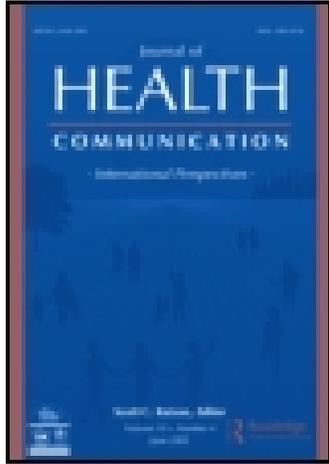


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The Effects of Antismoking Messages From Family, School, and Mass Media on Smoking Behavior and Smoking Intention Among Chinese Adolescents

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The prevalence of adolescent smoking has been increasing rapidly in China. Expanding adolescent exposure to antismoking messages may be an effective approach to prevent tobacco use among this population. Using a cross-sectional sample of 8,444 high school students in four Chinese cities, this study assessed the relation between self-reported exposure to antismoking messages from families, schools, and mass media and the rate of past 30-day smoking and smoking intention among junior and senior high school students. Results from logistic regression suggested that antismoking messages delivered via school and media inhibited both tobacco use and the intention to smoke. The effects of familial warnings about harmful effects of smoking, in contrast, were at best insignificant.

Adolescent tobacco use is a growing public health problem in China. According to the 1996 and 2002 national surveys on tobacco use, the prevalence of smoking among Chinese adolescents has increased substantially during the past three decades (Yang et al., 1999; Yang, Ma, Liu, & Zhou, 2005). At present, 18.14% of Chinese boys and 3.16% of Chinese girls between the ages 13 and 18 years smoke. This translates to a total of 15 million regular smokers in this sector of the population (Ji, 2007). If the current pattern persists, it is estimated that at least 50 million people in this age cohort now living in China will die prematurely from smoking-related diseases (Cheng, 1999).

Given the scope of the problem, there is an urgent need to develop effective intervention methods to prevent and reduce smoking among adolescents. One type of intervention believed to be effective is the conveyance of antismoking messages to teens in various social environments, including the family, school, and larger society, where the adolescent socialization process and subsequent behaviors occur. Parents, teachers, and the media sometimes take the responsibility of dissuading children from initiating or continuing the course of action that is harmful to them. Although the intent of such communication is to prevent unhealthy behaviors

such as smoking, some suggest that simply passing on the information might not work; it can increase children's curiosity or even lead to rebellious behavior. In other words, the messages can be ignored, rejected or, at its worst, backfire (Austin, Chen, & Grube, 2006; Ennett, Bauman, Foshee, Pemberton, & Hicks, 2001; Flay, 2000). To effectively reduce smoking and the intent to smoke, the messages must be able to positively influence their adolescent audience. Unfortunately, this issue has not been fully investigated in the Chinese tobacco control literature.

In the present study, we use data from a recent survey of students attending junior and senior high schools in four Chinese cities—Bayannaer, Changchun, Dalian, and Nanjing—to explore how exposure to antismoking messages affects the smoking behaviors and smoking intentions among Chinese adolescents. We hypothesize that antismoking messages delivered through parents, teachers, and the media inhibit smoking and reduce the intention to smoke among Chinese adolescents.

Background

The effects of parent–child communication, teacher–pupil communication, and antismoking advertisements in the media on the smoking habits of adolescents have been widely examined in the U.S. and other Western countries. However, there has been no systematic investigation regarding the effects of antismoking messages on adolescent tobacco use

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in China. The fact that China subscribes to different cultural values compared with Western countries provides us an opportunity to study whether the effects of antismoking messages would be different in China.

According to Hofstede (2011), China is a highly collectivistic culture with a high score of power distance. Top collectivistic values include the virtue of filial piety, which requires the children to respect the wishes and desires of their parents. A high stance in power distance is demonstrated by following the guidance of authorities. This cultural norm means that messages communicated from parents and teachers should carry more significance among Chinese adolescents. To a certain degree, messages delivered by credible media sources are also perceived to hold authority. Thus, antismoking messages communicated through parents, teachers, and the media may have a stronger effect on adolescents' behaviors in China than in Western countries.

Antismoking Messages From the Family

The family unit is the primary agent of socialization. It provides a basic social environment where various social, cultural, and biological factors interact and lead to different behavioral outcomes among children and youths. Smoking and antismoking practices of parents are presumed to be the fundamental determinants of children's experiment or use of tobacco. Unlike parental smoking, which has been frequently found to predict children's smoking behavior (e.g., Biglan, Duncan, Ary, & Smolkowski, 1995; den Exter Blokland, Engels, Hale, Meeus, & Willemsen, 2004; Gilman et al., 2009; Hill, Hawkins, Catalano, Abbott, & Guo, 2005; Peterson et al., 2006), the transmission of antismoking messages from parent to child was reported as having mixed, if any, effects on the onset and the continuation of tobacco use among adolescents (Andrews, Hops, Ary, Tildesley, & Harris, 1993; Ennett et al., 2001; White, 2012). According to a recent study using longitudinal data, children initiated smoking and drinking behaviors despite warnings and concerns from their parents regarding the use of such substances. Additional analysis in the study showed that adolescent exposure to antismoking or antidrinking rules and disciplines from parents predicted even an increased use of tobacco or alcohol (Ennett et al., 2001).

Chinese adolescents come from a family environment that is different in some ways from the average family environment in the United States. For example, the average family size in modern China is smaller than that in the United States because of the One Child Policy. Therefore, Chinese adolescents usually receive more parental attention at home than do their American counterparts (Wen et al., 2007). In addition, China is often perceived as a high power distance culture, indicating that Chinese children are taught to strictly obey and follow their parents' orders (Hofstede, 2011). The perceived disapproval from parents might have substantial effects on the choice of behaviors among Chinese adolescents. Whether the conveyance of antismoking messages from parent to child produces beneficial effects among Chinese adolescents merits the analysis in this study.

Antismoking Messages From the School

As adolescents spend a considerable amount of their time in school, school environments have a major influence on their behavioral choices; school-based smoking prevention programs are therefore widely adopted. One of the preventive approaches commonly used by some Chinese middle schools is a classroom-based and teacher-delivered education regarding the adverse physical, mental, and social consequences of tobacco use (Wen et al., 2007). This approach aims to reduce, delay, or prevent smoking by exposing adolescents to the hazards, disciplinary consequences, and counternormative nature of smoking. The basic assumption is that the adolescent behavior is guided by rationality, and that given the new knowledge and clarification of the norms, they will change their behaviors accordingly (Paglia & Room, 1999).

In general, school-based intervention programs have been found to be effective in reducing adolescent smoking, especially when the curriculum emphasizes on the short-term effects (e.g., bad breath, yellow teeth and fingers, dry and wrinkled skin, smelly clothes and hair, etc.) of tobacco use (Bachman, Johnston & O'Malley, 1991; Bellew & Wayne, 1991; Miller, Gillespie, Billian, & Davel, 2001; Sussman et al., 1993), the social disapproval from the majority of peers who are not smokers (Crone et al., 2003; Wiborg & Hanewinkel, 2002), and the social skills needed to resist any sociocultural pressures to smoke (Bruvold, 1993; Flay, 2000; Leventhal, Keeshan, Baker, & Wetter, 1991; Stead, Hastings, & Tudor-Smith, 1996).

Antismoking Messages From Mass Media

In addition to family and school, adolescents often receive smoking-related messages from mass media sources including television programs, movies, newspapers, magazines, billboards, and the Internet. In China, the government banned cigarette advertising nationwide in 1995 in an effort to reduce smoking prevalence (Taylor & Raymond, 2000). The ban includes the publication of advertisements related to tobacco or tobacco products through radio broadcasts, cinematography films, television programs, newspapers, and magazines. The placement of tobacco advertisements in public places such as waiting rooms, theaters, conference halls, sports stadiums, and gymnasiums was also prohibited (Advertisements Law of the People's Republic of China, Article 18). In the meantime, the government has promoted antismoking advertisements of all forms, aiming to reduce or cease smoking among regular smokers and to prevent the initiation of smoking among non-smokers. Often the antismoking media campaigns in China used TV programs and billboard advertisements to dismiss gifting cigarettes as an acceptable social norm (Mullin, Prasad, Kaur, & Turk, 2011). No researchers have focused on categorizing the themes of antismoking advertisement in China, except Wu and Lin (2013). They used Pechmann, Zhao, Goldberg, and Reibling's (2003) typology of antismoking message themes as a guideline to examine the effects of those messages on Chinese adolescents' smoking cognition and behavioral intention. The themes are disease and death, endangerment of others, cosmetics, inauspicious life circumstances, refusal skill, role models, and marketing

and selling tactics. According to Wu and Lin, these seven themes generated by Pechmann and colleagues (2003) are also present in the antismoking messages in China. Although antismoking advertising in China does not target adolescents in particular, it was expected to play an important role in adolescent smoking prevention since teenagers are often heavily exposed to advertisements in the media (Jernigan & Wright, 1996; Kuang, 2008).

To date, only a few studies have assessed the influence of antismoking media messages on tobacco use among Chinese adolescents. The outcome variable in these studies is mainly the attitude toward smoking. The studies have also been limited to the analysis of messages conveyed through the print media. Yang and colleagues (2004), for example, conducted an explorative analysis of the printed health educational materials for tobacco control and found only a few to be appealing to adolescents in China. In a control group study, Kuang (2008) tested the short-term effects of antismoking posters on Chinese adolescents' smoking-related attitudes and intentions. Results showed that the viewers of these antismoking posters did not exhibit stronger antismoking attitudes or intentions disregarding the themes in the ads. With the implementation of more antismoking ads since 2006, further studies are needed to explore the general effects that such ads have on the smoking behavior of Chinese adolescents.

Method

Study Setting and Sampling Procedure

Bayannaoer, Changchun, Dalian, and Nanjing are four cities of moderate to large size in different regions of China, with a population of 1.7, 7.1, 5.9, and 6.1 million, respectively. They were among 17 cities selected in 2009 to participate in the Emory Global Health Institute – Tobacco-Free Cities (TFC) program, an initiative funded by the Bill & Melinda Gates Foundation with the aim of changing the social norms regarding tobacco use in China. Each city implemented interventions that emphasized on creating smoke-free environments among various target populations including pregnant women, government employees, healthcare providers, and school students (Huang et al., 2013). Bayannaoer, Changchun, Dalian, and Nanjing all targeted school students and personnel. Within each city, a survey of students from Grade 7 to 12 was performed in a number of junior and senior high schools that were chosen using stratified cluster sampling. All students in these schools were included in the survey. The sample consisted of 8,444 students.

The survey questions were adapted from the core questions in the Global Youth Tobacco Survey about tobacco-related knowledge, attitudes and behaviors, policies in a range of environments (e.g., home, school), and exposure to secondhand smoke. These questions were translated into Chinese, adapted to the context of China, and pilot-tested. Efforts were made to ensure that the survey participants understood the questions. The Institutional Review Board of the Centers for Disease Control and Prevention in each city approved the survey. Enumerators from the Centers for Disease Control and Prevention received training before

administering the survey and strictly followed the protocol. The survey was anonymous and underwent a passive consent process, in which a letter was first sent to parents describing the survey's main purpose, the protection of the students' privacy, and the voluntary nature, that is, the students have the right not to participate in the survey with the parents' signature. Teachers were not present while the students completed the survey, and enumerators checked each returned questionnaire for completion.

Measures

Past 30-Day Smoking

We measured adolescents' past 30-day smoking, one of the outcome variables of this study, with a single question: "During the past 30 days, on how many days did you smoke cigarettes?" Those who answered "0 days" were defined as non-smokers. The rest, who answered "1 to 30 days", were defined as current (past 30-day) smokers.

Smoking Intention

We measured intention to smoke, the other outcome variable of this study, with a single question, "Do you think you will be smoking in five years from now?" Those who responded positively were marked as having intention to smoke.

Antismoking Messages From Family

We measured this key predictor using the question, "Has anyone in your family discussed the harmful effects of smoking with you?" The respondents answered, "definitely not," "probably not," "probably yes," or "definitely yes." Students who answered "definitely yes" were coded as having received antismoking messages from family.

Antismoking Messages From School

This variable was measured with the question, "During this school year, were you taught in any of your classes about the dangers of smoking?" The respondents answered "yes," "no," or "not sure." Those who answered "yes" were coded as students who have received antismoking messages from teachers.

Antismoking Media Messages

In the questionnaire, students were asked, "During the past 30 days, how many antismoking media messages (e.g., television, radio, billboards, posters, newspapers, magazines, movies) have you seen or heard?" The answers were categorized into three categories, "a lot," "a few," and "none," indicating the levels of exposure to antismoking media messages from high to low.

We also measured a variety of variables known to be associated with smoking and intention to smoke, including parental smoking, peer factors, and smoking-related knowledge and attitudes (e.g., Leatherdale, McDonald, Cameron, Jolin, & Brown, 2006; Simons-Morton et al. 1999). Specifically, parental smoking was measured by the question, "Do your parents smoke?" The peer-related questions included "Does any of your closest friends smoke cigarettes?", "Do you think boys who smoke have more or fewer friends?", "Do you think girls who smoke have more or fewer friends?",

“Do you think smoking cigarettes makes boys look more or less attractive?”, and “Do you think smoking cigarettes makes girls look more or less attractive?” Smoking-related knowledge and attitudes were measured by questions, “Do you think cigarette smoking is harmful to your health?” and “Does smoking cigarettes help people feel more or less comfortable at celebrations, parties, or other social gatherings?”

Analytical Strategies

Because the data used in the study exhibited hierarchical structures with individual observations nested within the schools, hierarchical logistic regression models (Bryk & Raudenbush, 1992) were used to correct for the lack of independence among nested observations. We did so by separating the residual variance into two components: a residual variance at the individual level and a residual variance that is constant across individuals within a school but random across different schools. The standard errors produced by this approach allowed for valid tests of statistical significance (for more discussion, see Bryk & Raudenbush, 1992).

Two series of models were estimated. The first series of models estimated the association between the exposure to antismoking messages and current smoking status of adolescents, controlling for age, grade, and all other smoking-related factors. Given the cross-sectional nature of the data and the difficulty to specify the causal direction of certain variables, another series of models were added to estimate the influence of antismoking messages on smoking intention. All the hierarchical logistic models were analyzed by HLM 7.0. We reported the odds ratios (ORs) and their 95% confidence intervals (CI) with a robust standard error.

Results

The descriptive analysis of the sample is presented in Table 1. Both genders were about equally represented, with 49.1% boys and 50.9% girls. The age of the majority of students ranged from 12 to 17 years. Among all the respondents, 6.1% indicated that they had smoked in the past 30 days and 16.8% indicated that they would start smoking within five years. A greater proportion of boys than girls reported as having smoked in the past thirty days: 11.2% for boys versus 1.2% for girls. A similar proportion was present among adolescents regarding an intention to smoke within 5 years: 25.8% for boys versus 8.1% for girls. Among the key predictors, a little less than half of the students reported that their parents had discussed the harmful effects of smoking with them and around two thirds of the students received antismoking education in class. Regarding the amount of exposure to antismoking media messages, 30.4% of students reported “a lot” compared with 47.5% who reported “a few” and 21.8% who reported “none.”

Table 2 reports the past 30-day smoking analysis using the hierarchical logistic regression model. In the basic model, we estimated how the exposure to antismoking messages

Table 1. Characteristics of respondents

	Total (<i>N</i> = 8,444)	Male (<i>n</i> = 4,142)	Female (<i>n</i> = 4,302)
Smoked in the past 30 days? (%)			
Yes	6.1	11.2	1.2
No	92.0	86.8	97.1
Missing	1.8	2.0	1.7
Will smoke in 5 years from now? (%)			
Yes	16.8	25.8	8.1
No	83.2	74.2	91.9
Family discussed the harm of smoking? (%)			
No or uncertain	53.8	50.2	57.3
Definitely yes	46.2	49.9	42.7
Taught about the dangers of smoking in class during this school year? (%)			
No or not sure	25.3	27.3	23.3
Yes	66.4	64.1	68.7
Missing	8.6	8.6	8.0
During the past 30 days, how many antismoking media messages (e.g., television, radio, posters, newspapers, magazines, movies) have you seen or heard? (%)			
None	21.8	22.2	21.4
A few	47.5	46.1	48.8
A lot	30.4	31.3	29.6
Missing	0.3	0.4	0.2
Have you ever tried or experimented with cigarettes? (%)			
Yes	14.3	23.1	5.8
No	85.6	76.8	94.1
Missing	0.1	0.1	0
Age, years (%)			
≤ 12	15.6	16.3	14.9
13	16.7	16.6	16.9
14	13.9	14.3	13.4
15	13.3	13.2	13.5
16	17.4	17.2	17.6
≥ 17	23.0	22.3	23.7
Missing	0.1	0.1	0
Grade (%)			
7th	28.9	30.8	27.1
8th	20.4	19.9	20.9
9th	13.8	14.2	13.4
10th	19.1	18.6	19.5
11th	10.8	9.8	11.8
12th	7.0	6.7	7.3
Do your parents smoke? (%)			
No	40.8	39.9	41.5
Father only	54.7	54.9	54.5
Mother only	0.8	0.8	0.7
Both	3.6	4.0	3.2
Missing	0.2	0.3	0.1
Any close friends smoke? (%)			
No	55.3	46.9	63.4
Yes	44.6	52.9	36.5
Missing	0.1	0.2	0.1

(Continued)

Table 1. Continued

	Total (<i>N</i> = 8,444)	Male (<i>n</i> = 4,142)	Female (<i>n</i> = 4,302)
Boys who smoke have more friends? (%)			
No	78.7	78.9	78.5
Yes	20.5	20.3	20.8
Missing	0.8	0.9	0.7
Girls who smoke have more friends? (%)			
No	93.1	92.1	94.1
Yes	6.7	7.7	5.7
Missing	0.2	0.2	0.1
Boys who smoke are more attractive? (%)			
No	83.4	81.3	85.5
Yes	16.4	18.5	14.4
Missing	0.1	0.2	0.1
Girls who smoke are more attractive? (%)			
No	90.6	88.9	92.3
Yes	9.1	10.9	7.5
Missing	0.2	0.2	0.3
Smoking makes social gatherings more comfortable? (%)			
No	96.7	95.3	98.1
Yes	9.1	4.6	1.9
Missing	0.2	0.1	0.1
Smoking is harmful to your health? (%)			
No	13.1	16.0	10.3
Yes	86.8	84.0	89.6
Missing	0	0	0.1

affected teenage smoking habits within schools, controlling for age and grade level. As depicted, the risk of smoking in the past 30 days for students who had received antismoking messages at home was significantly higher than those who had not (OR = 1.46; 95% CI [1.22–1.74]). Students who learned about the risk of smoking in school were less likely to smoke than those who reported otherwise (OR = 0.60; 95% CI [0.45–0.80]). As for the antismoking messages in the media, those who saw or heard “a lot” of such media messages were less likely to smoke in the past 30 days than those who saw or heard no such messages (OR = 0.67; 95% CI [0.51–0.86]). No significant difference was found between those who saw or heard “a few” such media messages and those who saw or heard “none.”

When controlling for all other key variables in the full model, the same association remained. More specifically, the exposure to antismoking messages in families predicted an increased level of smoking in the past 30 days (OR = 1.72; 95% CI [1.45–2.04]). In contrast, both the class discussion about the danger of smoking (OR = 0.70; 95% CI [0.56, 0.89]) and the exposure to a great amount of antismoking media messages (OR = 0.73; 95% CI [0.56, 0.95]) predicted decreased levels of past-30-day smoking.

Table 3 presents the analysis of how the exposure to antismoking messages from families, schools, and the media sources affects smoking intention among adolescents, controlling for age, grade level, current smoking status (past

30-day smoking), and school location at baseline. Both the basic model and the full model found the same associations

Table 2. Hierarchical logistic regression analyses of antismoking messages on past 30-day smoking (sex, age, grade, and school ID controlled)

	Basic model	Full model
Family discussed the harm of smoking (Ref: no)		
Yes	1.46*** (1.22, 1.74)	1.72*** (1.45, 2.04)
Class discussed danger of smoking (Ref: no)		
Yes	0.60*** (0.45, 0.80)	0.70** (0.56, 0.89)
How many antismoking media messages (e.g., television, radio, posters, newspapers, magazines, movies) have you seen or heard? (Ref: none)		
A few	0.87 (0.69, 1.09)	0.94 (0.76, 1.17)
A lot	0.67** (0.51, 0.86)	0.73* (0.56, 0.95)
Parents smoking (Ref: no)		
Father only		1.10 (0.87, 1.41)
Mother only		3.52** (1.50, 8.23)
Both		4.43*** (2.56, 7.64)
Close friends smoking (Ref: no)		
Yes		10.53*** (6.73, 16.47)
Boys who smoke have more friends? (Ref: no)		
Yes		1.32 (0.97, 1.80)
Girls who smoke have more friends? (Ref: no)		
Yes		1.09 (0.69, 1.72)
Boys who smoke are more attractive? (Ref: no)		
Yes		2.04*** (1.38, 3.02)
Girls who smoke are more attractive? (Ref: no)		
Yes		0.99 (0.67, 1.46)
Smoking makes social gatherings more comfortable? (Ref: no)		
Yes		4.42*** (3.05, 6.41)
Smoking is harmful to your health? (Ref: no)		
Yes		0.38*** (0.27, 0.55)

p* < .05, *p* < .01, ****p* < .001.

Table 3. Hierarchical logistic regression analyses of antismoking messages on smoking intention (age, grade, past smoking, and school ID controlled)

	Basic model	Full model
Family discussed the harm of smoking (Ref: no)		
Yes	0.95 (0.80, 1.14)	1.06 (0.90, 1.23)
Class discussed danger of smoking (Ref: no)		
Yes	0.64*** (0.53, 0.78)	0.72** (0.59, 0.88)
How many antismoking media messages (e.g., television, radio, posters, newspapers, magazines, movies) have you seen or heard? (Ref: none)		
A few	0.89 (0.75, 1.06)	0.89 (0.76, 1.06)
A lot	0.65*** (0.51, 0.82)	0.66*** (0.52, 0.84)
Parents smoking (Ref: no)		
Father only		1.46*** (1.19, 1.79)
Mother only		3.28** (1.35, 7.99)
Both		2.01** (1.22, 3.30)
Close friends smoking (Ref: no)		
Yes		3.12*** (2.46, 3.97)
Boys who smoke have more friends? (Ref: no)		
Yes		1.12 (0.87, 1.45)
Girls who smoke have more friends? (Ref: no)		
Yes		0.86 (0.63, 1.19)
Boys who smoke are more attractive? (Ref: no)		
Yes		1.55** (1.13, 2.13)
Girls who smoke are more attractive? (Ref: no)		
Yes		1.15 (0.82, 1.62)
Smoking makes social gatherings more comfortable? (Ref: no)		
Yes		1.84** (1.20, 2.86)
Smoking is harmful to your health? (Ref: no)		
Yes		0.38*** (0.29, 0.49)

** $p < .01$, *** $p < .001$.

between the three key variables and the intention to smoke. In the full model, family discussions about the harmful effects of smoking were not associated with smoking (OR = 1.06; 95% CI [0.90, 1.23]). Being taught about the dangers of smoking in class predicted a decreased level of smoking intention (OR = 0.72; 95% CI [0.59, 0.88]). Compared with students who claimed to have received no antismoking media messages, those who claimed that they had perceived “a lot” of such messages were less likely to report that they would smoke in 5 years, controlling for all other confounders.

Discussion

In China today, antismoking education and messages are commonly adopted to prevent adolescents from smoking. The current study examines the effects of the exposure to antismoking messages from three major sources, families, schools, and the mass media, on the current smoking habits and smoking intentions of Chinese adolescents. The results of the analysis generally support the assumptions and premises held by the policy makers and programmers that school-based antismoking education and antismoking advertisements in the media would serve the preventive purposes. Family-child communication/parent-child communication, in contrast, exhibits no beneficial effect on adolescent prevention in our sample.

The first key factor found to be effective in adolescent smoking prevention in the present research is a teacher-delivered antismoking lesson in school. According to the analysis, an antismoking education from school is associated with an adolescent's smoking habit and smoking intention. The students who received lessons on the dangers of smoking in class were less likely to report current smoking or intentions to smoke in the future. This finding echoes the idea behind several school-based adolescent smoking prevention pilot programs in China.

The Stay Away from Tobacco program, for example, is a school-based adolescent smoking prevention program conducted in Beijing, China (Chen, Fang, Li, Stanton, & Lin, 2006). Three hundred and eighty one students in Grades 7, 8, 10, and 11 are assigned to three groups (an intervention group with school teachers delivering the program, an intervention group with researchers delivering the program, and a comparison group). The intervention curriculum involves teaching students about the social, psychological, and physical consequences of smoking and providing social skills to resist peer pressure and media pressure. The program showed that adolescents who received the educational program experienced a significant decline in cigarette smoking whereas no decline was observed among those who did not receive the program. Two other school-based smoking randomized intervention programs in Wuhan and Guangzhou yielded similar results (Chou et al., 2006; Wen et al., 2010). Researchers found that the prevention curriculum that addressed the students' smoking-related knowledge, attitudes, and refusal skills significantly inhibited the escalation from experimental to regular smoking among Chinese adolescents.

In addition to school-based antismoking education programs, antismoking advertising in the media has beneficial effects in reducing tobacco use among Chinese adolescents as indicated in the present research. Adolescents who are exposed to a large amount of antismoking media messages are less likely to smoke cigarettes on a regular basis and are less prone to smoke in the future than those who were exposed to none.

Similar beneficial effects of antismoking advertising can be found in a number of antismoking campaigns in the U.S. and other countries. Several studies found that the campaigns appeared to be effective in preventing or reducing adolescent smoking (Emery et al., 2012; Emery et al., 2005; Farrelly et al., 2002; Wakefield, Flay, Nichter, & Giovina, 2003), especially when they were implemented with other antismoking strategies such as a community-based intervention or smoke-free policy (Pechmann & Reibling, 2000). Although these studies have concluded that the exposure to the campaigns would prevent the escalation from experimentation to established smoking stage and reduce tobacco use among adolescents, they failed to distinguish the effects of antismoking advertising from those of other tobacco control programs (Kuang, 2008). The present study suggests that exposure to antismoking media messages decreased adolescents' intentions to smoke, when controlling for reported exposure to other typical antitobacco programs.

However, neither the previous studies on the antismoking campaigns nor the present research has investigated the possible indirect effect of the media advertising on adolescent smoking. For example, adolescents may assume that smoking-related messages in the mass media will influence the attitudes and behaviors of their peers, and these perceptions in turn can influence their own smoking behaviors (Gunther, Bolt, Borzekowski, Liebhart, & Dillard, 2006). Due to the limitation of the data used in the present study, further research is needed to determine whether such indirect effects exist in the prevention of smoking among Chinese adolescents through the antismoking advertising on the media.

In China, very few antismoking media campaigns were designed to target adolescents in particular. Given the findings in the current and other relevant studies, China should consider implementing more adolescent-specific media campaigns, which may strengthen the beneficial effect by using the media channels that communicate to the larger number of young audiences and focusing on the topics that adolescents feel more interested in.

Unlike school-based tobacco prevention programs and antismoking advertisements in the media, antismoking messages from parents and other family members did not show any association with the intention to smoke in adolescents in our sample. Messages from parents and family appeared to be associated with an increased risk of current smoking of adolescents, which is counter-intuitive and against our hypothesis that antismoking messages from family members should prevent adolescent from smoking. Similar findings regarding familial antismoking socialization were reported in Western countries. For example, using cross-sectional data from 119 Dutch families, Engels and Willemsen (2004) found

no association between parental warnings regarding the dangers of smoking and the adolescents' intention to smoke. In another study based on longitudinal data, Engels, Finkenauer, Kerr, and Stattin (2005) again failed to find significant links between the smoking-specific parental control (e.g., perceived parental warnings and rules) and smoking onset among Dutch adolescents. Similarly, other longitudinal study conducted in the United States found that parent-child communication about adolescent tobacco use was not related to the initiation of smoking (Ennett et al., 2001).

A possible explanation for these puzzling findings is related to the attenuation of familial influence during the adolescent years. Adolescence is a transitional stage before adulthood. During this stage, teens seek independence and status among peers. As adolescents spend a considerable amount of their time with friends and outside their homes, peer pressure emerges as a powerful influence over behavioral changes (Houston, 1993). It is possible that the parental control, once influential on children (Henriksen & Jackson, 1998), diminishes or even acts counterproductively when the warnings, rules, and disciplines conveyed are conflicting with their peer norms (Engels et al., 2005). This phenomenon of decreased parental authority over children's behaviors during their adolescent years may be more common in current context of China. Because of the One Child Policy that has been enforced since the 1980s, many children were the only child of the family and often described as the "spoiled generation" (Lee, 2012).

The observed association between the parent-child communication about tobacco use and the initiation of smoking of adolescent, however, is more likely due to the reverse causation. Parents or other family members of a teenage smoker are more likely to initiate conversation about the harmful effects of tobacco use, which leads to an increased level of family-delivered antismoking messages. In another word, parental warnings about the harmful effects of tobacco use tend to be a response to children's smoking behaviors rather than a preventive strategy used in advance. A randomized controlled trial design may be used for a better understanding of the causal effect of family-child communication on adolescent tobacco use (Leiva et al., 2014).

Our study showed that adolescents whose parents do not smoke were less likely to smoke. It may suggest that responsible parent modeling is crucial and should be promoted to prevent adolescents from smoking. Training programs that raise parental awareness on the importance of behavioral modeling at home can be integrated into school-based smoking prevention programs (Flay, 2000). By inviting parents to class discussions or other intervention activities, the school can help parents better understand the proper behaviors to model and reinforce, as well as suggest preventive strategies needed to prevent their children from smoking. In the meantime, greater investments should be made in interventions to promote quitting among adult smokers (and parents in particular). Tobacco control resources would be most effective if directed towards adult cessation rather than youth prevention.

The relationship between the exposure to antismoking messages and adolescent smoking in our sample should be

interpreted with caution. Although the antismoking messages from schools and the media are negatively associated with current levels of tobacco use, the cross-sectional nature of the data prevents the inference of causality. When data become available, a longitudinal research design would be highly desirable to determine whether exposure to such messages will influence tobacco use. This type of study is also essential to discover how the effects of antismoking messages are mediated by other smoking-related variables. For example, exposure to antismoking messages may not reduce adolescent tobacco use directly. Instead, they could affect normative beliefs regarding tobacco use, which, in turn, affects the subsequent behaviors. Although we include variables such as smoking-related attitudes and knowledge in the analysis, the cross-sectional design is not sufficient for specifying the real causal order.

The present study has other limitations. Firstly, we did not have enough information to differentiate the content of family and teacher-delivered antismoking messages or distinguish between various antismoking advertisements in the media. We were therefore unable to provide suggestions regarding what forms of antismoking messages would be most effective. Secondly, the findings from this study may not be generalizable to the entire Chinese adolescent population given that our study sample was drawn from only four cities. Last, all claims on current smoking habits and intentions to smoke were self-reported. Although appropriate measures such as keeping the questionnaires anonymous and dismissing the teachers from the survey site were taken, some students might have been reluctant to report the truth.

Despite these limitations, findings from this study suggest that antismoking school curricula and the media advertising may play an important role in smoking prevention among Chinese adolescents. It merits further research to evaluate and synthesize the effectiveness of various prevention and control strategies targeted at the young in different social contexts.

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