Tobacco Advertising, Anti-Tobacco Information Exposure, Environmental Smoking Restrictions, and Unassisted Smoking Cessation Among Chinese Male Smokers: A Population-Based Study

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Abstract

The study examined the prevalence of unassisted smoking cessation among Chinese urban male smokers and factors important in the decision to quit. A cross-sectional survey employing multistage sampling involving 5,782 participants in six cities in China was conducted. Survey respondents reported their smoking cessation status and related individual and environmental variables. Among current smokers 1,112 or 35.0% (95% CI [31.0%, 40.8%]) had attempted to quit and of those who had made such an attempt 87.6% reported that they had done so without assistance. Of all former smokers (3,389), most (97.6%; 95% CI [96.7%, 98.5%]) quit without assistance. Logistic regression analysis showed those who engaged in physical exercise and who had more belief in their ability to quit were more than twice as likely to make a quit attempt and be successful than those in comparable reference groups. Exposure to tobacco advertising was negatively associated with both unassisted quit attempts and success. By contrast, exposure to anti-tobacco information was positively associated with unassisted quit attempts while household and workplace smoking restrictions were negatively associated with unassisted attempts to quit. Most attempts to quit smoking among Chinese males are unassisted. Unassisted attempts to quit smoking and success rates are highly influenced by the presence of environmental smoking restrictions, tobacco advertising, and exposure to anti-tobacco information. Smoking cessation programs and policies in China need to pay greater attention to the social and cultural norms, which perpetuate high levels of smoking.

Keywords

unassisted quitting, Chinese cultural norms, male smokers, environmental smoking restrictions, tobacco advertising, anti-tobacco information

Globally tobacco use is one of the leading causes of premature mortality (World Health Organization, 2008). China leads the world in tobacco consumption and smoking-related deaths, reflecting the fact that it produces and consumes more than 30% of the world's total cigarettes (Chinese Center for Disease Control and Prevention, 2011). While the health benefits of smoking cessation are well known, the current social climate is still conducive to smoking in China. This makes it difficult for those wishing to quit.

In Western countries many smokers receive formal help in their attempts to quit, from established quitlines and health professionals. For example, in Christchurch, New Zealand, approximately one fifth of smokers are enrolled in a local primary care quit program and the use of centrally (Ministry of Health) funded quitlines remains substantial (Barnett, Moon, Pearce, Thompson, & Twigg, 2017; Hiscock, Pearce, Barnett, Moon, & Daley, 2009). Most studies report that the majority of those who have made attempts to quit smoking have

done so without formal help, that is, without professional or pharmacologically mediated assistance (Cokkinides, Ward, Jemal, & Thun, 2005; Curry, Sporer, Pugach, Campbell, & Emery, 2007; Shiffman, Brockwell, Pillitteri, & Gitchell, 2008; Smith, Chapman, & Dunlop, 2015; Williams, Beebe, & Neas, 2015; Zhu, Melcer, Sun, Rosbrook, & Pierce, 2000). For example, in the United States, Smith et al. (2015) identified that unassisted quit attempts were higher than assisted quit attempts in every state and this was also true for quit success. Despite such studies, there is little understanding of unassisted attempts to quit smoking and the factors influencing this process.

This is true in China, where most (95%) smokers quit without assistance (Chinese Center for Disease Control and Prevention, 2011; Jiang, Elton-Marshall, Fong, & Li, 2010). By contrast, the number of smokers who visit smoking cessation clinics or use central and local government help hotlines is small (Yang & Yang, 2012). For example, in Hangzhou in 2009 while there were 19 smoking quit clinics, these had few visitors with some clinics recording only one visit per month (Yang & Yang, 2012). Similarly in Beijing while 22 clinics were initially established in 1996, only 3 were retained due to few visitors (Yang & Yang, 2012). In other places, such as Hefei city, where a quitting help hotline was established in 2015, the result was much the same (Qiu, Zhu, Gao, & Ye, 2017). The hotlines of Jiangxi province, established earlier on the World Smokefree Day in 2009, recorded only nine people making contact over a 6-month period (Wang, 2015).

This evidence suggests that unassisted methods contributed to successful quitting on the part of 70 million smokers in China, thus producing very significant health benefits (Chinese Center for Disease Control and Prevention, 2011). By improving the knowledge of unassisted smoking cessation, it may be possible not only to increase the success rate for smokers who decide to make an unassisted quit attempt but also to develop more effective interventions for those who are unable to quit. Ultimately, this may better explain why targeted quitlines are so unsuccessful in China compared to Western countries, where success rates are higher (Hiscock et al., 2009).

Although the potential public health benefits of investigating how the majority of smokers quit are significant, research in the area of unassisted smoking cessation is limited (Curry et al., 2007; Shiffman et al., 2008; Zhu et al., 2000). With this in mind, this study has three key objectives:

1. To compare levels of unassisted quit behavior in China to those in international research
2. To study the effect of personal and environmental factors on unassisted quit rates
3. To evaluate some of the reasons why Chinese smokers seldom use formal systems of help in their quit attempts

With respect to the preceding objectives, the following observations are important. First and foremost, it is important to determine how unassisted quit attempts and/or successful quitting prevalence differs between different demographic groups. Additionally, it is also necessary to examine whether unassisted quit attempts and/or success relate to individual psychological characteristics. Since unassisted quitting is more manifest as a learned behavior, indicating personal will and motivation, there is a need to take self-control belief into account (Cottrell, Girvan, & Mckenzie, 2006). Some studies have revealed that smokers had less belief in the importance of self-control than nonsmokers (Badr & Moody, 2015; Eiser, Eiser, Gammage, & Morgan, 1989), but did not relate the presence of self-control to patterns of quitting. It should be mentioned that self-control is significant in people's behavioral choice in the Chinese cultural context (Yang, 2018).

It is important to note that environmental factors can also influence peoples' behavior and motivation to quit (Barnett et al., 2017). Thus it is likely that by modifying environmental cues, the tobacco control environment will influence smokers' unassisted choices by making it easier to quit. Few studies have examined environmental factors relating to unassisted quitting (Chapman & MacKenzie, 2010). For example, in the United States Williams et al. (2015) observed that state-level factors associated with unassisted quit attempt rates included state anti-smoking sentiment and tobacco taxes. However, no significant relationships were uncovered between unassisted quit success rates and state-level factors.

Given the absence of published studies, there is a need to investigate the role of tobacco advertising and exposure

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to anti-tobacco information in unassisted quitting. The information–motivation–behavioral skills theory argues that the relative strength of each of these factors will influence the desire to continue smoking or the motivation to quit (Cottrell et al., 2006; Yang, 2018). This article hypothesizes that unassisted quitting will be less likely in places with strong tobacco advertising, while anti-tobacco information exposure will lead to higher rates of unassisted quitting. Compared to unassisted quitting, assisted quitting is more manifest as a coping behavior, in response to some external environmental pressure (Yang, 2010; Yang et al., 2009). Where strong restrictions on smoking exist, such as in certain types of households and workplaces, the stress created by such factors may result in smokers being more likely to seek formal help to quit. Thus in such situations, it can be suggested that home and workplace restrictions will lead to lower rates of unassisted quitting.

Finally, it is important to know how smokers perceive the process of quitting and the extent to which they can do it alone without formal help. This may underly Gross et al.'s (2008) finding that in Germany most smokers (55.2%) believed they could quit on their own and 40.1% felt that help was not necessary. Of course, this limited definition of unassisted quitting does not take into account the fact that smokers are part of social networks and the smoking norms in these networks either encourage people to continue smoking or attempt to give up (Christakis & Fowler, 2008). Such networks are far more likely to impact smokers' choices than using pharmacological cessation aids or seeking assistance from smoking quitlines.

Methods

Study Area and Participants

This was an observational cross-sectional, multilevel study with a multistaged cluster sampling design. Six cities were selected from across China and differentiated by regional location: Northeast (Jilin), North Central (Taiyuan), Northwest (Xianyang), Southeast (Chongqing), Southwest (Hangzhou), and South Central (Guangzhou). Within each city two residential districts were randomly selected from the main urban zones and four communities were randomly selected within each district. Within each community the family household registration ("hukou") list was used to randomly sample households. The sample was limited to males aged 15 years and over who had lived in these cities for at least 1 year (Yang, Peng, Barnett, & Zhang, 2018). Finally, one respondent, whose birth date was closest to the date of contact, was selected from each household to be surveyed if there were two or more male residents (Yang et al., 2018). The sample size was determined based upon the need to obtain accurate prevalence estimates for smoking and unassisted cessation was calculated by $Var(p) = D \times \dfrac{p(1-p)}{N}$, where D is the "design effect," which results from the sampling technique (Yang, 2018). It should be mentioned that the sample estimates are mainly for unassisted quit attempts. Given a very low prevalence of unassisted quit success rates, a much larger sample would have been needed but this was impossible given the financial resources available for this study.

Data Collection

A self-administered questionnaire was scheduled, once an individual was identified and he agreed to participate in the survey. Field staff were fourth-year and graduate students from a local medical college who had received a 1-day training on study protocol and interviewing procedures (Yang et al., 2018). Each person was responsible for completing 10 questionnaire surveys and these were evaluated by the principal investigator of the study. The same survey protocol was used across the six cities to assure homogeneity of interview and data collection. The study was approved by the ethics committee of Zhejiang University (2014: 1-017). Verbal consent was obtained from all respondents, following verbal instruction from an investigator. Each participant had an opportunity to seek information or clarification about the survey items and was given adequate time for questionnaire completion. Participants were requested to resolve any omissions after investigators checked and returned questionnaires for completeness. As appropriate, a token of appreciation (small gifts, such as soap and toothbrush, valued at about 10 RMB) was given following questionnaire completion.

Variable Definition and Measurement

Dependent Variables

Smoking status, including frequency and quantity of smoking and smoking history, was assessed through a self-report. Those who smoked regularly each day were defined as daily smokers; otherwise, they were categorized as occasional smokers.

Quit attempts refer to attempts to quit smoking on at least three occasions and where each attempt lasted longer than 3 days. *Unassisted cessation attempts* refer to quit attempts made by smokers without any assistance (in the form of reported use of drugs and behavioral assistance) and successful quitting by former smokers without any assistance (Williams et al., 2015; Zhu et al., 2000). Smokers were asked, "Did you ever get any help to quit smoking from health professional workers, including quit clinics, hotlines, and others?" Smokers who answered

"No" were defined as those who made an unassisted quit attempt. Similarly, the same criteria applied to quit success, which referred to reports by smokers that they had stopped smoking at the time of the interview.

Independent Variables

Independent variables relating to individual characteristics such as smoking intensity, self-control belief in quitting, and environmental factors likely to influence the decision to quit were included in the multivariate analysis. All respondents provided sociodemographic information on age, ethnicity, marital status, education, occupation, and per capita household income. The level of cigarette consumption (which differentiated between heavy [≥10 cigarettes per day] and light [<10 cigarettes per day]) smokers was also included as a background factor as this is related to difficulties of quitting. Given the importance of self-control belief in quitting, a questionnaire was developed, which included six items (relating to the importance of health status, personal privacy, personal initiative, the need for steadfastness and willpower, not to be at the "mercy of nature," and degree of environmental support. Items are rated on a 5-point Likert-type response and range from *highly disagree* to *highly agree*. A total self-control score was obtained by summing the scores for scores on the five items; the higher the total score, the greater the perceived level of self-control. Consistent with prior practice, a cutoff of 18 or more in the total score was classified as a higher score and signified higher self-control levels (Yang, 2018). This study also shows acceptable reliability, Cronbach's coefficient α being 0.73. Given that physical exercise is commonly thought to strengthen people's willpower and endurance and encourage quitting, respondents were asked whether they engaged (yes/no) in physical exercise for at least 30 min a day.

Three environmental variables relating to environmental smoking restrictions, tobacco advertising, and anti-tobacco information exposure were also included. Smoking restrictions in households and workplaces were defined as in terms of three levels: *none, partial*, or *complete*. For retired or unemployed respondents, "workplace" referred to the place where they went for temporary work, leisure, or community activities. For students, the workplace covered classrooms and libraries and the household environment also included dormitories (Yang, Jiang, Barnett, Peng, & Yu, 2015). Exposure to tobacco advertising was measured by whether respondents had seen any tobacco advertising in the past 6 months. Response categories included *never, seldom, sometimes, often*, and *always*. Anti-tobacco information exposure was measured by whether respondents had seen any anti-tobacco information in the past 6 months, with the responses being the same as for the tobacco-advertising measure (Yang et al., 2015).

In addition to the multivariate analysis, we also explored reasons why smokers did not seek formal systems of assistance to quit. To help answer this, the following question was asked, "Why do you did not want go to a smoking cessation clinic or use a quitting hotline?" Respondents were provided with 10 possible choices (Yang, 2010): (a) "I didn't think of going to the physician for quitting smoking at all" (*automatic behavior*). (b) "Smoking cessation is a thing that you can solve, it is not necessary to look for other help" (*self-reliance*). (c) "It feels embarrassing to seek assistance to quit" (*embarrassment*). (d) "I do not believe that it is effective" (*no confidence in the assistance*). (e) "It takes too much time" (*time cost*). (f) "It needs too much money" (*economic cost*). (g) "It is inconvenient" (*convenience*). (h) "It is too complicated and too troublesome" (*complexity*). (i) "Support attitude of family members is more important" (*family members attitudes)*. (j) "Support attitude of friends is more important" (*friends' attitudes*).

Data Analysis

All data were entered into a database using Microsoft Excel. The dataset was then imported into SAS (9.3 version) for the statistical analyses. Analyses were implemented by quit attempts and success status. Descriptive statistics were calculated for quit attempts and success prevalence. Both unadjusted and adjusted methods were considered in analyses. The unadjusted method used only the key factors of interest as independent variables in the analyses, while the adjusted method considered the influence of potentially confounding sociodemographic characteristics as covariates in the multivariable logistic models. Six models were developed in order to explore associations between individual and environmental factors and unassisted smoking cessation. The first two models include individual-level factors; Model 1 examines just sociodemographics, while Model 2 added physical exercise and self-belief. The final four models added environmental factors: Model 3 (workplace restrictions), Model 4 (household restrictions), Model 5 (tobacco advertising exposure), and Model 6 (anti-tobacco information exposure). The SAS 9.3 was applied to run complex survey data analysis procedure in computation, using community as the clustering unit in order to account for a within-clustering correlation.

All analyses were weighted (Grilli & Pratesi, 2004). Weights included (a) sampling weights, as the inverse of the probability of selection, calculated at city and district-level, and were then multiplied together. (b) Nonresponse weights consisted of household and individual aspects. (c) Poststratification weights were calculated using age (less than 25 years, 25–34 years, 35–44 years, 45–54 years, and 55 years and over), based on

Table 1. Characteristics of Sample and Subsample.

Group	N	% of sample	Unassisted quit attempt		Unassisted quit success	
			n	% of sample	n	% of sample
Age (years)						
<25	155	9.8	125	13.0	30	4.9
25–34	315	16.8	237	21.7	78	9.4
35–44	427	19.4	307	21.9	120	9.4
45–54	406	23.3	279	24.9	127	20.9
55+	344	307	164	18.5	180	49.4
Ethnicity						
Han	1566	95.7	1057	94.9	509	96.5
Minority	81	4.4	55	5.0	26	3.5
Education						
Elementary school or less	158	17.7	87	13.0	71	23.2
Junior high	434	29.9	284	27.1	150	34.1
High school	481	23.5	351	28.0	130	16.6
Junior college or college	574	29.6	390	31.9	184	26.1
Marital status						
Unmarried	298	18.1	235	23.3	63	10.1
Married	1248	75.6	811	70.6	437	83.1
Divorced or widowed	71	6.2	66	6.1	35	6.8
Occupation						
Managers and service	529	27.1	376	30.5	153	22.0
Professionals	140	8.3	93	9.0	47	7.2
Operations	492	29.7	348	31.6	144	26.9
Retired	188	15.7	89	10.0	99	24.5
Other	298	19.9	206	18.9	92	19.4
Income/person/year (RMB)						
<20,000	489	30.1	300	26.0	189	36.5
20,000–39,999	504	31.6	344	32.2	160	30.6
40,000–19,999	654	38.2	468	41.8	186	32.9

estimated distributions of these characteristics from a national survey (National Bureau of Statistics, 2017). The final overall weights were computed as the product of the prior three sets of weights.

Results

A total of 6,500 individuals were identified as potential participants for this study, of whom 6,010 (93.9%) were contacted and they agreed to participate in the survey. Of the 6,010 questionnaires, 5,782 provided a valid record for the analysis of respondents' quit attempts and their sociodemographic characteristics (see Table 1). Of the 5,782 participants, 2,852 were smokers—a prevalence of 44.8% (95% CI [41.1%, 48.5%]). Among current smokers 1,112 or 35.0% (95% CI [31.0%, 40.8%]) had attempted to quit and 87.6% reported that they had done so without assistance. Of all former smokers (3,389), most (97.6%: 95% CI [96.7%, 98.5%]) had quit without assistance.

With respect to the characteristics associated with attempts to quit smoking, the unadjusted analysis showed those who were older and of Han ethnicity were more likely to have made an unassisted quit attempt (Table 2). Compared to people with lower levels of education (elementary school or less), those with higher levels of education (high school or junior college or college) were less likely to have attempted to quit. People who engaged in physical exercise and who had stronger self-control belief had a higher prevalence of quit attempts. Neither income nor smoking status was related to unassisted attempts to quit. By contrast, all three environmental factors were related to quit attempts. As expected, exposure to tobacco advertising reduced the chances of an unassisted quit attempt, while exposure to anti-tobacco information did the reverse. Consistent with expectations, household and workplace smoking restrictions were negatively associated with unassisted quit attempts (Table 2).

Background factors associated with quit success were similar, but the results were less consistent. Again age,

Table 2. Unassisted Quit Attempts Prevalence and Individual and Environmental Influences.

Group	N	Prevalence	Unadjusted OR [95% CI]	Model 1: adjusted OR [95% CI]	Model 2: adjusted OR [95% CI]	Model 3: adjusted OR [95% CI]	Model 3: adjusted OR [95% CI]	Model 5: adjusted OR [95% CI]	Model 6: Adjusted OR [95% CI]
Age (years)									
<25	125	81.9	1.00	1.00	1.00	1.00	1.00	1.00	1.00
25–34	237	85.6	1.31 [0.90, 1.92]	1.75 [1.24, 2.47][b]	1.63 [1.02, 3.05][a]	1.32 [0.87, 1.20]	1.32 [0.99, 1.76]	1.41 [0.96, 2.07]	1.61 [1.03, 2.50][a]
35–44	307	88.4	1.67 [0.54, 5.22][b]	1.03 [0.66, 1.60]	1.17 [0.69,2.88]	1.48 [0.52, 4.19]	1.51 [0.65, 3.55]	1.71 [0.55, 5.36]	1.82 [0.77, 4.30]
45–54	279	90.5	2.10 [1.39, 3.19][b]	3.65 [1.39, 9.58][b]	2.86 [1.3, 3.13][b]	1.70 [1.13,2.56][b]	1.86 [1.10, 3.13][b]	2.27 [1.59, 3.24][b]	2.09 [1.32, 3.58][b]
55+	164	89.5	1.87 [1.17, 3.01][b]	1.11 [0.87, 1.42]	1.24 [0.78, 2.09]	1.09 [0.60, 2.56]	1.32 [0.56, 3.09]	1.73 [1.06, 2.83]	1.69 [0.85, 3.39]
Ethnicity									
Han	1057	88.1	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Minority	55	79.2	0.51 [0.32, 0.78][b]	0.45 [0.17, 0.96][a]	0.51 [0.25, 0.81][b]	0.37 [0.14, 0.59][b]	0.50 [0.32, 0.79][b]	0.44 [0.33, 0.60][b]	0.44 [0.33, 0.63][b]
Education									
Elementary school or less	87	97.5	1.00			1.00			
Junior high	284	86.7	0.17 [0.03, 1.06]	0.50 [0.30, 0.81][b]		0.22 [0.04, 1.12]			
High school	351	84.0	0.13 [0.02, 0.79][b]	1.20 [0.47,3.09]		0.37 [0.04, 0.95][a]			
Junior college or college	390	87.7	0.18 [0.05, 0.68][b]	0.87 [0.43,1.75]		0.46 [0.19, 1.26]			
Marital status									
Unmarried	235	84.6	1.00						
Married	811	88.2	1.36 [1.05, 1.76][a]						
Divorced or widowed	66	93.7	2.69 [0.55, 13.8]						
Occupation									
Managers and service	376	89.5	1.00						
Professionals	93	84.8	0.65 [0.26, 1.67]						
Operations	348	88.8	0.93 [0.65, 1.33]						
Retired	89	91.2	1.25 [0.76, 1.99]						
Other	206	82.3	0.55 [0.28, 1.08]						
Smoking status									
Number of cigarettes smoked									
<10	353	89.7	1.00						
10 or more	759	86.8	0.77 [0.31, 1.82]						
Smoking frequency									

Table 2. (continued)

Group	N	Prevalence	Unadjusted OR [95% CI]	Model 1: adjusted OR [95% CI]	Model 2: adjusted OR [95% CI]	Model 3: adjusted OR [95% CI]	Model 3: adjusted OR [95% CI]	Model 5: adjusted OR [95% CI]	Model 6: Adjusted OR [95% CI]
Occasional smoker	818	88.1	1.00						
Daily smoker	294	86.3	0.85 [0.41, 1.79]						
Income/person/year (RMB)									
<20,000	300	88.4	1.00						
20,000–39,999	344	87.2	0.89 [0.75, 1.06]						
40,000–19,999	468	87.6	0.92 [0.58, 1.45]						
Physical exercise									
No	638	83.7	1.00		1.00	1.00	1.00	1.00	1.00
Yes	474	93.2	2.65 [1.09, 6.45]a		2.56 [1.07, 6.25]a	2.17 [1.12, 4.60]b	2.34 [1.03, 5.30]a	2.49 [1.10, 5.61]a	2.53 [1.09, 5.87]b
Self-control belief for quitting									
Low	237	77.7	1.00		1.00	1.00	1.00	1.00	1.00
High	875	90.2	2.66 [2.00, 3.56]b		2.62 [1.83, 3.77]b	1.52 [1.04, 2.22]a	2.58 [1.77, 3.74]b	2.51 [1.85, 3.41]b	2.58 [1.78, 5.87]b
Advertising exposure									
Never	388	92.2	1.00					1.00	
Seldom	366	90.0	0.79 [0.55, 1.12]					0.90 [0.66, 1.26]	
Sometimes	208	78.0	0.30 [0.25, 0.36]b					0.37 [0.35, 0.40]b	
Often/almost always	150	81.2	0.36 [0.27, 0.49]b					0.45 [0.35, 0.57]b	
Household smoking restrictions									
None	385	95.0	1.00				1.00		
Partial	420	84.5	0.82 [0.38, 1.82]				0.79 [0.34, 1.81]		
Complete	307	81.7	0.23 [0.08, 0.78]b				0.31 [0.12, 0.81]b		
Workplace smoking restrictions									
None	327	95.5	1.00			1.00			
Partial	419	87.5	0.58 [0.39, 0.86]b			0.65 [0.45, 0.96]a			
Complete	366	80.5	0.19 [0.14, 0.27]b			0.26 [0.22, 0.31]b			
Anti-tobacco information exposure									
Never	150	81.2	1.00						1.00
Seldom	359	91.5	2.50 [2.08, 2.94]b						2.49 [1.86, 3.32]b
Sometimes	192	81.2	1.72 [1.26, 380]b						1.55 [1.11, 2.18]a
Often/almost always	386	88.1	1.45 [1.10, 1.92]a						1.24 [0.83, 1.85]

a<0.05, b<0.01

ethnicity, and marital status were related to unassisted quit success (Table 3). The differences were greater by age and ethnicity. As regards marital status, those who were married or divorced/widowed were much more likely to have been successful in quitting smoking. While the patterns for education remained, these were only significant for junior high school students, which was the least likely group to quit. While smoking status remained not significant, this was not true for income where middle-income persons had a greater chance of quit success than those on lower incomes. The effects of physical exercise and self-control belief remained much the same as before as did the effects of advertising exposure. While exposure to anti-tobacco information increased the chances of people making a quit attempt, the results suggest that such attempts were unlikely to succeed. By contrast, while the effect of smoking restrictions reduced the prevalence of unassisted quit attempts, such restrictions were more likely to be associated with quit success.

When all variables were entered into multiple logistic models, the relationships did not change (Tables 2 and 3). For unassisted quit attempts, the effects of both physical exercise and self-control belief increased the chances as did anti-tobacco information exposure. By contrast, both advertising exposure and household and workplace smoking restrictions resulted in fewer quit attempts. Quit success was most marked among those who exercised and those who had strong belief in their ability to quit as well as those facing home and workplace smoking restrictions, although only the former was significant. While exposure to anti-tobacco information had increased the chances of a quit attempt, this was not the case with quit success. Although not significant, the chances of quit success were lower for groups that had indicated an awareness of anti-tobacco messages.

With respect to why smokers were unwilling to seek formal help in their quit attempts, Table 4 indicates the most important reasons smokers cited to explain their reluctance to use smoking cessation clinics or quitting hotlines. For quit attempts, lack of convenience, the importance of being self-reliant, and not having to think about other alternatives (automatic behavior) emerged as the most important factors. For quit success the same factors emerged.

Discussion

This study indicates that few male smokers in the sample attempted to quit smoking and were successful in their quit attempts. Only a minority of smokers (35%) had made a quit attempt, and of this small group only 19% had ceased smoking at the time of the interview. But for those who made a quit attempt, most (88.2%) did so on their own without formal help. With respect to the first

research objective, of comparing Chinese unassisted quit rates to those reported elsewhere, the findings suggest that these are much higher in China than in the Western world (Cokkinides et al., 2005; Curry et al., 2007; Shiffman et al., 2008; Smith et al, 2015; Williams et al., 2015; Zhu et al., 2000). For example, in Australia, Smith et al. (2015) claimed that 54%–69% of ex-smokers reported that they had received no formal assistance in quitting smoking and 41%–58% of current smokers had attempted to quit unassisted. Similarly in the United States, previous studies of successful quit attempts report similar unassisted quit rates from 64% to 78% (Cokkinides et al., 2005; Shiffman et al., 2008). In Canada, Mao and Bottorff (2016) pointed out that Chinese smokers rarely used cessation aids or services even after they had immigrated to Canada, with only 3/22 participants (13.6%) reporting they had done so.

While few people sought assistance to quit smoking, with respect to the second objective the results suggest that there are distinct individual and environmental differences affecting this result. This study found that unassisted quitting increased with age, which is consistent with findings from other studies (Curry et al., 2007; Zhu et al., 2000). This may reflect the fact that increasing health problems often mean that not only does the need to quit increase with age, but also so does the motivation to quit (Yang, 2018). Patterns of unassisted quitting also reflected ethnic variations, with ethnic minority Chinese being less likely to make an unassisted quit attempt than Han Chinese. This may reflect differences in culture and health awareness (Yang, 2018). However, unlike previous research (Curry et al., 2007; Zhu et al., 2000), we found that smoking status was not associated with unassisted quitting. Again this may reflect a lack of health awareness and the tolerance of high levels of smoking among Chinese males. Interestingly socioeconomic differences were also unrelated to unassisted smoking cessation.

As expected, self-control belief for quitting smoking was associated with both unassisted attempts and success. Unassisted quitting is a manifestation of personal will and, in a highly pro-smoking culture, many Chinese people depend on a strong willpower to quit (Yang, 2018). As Mao and Bottorff (2016) reported in Canada, smokers believed in willpower as the key to successful quitting and especially among men, this symbolized masculine norms of strength and self-control. Such norms are rooted in Chinese culture, which prides itself on gender identities for men as being heads of their society and family (Mao & Bottorff, 2016). The authors also noted a tendency on the part of Chinese men to deny a physiological addiction to smoking. Rather they portrayed themselves as being psychologically addicted to the "habit of smoking," which served key social functions, and thus saw

Table 3. Unassisted Quit Success Prevalence and Individual and Environmental Influences.

	N	Prevalence	Unadjusted OR (95% CI)	Model 1: adjusted OR [95% CI]	Model 2: adjusted OR [95% CI]	Model 3: adjusted OR [95% CI]
Age (years)						
<25	30	90.5	1.00	1.00	1.00	1.00
25–34	78	96.6	3.01 [0.19, 46.1]	1.90 [0.23, 0.50]	1.42 [0.99, 2.02]	1.28 [0.91, 1.78]
35–44	120	93.9	1,62 (1.27, 2.07][b]	2.54 [1.20, 5.35][a]	1,54 [0.79, 3.02]	1,44 [0.54, 3.90]
45–54	127	96.6	3.26 [1.16, 9.11][a]	1.18 [0.34, 3.61]	2.02 [1.06, 3.84][a]	1.76 [1.08, 2.88][a]
55+	180	99.9	7.45 [3.15, 9.57][b]	5.56 [1.29, 12.87][b]	1.41 [0.57, 3.48]	1.25 [0.71, 2.18]
Ethnicity						
Han	509	97.9	1.00	1.00	1.00	1.00
Minority	26	86.6	0.14 [0.04, 0.34][b]	0.23 [0.07, 0.97][a]	0.44 [0.24, 0.79][b]	0.42 [0.32, 0.55][b]
Education						
Elementary school or less	71	99.8	1.00			
Junior high	150	94.6	0.03 [0.001, 0.56][b]			
High school	130	99.4	0.26 [0.06, 1.05]			
Junior college or college	184	98.2	0.09 [0.01, 1.32]			
Marital status						
Unmarried	63	92.5	1.00	1.00		
Married	437	98.0	4.01 [2.07, 7.78][b]	3.14 [1.55, 6.39][b]		
Divorced or widowed	35	99.4	12.59 [1.43, 64.32][b]	3.60 [0.19, 15.23]		
Occupation						
Managers and service	153	98.8	1.00			
Professionals	47	92.5	0.15 [0.02, 1.21]			
Operations	144	96.3	0.31 [0.03, 3.68]			
Retired	99	99.9	7.82 [0.53, 73.21]			
Other	92	96.6	0.33 [0.08, 1.40]			
Smoking status						
Number of cigarettes smoked						
<10						
10 or more						
Smoking frequency						
Occasional smoker						
Daily smoker						
Income/person/year (RMB)						
<20,000	189	96.4	1.00			
20,000–39,999	160	98.1	1.84 [1.08, 3.16][a]			
40,000–19,999	186	98.4	2.17 [0.94, 5.01]			
Physical exercise						
No	303	96.9	1.00		1.00	1.00
Yes	232	98.4	1.99 [1.36, 2.89][b]		2.21 [1.04, 4.67][a]	2.36 [1.07, 5.22][a]
Self-control belief for quitting						
Low	88	95.2	1.00		1.00	1.00
High	447	98.0	2.45 [1.87, 3.20][b]		3.32 [1.16, 9.55][b]	2.34 [1.72, 3.18][b]
Advertising exposure						
Never	191	99.5	1.00			1.00
Seldom	191	98.6	0.36 [0.02, 6.96]			0.90 [0.65, 1.25]
Sometimes	93	98.7	0.37 [0.04, 3.29]			0.39 [0.36, 0.41][b]
Often/almost always	60	81.4	0.02 [0.001, 0.34][b]			0.45 [0.35, 0.58][b]
Household smoking restrictions						
None	212	97.9	1.00			
Partial	111	94.7	4.55 [1.19, 9.01][b]			
Complete	212	99.0	2.12 [0.36, 12.5]			
Workplace smoking restrictions						
None	203	97.2	1.00			
Partial	159	96.9	1.08 [0.47, 2.50]			
Complete	173	98.3	1.68 [1.08, 2.63][a]			
Anti-tobacco information exposure						
Never	181	33.1	1.00			
Seldom	95	15.4	0.13 [0.01, 1.92]			
Sometimes	102	17.1	0.04 [0.001, 0.87][a]			
Often/almost always	157	34.4	0.07 [0.01, 0.89][a]			

[a]<0.05, [b]<0.01

Table 4. Reasons Why Smokers Were Unwilling to Seek Professional Help to Quit.

Group	Quit attempts (*n* = 1211)			Quit success (*n* = 535)		
	N	%	Rank	N	%	Rank
Smoking cessation clinic						
Automatic behavior	701	61.7 [57.2,69.2]	3	414	70.6 [56.3,84.9]	3
Self-reliance	783	68.7 [62.2,75.1]	2	437	75.2 [64.4,86.0]	1
Embarrassment	362	27.8 [17.8,37.8]	7	186	22.4 [4.4,40.4]	7
No confidence in the assistance	402	36.2 [31.7,40.9]	6	228	47.8 [37.4,58.1]	5
Time cost	554	49.0 [43.5,54.5]	4	303	46.5 [35.2,57.8]	4
Economic cost	525	46.6 [39.2,54.0]	5	265	44.1 [35.8,52.3]	6
Convenience	771	70.0 [63.9,76.1]	1	395	73.7 [68.8,78.4]	2
Complexity	228	22.1 [18.7,25.5]	8	107	27.1 [19.7,34.5]	8
Family members attitudes	108	9.5 [7.2,11.8]	10	58	9.1 [0.8,17.3]	9
Friends' attitudes	121	11.1 [1.4,20.8]	9	59	8.3 [−1.5,18.1]	10
Quitting hotline						
Automatic behavior	740	65.2 [58.3,72.0]	2	410	70.4 [57.5,83.3]	2
Self-reliance	771	68.8 [61.9,75.6]	1	414	72.3 [64.2,80.4]	1
Embarrassment	398	29.8 [14.1,43.9]	7	206	25.8 [6.3,45.2]	7
No confidence in the assistance	400	36.6 [30.4,42.8]	6	216	42.4 [36.0,48.8]	5
Time cost	544	46.8 [36.1,57.5]	4	284	45.9 [33.0,58.7]	4
Economic cost	489	42.5 [35.3,49.7]	5	246	39.1 [30.9,47.3]	6
Convenience	685	61.0 [54.6,65.4]	3	354	65.4 [58.6,72.2]	3
Complexity	258	25.0 [21.6,28.5]	8	135	31.9 [26.5,35.9]	8
Family members attitudes	113	10.2 [0.5,19.8]	10	55	8.4 [−1.3,18.1]	10
Friends' attitudes	115	11.0 [3.4,18.6]	9	60	8.8 [−1.6,19.2]	9

themselves as able to control their health behavior. This would partly explain why such men showed indifference to smoking cessation services, which they saw as only being necessary for nicotine addicts, and why they were more likely to make an unassisted quit attempt. The same argument could be extended to the effects of physical exercise on quitting. Mao and Bottorff argued, in their qualitative study of Chinese Canadian immigrant men in British Columbia, that one participant noted that regular jogging and walking, rather than using cessation assistance, was the key to successful quitting and remaining smoke-free (Mao & Bottorff, 2016). Similarly, in this study regular physical exercise increased the chances of both quit attempts and success by a factor of 2.5.

Few studies have examined the effect of environmental factors upon unassisted quitting. The current study found that exposure to tobacco advertising and anti-smoking information worked in opposition to each other. The former resulted in up to 60% fewer quit attempts and even minor levels of advertising resulted in much less success (between 64% and 98%) in being able to quit. While exposure to anti-tobacco advertising resulted in more unassisted quit attempts, these did not translate into smokers becoming smoke-free. These findings are similar to those of Williams et al. (2015) who maintained that in the United States unassisted quit attempts were related to state anti-smoking sentiment and not tobacco taxes, but the effects of the latter on quit success, as in this study, were not significant. On the other hand, Zhu et al. (2000) concluded that heightened anti-tobacco campaigns in California may have been one of the factors accounting for the increased number of smokers seeking assistance.

The presence of both home and workplace environmental restrictions was also important in affecting the likelihood of an unassisted quit attempt. But rather than encouraging people to quit, more restrictions had the reverse effect, with those who faced *complete* restrictions in the home and workplace being, respectively, 74% and 79% less likely to make an unassisted quit attempt. However, in both cases those who did attempt to quit were more likely to be successful, although this trend was only significant in the case of household smoking restrictions. Generally speaking, such household and workplace restrictions are likely to produce high levels of stress upon smokers such that they are unable to quit on their own and thus are more likely to seek assistance to cope with their new smoke-free environments. However, the high prevalence rates of 80% or more for unassisted quit attempts and success across all three restriction groups (none/partial/complete) suggest that the majority of smokers were still unlikely to seek formal assistance.

Addressing a gap in the literature, with respect to the third objective, this also found that several important reasons why smokers were unwilling to seek professional smoking cessation aids. Self-reliance, automatic behavior, and convenience emerged as the three key factors that shaped people's perceptions of smoking cessation services. Self-reliance reflected people's feelings that they were able to solve their own problems without outside help (Gokirmak, Ozturk, Bircan, & Akkaya, 2010; Yang et al., 2008). This may reflect the increasing individualistic culture emerging in China in contrast to the greater tendency of Western smokers to seek help from official sources. It is likely that smokers who do not use smoking cessation aids do not perceive smoking to be a problem and thus, as noted by Gross et al. (2008), believe they do not need help. Self-reliance could also reflect a fear of "losing face" (Gross et al., 2008). As Mao and Bottorff (2016) identified, Chinese men in their study acknowledged the difficulty of quitting smoking and that failure in front of outside people would result in them "losing face." There were also concerns about the perceived risks of sharing private information with "outsiders" when seeking cessation assistance.

Automatic behavior was similar to self-reliance in that it highlighted the tendency of smokers to not consider smoking cessation services when attempting to quit. This could reflect the fact that smokers were unaware of the presence of cessation aids and services available or, if they were aware, they viewed such services as being irrelevant for their needs. It is interesting that over a third of the smokers reported that they had no confidence in any help that may be provided. Given the high proportion of doctors who still smoke in China, this suggests that smokers mistrusted the effectiveness of any potential smoking cessation assistance. This is consistent with Gross et al.'s (2008) German study where smokers perceived smoking cessation aids not to be helpful and with a study in Ontario that has demonstrated that only 20% of smokers were convinced that the smoking cessation aids increased their chances in quitting (Hagimoto, Nakamura, Morita, Masui, & Oshima, 2010).

A key factor to emerge was "convenience." It is likely, as Mao and Bottorff (2016) claimed, that it was impractical for Chinese smokers to attend cessation clinics or to engage with quitlines simply because they had no time for such activities with other factors, such as earning a living, being of a higher priority. Not surprisingly "time cost" was mentioned by over 40% participants and thus tends to support this interpretation.

By contrast, other factors such as family members' attitudes and the attitudes of friends were considered unimportant among the reasons smokers cited as to why they attempted to quit of their own. Basically, this is not surprising. For most groups smoking is an acceptable social activity in China, so processes of social stigmatization are much less important than in higher income countries. With few exceptions, such as a pregnancy in the household, friends and family are unlikely to have a significant impact on the decision to quit.

Study Limitations

As with any quantitative cross-sectional study, the findings need to be treated with caution, as such a design precludes causal inference. Longitudinal studies are necessary to further confirm these findings. This work only focused on urban residents. More research needs to be done on those who live in rural areas and the individual and environmental factors that have affected rural smokers' attempts to quit. More insightful qualitative research needs to be undertaken to more deeply explore why Chinese smokers are so resistant to engaging with state-sanctioned smoking cessation services. In a country where physicians continue to smoke, it is hardly surprising that Chinese smokers who wish to quit have little confidence in the assistance that is offered. Ultimately, due to the small sample size, standard errors of many associations are large in the unassisted quit success analysis, making interpretation difficult. Further studies of success need a much larger sample size.

Conclusions and Policy Implications

This study adds important insights about the unassisted quit behavior among Chinese smokers. These findings can be used to inform future smoking cessation programs and policies in China. With this in mind, smoking cessation programs need to pay greater attention to the social and cultural norms affecting smoking and how these might change.

The findings make it clear that, just as in other Asian countries, most attempts by Chinese smokers to quit smoking do not involve different forms of smoking cessation assistance, such as smoking cessation clinics, quitlines, or other forms of professional help. These results stand in contrast to most Western countries, where there has generally been greater proportion of smokers receiving cessation assistance. The reasons clearly are not the absence of such services in China, for these exist in most larger cities, but the fact is that such services are not used. These patterns reflect cultural norms. Chinese culture, to a large extent, is still adhering to agrarian social mores, which emphasize spirit and perseverance in coping with behavioral problems (Yang, 2018). Thus most attempts to quit smoking reflect willpower rather than professional assistance. Many Chinese men think that smoking cessation services are unnecessary, an intrusion into one's privacy, a source of potential embarrassment and loss of

face, an affront to their gender identity, and in conflict with a culture of self-reliance so typical of much of Chinese society.

High rates of smoking remain a significant problem for China especially since strong tobacco control policies coupled with social mechanisms of stigmatization, which helped produce a decline in prevalence in Western countries, are largely absent. By contrast, in much of China smoking is still socially accepted and restrictions are few. Thus in such situations smokers find it difficult to quit especially when state institutions continue to sanction smoking. Not surprisingly state or city smoke-free initiatives are often ignored as they are seen as ineffective by an increasingly cynical smoking public, many of whom wish to quit. Thus smoking cessation cannot be understood in a narrow sense, of limiting it to be a medical professional responsibility, when in fact it is a society responsibility.

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