Original Investigation

Tobacco Smoking, Quitting, and Relapsing Among Adult Males in Mainland China: The China Seven Cities Study

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Abstract

Introduction: Despite an estimated 1 million tobacco-related deaths annually in China, public health officials face overwhelming barriers to implementing effective tobacco control policies and programs. Models of effective tobacco control can be adapted for Chinese tobacco use and culture based on reliable and valid data regarding predictors of smoking and abstaining.

Methods: As part of the China Seven Cities Study to assess the role of rapid social, economic, and cultural change on tobacco use and related health practices and outcomes, 4,072 adult male smokers provided data in 3 annual waves. Measures included current smoking, nicotine dependence, readiness for quitting, perceived stress, hostility, depressive symptoms, as well as covariates (e.g., age, marital status, educational attainment, and family income).

Results: Odds of being abstinent at Wave 3 were increased by: lower nicotine dependence at Wave 1 and becoming less dependent between Waves 1 and 3; progressing beyond the contemplation stage between Waves 1 and 3; perceiving less stress, whether initially at Wave 1 or over time from Wave 1 to Wave 3; and lower hostility scores at Wave 1 and decreased hostility from Wave 1 to Wave 3. Among those who quit, odds of remaining abstinent rather than relapsing by Wave 3 were higher among those who were less dependent at Wave 1 and who became less dependent from Wave 1 to Wave 3; and those who showed decreases in hostility from Wave 1 to Wave 3.

Conclusions: The public health challenge posed by very high prevalence of male smoking in China can be met by policies and programs that lead to successful long-term cessation. This can only be done successfully by designing interventions based on knowledge of the country's smokers and the current study suggests several elements.

Introduction

Cigarette smoking is a major risk factor for mortality in China (Gu et al., 2009; G. Yang et al., 2008), with an estimated million tobacco-related deaths annually—more than any other country—a total, which is expected to increase for decades (Peto, Chen, & Boreham, 2009). There are an estimated 300–350 million Chinese smokers, approximately 57%–70% of men and 2%–4% of women, constituting one-third of the world's smokers (Ho et al., 2010; Ma et al., 2008; World Health Organization, 2008; G. Yang et al., 2008). Despite this enormous public health threat, Chinese officials face overwhelming barriers to implementing effective tobacco control policies and programs (Gonghuan, 2010; ITC Project, 2009; Ma et al., 2008; Peto et al., 2009). China's tobacco problem will only be solved if these barriers are overcome to prevent smoking onset, increase cessation, and prevent relapse.

There are no significant smoking cessation programs in China so it is not surprising that a recent face-to-face survey of a cohort of 4,800 adult smokers and 1,200 adult nonsmokers in six cities in China found that three-quarters of smokers did not plan to quit, half had never tried, and only one-quarter thought they could successfully quit (Jiang, Elton-Marshall, Fong, & Li, 2010). Although Chinese smokers have expressed less interest in quitting smoking and received less assistance than their Western counterparts, the determinants of intentions to quit may be similar (Feng et al., 2010; Qian et al., 2010; J. Yang et al., 2011; T. Z. Yang, Fisher, Li, & Danaher, 2006). While it was reported that Chinese participants in the international Quit and Win biennial smoking cessation contests achieved among the highest 1-year continuous abstinence rates (~43%), these findings have been attributed to the particular differences between Chinese smokers and those of other nations, such as culture, gender, degree of addiction, makeup of nicotine patches, and nature of prizes (Sun et al., 2000). Moreover, comparisons across countries and meaningful conclusions have been characterized as

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“very problematic” because of the countries’ increasing heterogeneity and the failure of the contests to affect population smoking rates (Cahill & Perera, 2008). Currently, a number of tobacco control initiatives are underway, including: all health care facilities should be smoke free at the end of 2011; smoke-free schools decision issued by Ministry of Education; Tobacco Control Mass Media Promotion Activities; and Healthy Cities Program (Lv et al., 2011). The first smoking cessation clinic in Guangzhou, China’s third largest city, was established only 6 years ago and had success similar to Western clinics (i.e., by intention to treat, the 6-month 7-day point prevalence quit rate was 24% [95% CI = 18%–30%]). Smokers with more confidence in quitting or were at action stage were more successful in quitting (W. H. Zhu et al., 2010). Despite this progress, more must be done. But implementation has been spotty and not well supported.

Although models of effective tobacco control exist in developed nations in the West, it is likely that they will only have similar success in China if they are adapted for Chinese tobacco use and culture. A large, multisite study in China provided a wealth of data from which to identify promising variables. The China Seven Cities Study (CSCS) was initiated by a consortium of researchers in the United States and China in 2001 to gain a more complete understanding of the role of rapid social, economic, and cultural change on tobacco use and related health practices and outcomes in China, with the ultimate goal of developing and implementing effective community-based approaches to tobacco use prevention and control (Johnson et al., 2006).

Most smokers in North America and Europe try to quit on their own, that is, without any intervention; studies of these self-quitters have found that approximately half relapsed within a week and approximately 90% within 6 months (Hughes, Keely, & Naud, 2004). A review of findings on the maintenance of abstinence and relapse concluded that slips, younger age, nicotine dependence, low self-efficacy, weight concerns, and previous quit attempts predicted relapse (Ockene et al., 2000).

Many intervention approaches to smoking cessation have been demonstrated to be effective in the West, including brief strategies employed by health care providers (e.g., the 5 As and the 5 Rs) and in telephone counseling, and more comprehensive treatments that involve multiple visits and medication (Fiore et al., 2008). Despite the evidence for successful behavioral and pharmacological cessation interventions, 75% of smokers who quit fail to remain abstinent for more than 6 months (Coleman et al., 2010; Fiore et al., 2008). One promising approach for smoking cessation is the incorporation of technology-supported interventions. We were the first to pilot the use of technology for the delivery of tobacco cessation interventions in China when we developed and implemented an eight-session smoking cessation program, a tailored version of Project EX, with late adolescent smokers in Wuhan, China. PDAs were utilized for program delivery and assessment. The program resulted in a 14.3% 7-day quit rate, 10.5% 30-day quit rate, and, among those who did not quit, a 16% reduction in daily smoking at post-test and 33% reduction at 4-month follow-up. The use of cell phone text messaging and other web-based approaches hold tremendous potential for scalable cost-effective methods of reaching large populations as is the case in China (Zheng et al., 2004).

The primary aim of the present study was to identify smoking-related and psychosocial variables that predict quitting and relapse in a sample of Chinese males because little or none of the data regarding cessation and relapse reported to date have been derived from studies of Chinese smokers. If the determinants of quitting and relapsing are similar in this sample to those in the Western samples documented in the literature cited above, they should include smoking-related variables, such as nicotine dependence and stage of change, and psychosocial variables, such as perceived stress.

Methods

Data Sources and Sample Selection

The CSCS is an ongoing collaboration between U.S. researchers and Chinese public health leaders to assess the role of rapid social, economic, and cultural change on tobacco use and related health practices and outcomes to inform the development of health promotion programs. The participating seven cities, which span much of the geographic, economic, and cultural diversity of China, are located in four regions: Northeastern (Harbin, Shenyang), Central (Wuhan), Southwestern (Chengdu, Kunming), and Coastal (Hangzhou, Qingdao). For the current study, we analyzed longitudinal smoking data of fathers from two cohorts of 7th and 10th grade students collected from 2002 to 2004. Detailed recruitment and sampling procedures are described in our previous published papers (Johnson et al., 2006; Xie et al., 2006). Both students and their parents completed self-report questionnaires. Questionnaire items were translated from English to Mandarin and then back-translated to English by translators fluent in both languages and trained in behavioral science theory and tobacco use research. All survey instruments and consent procedures were approved by the Institutional Review Boards of the University of Southern California and each of the seven participating Chinese cities.

Mothers were excluded from this current study because very few reported ever smoking (8.8% of mothers vs. 71.7% of fathers) or smoking daily (3.3% of mothers vs. 49.9% of fathers) in the past 30 days at the baseline. Therefore, the eligible participants at baseline in 2002 comprised fathers of 6,091 middle school and academic and vocational high school students (2,615 7th graders and 3,476 10th graders). Attrition in the follow-up years reduced the sample to 5,742 (94.2% of baseline sample) in 2003 and 5,164 (84.8% of baseline sample) in 2004. A total of 4,072 (66.9% of the baseline sample) fathers provided data at all three waves. Attrition analysis comparing baseline characteristics between participants who were retained and lost to follow-up revealed no significant differences in education attainment, family income levels, parental smoking status during childhood, general health status, age at initiation of first cigarette use and daily smoking, nicotine dependence, general perceived stress, hostility, and depressive symptom experience. Slight differences were observed for marital status (92.8% of currently married for attrition cases vs. 96.3% for retained cases, $p < .0001$) and age (42.8 ± 4.1 for attrition cases vs. 42.4 ± 4.0 for retained cases, $p < .0001$).

At each wave, participants were asked, “During the past 30 days, on how many days did you smoke cigarettes?” Based on participants’ responses, we categorized them as abstaining, smoking at least one day but not daily, or smoking daily in the past month. Initially, we reduced the analysis sample to those

participants who provided data at all three waves and who reported smoking daily in the past 30 days at baseline ($n = 1,912$), and then further restricted the analysis to participants who were either smoking daily or abstaining at follow-up waves ($n = 1,463$). Participants who reported smoking at least one day but not smoking daily ($n = 449$) were excluded from the analysis. As all participants in the analysis sample were daily smokers at baseline ($n = 1,463$), those who reported smoking daily in the past month at both Wave 2 and Wave 3 follow-ups were classified as stable smokers ($n = 1,215$, 83.0%). Participants were classified as quitters ($n = 139$, 9.5%) if they either reported smoking daily at baseline and Wave 2 follow-up but were abstinent at Wave 3 follow-up, or if they were smoking at baseline but were abstinent at both Wave 2 and Wave 3 follow-ups. Participants who were smoking at baseline, abstinent at Wave 2 follow-up, but reported smoking at least one day in the past month at Wave 3 follow-up were classified as relapsers ($n = 109$, 7.5%).

Measures

Nicotine Dependence

Nicotine dependence was assessed with the Fagerström Tolerance Questionnaire (FTQ; Fagerström, 1978). The psychometric validity of a Chinese version FTQ was evaluated using two biomarkers (exhaled-air carbon monoxide and saliva cotinine levels) in a Chinese adult population (Huang, Lin, & Wang, 2006). With removal of two items on “nicotine yield” and “inhalation,” the psychometric performance of the remaining six-item scale was fairly reliable and valid and, thus, recommended for the use in the Chinese adult population. Cronbach’s alpha was .66, .67, and .45 in the years 2002–2004.

Readiness for Quitting

Baseline stages of quitting readiness were structured according to the Stage of Change Theory (Prochaska, 1992). Participants who reported that they either never thought about quitting smoking or decided not to quit were classified in the *Precontemplation stage* (coded as 0). Those who were uncertain about quitting were classified in the *Contemplation stage* (1). Those who planned to quit or had already done so were classified in the *Preparation/Action/Maintenance stages* (coded as 2); these stages were combined because few chose them.

Perceived Stress

Three items were adapted from Cohen’s Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) to categorize participants on their reports of frequency of experiencing stress in the past month (“felt nervous and stressed,” “could not cope with all the things that you had to do,” “felt difficulties piling up so high that could not overcome them”). Cronbach’s alpha was .83, .86, and .81 in the years 2002–2004.

Hostility

Three Likert scale items were adapted from the Buss–Durkee Hostility Inventory (Buss & Durkee, 1957) to assess participants’ levels of hostility (“lose temper easily,” “can’t help being a little rude to people I don’t like,” “have been kind of grouchy.”). Cronbach’s alpha was .74, .77, and 0.84 in the years 2002–2004.

Depressive Symptoms

The short form of the Center for Epidemiological Studies Depression Scale (Cheung & Bagley, 1998) was used to measure frequency of participants’ depressive symptoms (“have trouble shaking off sad

feelings,” “feel depressed,” “feel sad” in the past week). Cronbach’s alpha was .85, .89, and 0.90 in the years 2002–2004.

Other Covariates

The CSCS questionnaire included information on sociodemographic characteristics including age, marital status, educational attainment, and family income. Education attainment was categorized as “Below Senior High School,” “Senior High School,” and “College or above.” Monthly family income was determined by the participants’ response to the question “What is your total monthly family income from all sources?” The response options ranged from “<RMB¥100/month” (<U.S.\$15/month) to “>RMB¥10,000/month” (>U.S.\$1,530/month). Marital status was defined as “Married” versus “Unmarried” which included “Divorced,” “Widowed,” “Separated,” and “Never Married.” Participants’ self-perceived general health status was assessed with the item, “How would you describe your health?” and responses were collapsed into two categories, “excellent or good” and “fair or poor.” Participants also reported age of daily smoking initiation and parental smoking status during childhood (a Yes/No dichotomized variable).

Statistical Analysis

Sample characteristics and the smoking-quitting-relapsing pattern over the 3-year study period were assessed with descriptive statistics and Chi-square tests, paired t tests, and repeated measures analysis of variance. Multivariate polytomous logistic regressions were utilized to evaluate smoking-related behavioral determinants (i.e., FTQ, readiness of quitting stages, hostility, perceived stress, and experience of depressive symptoms) of the three-category smoking behavioral pattern (i.e., stable daily smoking, abstaining, and relapsing). This analytic technique enabled us to use the three waves of data to model the dynamic of smoking/quitting behavioral pattern over a 3-year period. Conventional logistic regression is not able to handle the multi-categorical outcome as well as polytomous logistic regression.

Stable daily smoking was set as the reference category for calculating the odds of abstaining (coded as 1) versus stable daily smoking (coded as 0), and relapsing was set as the reference category for calculating the odds of abstaining (coded as 1) versus relapsing (coded as 0). Covariates including the city of residence, sociodemographic characteristics (age, family income, and education attainment), age of daily smoking initiation, parental smoking status during childhood, and perceived general health status were adjusted in the models. Both initial score at baseline and change scores from baseline to either Wave 2 or Wave 3 follow-up were included in the model simultaneously in order to capture effects of both initial and change levels of smoking-related behavioral determinants on the odds of abstaining versus stable daily smoking or abstaining versus relapsing over time. The smoking-related behavioral determinants were repeatedly assessed in three waves, which allowed us to model time-varying effects of both initial and change status on the dynamics of smoking/quitting behaviors over time. All statistical analyses were carried out using SAS (v. 8.0; SAS Institute, Cary, NC).

Results

Average age of participants was 42 years with the distribution of education attainment of 41.7% below high school, 35.1% high school, and 23.2% college or above. The majority reported

Table 1. Baseline General Characteristics

	<i>n</i> (%)	Mean (SD)
City of residence		
Chengdu	225 (15.4)	
Hangzhou	149 (10.2)	
Shenyang	213 (14.6)	
Wuhan	235 (16.1)	
Harbin	155 (10.6)	
Kunming	244 (16.7)	
Qingdao	242 (16.5)	
Age (years)		42.25 (3.97)
Education attainment		
Below high school	608 (41.7)	
High school	512 (35.1)	
College or above	338 (23.2)	
Family income level		
<500 Yuan/month	217 (15)	
500–2,000 Yuan/month	923 (63.7)	
>2,000 Yuan/month	310 (21.4)	
Parental smoking		
No	302 (21.5)	
Yes	1,103 (78.5)	
General health status		
Fair/poor	836 (57.5)	
Excellent/good	619 (42.5)	
Age of smoking initiation (years)		10.52 (4.50)
Age of daily smoking initiation (years)		14.53 (4.95)

family incomes between RMB¥500 and RMB¥2000 per month (U.S.\$77 to U.S.\$307/month). About 79% of participants reported parental smoking during their childhood. Ages of smoking initiation and daily smoking initiation were between 10 and 14 years old. The proportion of participants who perceived their health status as excellent or good was 42% (Table 1).

The vast majority (94.7%) of participants were at either the precontemplation or contemplation stage at baseline (Table 2).

The precontemplators constituted 52.9% of participants, combining those who never thought about quitting (31.7%) and those who thought about quitting but decided not to (21.2%). The contemplators constituted the 41.8% of participants who thought about quitting but had not yet made up their minds. The remaining 5.3% were combined into a preparation, action, and maintenance category, with 1.9% planning to quit within the next 6 months, 0.8% planning to quit within the next 30 days, 1.4% currently taking action to quit, 0.3% who quit within the last 6 months, and 0.9% who quit more than 6 months ago.

Average FTQ scores declined significantly from baseline to Wave 2 followed by a significant increase to Wave 3. Mean levels of hostility, perceived stress, and experience of depressive symptoms were unchanged from baseline to Wave 2, but from Wave 2 to Wave 3, mean levels of hostility and perceived stress decreased and depressive symptoms increased significantly.

Table 3 presents results of multivariate polytomous logistic regressions with adjustments for city of residence, age, education, family income, parental smoking during childhood, baseline perceived general health status, and age of initiation of daily smoking. Significantly greater odds of abstaining than stable daily smoking were predicted by lower levels of FTQ ($OR = 0.34$), hostility ($OR = 0.54$), and perceived stress ($OR = 0.65$) at baseline, and decreases in FTQ ($OR = 0.35$), hostility ($OR = 0.51$), and perceived stress ($OR = 0.73$) from baseline to Wave 3. For example, a 1-point unit decrease in baseline FTQ score (i.e., becoming less nicotine dependent) led to 66% (i.e., $[0.34-1] \times 100\%$) greater odds of abstaining than continuing stable daily smoking. Moreover, for every 1-point unit decrease in FTQ score from baseline to Wave 3, participants had 65% (i.e., $[0.35-1] \times 100\%$) greater odds of abstaining than continuing stable daily smoking.

Participants who had taken some actions beyond the precontemplation stage at baseline (as reflected by a higher quitting stage score) had 120% (i.e., $[2.2-1] \times 100\%$) greater odds of abstaining than remaining a stable daily smoker. No significant result was observed for experience of depressive symptoms.

Table 2. Smoking-Related Behaviors by Time

	Baseline (T1)	Wave 2 (T2)	Wave 3 (T3)
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Stage of quitting readiness			
Precontemplation ^a	734 (52.9)		
Contemplation	580 (41.8)		
Preparation/action/main	73 (5.3)		
	Mean (SD)	Mean (SD)	Mean (SD)
FTQ score ^b	3.64 (1.41)	3.22 (1.71)	3.81 (1.58)
Quitting stage score	0.52 (0.6)		
Mean hostility score ^c	2.38 (0.5)	2.30 (0.55)	2.04 (0.65)
Mean perceived stress score ^c	2.27 (0.98)	2.23 (0.99)	2.09 (0.89)
Mean scores depressive symptoms ^c	1.30 (0.62)	1.26 (0.58)	1.54 (0.85)

Note. FTQ = Fagerström Tolerance Questionnaire.

^a $p < .01$.

^b $p < .01$ for baseline versus Wave 2 and Wave 2 versus Wave 3.

^c $p < .01$ for Wave 2 versus Wave 3.

Table 3. Results of Multivariate Polytomous Logistic Regressions

Predictors	Odds of abstaining (coded as 1) vs. stable smoking (coded as 0)		Odds of abstaining (coded as 1) vs. relapsing (coded as 0)	
	OR (95% CI)	p Value	OR (95% CI)	p Value
FTQ sum score at T1	0.34(0.27–0.43)	<.0001	0.52(0.39–0.70)	<.0001
Change of FTQ sum score from T1 to T3	0.35(0.30–0.41)	<.0001	0.50(0.42–0.61)	<.0001
Quitting stage at T1	2.20(1.38–3.50)	<.01	0.85(0.41–1.79)	.67
Mean hostility score at T1	0.54(0.31–0.95)	.03	0.55(0.26–1.16)	.13
Change of mean hostility score from T1 to T3	0.51(0.35–0.75)	<.001	0.45(0.28–0.73)	<.01
Mean depressive symptoms score at T1	0.80(0.53–1.22)	.30	0.93(0.51–1.67)	.83
Change of mean depressive symptoms score from T1 to T3	0.88(0.67–1.15)	.34	0.95(0.65–1.39)	.88
Mean perceived stress score at T1	0.65(0.48–0.88)	<.01	0.90(0.58–1.37)	.66
Change of mean perceived stress score from T1 to T3	0.73(0.56–0.94)	.01	0.81(0.57–1.16)	.29

Note. Each predictor was analyzed separately. In each multivariate model, both baseline and 2-year change scores for each predictor with adjustment of city residence, age, education, income, parental smoking during childhood, baseline general health status, and age of initiation of daily smoking. T1 = Year 1; T2 = Year 2; T3 = Year 3; FTQ = Fagerström Tolerance Questionnaire.

Results comparing the odds of abstaining versus relapsing revealed that lower nicotine dependence (FTQ, $OR = 0.52$) and decreases in nicotine dependence over time ($OR = 0.50$) significantly predicted greater odds of abstaining rather than relapsing over the follow-up study period. In addition, larger decreases in hostility from baseline to Wave 3 ($OR = 0.45$) significantly predicted greater odds of abstaining than relapsing. None of the other variables significantly predicted remaining abstinent versus relapsing.

Discussion

The very high prevalence of smoking by Chinese adult males suggests that this population should be a high priority for cessation interventions. An early step in achieving this aim involves identifying factors associated with quitting and relapsing in order to inform the development of effective interventions for this population. Our findings based on a cohort of 1,463 Chinese adult male daily smokers showed that being less nicotine dependent at Wave 1, as well as becoming less dependent from Waves 1 to 3, yielded greater odds of being abstinent by Wave 3. Similarly, smokers who progressed beyond the contemplation stage of quitting between Waves 1 and 3 had significantly greater odds of being abstinent by Wave 3. Less dependence, and becoming less dependent from Wave 1 to Wave 3, also lowered the odds of relapsing among those who quit. Beyond nicotine dependence measures, we were interested in how psychosocial factors prospectively affected quitting and remaining abstinent. Perceiving less stress, whether initially at Wave 1 or over time from Wave 1 to Wave 3, significantly increased the odds of quitting. Further, those with lower hostility scores at Wave 1 and those who showed decreases in hostility from Wave 1 to Wave 3 had significantly greater odds of quitting. Those who showed decreases in hostility from Wave 1 to Wave 3 also had significantly greater odds of remaining abstinent than relapsing by Wave 3. We found no significant associations between quitting and depressive symptoms, which might be explained by the significant increase in depression scores over the 3 years of the study. The attrition analysis found no significant difference in baseline depression between participants who were retained and lost to follow-up and we have no plausible

alternative explanation for why the expected relationship did not occur.

Large-scale cessation programs for Chinese males who smoke daily would benefit by taking steps to reduce nicotine dependence. In Australia, Europe, and the United States, several population-based strategies have been found to be effective in reducing the number of cigarettes smokers consume per day. This includes clean indoor air laws (Dinno & Glantz, 2009; Eriksen & Cerak, 2008), media campaigns (Bala, Strzeszynski, & Cahill, 2008; Messer et al., 2007; Vallone, Duke, Cullen, McCausland, & Allen, 2011), and increased taxation (Dinno & Glantz, 2009). These strategies have also been associated with smokers being categorized in the later stages of the quitting continuum (DiClemente et al., 1991; Dinno & Glantz, 2009; Messer, et al., 2007; Pierce, Farkas, & Gilpin, 1998; Vallone, et al., 2011). As a decrease in smoking consumption can indicate a decrease in dependence, such strategies may be effective in increasing cessation in China.

Smaller scale or tailored smoking cessation programs for Chinese males should aim to train those with elevated levels of hostility and perceived stress to reduce or better cope with these negative feelings. These strategies have been shown to increase the likelihood that smokers will quit and remain abstinent once they do (al'Absi, Carr, & Bongard, 2007; Tsourtos et al., 2011) and may be applicable to Chinese adult male smokers. Despite extensive studies in western countries, we still lack evidence for any specific behavioral intervention to prevent relapse among smokers who have quit (Hajek, Stead, West, Jarvis, & Lancaster, 2009). Depressive mood has been hypothesized to increase the risk of relapse. To test this hypothesis, a study compared telephone cessation counseling with and without a treatment component for depression and found that treatment condition did not affect relapse, either alone or interacting with subjects' history of depression (Mermelstein, Hedeker, & Wong, 2003). A Cochrane review of the evidence regarding the use of varenicline and bupropion showed that standard and lower doses of varenicline increased the chances of successful long-term smoking cessation between two- and threefold compared with no drug, but there was only limited evidence for its role in relapse prevention (Cahill, Stead, & Lancaster, 2011).

It should be noted that although both population-based and individualized models of effective tobacco control exist in other countries, they may not translate readily to China without being adapted for Chinese tobacco use and culture. Thus, future research and practice should consider that smoking in China: (a) is largely a male phenomenon (although this may be changing); (b) is one of the highest rates in the world; (c) trends toward increasing smoking dosage over recent years; (d) older age of onset than in many countries but decreasing; (e) unenforced and geographically variable laws on smoking age; (f) little or no enforced regulations on smoking in public places and worksites; (g) anticipated negative reaction to increased taxes on cigarettes; and (h) no visible antismoking campaigns and practically no smoking control infrastructure at this time. In other words, there is a strong norm for smoking in China, which why smoking initiation, failure to quit, and relapse rates are high (Rich & Xiao, 2012).

China is a party to the WHO Framework Convention on Tobacco Control, ratifying the Convention in 2005 and putting it into effect the following year. We can say that based on the North American and European experience one would expect widespread implementation of the Treaty in China to promote higher rates of cessation and cessation maintenance. However, implementation of the controls called for in the treaty has been problematic and not executed to any great extent (Yu, 2011). One positive sign is the inclusion of tobacco control measures such as smoke-free public places for the first time in China's 12th five-year Plan (C. Zhu, Young-soo, & Beaglehole, 2012).

We limited our analytic sample to Chinese men who were daily smokers at Wave 1 and thus did not capture other categories of smokers (e.g., nondaily or social smokers). We also did not consider the number of cigarettes consumed per day. Nonetheless, by focusing our analyses on daily smokers we targeted those at greatest risk for tobacco-related disease. Future research could examine nondaily or social smokers in order to fill this gap.

Smoking status was ascertained by self-report and not validated with biochemical tests. Although western studies have shown that misclassification of smoking status by using self-report only is very uncommon, limited research on this topic exists for Chinese populations (Caraballo et al., 1998).

Cronbach's alpha of .45 for the nicotine dependence measure in 2004 was low, suggesting low consistency/reliability of this measure; however, Cronbach's alpha was .66 and .67 in years 2002 and 2003. Furthermore, Cronbach's alpha scores were acceptably high for the other measures (i.e., depression, hostility, perceived stress) at all waves.

Conclusions

The high rate of smoking among males in China is a significant challenge that can be overcome by implementing effective policies and programs to prevent smoking onset, reduce relapse, and increase successful cessation. Males in other Western Pacific (e.g., Indonesia, Thailand) and Southeast Asian countries (e.g., Laos, Malaysia) also have very high rates of smoking. The variables that influenced quitting and maintaining abstinence in the present study may also be important in neighboring countries that are heavily influenced by and have economic and

cultural similarities to China. Other variables may be important, however, in nations with cultural or economic differences, such as those that are not experiencing as dramatic economic growth as China. Many approaches to smoking cessation have been found to be effective in Western countries, ranging from population-based interventions to pharmacologic treatments. Adapting such strategies to China, the world's leading consumer and producer of tobacco products, can lead to significant reductions in tobacco-related disease in the world's most populous country.

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Declaration of Interests

We declare that we have no conflicts of interest.

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