Original Investigation

Employment and social “determinants” of smoking in urbanizing China: A representative survey

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Abstract

Introduction: This study explored social determinants of smoking among a sample of male Chinese adults in Changqiao, a community representing the transition from traditional to a “mobile” urban culture in China. New commercial systems have introduced high profits but also layoffs in the absence of government security systems.

Methods: In-person interviews were conducted by trained interviewers with 123 male participants selected at random. Bivariate and multivariate analyses were computed based on the Behavioral Ecological Model (BEM). About 61% of male participants were ever-smokers and 48% were current smokers.

Results: Current smoking was associated with involuntary unemployment (odds ratio [OR] = 6.52), the absence of home smoking restrictions (OR = 0.34), and social reinforcement such as friends’ smoking (OR = 4.02) and receiving smoking-related gifts (OR = 6.39).

Discussion: Findings support the BEM. It is especially important to verify the relationship between unemployment and smoking, given the recent rise in involuntary job loss due to the transitional economy in China.

Introduction

As the most populous country and growing economic power, China plays a substantial role in global health (Han, Chen,

Evans, & Horton, 2008). Several studies have proven that tobacco smoking is an important threat to public health in China (Gu et al., 2009; Liu et al., 1998; Niu et al., 1998). In 2002, the national prevalence of smoking was 66% for males and 3% for females (G. Yang, Ma, Liu, & Zhou, 2005). Few cessation programs are available in China (de Vries, 2007). Most smoking correlates identified in China have been demographic (Pan, 2004) and cannot be modified for tobacco control. Thus, behavioral epidemiology is needed to inform tobacco control in China.

Recent studies have called for an ecological approach to tobacco control (Unger et al., 2003). In China, many smokers are “social smokers,” and their smoking behavior is influenced heavily by socioenvironmental factors (Pan, 2004; Pan & Hu, 2008). Social contingencies (specific situations in which reinforcement for behavior occurs) of smoking in China are dynamic due to the economic and social transitions China has experienced in the past few decades. With the evolution from a government planned to a marketplace economy, involuntary job loss (*xia gang*) has increased (Duckett & Hussain, 2008). National statistics have shown that between 1995 and 2002, 45 million Chinese were laid off (Giles, Park, & Zhang, 2005). Meanwhile, western practices such as cigarette smoking have increased with marketing and may be supported by social norms of collectivism (Bian, 1994). These changing conditions could be synergistic for smoking behavior in China.

The Behavioral Ecological Model (BEM) is an extension of respondent and operant principles of behavior with an emphasis on contingencies of reinforcement from proximal environmental sources, such as families, to distal environmental sources,

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such as international policies (Hovell, Wahlgren, & Adams, in press; Hovell, Wahlgren, & Gehrman, 2002). The BEM emphasizes cultural and social factors as important “determinants” of behavior. The present study used the BEM to determine probable correlates (determinants) of smoking in a representative sample of Chinese adults. The BEM has been applied in correlation and intervention studies in different countries (Hovell et al., in press). Studies involved acculturation (Hofstetter et al., 2004; Landrine & Klonoff, 2004), secondhand smoke exposure (Hughes, Corcos, Hofstetter, Hovell, & Irvin, 2007; Hughes et al., 2008), home smoking bans (Hughes et al., 2009; Martinez-Donate et al., 2008), substance use (Bousman et al., 2005), dietary behaviors (Song et al., 2004) and physical activity (Adams et al., 2006).

The present study is the first application of the BEM in China and the first to explore the role of unemployment. Consistent with the BEM and Chinese cultural values, we hypothesized that smoking would be more likely to occur among individuals receiving gifts related to smoking (implied antecedent and reinforcer), among those with friends who smoke (models of behavior), among those reporting the absence of reprimands for males smoking (social reinforcement), and among those reporting the absence of smoking restrictions in the home (behavioral rules and social reinforcement). We also hypothesized that stress due to job loss would increase smoking in this subgroup.

Methods

Study setting and sampling

Changqiao (population: 103,000) is located on the outskirts of urban Shanghai. Cross-sectional data were obtained through face-to-face interviews by researchers at Fudan University, using probability sampling techniques (Zheng et al., 2008). The Changqiao Residents' Committee (Mok, 1988) facilitated the recruitment process by contacting randomly selected residents and promoting voluntary participation with a small monetary incentive, resulting in few refusals. From April to June 2006, 243 participants from the Changqiao District completed interviews. After excluding women due to low rates of smoking (e.g., zero), 123 males were included in the analysis. The San Diego State University Institutional Review Board approved the study protocol.

Measures

Individuals who smoked at least 100 cigarettes in their lifetime and currently smoked some days or every day were classified as current smokers (U.S. Department of Health and Human Services [USDHHS], 1996). Demographic variables included age, marital status, employment status, educational level, and family income. Participants reported their endorsement of the harm of smoking, and smoking restrictions in the household. They also reported the number of residents in the household and each resident's age, gender, relationship to the participant, smoking status, cessation history, tolerance of others' smoking, and attitude toward smoking bans in public places.

Three items were used to measure the influence of social contingencies on smoking. Gift receiving was measured by the response to the question, “Have you ever received gifts that are related to smoking, such as cigarettes, lighters, and ashtrays?”

The proportion of friends who smoke was used as a marker for role models for smoking and probable encouragement to smoke. We used the question, “How many of your friends smoke?” (responses coded as *most* and *some/few* due to skewness). Finally, we expected reprimands to reduce smoking level. For this measure, we used the question, “How likely will a male be reprimanded for smoking in the following places in the community?” Nine places were included: homes, workplaces, restaurants, bars and clubs, schools, public transportation, hospitals, shopping malls, and government buildings. Answers were coded on a scale from 1 to 3 (representing *likely*, *sometimes*, and *never*, respectively). A scale was formed by averaging scores for the nine items, with up to three missing ($M = 1.804$, $SD = 0.476$, Cronbach's $\alpha = .85$).

Data analyses

Data were analyzed using SPSS version 14.0. The bivariate associations between current smoking status and each theoretical correlate were estimated using chi-square tests. Variables yielding p values of less than .20 were included in sequential logistic regression analyses. To assess predictors of different proximities based on the BEM, variables were entered by blocks: sociodemographic variables, home smoking restrictions, and social contingencies. We tested the following interactions one at a time: age and friends' smoking, age and home smoking restrictions, age and reprimands, home smoking restrictions and friends' smoking, and home smoking restrictions and receiving gifts.

Results

Demographic characteristics of the overall study sample ($n = 243$), including age, gender ratio, educational level, and marital status, resembled those of another study in the same community (Zheng et al., 2008).

Among the male participants, 61% were ever-smokers, including 48% current smokers and 13% former smokers. On average, current smokers consumed 15 cigarettes/day. Half of the current smokers (51%) had tried quitting but failed, with an average of four attempts over the lifetime. Half of the participants had no home smoking restrictions. In contrast, more than 95% reported endorsement of the negative health consequences of smoking.

Table 1 shows bivariate associations between current smoking and each independent variable. With the exception of marital status ($p > .20$), most factors were related to current smoking. Table 2 presents sequential multiple logistic regression models. In the final model, the odds of smoking were significantly higher among the involuntarily unemployed males, males whose friends were mostly smokers, and males who had received smoking-related gifts. The odds of smoking were marginally higher among males who had no home smoking restrictions. Age was significant in Models 1 and 2 but not in Model 3, suggesting that more proximal social factors related to age may be the mechanisms by which age is often predictive. Reprimands were not significant in any model. No first-order interactions reached significance. This final model had an adequate goodness of fit ($\chi^2 = 5.74$, $df = 8$, $p = .677$; Hosmer & Lemeshow, 1980).

Table 1. Bivariate associations between selected characteristics and current smoking status of male participants in Changqiao, Shanghai, China, 2006 (N = 123)

Characteristic	Number of subjects ^a	Current smoking (%)	Crude odds ratio	<i>p</i> value ^b
Age (years)				<.001
20–39	25	40.0	1.00	
40–59	64	68.8	3.30	
60–79	34	14.7	0.26	
Marital status				.525
Single/divorced/widowed	32	46.9	1.00	
Married	91	48.4	1.06	
Educational level				.025
Middle school or lower	31	48.6	2.24	
High school or equivalent	53	55.7	4.25	
Higher education	27	29.6	1.00	
Employment status				<.001
Currently employed	57	57.9	0.17	
Retired	43	18.6	1.00	
Involuntarily unemployed	21	81.0	3.09	
Family income (Chinese yuan/month)				.123
0–1,499	36	61.1	1.68	
1,500–2,999	56	39.3	0.69	
≥3,000	31	48.4	1.00	
Friends' smoking status				<.001
Most friends smoke	50	86.0	8.40	
Some/few friends smoke	71	42.3	1.00	
Received smoking-related gifts ^c				<.001
None	74	44.6	1.00	
Some	49	85.7	7.45	
Home smoking restrictions				.007
No	64	59.4	1.00	
Yes	59	35.6	0.38	
Spouse has low tolerance for smoking				.096
No	75	53.3	1.74	
Yes	48	39.6	1.00	
Spouse supports public smoking bans				.046
No	56	57.1	1.98	
Yes	67	40.3	1.00	

Note. ^aSome variables do not total 123 due to missing values.

^bBased on chi-square test.

^cGifts refer to cigarettes, ashtrays, lighters, and anything else that is related to smoking.

Table 2. Sequential multiple logistic regression models of current smoking in Changqiao, Shanghai, China, in 2006 (N = 117)

Variable	β	Odds ratio	95% CI	<i>p</i> value
Model 1				
Age (years)				.013
20–39		1.00		
40–59	1.25	3.49	1.51–13.39	
60–79	–0.36	0.77	0.11–4.54	
Employment status				.028
Currently employed		1.00		
Retired	–1.24	0.29	0.07–1.21	
Involuntarily unemployed	1.26	3.54	0.90–14.00	
Nagelkerke $R^2 = .39, \chi^2 = 40.54, p < .001$				
Model 2				
Age (years)				.012
20–39		1.00		
40–59	1.29	3.63	1.21–10.89	
60–79	–0.44	0.64	0.09–4.40	
Employment status				0.34
Currently employed		1.00		
Retired	–1.17	0.30	0.07–1.34	
Involuntarily unemployed	1.29	3.64	0.91–14.67	
Home smoking restrictions				0.21
No		1.00		
Yes	–1.07	0.34	0.14–0.85	
Nagelkerke $R^2 = .43, \chi^2 = 46.08, p < .001$				
Model 3				
Age (years)				.107
20–39		1.00		.044
40–59	0.95	2.57	0.71–9.37	.016
60–79	–0.77	0.46	0.06–3.88	.001
Employment status				0.44
Current employed		1.00		
Retired	–0.41	0.66	0.13–3.45	
Involuntarily unemployed	1.88	6.52	1.34–31.70	
Friends' smoking				0.16
Some/few		1.00		
Most	1.39	4.02	1.30–12.41	
Receiving gifts				0.01
None		1.00		
Some	1.86	6.39	2.15–19.01	
Possibility of reprimand ^a	–0.66	0.52	0.17–1.63	.320
Home smoking restrictions				.057
No		1.00		
Yes	–1.08	0.34	0.11–1.03	
Nagelkerke $R^2 = .59, \chi^2 = 67.80, p < .001$				

Note. ^aPerceived possibility of reprimand is a scale of how likely a male will be reprimanded for smoking in this community; it was analyzed as a continuous variable.

Discussion

Findings from Changqiao have special implications for China. As an urbanizing community, Changqiao is under the influences of both traditional Chinese and modern western culture (Zheng et al., 2008), representing many areas in China that are in transition to urbanization and westernization.

In Changqiao, males were more likely to smoke if most of their friends were smokers. More than 50% reported that they usually smoked in gatherings of friends or smoked to start conversations

in social settings (data not shown). Fewer than 10% of the men lived with another smoker, suggesting that the main pro-smoking influence came from outside the home. Policies such as bans in public settings should be implemented to limit smoking, as well as to protect nonsmokers from toxic exposure. Based on the BEM, rules and policies deliver immediate negative consequences for smoking and could reduce smoking behavior.

According to the BEM, a smoking-related gift may serve as a tangible reinforcer or a marker for social contingencies for smoking. However, gift receiving has never been studied as a predictor of smoking in China. Our findings suggested that males who received smoking-related gifts were more likely to be current smokers. In China, cigarettes and related items are frequently offered as impressive gifts and “connection builders,” regardless of the recipient’s smoking status (Pan, 2004), especially in the business subculture (Cheng, 1999). Marketing campaigns that discourage the use of tobacco-related products as gifts might reduce the prevalence of such gift giving and move the culture closer to one that curtails tobacco use.

The present study found that the absence of home smoking restrictions was related to smoking. This finding is consistent with previous research in the United States (Farkas, Gilpin, Distefan, & Pierce, 1999; Gilpin, White, Farkas, & Pierce, 1999). Logistic regression findings (data not shown) suggested that home smoking restrictions were associated with having fewer friends who smoke, the spouse’s low tolerance of secondhand smoke, and support for public smoking bans. In traditional Chinese culture, the family is highly valued (T. Yang, Fisher, Li, & Danaher, 2006). Targeting married women in China to reduce their husbands’ smoking by encouraging them to adopt home smoking restrictions offers promise for tobacco control. Such restrictions would reduce risks to family members otherwise exposed to passive smoke.

The present study found a high smoking prevalence among involuntarily unemployed males. This finding is consistent with findings in the United States (Falba, Teng, Sindelar, & Gallo, 2005) but has not been reported in China. With modernization of the Chinese economy, employment practices are in transition (Duckett & Hussain, 2008; Tsui, 2002). The unemployed population no longer receives government-provided income, social, or health benefits (Gao, 2008). These changes might lead to decreased quality of life and poorer health. The Chinese Urban Labor Survey estimated an unemployment rate of 14% among urban permanent residents (Giles et al., 2005). Unfortunately, few health-related studies have investigated unemployment in this new economy. We suggest that more studies of newly unemployed males in China be conducted, especially regarding depression, anxiety, and other reactions to job loss as mediators of smoking.

Several studies have shown that middle-aged Chinese males smoke more than others (Xu et al., 2007; Zheng et al., 2008); the present study found the same. However, after adjusting for other variables in Model 3, we found that the association between age and smoking was no longer significant. In this analysis, males aged 40–59 years were more likely to have a large proportion of friends who smoke (data not shown), implying the existence of a “middle-aged smoking culture” through which social contingencies might account for more smoking. In the present study, males aged 40–59 years also were more likely to have been

laid off (data not shown), a finding consistent with national employment statistics (Giles et al., 2005).

Despite the high prevalence of smoking, the majority of participants endorsed the health hazards of smoking and nonsmokers’ rights to be free of exposure. Similar findings were documented by Gong et al. (1995) in the Minhang District, Shanghai. A possible explanation for this finding, based on the BEM, is that negative health consequences of smoking are delayed in time, compared with more immediate physiological and social reinforcement, which influence smoking directly.

Several demographic and individual variables have been associated with smoking in China (Chen et al., 2004; Pan, 2004; Xu et al., 2007). The present study adds to the literature by demonstrating relationships between smoking and relevant social factors, some of which may be mechanisms by which demographic factors predict smoking. Results suggest replication using a longitudinal research design among a larger sample including both males and females. To tackle the smoking epidemic in China, future interventions should target different levels of the social environment in China, such as families, friends, business, cultural norms, and policies.

Finally, the low smoking rates among women in China demonstrate that cultural factors can promote smoking and at the same time suppress smoking when applied differentially to subgroups of the population. This is a critical observation that justifies more research from which better understanding of culture and cultural processes can be forthcoming. Ultimately, such new knowledge may contribute to technologies that can alter cultures to increase the likelihood of health-promoting practices and reduce the likelihood of risk practices.

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Declaration of Interests

None declared.

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