Smoking behaviors and intentions among adolescents in rural China

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Smoking behaviors and intentions among adolescents in rural China: The application of the Theory of Planned Behavior and the role of social influence

ABSTRACT

Introduction: This study investigated the associations between the variables of the Theory of Planned Behavior (TPB), influence of significant others, and smoking intentions and behaviors among adolescents living in rural southern China.

Methods: A cross-sectional study was conducted among 2,609students in two junior high schools in rural Shantou, Guangdong province, using a self-administered questionnaire. Logistic regression models were fitted to estimate univariate and adjusted odds ratios and corresponding 95% confidence intervals.

Results: Multivariate analyses showed that having favorable attitudes towards smoking on psychological and social aspects, perceived behavioral control, and having most friends who were current smokers were significantly associated with smoking intentions in the next six months and in the next five years. Having most family members who were current smokers was also significantly related to smoking intention in the next five years. Having favorable attitudes towards smoking on psychological aspect and negative attitudes on physical aspect, perceived support from friends on smoking, and having most friends and senior relatives being current smokers were significantly associated with increased likelihood of ever smoking. Perceived behavioral control and having most friends being current smokers were also significantly associated with regular smoking and smoking in the past 30 days.

Conclusions: Our results suggest that the key constructs of the TPB model and friends' smoking

behaviors play important roles in accounting for smoking intentions and behaviors among rural Chinese adolescents.

INTRODUCTION

It is estimated that there were 301 million smokers in China [1], one third of all smokers worldwide [2]. As of 2010, the prevalence of current smoking was 52.9% among males and 2.4% among females in China [1]. The country has the largest number (over one million in 2005) of people dying from smoking-related diseases [3]. By 2030, 3.54 million adults aged 40 years or above in China will die from smoking-related diseases [3]. In a national survey conducted in cities in China, the prevalence of life-time smoking was 22.4% among male middle school and college students and 3.9% among female students [4]. A lower age of onset for smoking has also been observed in China [3]. This trend is consequential, as those who start smoking in early adolescence are more likely than others to become regular smokers [5].

Higher prevalence of ever smoking was reported in rural areas than in urban areas in Zhejiang province [6]. However, the reverse trend was observed in Shanghai [7]. Urban girls were consistently found to have higher smoking rates than rural girls [8, 9]. Although several anti-smoking interventions had targeted students in urban China [10, 11] no similar intervention has been found among rural adolescents. It is therefore important to identify factors associated with smoking among rural adolescents so that tailored interventions can be designed.

The Theory of Planned Behavior (TPB) is commonly used in health behavior research. It states that individuals' attitudes toward a health-related behavior (cognitive and affective evaluations of that behavior), subjective norms (perceptions of significant others' approval of that behavior), and perceived behavioral control (perceived competence to perform that behavior)

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determine their behavioral intentions, which leads to the performance of the behavior [12]. In particular, Ajzen [13] proposed that perceived behavioral control is comprised of two components: self-efficacy (the ease or difficulty of performing a behaviour) and controllability (the extent to which the performance is up to the actor). The theory has been able to predict smoking onset in a number of cross-sectional and longitudinal studies targeting adolescents in some western countries [14-16]. However, performance of behavioral theories varies across cultural contexts [17]. It is unclear whether it is applicable to understand smoking among adolescents in the Chinese context. Research is warranted as there is only one such study in China [18], which covered only urban and not rural adolescents.

Social influences are as important as cognitive factors in determining adolescent smoking behavior. According to the Social Cognitive Theory, a behavior is learnt through the observation of the behavior of others (Bandura, 2001). Parents' and friends' smoking behaviors are moderately to strongly associated with onset of smoking among adolescents [19-21]. Adolescents in rural China are surrounded by adult smokers, as 56.1% of the adult men in rural China are smokers [1]. Being surrounded by adult smokers is shown to be associated with adolescent smoking initiation [22]. Adolescence is characterized by a critical period for physical and psychosocial development, and social influence are said to be particularly important for their formation of identity and behaviors (Gifford-Smith, Dodge, Dishion, & McCord, 2005). Therefore, it is assume that peer influence will exert a significant influence on smoking over and above the beliefs that one may hold onto the behavior. It is expected that social influence will contribute to the prediction of behavioral intention independently of the TPB variables.

This study investigated the prevalence of ever-smokers, current smokers and regular smokers, and intention to smoke in the next six months and five years among junior secondary

school students in rural southern China. The timeframe of six months and five years was chosen as we wish to tap participants' intention to smoke in both the short and long term future. In particular, as national study in China reported that the average age of smoking initiation was 19 years old among Chinese men (Yang, Fan, Tan, & et al., 1999), we specifically asked participants intention to smoke in the coming five years (which is about 5 years from their current age). We tested the hypothesis that factors derived from the TPB and proportions of significant others being current smokers were significantly associated with the dependent variables related to smoking. We tested an additional hypothesis that TPB-related variables and proportions of significant others' current smoking variables were independently associated with smoking

METHODS

Study design and participants

A cross-sectional survey was conducted in November 2009. The study participants came from two junior high schools in Liangying County of rural Shantou in Guangdong province. With an area of 72.4 km^2 and a population of about 200 thousand living in 70 villages (Bureau of Statistics of Liangying Township, 2011). Liangying has a relatively high living standard and is classified as the second class out of the four classes of rural China (from very affluent to very poor). In 2009, the annual income per capita in Liangying was 5210 RMB, higher than the national average of 4140 RMB for rural araes in China but close to the mean of Guangdong Province (Bureau of Statistics of Liangying Township, 2011 ; National Bureau of Statistics of China, 2010). There were more than 10,000 students studying in 10 junior high schools in Liangying in the 2009/2010 academic year. Out of the 10 schools, two, which represented the average to above average academic performance level,

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were selected. These two schools belonged to the same school district and had similar facilities, number of students and smoking-related policies. Therefore, the influence of these structural variables on smoking was comparable.

An invitation letter was sent to the school principals, and both schools agreed to participate. Graduate students who majored in public health in the Shantou University assisted with the survey questionnaire administration. Before data collection, standard training was provided for the survey administrators to ensure the quality of the survey and to reduce the between-person variation. A structured and self-administered questionnaire was administered in classroom settings in the absence of teachers. All students in Grades 7-9 were invited to join the study and 2,609 students, representing a response rate of 93.4%, completed the survey. Written informed consent was obtained from their parents in advance. This study was approved by the Survey and Behavioral Research Ethics Committee of the Chinese University of Hong Kong.

Measures

Socio-demographic characteristics

Information collected included age, sex, school, grade, average pocket money received per day (none, ≤1.99 RMB, 2-4.99 RMB, or ≥5 RMB; 1US$=6.06RMB), and education level of the primary guardian.

Smoking-related dependent variables

Questions were asked to assess lifetime history of smoking (ever-smoking, "Have you ever tried smoking cigarettes, even one puff or two?" (No/Yes) and regular smoking ("Have you smoked cigarettes at least once a week for three months or more consecutively, previously or currently?") with 3 categories (No, previously yes but not now, currently yes). Similar definitions of ever smoking

and regular smoking have been used in other studies (Dierker, Avenevoli, Goldberg, & Glantz, 2004; Fuemmeler, Kollins, & McClernon, 2007). Current smoking was defined as 'ever smoked in the past 30 days'. Participants' intentions to smoke in the future were assessed by two questions: 'Do you think you will smoke in the coming six months?' and 'Do you think you will smoke in the next five years?' with 4 options ('definitely no', 'probably no', 'probably yes', and 'definitely yes') [23].

TPB-related construct variables

The Smoking Attitude Scale (SAS) was modified from a study targeting Chinese adolescents in Beijing [24]. It has three subscales on psychological (5 items), physical (6 items) and social (6 items) attitudes. The 4-point items range from 'strongly disagree' to 'strongly agree', with higher scores indicating more favorable attitudes towards psychological and social aspects but less favorable attitudes towards physical aspects of smoking. In this study, the Cronbach's α values of the three subscales were acceptable (0.69 to 0.75). Two 2-item scales were constructed for this study to assess subjective norms of family members (Cronbach's α =0.67) and friends (Cronbach's α =0.73) disapproval of the participant's smoking. The perceived behavioral control was measured by two constructs: controllability and self-efficacy. The 4-item Perceived Controllability (PC) scale was constructed by the research team to assess participants' behavioral control for refraining from smoking (Cronbach's α = 0.67). Responses included six categories (ranging from 'strongly disagree' to 'strongly agree'). The validated Chinese version of the 12-item Smoking Self-Efficacy Questionnaire (SEQ-12) was used to assess self-efficacy on internal (intrapersonal and physiological) stimuli and external (social) stimuli [25]. In addition, two items were used to assess self-efficacy in refusing smoking when their family members and friends offer cigarettes to them (5-point Likert scales: 'strongly disagree' to 'strongly agree'); a higher score indicated better self-efficacy to refrain from smoking. The Cronbach's α of the modified 14-item scale was 0.96.

Proportions of significant others being current smokers

Students were asked to estimate proportions of their family members, friends and older relatives being current smokers (none, a few, and most/almost all of them).

Data analysis

Univariate odds ratios (ORu), adjusted odds ratios (AOR) and the corresponding 95% confidence intervals (CI) were reported. Three sets of multivariable logistic regression models were fitted. Model I and II tested the hypotheses that: 1) the TPB-related variables, and 2) proportion of significant others' current smoking, were associated with smoking behaviors and intentions, adjusted for significant background variables, respectively. Model III tested the hypothesis that the TPB-related variables and proportions of significant others' current smoking variables were independently associated with smoking behaviors and intention by entering the two sets of variables into the same model. The mean values of the TPB-related construct scales were used to take into account missing data. For the TPB-related variables, proportions of significant others' current smoking, and the smoking-related outcome variables, complete case analysis was used, in which those with missing information were excluded. For the covariate variables, there were no missing data for school and grade. A missing category was created for the gender and age variables, whereas missing data were assigned values of the most common category (no pocket money) for the variable of average daily pocket money, because 955 out of 2391 students reported no pocket money. All statistical analyses were conducted using SPSS 16.0 and $p<0.05$ was considered statistically significant.

RESULTS

Socio-demographic characteristics, smoking prevalence and intentions

Slightly more than half (55%) of the participants were male; 36.6% reported receiving no pocket money (see Table 1 for other background characteristics). The prevalence of ever-smoking was 29.4% (42% for males and 14.1% for females, p < 0.001), while 5.6% (9.7% for males and 0.8% for females, p < 0.001) had smoked in the past 30 days (current smokers) and 5.4% (9.3% for males and 0.5% for females, p < 0.001) had smoked cigarettes at least once a week consecutively for at least three months either in the past or currently (regular smokers). Of all sampled students, 4.6% (7.2% for males and 1.5% for females, p < 0.001) intended to smoke in the next six months and 13.3% (21.3% for males and 3.7% for females) intended to smoke in the next five years (Table 1). Amongst never smokers, 2.1% (3.4% for males and 0.9% for females, p < 0.001) intended to smoke in the next six months and 7.5% (13.7% for males and 2.3% for females, p < 0.001) in the next five years. Of the participants, 83.2%, 42.5%, and 96% reported having at least a few of their family members, friends, and senior relatives who were current smokers respectively.

Univariate analyses of factors associated with smoking behaviors and intentions

In the univariate analysis, girls were less likely than boys to be ever-smokers, current smokers or regular smokers, and to intend to smoke in the next six months or in the next five years (p < 0.001). Students aged 15-17 years, as compared to those aged 11-12 years, were more likely to be ever-smokers, current smokers and regular smokers (p < 0.05). Receiving daily pocket money of 5 RMB or more was significantly associated with all the variables on smoking behaviors and intentions (p < 0.05). In addition, all TPB variables, and having at least a few of their family members and friends as current smokers were significantly associated with variables on smoking behaviors and intentions (p < 0.05). Having most or almost all older relatives as current smokers was associated with ever-smoking and current smoking (p < 0.05) (Table 2).

Multivariate analyses of smoking behaviors

Adjusted for the significant background variables, almost all of the TPB variables remained significantly associated with the studied smoking behaviors, with the exception of subjective norms involving family members and regular smoking (Table 3, Model I). In Model II, having at least a few friends who were current smokers was significantly associated with all variables on smoking behaviors, adjusted for significant background variables.

In Model III, most of the TPB variables remained significant when the variables on proportion of significant others' being current smokers were included in the model, although the associations were attenuated compared to Model I. The subjective norm involving friends was no longer significantly associated with current smoking, after being adjusted for having friends being current smokers. In contrast, having a few, most or almost all friends as current smokers remained significantly associated with all variables on smoking in the presence of the TPB variables, although the strength of the associations was attenuated (Table 3).

Multivariate analyses of smoking intentions

Adjusted analyses showed that the TPB variables, including psychological and social attitudes toward smoking, subjective norm involving friends, controllability and self-efficacy, were significantly associated with the two variables on intention to smoke in the future (Table 4, Model I). Having friends being current smokers was significantly associated with the two variables on intention to smoke, while having family members being current smokers was significantly associated with intention to smoke in the coming five years but not with intention to smoke in the next six months (Table 4, Model II).

In Model III which included both TPB variables and variables on proportion of significant others' being current smokers, subjective norm involving friends was no longer significantly associated with the variables on smoking intention, while the attitudinal and perceived behavioral control variables remained statistically significant. The associations between having at least a few friends as current smokers and smoking intentions remained significant, although the strength also became attenuated. In contrast, the association between having most or almost all family members as current smokers and intention to smoke in the next five years remained significant and became stronger after adjusting for TPB variables.

DISCUSSION

Almost one third of the sampled junior high students (42% for boys and 14.1% for girls) in rural China had ever smoked, while about 10% of the male students were current or regular smokers. Among never-smoked students, about 2% intended to smoke in the next six months. Furthermore, 7.5% (13.7% for males and 2.3% for females) of the never-smoked students intended to smoke in the coming five years. Therefore, we expect that around 15% of this cohort would become smokers during their late teenage years. Anti-smoking interventions targeting junior high school students in rural China are lacking and urgently warranted.

The prevalence of smoking obtained from this study was slightly lower than that of a previous national survey, which reported a 32% prevalence of experimental smoking. That study included adolescents between the ages of 11-20 and some were non-students[9], which may partially explain the slightly higher smoking prevalence observed in their study. Another national survey conducted only among high school and college students in urban cities cities in 2005 reported a life-time smoking prevalence of 29.5% for junior high school boys and 14.2% for girls

[4]. Therefore, we observed a much higher male life-time ever smoking rate than the 2005 national survey and a very similar ever smoking rate for females.

One of the most distinctive features of smoking patterns in China is the disparity between the high prevalence among males and the low prevalence among females. This trend applies to adolescents as well [4, 9, 18] and was supported by this study. In China, smoking was traditionally considered a masculine act and was socially unacceptable for females [27]. Female smokers are often stigmatized as promiscuous women [28]. However, with the rapid economic growth in China, the Chinese women enjoy higher levels of political and social freedom [27]. To the tobacco industry, the rural women in China have emerged as an enormous barely-tapped market, and aggressive marketing strategies now portray smoking as a desirable behavior for women [26]. Thus, cultural barriers to female smoking may be reduced as a result.

Positive psychological attitudes toward smoking were significantly associated with most of the dependent variables related to smoking behavior and intentions after adjusting for the background variables and significant others' smoking status. In a previous longitudinal study in Beijing, perceived psychological values at baseline was one of the strongest predictors of past 30-day smoking at the six-month follow-up, especially among male adolescents [24]. Positive psychological values were important reasons for adolescent smoking in China [28]. Our results thus corroborate these previous findings.

Furthermore, our adjusted analysis showed that the physical attitudes subscale was significantly associated only with ever smoking. This is also consistent with the study results of Chen et al. [24] conducted in Beijing, which found that attitudes towards the physical aspects of smoking were less important in predicting 30-day smoking than attitudes towards the psychological and social aspects. Similarly, the 1998 National Smoking survey showed that

adolescent experimenters and smokers would continue to smoke despite their awareness of physical harm, believing that such harm would occur decades later [9]. These results may have been due to the fact that adolescents tend to give low priority to long-term health risks [29]. Thus, it may be more effective for interventions to focus on the immediate consequences of smoking when targeting this sample [30].

Perceived controllability and self-efficacy were significantly associated with current smoking and regular smoking status in this study. A meta-analysis reported an association between self-efficacy and smoking cessation [31], and decrease in self-efficacy over time was found to be associated with onset of smoking among adolescents [32]. The China Seven Cities Study (CSCS) has found that perceived ability to refuse offers of cigarettes was associated with smoking intention and behavior [18]. Perceived behavioral control was also found to moderate the effects of smoking-related attitudes and subjective norms [18]. In the present study, we measured self-efficacy comprehensively in two dimensions (internal and external). Both dimensions are important to guide the planning of interventions. Increasing controllability and self-efficacy to refrain from smoking through skill-based training is important in smoking prevention targeting the current sample.

Corroborating studies on adolescents in urban China [24] and in the U.S. [33], we found that positive attitudes towards the social aspect of smoking were significantly associated with smoking behaviors and intentions. Smoking has an important traditional social function in China. Offering cigarettes to others is a gesture of friendliness, politeness and good will, as well as a normative behavior in social and business interactions [34]. In the absence of effective health promotion, this culture remains intact in contemporary rural China. Hence, rural Chinese adolescents grow up in a social and cultural environment that is supportive of smoking for social

reasons, including asking others to smoke and being asked to smoke. Relevant social norms and practices pose a significant challenge to smoking control efforts in China.

Social influence is extremely important for adolescents. Having friends who were current smokers was strongly associated with smoking, confirming the important role of peer influences in smoking among adolescents [20-21]. Such effect has also found to be independent from the TPB variables. Similarly, we found that subjective norm involving friends became non-significant after adjusting for proportion of friends being current smokers. This may be explained by the correlation between the two variables, as we expect that smoking friends would be supportive of smoking. Given the significant effect of peer influences observed in the present study, peer education involving adolescent ex-smokers may be a promising intervention approach [35]. Whereas some studies reported that parental smoking played an important role in smoking onset of their children [20, 36] others did not find a strong association [8, 37]. Our study did not specifically examine parental influence. However, we found that having family members as current smokers was significantly associated with smoking intention in the next five years but not with current and past smoking behavior, nor with intention to smoke in the next six months. While peer influences are important to adolescents in the shorter term, family members may exert an influence in the long run. Over the long term, it is important to involve family members in smoking interventions targeting the current sample of Chinese adolescents [27].

The study has several limitations. First, it was conducted only in two junior high schools in a rural town in Shantou, Guangdong province, China. Given the large geographic area, a huge size of rural population (around 47.43% in 2012) (National Bureau of Statistics of China, 2013) and limited funding, resources and time, it was difficult for us to draw a representative sample of rural adolescents. The study sample may represent junior high school students living in relatively

affluent rural areas in southeastern China at best. Caution should therefore be exercised in generalizing the results. Second, given the cross-sectional design, causal relationships cannot be established by our findings. Third, there may be social desirability biases, and self-reporting may have led to underreporting of smoking behaviors [38]. However, it is likely that this effect was minimal, as the survey was anonymous. By comparison with biochemically verified measurements on smoking, anonymous self-reported surveys have been found to be reliable and valid [39]. Fourth, some of the measures used in the present study had relatively low internal consistency (below 0.7), therefore the validity of the findings might have been limited.

In the present study, peer influence was measured by asking participants to estimate the proportion of their friends who have smoked. As pointed out by researchers, there are some limitations associated with this measure, as individuals may be inaccurate in characterizing the behavior and attitudes of their friends. The congruence in attitudes and behaviors reported may also simply be due to projection of the participant. Also, the peer effect may also be confounded with selection effects as adolescents are likely to choose friends based on common values, beliefs, and personality characteristics (Bauman & Ennett, 1996). The true peer effect documented in the present study might have thus been overestimated (Jaccard & Blanton, 2005). Despite such limitations, it is acknowledged that the estimation of peer effect is difficult given the various issues such as simultaneous effect (reflection), correlated unobservables (contextual effects), and endogenous group membership (Manski, 1993). The measure used in the present study is one of the most feasible and commonest ways in assessing peer effect reported in the literature, as compared to other methods such as experimental design (Cohen & Prinstein, 2006), or natural observations (Craig, Pepler, & Atlas, 2000). Future studies should seek to assess the behaviour of participant's peers directly. Longitudinal studies should also be used to document the changes in

behaviour between the participants and their peers, so that the selection effect can be delineated.

In sum, we find that the prevalence of smoking is high among Chinese rural adolescents. The TPB is applicable to explain smoking behaviors and intentions in this population, providing support for the use of this theory in designing anti-smoking prevention programs targeting the current sample. It is essential not only to focus on physical harm, but to also consider psychological attitudes toward smoking. Smoking status of significant others is also found to be significant predictors on adolescent smoking and such effect is independent from the TPB variables. Results provide important implications that interventions to reduce smoking among the current sample should target not only adolescents' beliefs about smoking, but also skills in mitigating the potential harmful effect of significant others. Empowerment and skill-based training to enhance self-efficacy to refrain from smoking offers are important, while peer education is a potentially effective strategy given the influence of peer norms on smoking behavior. As students with family members who were current smokers are likely to smoke in the next five years, family members need to be involved in interventions. Intensive anti-smoking efforts are warranted as such efforts are lacking at the present time. Finally, cognitive and social interventions can only be effective in the presence of policy changes, including the banning of smoking in public spaces, prohibiting youth from buying cigarettes, banning tobacco advertisements and increasing prices through taxation [3]. Such policies are either lacking or not well enforced in rural China [3]. Overall, findings of the present study call for the need of interventions in combating smoking among the current sample of rural adolescents in China and provide insights on the constructs that could be targeted when designing anti-smoking interventions targeting this population.

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Table 1 Characteristics of the study participants

	n	%
School		
A	1477	56.6
B	1132	43.4
Grade		
7	1156	44.3
8	854	32.7
9	599	23.0
Gender		
Boys	1407	55.0
Girls	1151	45.0
Ethnicity		
Han	2392	99.1
Others	21	0.9
Average daily pocket money (RMB)		
No pocket money	955	36.6
<=1.99	424	16.2
2-4.99	438	16.8
>=5	574	22.0
Education level of primary guardian		
Primary school or below	917	45.0
Junior secondary school	845	41.5
Senior secondary school	246	12.1
College or above	30	1.5
Proportion of significant others as current smokers		
Family members		
None	434	16.8
A few	2094	81.0
Most	58	2.2
Friends		
None	1482	57.4
A few	878	34.0
Most	220	8.5
Senior relatives		
None	104	4.0
A few	1495	57.8
Most	986	38.1
Ever smoking during life time (ever-smoking)		
No	1786	70.6
Yes	745	29.4
Regular smoking previously or currently (regular smoking)$^{\parallel}$		
No	2382	94.6
Yes	137	5.4
Ever smoking in the past 30 days (current smoking)		
No	2306	94.4
Yes	137	5.6
Smoking intention in the next six months among all students		
No	2474	95.4
Yes	120	4.6
Smoking intention in the next five years among all students		
No	2245	86.7
Yes	344	13.3

$^{\parallel}$Regular smoking is defined as "having smoked cigarettes at least once a week for three

months or more consecutively, previously or currently".

Table 2 Univariate odds ratios of TPB, proportions of significant others as current smokers, and demographic variables with smoking intentions and smoking behaviors

	Ever-smoking	Regular smoking	Current smoking	Smoking intention in the next six months	Smoking intention in the next five years
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
School					
B	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
A	0.86 (0.72, 1.02)	**0.53 (0.37, 0.75)**	**0.58 (0.41, 0.82)**	**0.38 (0.26, 0.56)**	**0.54 (0.43, 0.68)**
Grade					
7	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
8	**1.49 (1.22, 1.81)**	1.14 (0.77, 1.69)	**1.58 (1.09, 2.31)**	**1.55 (1.04, 2.31)**	1.25 (0.97, 1.62)
9	**1.49 (1.19, 1.85)**	1.10 (0.71, 1.72)	0.75 (0.45, 1.26)	0.72 (0.41, 1.25)	0.84 (0.62, 1.15)
Gender					
Boys	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
Girls	**0.23 (0.19, 0.28)**	**0.05 (0.02, 0.12)**	**0.08 (0.04, 0.15)**	**0.19 (0.12, 0.33)**	**0.14 (0.10, 0.20)**
Age (years)					
11-12	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
13	**1.25 (0.90, 1.75)**	1.05 (0.50, 2.21)	**2.36 (1.04, 5.34)**	0.90 (0.44, 1.87)	1.09 (0.71, 1.68)
14	**1.63 (1.18, 2.27)**	1.48 (0.72, 3.02)	1.94 (0.85, 4.43)	1.54 (0.78, 3.03)	1.34 (0.88, 2.03)
15-17	**2.05 (1.48, 2.86)**	**2.30 (1.15, 4.63)**	**3.17 (1.41, 7.12)**	1.56 (0.79, 3.11)	1.25 (0.81, 1.91)
Average daily pocket (RMB)					
No	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
<=1.99	1.04 (0.81, 1.33)	0.81 (0.45, 1.47)	0.94 (0.55, 1.63)	0.81 (0.44, 1.49)	1.30 (0.93, 1.82)
2-4.99	0.91 (0.71, 1.17)	1.12 (0.66, 1.88)	1.30 (0.80, 2.12)	1.32 (0.79, 2.20)	**1.46 (1.06, 2.01)**
>=5	**1.62 (1.30, 2.01)**	**2.21 (1.47, 3.30)**	**1.77 (1.17, 2.70)**	**1.59 (1.02, 2.48)**	**1.73 (1.30, 2.30)**
TPB variables					
Attitudes					
Psychological	**2.93 (2.40, 3.57)**	**4.67 (3.37, 6.46)**	**6.24 (4.43, 8.81)**	**7.36 (5.16, 10.48)**	**5.43 (4.21, 7.01)**
Physical	**0.82 (0.69, 0.97)**	**0.64 (0.47, 0.86)**	**0.69 (0.50, 0.93)**	**0.45 (0.34, 0.60)**	**0.53 (0.44, 0.65)**
Social	**2.79 (2.31, 3.37)**	**4.44 (3.25, 6.07)**	**4.56 (3.33, 6.23)**	**5.92 (4.26, 8.22)**	**4.62 (3.64, 5.86)**
Subjective norm					
Family members	**0.58 (0.50, 0.68)**	**0.52 (0.40, 0.67)**	**0.44 (0.35, 0.57)**	**0.44 (0.34, 0.57)**	**0.43 (0.36, 0.52)**
Friends	**0.48 (0.42, 0.56)**	**0.45 (0.35, 0.57)**	**0.39 (0.31, 0.50)**	**0.38 (0.30, 0.48)**	**0.41 (0.35, 0.49)**
Perceived behavioural control					
Controllability	**0.67 (0.60, 0.75)**	**0.51 (0.43, 0.59)**	**0.49 (0.42, 0.58)**	**0.43 (0.36, 0.51)**	**0.50 (0.44, 0.57)**
Self-efficacy	**0.66 (0.61, 0.72)**	**0.54 (0.47, 0.62)**	**0.50 (0.44, 0.57)**	**0.43 (0.37, 0.50)**	**0.49 (0.44, 0.54)**
Proportions of significant others as current smokers					
Family members					
None	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
A few	**1.31 (1.02, 1.66)**	1.43 (0.84, 2.44)	**2.77 (1.40, 5.51)**	**2.07 (1.07, 4.00)**	**1.63 (1.13, 2.33)**
Most	**3.58 (2.02, 6.33)**	**5.46 (2.34, 12.74)**	**7.86 (2.89, 21.39)**	**8.75 (3.47, 22.09)**	**7.17 (3.83, 13.42)**
Friends					
None	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
A few	**3.98 (3.28, 4.83)**	**8.65 (4.92, 15.20)**	**5.55 (3.35, 9.17)**	**2.74 (1.66, 4.50)**	**3.56 (2.71, 4.66)**
Most	**7.86 (5.76, 10.73)**	**30.00 (16.47, 54.66)**	**25.14 (14.71, 42.97)**	**17.45 (10.61, 28.69)**	**8.79 (6.21, 12.45)**
Senior relatives					
None	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
A few	1.32 (0.77, 2.26)	0.84 (0.30, 2.38)	3.28 (0.45, 24.00)	0.67 (0.24, 1.92)	**0.53 (0.29, 0.96)**
Most	**3.43 (2.00, 5.88)**	2.19 (0.78, 6.10)	**9.88 (1.36, 71.78)**	2.10 (0.75, 5.87)	1.73 (0.97, 3.10)

Table 3 Multivariate-adjusted odds ratios of TPB and proportions of significant others as current smokers with smoking behaviors

	Ever-smoking[¶]			Regular smoking[†]			Current smoking[‡]		
	Model I	Model II	Model III	Model I	Model II	Model III	Model I	Model II	Model III
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Attitudes									
Psychological	**1.47 (1.11, 1.93)**	-	**1.40 (1.05, 1.87)**	**1.70 (1.06, 2.72)**	-	1.42 (0.88, 2.30)	**2.52 (1.54, 4.12)**	-	**1.98 (1.20, 3.27)**
Physical	**1.31 (1.07, 1.62)**	-	**1.27 (1.03, 1.57)**	1.18 (0.80, 1.72)	-	1.18 (0.80, 1.73)	**1.56 (1.03, 2.35)**	-	1.49 (0.98, 2.27)
Social	**1.44 (1.11, 1.87)**	-	1.22 (0.93, 1.61)	**1.93 (1.23, 3.04)**	-	**1.65 (1.03, 2.64)**	1.53 (0.96, 2.43)	-	1.23 (0.76, 1.99)
Subjective norm									
Family members	0.93 (0.76, 1.15)	-	0.95 (0.77, 1.18)	1.07 (0.74, 1.55)	-	1.12 (0.77, 1.65)	0.82 (0.57, 1.19)	-	0.82 (0.56, 1.21)
Friends	**0.70 (0.58, 0.84)**	-	**0.75 (0.62, 0.90)**	0.77 (0.56, 1.07)	-	0.81 (0.58, 1.14)	**0.70 (0.50, 0.97)**	-	0.78 (0.55, 1.10)
Perceived behavioral control									
Controllability	0.92 (0.80, 1.06)	-	0.90 (0.78, 1.04)	**0.74 (0.59, 0.92)**	-	**0.70 (0.55, 0.88)**	**0.73 (0.58, 0.92)**	-	**0.70 (0.55, 0.90)**
Self-efficacy	**0.86 (0.77, 0.95)**	-	0.90 (0.80, 1.00)	**0.76 (0.63, 0.91)**	-	**0.82 (0.67, 0.99)**	**0.66 (0.55, 0.78)**	-	**0.72 (0.59, 0.87)**
Proportions of significant others as current smokers									
Family members									
None	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)
A few	-	1.02 (0.76, 1.35)	0.97 (0.73, 1.30)	-	1.11 (0.61, 2.03)	1.04 (0.56, 1.96)	-	1.86 (0.89, 3.89)	1.65 (0.77, 3.55)
Most/almost all	-	1.39 (0.72, 2.68)	1.29 (0.66, 2.52)	-	1.89 (0.70, 5.15)	1.59 (0.54, 4.71)	-	2.02 (0.66, 6.21)	1.25 (0.35, 4.48)
Friends	-			-			-		
None	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)
A few	-	**2.57 (2.08, 3.17)**	**2.35 (1.89, 2.92)**	-	**4.87 (2.72, 8.73)**	**4.25 (2.35, 7.69)**	-	**3.11 (1.84, 5.26)**	**2.58 (1.50, 4.42)**
Most/almost all	-	**4.45 (3.17, 6.24)**	**3.39 (2.37, 4.85)**	-	**15.05 (7.93, 28.55)**	**8.41 (4.26, 16.60)**	-	**12.64 (7.14, 22.39)**	**6.71 (3.59, 12.55)**
Senior relatives	-			-			-		
None	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)	-	1.00 (reference)	1.00 (reference)
A few	-	1.28 (0.70, 2.33)	1.36 (0.74, 2.51)	-	0.75 (0.24, 2.39)	0.93 (0.28, 3.07)	-	2.10 (0.27, 16.61)	3.32 (0.39, 28.44)
Most/almost all	-	**2.18 (1.18, 4.01)**	**2.24 (1.20, 4.17)**	-	0.97 (0.30, 3.09)	1.23 (0.37, 4.06)	-	3.45 (0.44, 27.28)	4.98 (0.58, 42.75)

[¶]Multivariate model adjusted for school, grade, gender, ethnicity, and average daily pocket money.
[†]Multivariate model adjusted for school, grade, gender, ethnicity, average daily pocket money, and age.
[‡]Multivariate model adjusted for school, grade, gender, age, and education level of guardian.

Table 4 Multivariate-adjusted odds ratios of TPB and proportions of significant others as current smokers with smoking intention in the next six months and five years

	Smoking intention in the next six months*			Smoking intention in the next five years*		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Attitudes						
Psychological	**2.27 (1.36, 3.79)**	-	**1.74 (1.02, 2.96)**	**2.19 (1.54, 3.11)**	-	**2.06(1.44, 2.96)**
Physical	0.81 (0.54, 1.21)	**-**	0.78 (0.51, 1.18)	1.04 (0.79, 1.36)	**-**	0.96 (0.73, 1.27)
Social	**2.16 (1.33, 3.52)**	**-**	**1.88 (1.13, 3.14)**	**1.66 (1.19, 2.33)**	**-**	**1.47 (1.04, 2.08)**
Subjective norm						
Family members	1.37 (0.91, 2.07)	-	1.41 (0.92, 2.16)	0.88 (0.67, 1.14)	-	0.89 (0.68, 1.17)
Friends	**0.66 (0.46, 0.93)**	**-**	0.71 (0.49, 1.03)	**0.75 (0.59, 0.94)**	**-**	0.81 (0.64, 1.04)
Perceived behavioral control						
Controllability	**0.60 (0.48, 0.76)**	-	**0.59 (0.46, 0.76)**	**0.77 (0.65, 0.91)**	-	**0.74 (0.63, 0.89)**
Self-efficacy	**0.57 (0.48, 0.69)**	**-**	**0.60 (0.49, 0.73)**	**0.65 (0.58, 0.74)**	**-**	**0.68 (0.60, 0.77)**
Proportions of significant others as current smokers						
Family members						
None	-	1.00 (reference)		-	1.00 (reference)	1.00 (reference)
A few	**-**	1.42 (0.68, 2.98)	1.61 (0.70, 3.66)	**-**	1.34 (0.88, 2.02)	1.26 (0.81, 1.95)
Most/almost all	**-**	2.28 (0.78, 6.72)	2.22 (0.61, 8.06)	**-**	**2.94 (1.43, 6.08)**	**3.11 (1.40, 6.89)**
Friends	**-**			**-**		
None	**-**	1.00 (reference)		**-**	1.00 (reference)	1.00 (reference)
A few	**-**	1.63 (0.96, 2.76)	1.09 (0.62, 1.92)	**-**	**2.10 (1.57, 2.82)**	**1.64 (1.20, 2.23)**
Most/almost all	**-**	**9.03 (5.24, 15.56)**	**3.53 (1.90, 6.56)**	**-**	**4.18 (2.85, 6.12)**	**1.96 (1.27, 3.04)**
Senior relatives	**-**			**-**		
None	-	1.00 (reference)		-	1.00 (reference)	1.00 (reference)
A few	-	0.56 (0.17, 1.83)	0.92 (0.24, 3.50)	-	**0.44 (0.22, 0.87)**	0.58 (0.28, 1.19)
Most/almost all	**-**	0.97 (0.29, 3.17)	1.47 (0.39, 5.58)	**-**	0.92 (0.46, 1.82)	1.19 (0.57, 2.48)

*Multivariate model adjusted for school, grade, gender, average daily pocket money, and education level of guardian.

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