Impact of Role Models and Policy Exposure on Support for Tobacco Control Policies in Hangzhou, China

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Objectives: To examine how expectations of role models concerning smoking and exposure to tobacco control policies are associated with people's support for smoking bans. ***Methods***: Face-to-face interviews were conducted using multistage sampling. Employed structural equation modeling to examine the relationships and multi-group analysis to compare cross-group difference between smokers and non-smokers. ***Results***: Expectations of role models were found to be significantly associated with support for FCTC policies related to smoking. Policy exposure indirectly relates to policy support. Cross-group differences between smokers and non-smokers were not significant. ***Conclusion***: Expectations of role models are strong predictors of support for FCTC tobacco control policy among Chinese urban residents; policy exposure is associated with policy support indirectly through the influence of expectations of role models. Policymakers should utilize social roles to promote tobacco control measures.

Key words: role models, policy support, tobacco control policy, structural equation modeling, China

There has been a gradual decline in cigarette smoking in the western world since the beginning of late 1970s due to consistent public policies and education programs against smoking.[1] Governmental measures against smoking have generally succeeded in reducing the smoking rate in most sectors of society by portraying smoking behavior as less desirable, increasing risk perception and harm awareness, and increasing the cost of tobacco products through taxation.[2-4]

Social norms concerning smoking, including people's expectations of role models, also have started to change after nearly 3 decades as a result of the implementation of tobacco control policies in the US and some European countries. Role models refer to the social roles related to social norms, behavior codes, and status. Whereas there have been some studies on how social psychological factors influence public support for bans on smoking,[5-8] much less is known about how people's expectation of role models concerning smoking contribute

to the support for tobacco policies in societies such as China, where smoking still represents normative behavior. Understanding people's expectation of role models' behavior and attitude is important when introducing policy interventions designed to reduce smoking.[9-11]

In 2005, China ratified and participated in the WHO Framework Convention on Tobacco Control (FCTC), which requires participant countries to implement comprehensive smoking bans in all public spaces. Because of the limited success of previous tobacco policies in China, it remains an open question whether the social norm in China may hamper tobacco policy implementation. Other aspects of the local culture, such as paternalistic duties and strong emphasis on normative behavior, may alternatively promote support for tobacco policy. The current study explores how expectations of role models concerning smoking, along with exposure to tobacco control policies contribute to the support for FCTC policies among Chinese residents.

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Literature Review
Expectations of role models concerning smoking. A social role is a micro cultural system that contains the prescribed rules about how people positioned in a specific role should act and be

Figure 1
Conceptual Path Diagram
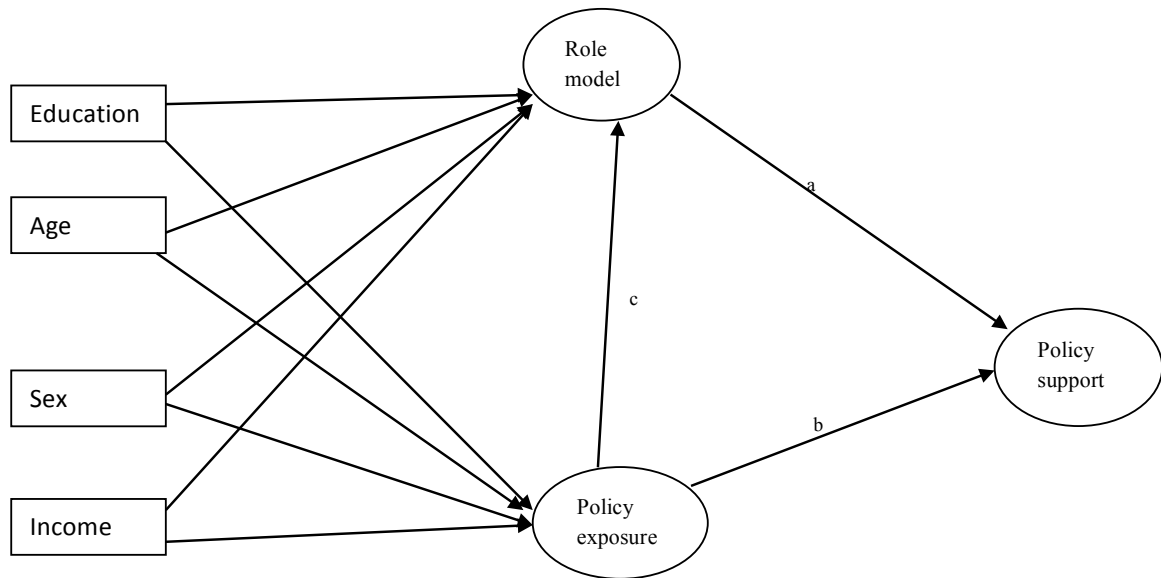
acted upon. During the last few decades, tobacco control policies have been implemented to change the social norms of smoking, establish non-smoking role models, and to change the popular image of cigarettes.[11] Scientists have argued that the success of these policy implementations depends on how the cultural institution defines the targeted behavior.[11-15]

People associate different levels of concern regarding the same behavior depending upon role models. Women, children, teachers, official cadre, and physicians are often expected to adhere to different levels of a standard of conduct. Role models based on certain occupations also are expected to conform to their own codes of behavior. For example, studies have found that teachers' behavior is imbued with moral significance and expectation for both in-class and out-of-class settings.[16,17] The public generally assumes that teachers, especially elementary and middle school teachers, should not smoke and should avoid smoking in the presence of children.[16,18] The professionalization of the physician role in society has brought with it the formalization of codes of behavior, prestige, moral duty, and expectations as to how they should act vis-à-vis patients.[19-22] Systematic studies of stigma associated with physician smokers is still scant, but the influence of physicians as role models is an emerging concern among tobacco control professionals.[23-25] In China, however, it remains an open question as to whether smoking is an expected role model behavior among physicians, where 41% of

male physicians admit to being smokers.[26]

Sex is another important dimension of role model in society. Attitudes toward smoking are imbedded in the cultural matrix of masculine/feminine roles. Sex role not only determines whether men are expected to smoke, it also stipulates whether women should be passively exposed to men's smoking. Scholars[27-29] have pointed out that a behavior that puts children or women, whose ideological image is innocent and passive, in danger of exposure to drug addiction or secondary harm is perceived as far more unacceptable than behavior that does not involve children and women. On the part of men, family wellbeing and parental roles have been found to be major motivations for smoking cessation.[30-32]

Policy exposure. Generally, public smoke-free space regulations are able to decrease the smoking rate in the general population[3] and among certain subcultures.[33] Scholars argue that combined bans have a stronger effect on reducing smoking than the additive effectiveness of individual regulations.[2,34] Public exposure to policy itself or policy's propaganda determines how much information people will receive concerning appropriate behavior. Public policies, including tobacco policy, are often designed with an aim to maximize information diffusion so that a broader audience can be reached and convinced. Studies have confirmed that, other things being equal, exposure to institutionally promoted messages increases people's support for the message content.[35-37] Vuolo[38] found

Table 1
Demographic Characteristics

	Percentage (%)	Mean(SD)	Range
Annual Income (Yuan)		3.38(1.58)	1-6
For Less than 10k	10.61		
10k-less than 20k	22.42		
20k-less than 30k	26.76		
30k-less than 40k	15.25		
40k-less than 50k	7.92		
50k and above	17.04		
Education			1-4
Elementary and below	13.3		
Middle school			
High school	33.33		
College and above	23.17		
	20.19		
Age		44.4(15.9)	15-88
Sex			
Men	57.8		
Women	42.2		
Smoke Status			
Non-smoker	69.81		
Smoker	30.19		

that these influences lasted for decades across 15 European countries. Tobacco policy's content *per se* is a communication tool that has an important impact on how people later perceive and react to cigarette smoking. Generally speaking, within a large population, the more frequently people encounter a policy, the more their attitudes toward the policy are positively affected.

In this study we hypothesized that there are structural relations among expectations of role models concerning smoking, exposure to smoking cessation policies, and policy support for smoking bans (Figure 1) such that: (1) people with higher expectations of role models against smoking would be more likely to support tobacco control policies (path a); (2) people with higher exposure to tobacco control policies would be more likely to demonstrate higher support for tobacco control policies (path b); and (3) people with greater exposure to tobacco control policies would be more likely to have higher expectations of role models concerning smoking (path c). Control variables, including education, income, sex, and age, are added to hold constant the demographic influence on people's accessibility, knowledge, and subculture of smoking.

METHODS
Sampling
Multi-stage sampling design was employed to collect data during the summer of 2011. First, we randomly selected 2 residential districts of Hangzhou, and then randomly selected 4 communities within each district. Hangzhou is located in southeast China with a population of 6.7 million; it has 6 districts and 16-22 communities within each district. The Community Committee Office randomly sampled households in each community, and these households were distributed across each community in approximate proportion to their estimated overall distribution across the city cluster of communities. Participants to the study were selected independently. The inclusion criterion was being a resident aged 15 years or older. One eligible resident from each household was selected into the study, based on nearest birthdate to the interviewing date, yielding a total sample size of 669. Demographic characteristics of the sample are shown in Table 1.

Methods of Data Collection
We scheduled a face-to-face individual interview once an eligible person was identified and agreed to participate. All surveys were conducted using a structured, interviewer-administered questionnaire. Interviewers were second-year medical graduate students or fourth-year medical students. Each interviewer received a one-day training on the study protocol and survey procedures. Questionnaires were administered privately to participants in their home or in a quiet place, such as a backyard or community park. Appointments were

Table 2
Descriptive Statistics of
Measurement Indicators

	Mean	SD
Expectation of Role Models Indicators		
"physician smoking"	3.63	.70
"teacher smoking"	3.47	.81
"smoking beside women & children"	3.49	.77
Policy Exposure Indicators		
"warning in public space"	3.74	1.17
"legislation advocacy"	2.98	1.19
"news of smoking ban"	3.59	1.19
Policy Support Indicators		
"ban on indoor smoking"	1.70	1.24
"ban on tobacco ads"	4.05	1.24
"anti-smoking media propaganda"	4.31	.98

scheduled through a community organization, and were rescheduled as necessary. Upon receiving instructions from assistants, participants were asked to complete a questionnaire of approximately 30 minutes' duration. Each participant was afforded an opportunity to ask or seek clarification of questions regarding the survey or questionnaire items, and given adequate time for completion. Possessing acceptable psychometric properties, our data collection procedures have been used extensively in smoking research in China.[31,39]

Measurement

We included survey items to measure expectations of role models based on 3 social identities that were chosen as most relevant to social normative concerns over smoking:

"What do you think about smoking beside women and children?"
"What do you think about physicians being smokers?"
"What do you think about schoolteachers being smokers?"

Exposure to policy was also measured on a Likert 5-point scale. The 3 questions asked the respondent to recall in the past 6 months: "Have you seen a non-smoking warning in public places?" "Have you encountered advocacy of the legislation on smoking?" and "Have you heard or seen the news of a smoking ban in public places?" Respondents answered each question by choosing from 5 options: "always, often, sometimes, rarely, never."

Three questions were used to measure attitudes toward tobacco control policies: "What is your at-titude toward the ban on indoor smoking?" "What is your attitude toward the ban on tobacco advertisement?" and "What is your attitude toward the media propaganda of tobacco control?" Responses to all questions were on a 5-point Likert scale, ranging from "strongly against" to "strongly support."

Analysis Strategies

The dataset used for the current study had no missing data due to the rigorous design of the study. Latent variable constructs were analyzed using factor analysis; a modification index was consulted to re-arrange factor loadings if theoretically appropriate. A structural equation model which includes the 3 major latent variables, expectation of role models, policy exposure, and policy support, was estimated using AMOS. A multi-group analysis was conducted to compare whether there were significant cross-group differences between smokers and non-smokers in terms of the relationships among the latent variables.

Four goodness-of-fit indices were used to evaluate the model. These were chi-square, chi-square may be significant in samples greater than 200 even when the model is a good fit. Chi^2/df smaller than 2 is an excellent indication of the model fit while values smaller than 3 are reasonably good. A CFI close to 1 indicates a very good fit of the model to the data. RMSEA (root mean square error of approximation), which penalizes complexity, indicates a very good fit when values are smaller than .05. The RMSEA, assesses how well the model fits the data and is not as sensitive to large samples as other fit indices. RMSEA value of .05 or below indicates a reasonably good fit of the model to the data.

Table 3
Measurement Model

	Standardized Regression Weights	Squared multiple correlation
Expectation of Role Models		
"physician smoking"	.551	.303
"teacher smoking"	.828	.686
"smoking beside women and children"	.858	.735
Policy Exposure		
"warning in public space"	.669	.447
"legislation advocacy"	.589	.347
"news of smoking ban"	.629	.395
Policy Support		
"ban on indoor smoking"	-.102	.010
"ban on tobacco ads"	.645	.416
"anti-smoking media propaganda"	.990	.979

Note.
Goodness-of-fit indices: Chi²: 46.94(p < .05); Chi²/df: 2.04; CFI: .98; RMSEA: .04

RESULTS
Measurement Model

The means and standard deviations of the indicators loading on each latent construct are reported in Table 2. Standardized estimate loadings of latent constructs on indicators are expected to be relatively high in magnitude and positive. A modification index is used for factor analysis by suggesting the decrease of chi-square statistics when a number of parameters are fixed to specific values. We consulted a modification index for model improvement if the modification index was high and held theoretical ground. The results indicate that large reduction of chi-square statistics would come from the following 3 parameters: regressing "support for ban on indoor smoking" on "attitude to smoking beside women and children," decreasing chi-square by 26; regressing the latter on the former indicator, decreasing chi-square by 16.8; and correlating their error terms, decreasing chi-square by 16.2. This means that concerns of smoking beside women and children and support for an indoor smoking ban may be related to an unexplained factor underlying both of them. We correlated the error terms to address the unexplained underlying covariance for model improvement. The estimates of measurement model are presented in Table 3. Although no firm rule exists, a conventional cutoff for latent construct loadings is .40; the estimates of most indicators are above .50 with a single exception. The squared multiple correlation conveys information about how much variance in each indicator is explained by its latent construct. Again, only one estimate has a low value of R-square. This variable was retained in the model, however, because dropping the indicator leads to a distorted negative error variance estimate as shown in the Heywood case.[40]

The bottom of Table 3 shows the goodness-of-fit indices. Besides the fact that the chi-square test is significant (p < .05), possibly due to the large sample size and higher correlation,[40] all other fit statistics suggest that the measurement model is a good fit to the data.

Structural Equation Model

The structural equation model includes 4 control variables: sex, income, education, and age. The unstandardized regression estimates in Figure 2 show which path coefficients are significant. Among the control variables, it was found that older and better educated people were more likely to have been exposed to non-smoking policies. Male respondents were less likely to disapprove of role models' smoking, whereas older people were more likely to indicate disapprove of smoking by role models.

Policy exposure moderately correlates with disapproval of role models' smoking behavior (.10, p < .05), but respondents' exposure to non-smoking policies is not associated with support for these policies (.07, p < .18). Instead, it is negative attitudes toward role models' smoking that is strongly associated support to tobacco control policies (.37, p < .001). The squared multiple correlation of support for policies is .11, indicating that ~11% of the

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Figure 2
Structural Model Coefficients and Goodness-of-Fit
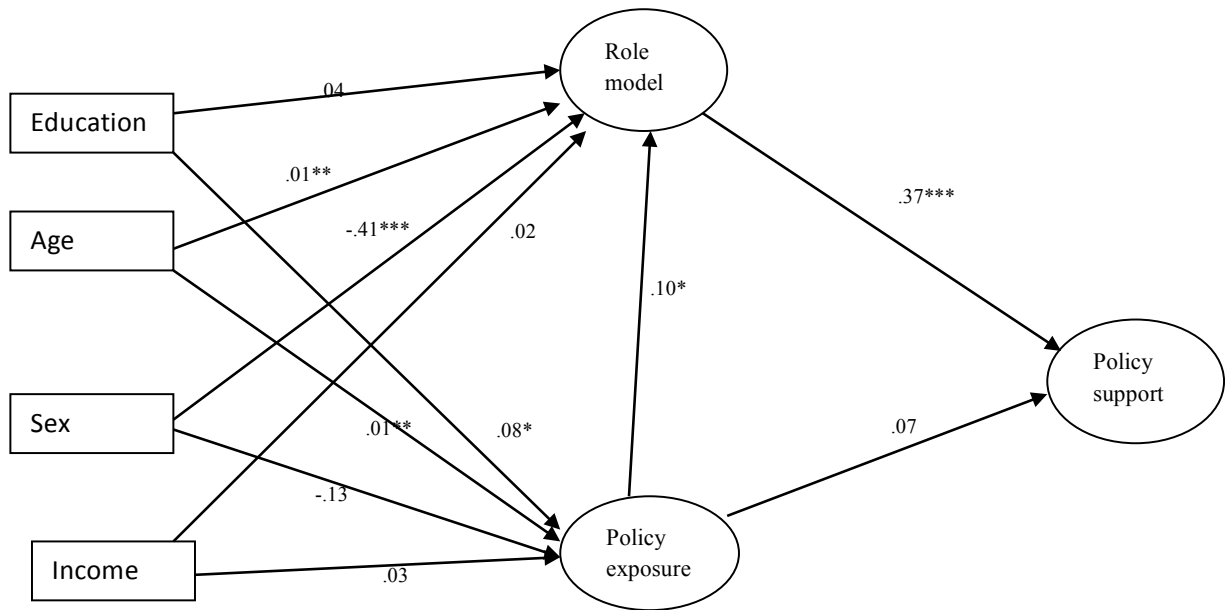
p < .05; ** p < .01; *** p < .001

Note.
Squared multiple correlation: policy exposure: .04; social stigma: .14; Policy support: .11. Chi^2:113.3(p < .001); Chi^2/df: 2.2; CFI: .97; RMSEA: .04

variance of this endogenous variable is explained by the model. The squared multiple correlation for expectation of role models is .14. The goodness-of-fit indices for the model are shown at the bottom of Figure 2. Other than chi-square, which is significant, all indices are adequate according to the conventional standards.

Although the association between policy exposure and policy support is not statistically significant, it is possibly so due to the mediation effect exercised by expectation of role models. The standard procedure of examining mediation effect consists of 3 steps: first, regress the dependent variable on the independent variable; second, regress the dependent variable on a mediator; third, regress the dependent variable on both the independent variable and a mediator. If significance of the association between independent and dependent variable in the third step drops considerably, it proves the existence of mediation effect.[41] Therefore we report the raw correlation between each of the 3 latent variables with the control variables included: correlation between policy exposure and policy support is .143 (p < .05); correlation between policy exposure and expectations of role models is .08 (p < .05); correlation between expectations of role models and policy support is .401 (p < .001). Because the full model in Figure 2 shows that the association between policy exposure and policy support is no longer statistically significant when expectations of role models enter the model, there is a mediation effect exercised by expectations of role models concerning smoking between exposure to policy and support for tobacco control policies.

A multi-group analysis was conducted to examine whether cross-group differences existed between smokers and non-smokers. We had predicted different effects of role model expectations and exposure to tobacco policies between smokers and non-smokers. The goodness-of-fit indices are summarized in Table 4. To test this hypothesis, a baseline model was first tested by freeing all parameters across the 2 smoking-status groups (χ^2 (df=104) = 194.7, p < .001;χ^2/df=1.87; CFI = .95; RMSEA=.04; AIC=350.7; BCC=360.8). We then ran a second model where the factor loadings and structural coefficients were constrained to be equal across the 2 groups (χ^2 (df=121) = 223.29, p < .001; χ^2/df=1.84; CFI =.95; RMSEA= .03; AIC=345.3; BCC=353.2). Indices suggested no better model fit

Table 4
Comparison of Goodness of Fit between Constrained and Unconstrained Model

	Chi²	Chi²/df	CFI	RMSEA	AIC	BCC	Chi²-difference
Unconstrained Model	194.74(df=104)	1.87	.95	.04	350.7	360.8	28(df=17), p = .04
Constraint Model	223.29(df=121)	1.84	.95	.03	345.3	353.2	

of allowing parameters to vary across smoking and non-smoking group. The lack of improvement in fit achieved by freeing the structural model indicated that there were no significant difference between smokers and non-smokers.

DISCUSSION

This study investigated how people's expectations of role models concerning smoking (represented by 3 social roles) influences their support for tobacco policy legislated recently in China. Previous research found that cultural institutions affect people's reaction to deviance and laws that regulate deviance. The study also investigated how much the frequency that people see or hear the message concerning the new tobacco policy in mass media and public spaces contributes to their support for tobacco restriction policies.

As informed by these research results, expectations of role models concerning smoking proved to be an important factor that affects people's support for FCTC policies, whereas exposure to non–smoking policies does not seem to exert a significant effect on policy support. However, policy exposure affects people's support for tobacco control policies through an indirect path. Tobacco smoking in China constitutes a significant phenomenon for its high prevalence and rich cultural meaning. Though a considerable proportion of people are smokers in China, the distribution of smoking is rather uneven. The smoking rate among men is disproportionally greater than among women (59.5% vs. 3.7%) although the literature rarely refers to women when talking about China's tobacco issues.[42] Smoking is much less a non-normative behavior in China, not only because historically tobacco was regarded as a symbolic embodiment of social prestige[43-45] and ritually cleansing instrument,[46,47] but also for its persisting instrumental and cultural utility in contemporary Chinese society.[48,49] Although smoking is a social norm for men, the society has strong norms against women who smoke. The distinct norms of smoking between sexes also manifest itself in the fact that the patriarchal tradition regards women and children as vulnerable people who must be protected. Permitting women and children breathe the smoke puffed by a man is more unacceptable, evoking negative judgments and stigma. Physician smoking has worried many Chinese for its potential of reducing cessation consultation, normalizing smoking,

and weakening smoke-free advocacy. The current study shows that expectations of role models such as women, physicians, and teachers are closely related to policy support. Understanding the social meaning of smoking in different social roles is crucial for policy intervention. Therefore, this study informs policymakers of another way of promoting tobacco control besides disseminating policy messages. This approach would establish positive role models against tobacco use, and alter the perceived image of smoking by using role models such as housewives, children, physicians, and teachers in anti-smoking advertisements. At the same time, policymakers should also be cautioned against using a non-normative behavior strategy that alienates marginal populations. Some studies already have found that tobacco policies can accidentally marginalize smokers from underprivileged backgrounds.[14,50]

Demographic background was also found to influence expected role models and exposure to tobacco policy. Education and age are positively associated with policy exposure. This finding implicitly suggests the current promotion of tobacco policy successfully targets older and better educated people who are generally regarded as upper class but may miss many younger and less educated people. A population specific health education program that focuses on less educated youth is required to compensate for this phenomenon. Both age and policy exposure were found to increase the expected role model against smoking, but being a male dramatically decreases expectation of role models against smoking at a substantial rate. This is likely the result of the fact that almost all the smokers in China are male, and smoking is a normative social behavior in men's milieu. An expected role model is, therefore, not only a psychological perception, but also a constructive product based on sex and culture. The promotion of tobacco control policies may face potential challenges because the role model against smoking is questioned by some men who have always held stronger structural power in defining the codes of behavior in China. Opposition against smoking in the presence of women and children was found to be a factor that affects attitudes toward smoking cessation policies. A campaign that focuses on quitting assistance in domestic settings in the presence of women and children may be effective in reducing tobacco use. Also, a relevant program

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that educates teachers and physicians about the harm of tobacco and equips them with appropriate cessation consultation skills is necessary. The model was not significantly improved when participants were separately analyzed as smokers versus non-smokers in a multi-group model, indicating that the pattern of supporting tobacco policy based on expectation of role models and policy exposure is not differentiated between smokers and non-smokers.

Limitation

There are several limitations to this study. First, the sample did not include 12 other cities that have introduced similar tobacco policies in the same year. Second, the measurement of the role model constructs needs to be expanded. This study measured expectations concerning the smoking behavior of physicians and teachers and smoking in the presence of women and children. A more detailed measurement of expectation of role modes' smoking behavior should be developed in the future by including more groups such as professors, celebrities, and cadres. Third, this study uses cross-sectional data; we expect improvement in convenient interpretation of causality if longitudinal data are available to test the theory.

Human Subjects Statement

The protocol and survey instrument were approved by the Ethics Committee at the Medical Center, Zhejiang University. We obtained informed written consent from all participants prior to interview.

Disclosure of Conflict

The authors have no competing interest for this study.

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