Instrumental Values formed two separate factors (constructs), and the Terminal Value factor was significantly associated with the Instrumental Value factors (covariance = 0.13, p < .01).

The summary index score was 45.65 (SD = 6.16) for the Terminal Values System and 41.34 (SD = 7.15) for the Instrumental Values System. Females scored higher than males on the Terminal Value System (46.74 versus 41.89, p<.01). Data in Figure 1 further indicates that among the respondents, about 12% of the sample reported endorsing fewer than 12 Terminal or Instrumental Values; while 37% to 39% reported possessing all 18 Terminal or Instrumental Values.

Figure 1. Distribution of the Respondents Reported Possessing Different Number of Core Values (N = 334, 47% Female
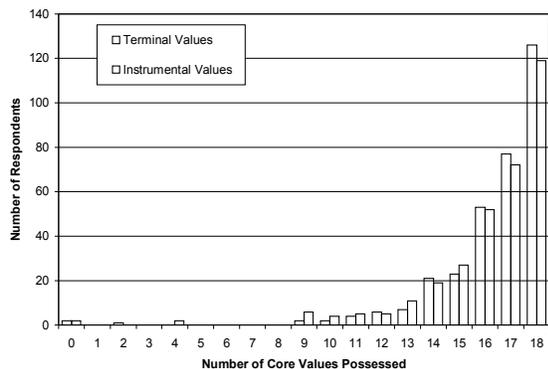
Associations between Individual Core Values and Smoking

To assess the association between individual Core Values and smoking, we cross-tabulated the 30-day smoking rate with the self-rated importance of the 36 Core Values (Table 3, see Appendix A). Results in the table reveal a general pattern: the smoking rate was the highest for the participants who rated a value as "not important"; the lowest for the participants who rated a value as "very important"; and in the middle for the participants who rated a value as "important". This pattern held for all 36 Core Values with five exceptions, including one Terminal Value (An Exciting Life) and four Instrumental Values (Salvation, Cheerful, Imaginative, and Intellectual). Results from both bivariate chi-square tests and multiavariate logistic regression analyses indicated that nine Terminal Values and ten Instrumental Values were significantly associated with smoking.

Associations between the Two Core Value Systems and Smoking

We assessed the correlation between the Core Value Systems and smoking by associating both the number of endorsed values and the rated significance of these values. Since the endorsed values were deviate from normal distribution (Figure 1 and Table 2), we categorized the number of endorsed Core Values into four groups (<12 Core Values, 12-14 Core Values, 15-17 Core Values, and 18 Core Values). Based on the data previously presented in Figure 1, we categorized the participants who endorsed all the 18 Terminal Values or all the 18 Instrumental Values into one group; we then categorized the participants who endorsed less than 12 values as another group; lastly we categorized the remaining participants who endorsed 12 to 17 Core Values into two groups with an even cutoff point of 3. Likewise, we also categorized the participants into four groups according to the rated importance of the Core Values. Using an equal score interval of 9 points we categorized all the participants into four groups, e.g., group 1: 18-26 points, group 2: 27-35 points, group 3: 36-45 points, and group 4: 46 points and above. Figure 2 presents the relationship between the number of endorsed Core Values and the 30-day smoking rate for both Terminal and the Instrumental Values respectively. Data from the figure indicate that as the number of endorsed Terminal Values increased from less than 12 to 18, and the 30-day smoking rate declined from 54.5% to 15.9% (Chi square = 10.91, p<.01); likewise, as the number of endorsed Instrumental Values increased from the lowest group to the highest group, the same smoking rate declined from 32.6% to 14.3%

(Chi square = 7.59, p < .05). The decline in smoking with the increases in the endorsed Core Values was statistically significant for the Terminal Values (p < .01) and for the Instrumental Values (p < .05) according to the Cochran-Armitage Trend test. These negative associations were further confirmed using multiple logistic regression, controlling for potential confounding effects from an array of covariates (e.g., age, gender, race, having smoking peers, exposure to pro-tobacco media and sensation seeking). The odds ratio was 0.56 (95% CI = 0.37-0.85, p < .01) for the association between the endorsed number of Terminal Values and 30-day smoking, and was 0.64 (95% CI = 0.46-0.89, p < .01) for the association between the endorsed number of Instrumental Values and 30-day smoking, indicating a protective effect of Core Values on smoking.
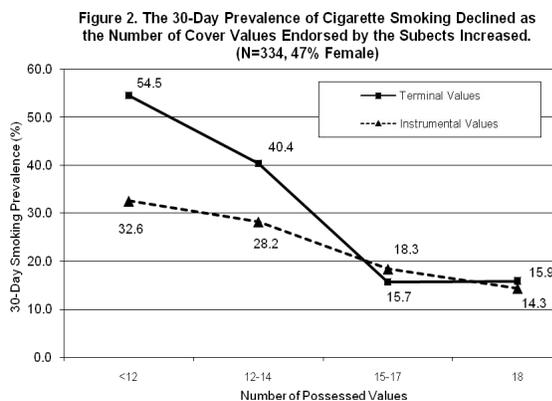

Figure 2. The 30-Day Prevalence of Cigarette Smoking Declined as the Number of Cover Values Endorsed by the Subects Increased. (N=334, 47% Female)

Note: the negative association between the number of endorsed Core Values and the 30-day cigarette smoking was statistically significant at p<.05 or p<.01 level after controlling for demographic factors using multiple logistic regression analysis (see text for details).

Figure 3 depicts the association between the rated significance of Core Values and 30-day smoking rate for both Terminal and Instrumental Values. As the total rating score for the Terminal Value increased from the lowest group to the highest group, the 30-day smoking rate declined from 66.7% to 13.9% (Chi square = 10.13, p < .05). Likewise, the smoking rate declined from 75.0% to 13.5% as the total rating score of Instrumental Value increased from the lowest group to the highest group (Chi square = 11.97, p < .01). The decline was statistically significant (p < .01 for both Core Value Systems

According to the Cochran – Armitage Trend test. Multiple logistic regression analysis controlling age, gender, race, having smoking peers, exposure to pro-tobacco media and sensation seeking indicated that the odds ratio was 0.44 (95% CI = 0.26-0.73, p < .01) for the association between the Terminal Values and smoking, and the odds ratio was 0.42 (95% CI = 0.26-0.69, p < .01) for the association between the Instrumental Values and smoking.
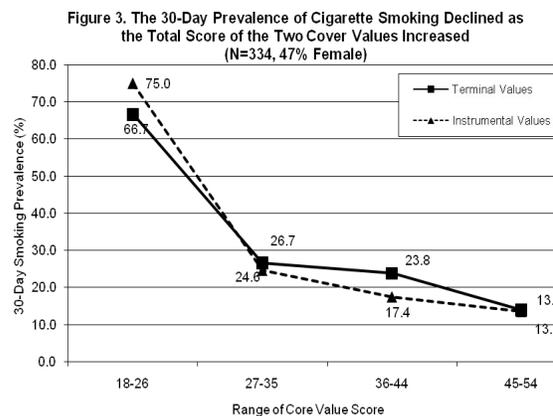

Figure 3. The 30-Day Prevalence of Cigarette Smoking Declined as the Total Score of the Two Cover Values Increased (N=334, 47% Female)

Note: the negative association between the total Core Value score and the 30-day cigarette smoking was statistically significant at p<.05 or p<.01 level after controlling for demographic factors using multiple logistic regression models (see text for details).

Moderation Effect of the Core Values on the Risk Factors

The upper panel of Table 4 presents four multiple logistic regression models (Models A0 to A3) that assessed the moderation effect of the Terminal Value System (rated importance scores) on pro-tobacco media, peer influence and sensation seeking tendency; the first model provided information of the impact of the Terminal Values only as the reference for the remaining three models. Data in the table indicates that all four models fit the data well (F-values ranged from 11.6 to 12.6, p < .01 for all of the models, and the adjusted R2 varied from 0.23 to 0.25). The negative coefficient of the interaction term between the Terminal Values and exposure to pro-tobacco media (Model A1, the regression coefficient = -0.086, p < .05) and having smoking peers (Model A2, the regression coefficient = -0.017, p<.01) indicate that subjects were less likely to smoke if they rated these highly, given the same levels of exposure to pro-tobacco media or having the same number

of smoking peers. No significant moderation effect was found between the two Core Value Systems and sensation-seeking tendency (p > . 05).

Table 4. Core Values Modify the Effect of Exposure to Pro-tobacco Media, Smoking Peers and Sensation-Seeking Tendency on 30-Day Smoking (Regression Coefficients)

Independent Variables	Analytical Model (N=344)			
Terminal Values	**A0**	**A1**	**A2**	**A3**
Intercept	0.581	0.322	0.382	-0.079
Age (in years)	0.038	0.036	0.038	0.037
Gender (male = 1, female = 2)	-0.194[+]	-0.204[+]	-0.195[+]	-0.202[+]
Race (Han = 1, others = 2)	-0.013	-0.019	-0.011	-0.013
Values	-0.096[+]	-0.001	-0.041	0.099
Pro-tobacco media (levels: 0 to 4)	0.098[+]	0.396[+]	0.098[+]	0.096[+]
Peer smoking (levels: 0 to 4)	0.040*	0.042*	0.100	0.039*
Sensation seeking (0 to 40)	0.011[+]	0.010[+]	0.011[+]	0.045*
Values * pro-tobacco media		-0.086*		
Values * peer smoking			-0.017[+]	
Values * sensation seeking				0.010
Model fit				
F (p value) from variance analysis	13.3(<.01)	12.6 (<.01)	11.6 (<.01)	12.1 (p<.01)
R^2	0.23	0.25	0.23	0.24
Instrumental values	**B0**	**B1**	**B2**	**B3**
Intercept	0.472	0.193	0.228	-0.051
Age (in years)	0.038	0.038	0.037	0.039
Gender (male = 1, female = 2)	-0.195[+]	-0.200[+]	-0.198[+]	-0.203[+]
Race (Han = 1, others = 2)	-0.011	-0.013	-0.012	-0.014
Values	-0.083[+]	0.013	0.005	0.027
Pro-tobacco media (levels: 0 to 4)	0.097[+]	0.340[+]	0.099[+]	0.095[+]
Peer smoking (levels: 0 to 4)	0.039*	0.044*	0.121	0.040*
Sensation seeking (0 to 40)	0.012[+]	0.011[+]	0.012[+]	0.038*
Values * pro-tobacco media		-0.078[+]		
Values * peer smoking			-0.026	
Values * sensation seeking				0.008
Model fit				
F (p value) from variance analysis	13.4 (<.01)	12.8 (<.01)	11.8 (<.01)	12.1 (<.01)
R^2	0.24	0.25	0.23	0.24

Note: Model A1 for assessing the interaction between the Terminal Value System and exposure to pro-tobacco media, Model A2 for assessing the interaction between the Terminal Value System and having peers who smoke; and model A3 for assessing interactions between the Terminal Value System and sensation seeking tendency. Likewise, Models B1 to B3 for assessing interactions between the Instrumental Value System and the same three pro-smoking risk factors. *: p<.05, and [+]: p<.01A

Likewise, the lower panel of Table 4 contains results from the four regression models assessing the moderation effect of the Instrumental Value System on the three pro-tobacco factors with regard to smoking. The goodness-of-fit statistics in the table indicate that all the four models fit the data well (F-values ranged from 11.8 to 13.4, p < .01 for all of the models; the adjusted R2 ranged from 0.23 to 0.25). The regression results indicated a significant negative interaction of the Instrumental Values with pro-tobacco media (regression coefficient = -0.078, p < .01) and having smoking peers (regression coefficient = -0.026, p < .05) in predicting cigarette smoking. Participants who rated the Instrumental Values more highly are less likely to smoke, given the same level of pro-tobacco media exposure or number of smoking peers. The moderation effect of the Instrumental Values and sensation seeking tendency was not statistically significant (p > .05).

Discussion

In this analysis, we add to the literature on tobacco by reporting the results from our research on the association between Core Human Values and current cigarette smoking, including the direct associations with smoking and the moderation effects with exposure to pro-tobacco media and having smoking peers that are related to smoking.

Core Values May Reduce the Likelihood of Tobacco Smoking
Findings from this study indicate that endorsing more Core Values or rating these values with greater significances is associated with reduced likelihood of tobacco smoking. When each of the 36 Core Values were assessed separately, nine of 18 Terminal Values (e.g., A Sense of Accomplishment, A World of Beauty, Family Security, Freedom, Happiness, Inner Harmony, Pleasure, Self-Respect, and True Friendship) and ten of 18 Instrumental Values (e.g., Clean, Forgiving, Helpful, Honest, Independent, Loving, Logical, Polite, Responsible, and Self-Control) were negatively associated with smoking. Further studies are required to examine potential moderation effects of these

subgroups of Core Values on other risk factors with regard to adolescent smoking. When the 36 Core Values are assessed as two integrated systems, both the Terminal Values and the Instrumental Values are negatively associated with cigarette smoking. Subjects who endorse a greater number of Core Values or rate the values with greater significance are less likely to smoke, and such effect is independent of demographic and other influential factors.

The negative association of several Core Human Values (e.g., Self-Controlled, Helpful, Loving, A World of Beauty) with smoking observed in our study is consistent with that reported by others (Chernoff & Davison, 1999; Goff & Goddard, 1999). Negative associations between several other Core Values (e.g., Family Security, Happiness, Inner Harmony, True Friendship, and Loving) observed in our study have not been reported by any published studies. Our finding contradicts those from a previous study related to the Core Value "Pleasure." This value was negatively associated with smoking in our study, but was reported as positively associated with smoking from the other study conducted in the United States (Nagel et al., 1995). We suspect that this difference could be due to cultural differences between China and the U.S. in perceiving the Core Value Pleasure. For example, when experiencing something pleasant (e.g., watching a favorite team win a game) a Chinese adolescent may be more likely to feel the pleasant sensations of happy, joy and satisfaction internally while an American adolescent may be more likely to celebrate it with many open actions, including smoking and drinking.

Moderation Effect of Core Value Systems on Pro-Smoking Risk Factors
A new finding from this study is that the two Core Value Systems significantly attenuate the effect of two influential pro-smoking risk factors (e.g., exposure to pro-tobacco media and having smoking peers) on smoking. Endorsing more of the Core Values or rating these Core Values with a greater significance mitigates the association between the two risk factors and 30-day smoking. This finding supports our hypothesis that integrated Core Value Systems

may serve as intrinsic resources for individuals to make decisions on whether or not to smoke when they are exposed to pro-tobacco risk factors.

Limitations of this Analysis

First, findings of this study were derived from cross-sectional data. Although more recent smoking behavior (smoking in the past 30 days) was used as the dependent variable to minimize potential reverse impact from smoking on Core Values, such reverse effects could not be completely ruled out without longitudinal data. Second, although the Core Values assessed in this study are broadly based (Rokeach, 1973, 1979), additional Core Values may be added such as Power and Wealth, as indicated by other researchers (Schwartz et al., 2001). We did not include Health as Core Value for this research because we want to focus on Values that are not explicitly related to risk behaviors and health. In addition, one researcher also reported no association between the Core Value "Health" and smoking behavior (Kristiansen, 1985b). Third, the lack of significant moderation effects of the two Core Value Systems on sensation seeking tendency could be due to the relatively small sample size of this study. Caution should be used when interpreting this result. Lastly, the participants of this study were medical students.

Implications and Recommendations

Despite these limitations, findings from this analysis have potential implications for tobacco research and tobacco use prevention practice. The negative association between Core Values and smoking observed in this study suggests the need for additional research on Core Values and smoking behavior in other cultures. If the impact of Core Values on smoking behavior can be validated across cultures, it will provide support for the addition of Core Value education as a key component to existing programs (CDC, 2004; US DHHS, 2004) to advance adolescent tobacco control strategies.

One immediate approach to translate the findings from this study to smoking prevention practice is to promote or strengthen Core Values that are protective against smoking. Although values are changeable in theory, it remains challenging to change specific Core Values and Core Value Systems. The method of Value Self-Confrontation (VSC) may offer a promising approach toward the challenge. The VSC, a cost-effective and brief intervention technique developed by Rokeach, confronts people who have assessed their own values with information about the Core Value priorities that discriminate between a positive and a negative reference group (Rokeach, 1973; Rokeach & Cochrance, 1972). This method has been tested in a number of well-designed intervention studies targeting a diverse array of social and behavioral issues ranging from racism to health behaviors. Both the immediate and long-term (up to 5 years) effects of VSC are reported in altering the perceived relative importance of several experimentally "manipulated" Core Values (e.g., Self-Controlled, Broad-Minded, Freedom, Equality) as well as expected changes in these targeted values and behaviors (e.g., reductions in attitudes and behavior against Blacks and increases in weight control activities) (Ball-Rokeach, Rokeach, & Grube, 1984; Grube, Mayton, & Ball-Rokeach, 1994). The VSC has also been used in prevention research for tobacco cessation and weight control (Conroy, 1979; Schwartz & Inbar-Saban, 1988). The potential theories and cognitive processes of behavior change associated with VSC, such as the Belief System Theory and the Dual Processing Cognitive mechanism have also been examined (Grube et al., 1994; Waller, 1994). However, the long-term effect of the VSC method on tobacco cessation is unknown and this method has not been adapted by current tobacco control practitioners.

An emerging trend in risk behavior reduction is the promotion of positive youth development, including the development of social competence, moral competence, self-resilience, and belief in future (Catalano, Berglund, Ryan, Lonczak, & Hawkins, 2004). Instead of explicitly targeting risk behaviors, this positive development approach emphasizes competence training for risk reduction. We recommend adding the enhancement of Core Human Values to these risk reduction programs. According to the findings of this study, any interventions that enhance the Core Values that are negatively

associated with smoking may be able to protect adolescents from smoking. This could include education to strengthen such Core Values as Family Security, Friendship, better personal image (for the Core Value of Beauty), hygienic habits (for the Core Value of Clean), and meditation (for Inner Harmony).

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Appendix A

Table 2. Psychometric Characteristics of the Two Core Human Value Systems Derived from Rokeach's Value Survey (N=334)

	Item Response (%)				Mean Score (SD)		
	Not important	Important	Very important		Male (N = 177)	Female (N=157)	*r*
Terminal Value (α =0.88)							
A Comfortable Life	7.9	33.7	58.4		2.44 (0.67)	2.58 (0.60)	0.34
An Exciting Life	36.3	44.8	18.9		1.80 (0.70)	1.85 (0.75)	0.20
A Sense of Accomplishment	9.7	36.9	55.8		2.40 (0.66)	2.58 (0.58)	0.42
A World of Peace	6.1	26.2	67.7		2.56 (0.64)	2.68 (0.54)	0.53
A World of Beauty	5.8	28.7	65.5		2.55 (0.64)	2.65 (0.54)	0.65
Equality	9.1	28.6	62.3		2.48 (0.68)	2.59 (0.63)	0.47
Family security	2.4	20.1	77.5		2.74 (0.51)	2.76 (0.46)	0.56
Freedom	3.6	18.8	77.5		2.72 (0.55)	2.75 (0.47)	0.49
Happiness	1.8	20.4	77.8		2.71 (0.52)	2.82 (0.40)	0.56
Inner Harmony	2.4	21.7	75.9		2.67 (0.55)	2.81 (0.41)	0.59
Mature Love	8.2	32.8	59.0		2.48 (0.67)	2.54 (0.62)	0.49
National Security	6.1	26.2	67.7		2.59 (0.62)	2.65 (0.58)	0.58
Pleasure	4.9	29.9	65.2		2.53 (0.63)	2.69 (0.50)	0.65
Salvation	30.9	44.3	24.8		1.91 (0.75)	1.97 (0.74)	0.51
Self-Respect	3.6	20.4	76.0		2.63 (0.61)	2.83 (0.37)	0.50
Social Recognition	10.0	37.7	52.3		2.37 (0.72)	2.48 (0.61)	0.53
True Friendship	2.7	21.6	75.7		2.67 (0.57)	2.79 (0.41)	0.53
Wisdom	7.6	19.8	72.6		2.57 (0.68)	2.74 (0.52)	0.47
Instrumental Value (α =0.90)							
Ambitious	10.1	37.5	52.4		2.43 (0.68)	2.41 (0.65)	0.53
Broadminded	3.9	31.3	64.7		2.57 (0.60)	2.65 (0.52)	0.57
Capable	6.1	26.4	67.5		2.56 (0.64)	2.68 (0.55)	0.47
Cheerful	32.9	43.0	24.1		1.94 (0.74)	1.88 (0.76)	0.49
Clean	17.9	47.7	34.5		2.04 (0.72)	2.30 (0.67)	0.51
Courageous	42.8	43.7	13.5		1.72 (0.70)	1.69 (0.68)	0.61
Forgiving	12.8	41.6	45.6		2.29 (0.73)	2.37 (0.64)	0.58
Helpful	20.4	47.4	32.2		2.11 (0.73)	2.12 (0.71)	0.67
Honest	9.7	33.7	56.5		2.44 (0.72)	2.50 (0.61)	0.55
Imaginative	26.7	44.1	29.2		2.09 (0.78)	1.95 (0.70)	0.56
Independent	9.2	32.7	58.1		2.40 (0.70)	2.59 (0.60)	0.46
Intellectual	5.5	25.1	69.4		2.58 (0.63)	2.71 (0.52)	0.50
Loving	7.9	40.7	51.4		2.39 (0.67)	2.49 (0.60)	0.60
Logical	7.3	35.9	56.8		2.49 (0.67)	2.50 (0.59)	0.58
Obedient	54.1	34.3	11.6		1.63 (0.72)	1.52 (0.66)	0.49
Polite	10.7	44.2	45.1		2.31 (0.69)	2.39 (0.63)	0.67
Responsible	3.7	28.3	68.0		2.55 (0.61)	2.75 (0.45)	0.48
Self-Controlled	9.1	39.2	51.7		2.39 (0.68)	2.47 (0.63)	0.43

Note: *r* = correlation coefficient of item scores with the total scale scores.

Table 3. Prevalence Rate (%) of 30-Day Cigarette Smoking by Self-Rated Importance of Core Values among a Sample of Medical Students in China, N=334, 47% Female

Terminal Values				Instrumental Values			
	Not important	Important	Very important		Not important	Important	Very important
A Comfortable Life	24.0	19.6	16.6	Ambitious	18.2	19.5	16.8
An Exciting Life	16.5	19.1	19.7	Broadminded	38.5	18.3	16.9
A Sense of Accomplishment[+]	41.7	17.5	15.6	Capable	25.0	19.8	17.0
A World of Peace	35.0	16.5	17.0	Cheerful	17.8	17.9	18.7
A World of Beauty*	40.0	22.0	14.3	Clean[+]	28.8	19.2	11.0
Equality	26.7	20.4	15.9	Courageous	20.0	18.0	14.0
Family security*	50.0	22.7	16.0	Forgiving[+]	39.0	15.6	14.9
Freedom*	66.7	12.7	17.2	Helpful*	25.4	18.2	13.6
Happiness*	33.3	25.8	15.9	Honest*	31.2	16.5	16.9
Inner Harmony*	62.5	18.3	16.4	Imaginative	19.3	17.5	18.3
Mature Love	25.0	17.8	17.5	Independent[+]	33.3	20.0	14.4
National Security	25.0	20.0	17.0	Intellectual	22.2	22.5	16.5
Pleasure[+]	37.5	23.5	14.3	Loving*	30.8	20.3	14.5
Salvation	18.8	21.7	11.5	Logical*	29.2	19.0	16.3
Self-Respect[+]	50.0	22.4	15.5	Obedient	15.0	25.2	13.2
Social Recognition	24.2	20.2	15.6	Polite*	25.7	20.3	14.5
True Friendship[+]	66.7	27.1	13.9	Responsible[+]	58.3	22.0	14.5
Wisdom	24.0	18.8	17.5	Self-Controlled[+]	33.3	20.5	13.8

Note: *: $p<.05$, and [+]: $p<.01$ from multivariate logistic regression analysis controlling for demographic factors. The association between individual Core Values and smoking was first analyzed using the Cochran – Armitage Trend Test, and then verified using logistic regression models.