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ORIGINAL PAPER

Parental, Behavioral, and Psychological Factors Associated with Cigarette Smoking among Secondary School Students in Nanjing, China

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Abstract We designed this study to assess parental, behavioral, and psychological factors associated with tobacco use among Chinese adolescents. The data were collected from 995 middle school students in Nanjing, China. Both smoking experimentation and current smoking (smoking in the past 30 days) were assessed among the study sample. Psychosocial measures include family structure, problem behaviors, social influence of smoking (both parental and friends' approval of smoking), depressive symptoms, social alienation, self-esteem, parental monitoring (social monitoring and academic monitoring) and parenting style (responsiveness and demandingness). Among the study sample (mean age 15.16 years and 50% females), 24% ever smoked and 15% smoked in the past 30 days. Advanced age, male gender, low family SES, low school performance and low educational aspiration were associated with both smoking experimentation and current smoking. Depressive symptoms, social alienation, low self-esteem, low social and academic monitoring, problem behaviors, low maternal and paternal responsiveness, peer smoking, parent smoking, and parental and friends' approval of smoking were positively associated with current smoking among Chinese adolescents. Future tobacco use prevention efforts among Chinese adolescents need to consider the parental, behavioral, and psychological correlates identified in the current study.

Keywords China · Secondary school students · Parental factors · Psychosocial factors · Smoking

Introduction

Cigarette smoking among adolescents has been a public health concern worldwide. China is the largest producer and the largest consumer of tobacco in the world, accounting for approximately 30% of estimated global consumption and 31% of world production (Corrao et al. 2000). The World Health Organization (WHO) Global Youth Tobacco Survey among 12,000 youth 13–15 years of age from 186 middle schools in China found that 23% of adolescents had smoked at some point in their lives (33% males and 13% females; Warren et al. 2000). According to national and regional studies, smoking onset mostly occurs between the ages of 10–15 (Yang et al. 1999; Zhang et al. 2000). A survey among 6,674 adolescents (aged 13–18 years) from the Chinese province of Zhejiang, indicated that 42% of the youth who smoked started before age 10 (Hesketh et al. 2001). Although the national legislation was established in the early of 1990s (China Congress 1991) to ban the sale of cigarettes to the minors (e.g., youth under 18 years of age), a 2006 report issued by the China Ministry of Health revealed that about 50 million Chinese teens smoked, accounting for 14.28% of the country's total smokers (Wang 2008).

Historically, cigarette smoking has been a male dominated behavior and smoking prevalence has been low among women (Yang et al. 1999). However, recent studies suggest a rapid increase in smoking rates among female

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adolescents and young adults in China (Mao et al. 2008; Sun et al. 2006). Based on the experiences of Western countries such as the United States, the gender gap in smoking was narrowing with the development of economic and the expansion of feminism (Shakib et al. 2005). A similar pattern was reported in the study of Hong Kong, one of the most highly westernized cities in China (Lau et al. 2003). The previous female smoking rate in Hong Kong was low. However, with the increased exposure to western culture, the prevalence of smoking had been increasing in young females (Lau et al. 2003). Currently, China has been undergoing rapid social, economic and cultural changes since the introduction of market economic in the late 1970s, which might increase smoking among young Chinese females.

A report of the United States Surgeon General on the health consequences of tobacco use noted that adolescence is the critical period in the process of becoming tobacco dependent (US Department of Health and Human Services 1988). The formation of a smoking habit starts from preparation, trying, experimentation, regular smoking, to nicotine dependence and once a habit is established it is difficult to break (US Center for Disease Control and Prevention 1998). Therefore, it is important to block the formation of a smoking habit among adolescents. To achieve this goal, it is necessary to identify significant determinants that affect the different stages of adolescent smoking (e.g., onset, experimentation, and current smoking). Previous studies showed that adolescent smoking was a complex behavior associated with various identifiable interpersonal factors such as family, school and peer influences (Holm et al. 2003; Parna et al. 2003; Pierce et al. 2008), and intrapersonal factors such as self-confidence, loneliness (Challier et al. 2000; Crone and Reijneveld 2007; Kokkevi et al. 2007).

Global literature indicated that living in single-parent family or in family constellation other than both parents was a risk factor for smoking among adolescents (Otten et al. 2007; Langille et al. 2003), while living with both parents was a protective factor (Jensen and Overgaard 1993). Studies in both US and Canada suggested that adolescent smoking was associated with lower family SES (Langille et al. 2003; Soteriades and DiFranza 2003). A number of recent studies have suggested that adolescent smoking (both smoking initiation and subsequent phases of engagement) was also associated with lower parental monitoring, parental tolerant attitudes towards youth smoking (Forrester et al. 2007), and parental smoking (Otten et al. 2007; Ashley et al. 2008).

In comparison to other family factors, parenting style has received less attention in adolescent smoking research. Jackson et al. (1998) suggested that adolescents reporting authoritative parenting style (a specific combination of demanding and responsive parenting behaviors) was significantly less likely to use tobacco and other substance than children reporting other types of parenting style. Previous studies also indicated that parenting style that was low in warmth, lack of emotional support and high in hostility was associated with high levels of smoking and other substance use among adolescents (Johnson and Pandina 1991; Wills et al. 1992; Simons and Robertson 1989). However, a recent study examining the association between global parenting style and adolescent smoking in the Netherlands revealed that parenting style did not serve as a context for smoking-specific parenting practices. Anti-smoking parenting practices may be effective in preventing or reducing adolescent smoking regardless of general parenting climate (Huver et al. 2007). In addition to the inconsistent findings in some of the studies, most of these studies were conducted in the Western nations and limited data are available from other developing nations, including China, where adolescent smoking is very prevalent.

Studies among Chinese adolescents who ever smoked cigarettes indicated that having friends/peers, teachers or parents who smoked was a strong influencing factor for adolescent smoking (Shakib et al. 2005; Wen et al. 2007; Zhang et al. 2000). Smoking among Chinese adolescents was also found to be associated with individual factors such as personal stress, loneliness, pressure from school, and self-esteem (Chen et al. 2008; Lam et al. 2005; Qiu et al. 2006). In addition, poor school performance, involvement in other risk-related behaviors, and lower parental socioeconomic status (SES) were associated with adolescent smoking in China (Li et al. 1999; Grenard et al. 2006; Liu 2003; Hesketh et al. 2007; Zhu et al. 1996). However, most of the existing studies had examined these factors separately, and limited data were available regarding the impact of parental monitoring and parenting styles. Accordingly, the current study was designed to examine the association between Chinese adolescent smoking and a wide spectrum of interpersonal and intrapersonal factors, including family factors (family constellation and family SES), educational aspirations, other problem behaviors, social influence of smoking (both parental and friends' pro-smoking behavior and attitudes), psychological factors (depressive symptoms, social alienation, self-esteem) and parenting (parenting style and parental monitoring). We hypothesized that adolescent smoking would be negatively associated with family SES, educational aspiration, parenting style, parental monitoring and self-esteem. We also hypothesized that adolescent smoking would be positively associated with engagement in other problem behaviors, pro-smoking social influence, and psychological problems (depression and social alienation).

Methods

Participants

The data were collected in 2001 from 995 students in ten secondary schools in Nanjing, the capital city of Jiangsu province in eastern China. The local research team, who were working in an educational research institute in Nanjing and had extensive experience in conducting research in the local schools, were asked to identify schools based on a number of criteria. The participating schools had to be "ordinary" schools, serving the general public from a wide range of socioeconomic backgrounds and had to be representative of the local public schools in terms of number of students enrolled and student/teacher ratio. The study protocol was approved by the Institutional Review Board at West Virginia University (USA) and the Institute of Higher Education Research at Nanjing University (China).

Survey Procedure

The school administrators were approached for permission to conduct the survey in their schools. Once the local research team received permission from the schools, they approached students in their classrooms. A self-administered questionnaire was distributed to all of the students in attendance in the selected classrooms. The students were informed by the research team that the survey was for research purpose only and participation in the survey was voluntary. Informed consents were obtained before students participated in the survey. The school teachers (including those who provided assistance with the recruitment) were asked to leave the classrooms during administration of the survey. The responses were anonymous and participants were assured of the confidentiality of their responses. Approximately 99% of those approached agreed to complete the questionnaire. Each participant was assigned an arbitrary identification number. No identifiable personal information was recorded in the survey or database.

Measures

Cigarette smoking. Measures of adolescent smoking in the current study were adopted from similar items in the US Centers for Disease Control and Prevention (CDC) 2000 Youth Risk Behavior Survey (Kann et al. 2000). Two items were employed to measure the prevalence of cigarette smoking: "ever smoked" and "smoked in the previous 30 days". For the purpose of data analysis in the current study, a three-category variable (non-smokers, experimenters, and current smokers) was created by combining the responses to the two items. Youth who reported ever smoked but did not smoke in the past 30 days were classified as "experimenters" and those who reported smoking in the previous 30 days were considered as "current smokers".

Problem behaviors. Students were asked whether they had engaged in 20 problem behaviors in the previous year on a 4-point scale: (1 = never, 2 = one time, 3 = several times, 4 = often). The scale was used in previous studies among Chinese adolescents (Li et al. 1996a, 1999). Exploratory factor analysis revealed six factors from 18 items: *Mischief/violence*: "fought", "mischief at school", "detained by teacher after school", "rode bike dangerously", and "threatened to hurt someone" (Cronbach $\alpha = .73$); *Delinquent behaviors*: "arrested by police", "extort money from someone" (Cronbach $\alpha = .64$); *Alcohol consumption*: "drank beer", "drank wine", and "drank hard liquor" (Cronbach $\alpha = .73$); *School truancy*: "cut school for a whole day" and "missed classes without proper cause" (Cronbach $\alpha = .77$); *Stealing*: "shoplifted" and "stolen" (Cronbach $\alpha = .45$); and *Cheating*: "cheated on test", "plagiarized on homework", "lied to parents about activities", "forged parent's signature (on report card)" (Cronbach $\alpha = .67$). Two items (e.g., "doodled on public buildings" and "damaged public property on purpose") with factors loading <.30 were removed from the final factorial structure.

Pro-smoking social influence. Students were asked about whether their parents (both father and mother) were currently smoking and how many (e.g., none, some, or most) of their friends/peers were smoking. In addition, students were asked how their friends and parents would feel if they smoked. The response choices were "admire", "don't care", and "against" for friend measures and "approval", "don't care", and "disapproval" for parent measures. For the purpose of data analysis in the current study, both "admire" and "don't care" from friend measure and "approval" and "don't care" from parent measures were considered as pro-smoking attitudes toward adolescent smoking.

Depression. Depressive symptoms were measured using the Center of Epidemiological Studies Depression Scale (CES-D; Radloff 1977). The 20-item CES-D was introduced into China in the early 1990s (Wang 1993). The existing Chinese version of CES-D was reexamined and modified by the investigators to ensure the accuracy of the translation. The Cronbach alpha was .89 for the current study sample. The scale scores ranged from 0 to 60, with a higher score indicating a higher frequency of depressive symptom.

Social alienation. Participants' feeling and perception of alienation were measured using the Social Alienation Scale developed by Jessor and Jessor (1977). The Social Alienation Scale consists of 15 Likert-type items assessing

perceived uncertainty in daily life and isolation from others. The scale was translated into Chinese by the investigators. Back-translation was performed to ensure the accuracy of the translation. The response option ranged from "strongly agree" to "strongly disagree". The scores ranged from 15 to 60 with higher scores representing higher levels of alienation. The Cronbach alpha was .80 for the study sample.

Self-esteem. The participants were also asked about their global feelings of self-worth or self-acceptance using the Self-Esteem Scale developed by Rosenberg (1965). The 10-item Self-Esteem Scale with a 4-point response option (i.e., "strongly agree" to "strongly disagree") was introduced into China at least a decade ago (Wang 1993). The total scores ranged from 10 to 40 with higher scores indicating higher self-esteem. The Cronbach alpha of the 10 items was .83 for the current study sample.

Parental monitoring. Students' perception of parental monitoring was measured with a 6-item scale used in a previous study among Chinese adolescents (Li et al. 2003). Response option ranges from "never" to "always" along a 5-point scale. Exploratory factor analysis yielded a two-factor structure for the scale. The first factor, consisting of four items, represents adolescents' perceptions of parental monitoring in their daily life ("Social monitoring"). The second factor represents adolescents' perceptions of parental monitoring in their academic sphere ("Academic monitoring"). Composite scale scores were obtained by averaging the responses to the items in each of the scales. The Pearson product moment correlation coefficient is .39 ($p < .001$) between the two scales. The Cronbach alpha were .84, .74, and .76 for the entire scale, the social monitoring scale, and the academic monitoring scale, respectively.

Parenting style. Parenting style was measured using the Authoritative Parenting Index (API) developed by Jackson et al. (1998). The original API consists of 16 items representing a "responsiveness" dimension of authoritative parenting and a "demandingness" dimension of authoritative parenting. The API was translated into Chinese by the investigators. Back-translation was performed to ensure the accuracy of the translation. Both maternal and paternal forms were used in the current study. The factorial structure of the original scale was replicated among the study sample using principal component factor analysis with oblique rotation. The items in each factor were assessed for internal consistency (Cronbach alpha). Two items in the original "responsiveness" dimension were excluded from the factor as the consistency estimation for the factor could be improved after the deletion of these items. The Cronbach alpha were .82 (maternal form) and .81 (paternal form) for the "responsiveness" factor (6 items), and .77 (maternal form) and .81 (paternal form) for the "demandingness" factor (7 items).

Statistical Analysis

First, frequency tabulation was used to examine the smoking practice and pro-smoking social influence among the study sample. The Chi-square test was employed to examine whether the smoking practice and pro-smoking social influence differed by gender. Second, the associations of smoking status (i.e., non-smokers, experimenters, and current smokers) with individual and family characteristics and pro-smoking social influence were examined using the Chi-square test (for categorical variables) or ANOVA (for continuous variables). Third, the associations of smoking status with psychosocial factors were examined employing ANOVA with smoking status as the between-subject factor variable. Post-hoc multiple comparisons were conducted to identify the pair-wise intergroup differences using the one-way ANOVA with the criterion of the least significant difference (LSD). Because of the substantial gender difference in prevalence of cigarette smoking, ANOVA was conducted separately for each gender group.

Results

Sample Characteristics

The study sample consisted of similar numbers of females and males (50% males and 50% females). The average age of the sample was 15.16 years. Detailed demographic characteristics including gender, age, ethnicity, perceived general health, academic standing in school, their educational expectation, and family SES are presented in Table 1. There was a significant gender difference with regard to the perceived general health condition. More males (82%) perceived themselves to be in excellent/good health than females [74%, χ^2 (1) = 9.72, $p = .002$].

Smoking Practice and Perceptions

Table 2 presents the percentages of smoking-related practices among male and female adolescents. Among all participants, 24% reported ever having smoked in their lifetime [31% males and 16% females, χ^2 (1) = 27.04, $p = .000$] and 15% of them reported they were current smokers [21% males and 8% females, χ^2 (2) = 35.18, $p = .000$]. About 35% of the sample [32% males and 42% females, χ^2 (1) = 1.40; $p = .237$] who "ever smoked" had smoked their first whole cigarette before 13 years of age and about 74% of them (same percent for males and females) had ever tried to quit. Among those who reported smoking in the previous month, 22% of them [27% males and 6% females, χ^2 (1) = 6.39, $p = .011$] reported

Table 1 Sample characteristics

	Overall	Male	Female
N (%)	995 (100)	495 (50)	487 (50)
Mean age (SD)	15.16 (1.37)	15.20 (1.34)	15.12 (1.39)
Han ethnicity (%)	96	97	94
Single child (%)	93	94	92
Parents divorced (%)	9	8	9
Live with both parents (%)	89	90	87
Live with grandparent(s) (%)	15	15	15
Excellent/good health (%)	78	82	74*
Mostly A's at school (%)	17	15	18
Plan to go to college (%)	96	95	97
Plan to go to graduate school (%)	70	68	73
Parent expect me to go to college (%)	99	98	99
Father finished college (%)	42	42	42
Mother finished college (%)	33	32	33
Father has a professional job (%)	43	43	43
Mother has a professional job (%)	35	34	37
Mean monthly family income (SD)[a]	3.93 (.98)	3.96 (.98)	3.90 (.98)

* $p < .01$

[a] Coding for monthly family income: 1 = <300 RMB; 2 = 300–500 RMB; 3 = 500–1,000 RMB; 4 = 1,000–3,000 RMB; 5 = 3,000–5,000 RMB; 6 = more than 5,000 RMB

Table 2 Smoking practice and pro-smoking social influence among Chinese adolescents

	Overall	Male	Female	χ^2 Statistics	*p* Value
N (%)	995 (100)	495 (50)	487 (50)		
Smoking practice					
Ever smoked	24%	31%	16%	27.044	.000
Experimenters (%)	9	10	8		
Current smokers	15%	21%	8%	35.177	.000
Smoked the first whole cigarette before 13-years-old[a]	35%	32%	42%	1.396	.237
Smoked at least one cigarette daily in past 30 days[a]	38%	44%	21%	5.520	.019
Smoked at least 10 days during past 30 days[a]	22%	27%	6%*	6.393	.011
Bought cigarettes from store in the past 30 days[a]	44%	51%	24%	10.234	.037
Was refused to buy cigarette in store because of underage in the past 30 days[a]	13%	14%	11%	.101	.750
Ever tried to quit[a]	74%	74%	74%	.009	.925
Pro-smoking social influence					
Mother is current smoking	4%	4%	4%	.437	.804
Father is current smoking	56%	54%	58%	1.638	.441
Friends/peers smoking	44%	47%	41%	5.242	.022
Parent approval of my smoking	1%	2%	0%	25.020	.000
Friends approval of my smoking	19%	28%	10%	53.055	.000

[a] Data were available only among those who reported ever smoking

smoking at least 10 days and 38% [44% males and 21% females, χ^2 (1) = 5.52, $p = .019$] reported smoking at least one cigarette daily on the days that they had smoked. Nearly one half of the sample who "ever smoked" reported having bought cigarettes from a store in the past month [51% males and 24% females, χ^2 (4) = 10.23, $p = .037$]. About 13% of the sample [14% males and 11% females, χ^2 (1) = .101, ns] who "ever smoked" reported they were refused to buy cigarette in store in the past 30 days because of underage.

As shown in Table 2, a small number of students (4%) reported that their mothers were currently smoking, whereas about one half of the participants reported their fathers (56%) and peers/friends (44%) were currently smoking. Only about 2% of males and none of the females reported that their parents would approve or do not care if

Table 3 Association of smoking status with family/individual characteristics and pro-smoking social influence

	Non-smokers	Experimenters	Current smokers	χ^2/*F*-statistics	*p* Value
N (%)	760 (76)	89 (9)	146 (15)		
Mean age (SD)	15.13 (1.57)	15.68 (1.62)	15.99 (1.59)	20.418	.000
Male	46%	53%	73%	35.177	.000
Family constellation					
Parents divorced	8%	13%	12%	4.846	.089
Single child	93%	93%	92%	.169	.919
Live with both parents	90%	80%	88%	8.631	.071
Live with grandparents	15%	15%	16%	.061	.970
Family SES					
Father finished college	46%	31%	28%	20.179	.000
Mother finished college	36%	22%	19%	22.488	.000
Professional dad	46%	35%	31%	11.248	.001
Professional mom	38%	26%	23%	14.786	.001
Mean monthly family income (SD)[a]	3.96 (.95)	3.84 (.99)	3.77 (1.09)	2.591	.075
Grades and education aspiration					
Mostly A's at school	19%	14%	7%	12.998	.002
Plan to go to college	97%	94%	90%	16.970	.000
Plan to go to graduate school	74%	76%	50%	34.895	.000
Parent except me to go to college	99%	99%	96%	10.599	.005
Health					
Excellent/Good health	78%	72%	83%	4.184	.123
Pro-smoking social influence					
Mother is smoking	3%	5%	10%	55.768	.000
Father is smoking	53%	62%	67%	19.362	.001
Friends/peer smoking	34%	63%	82%	148.188	.000
Parent approval of my smoking	1%	1%	6%	69.228	.000
Friends approval of my smoking	11%	35%	53%	161.159	.000

[a] Coding for monthly family income: 1 = <300 RMB; 2 = 300–500 RMB; 3 = 500–1,000 RMB; 4 = 1,000–3,000 RMB; 5 = 3,000–5,000 RMB; 6 = more than 5,000 RMB

they smoked and about 19% [28% males and 10% females, χ^2 (2) = 53.06; p = .000] reported that their friends would either "admire" or "do not care" if they smoked.

Association Between Individual Characteristics and Cigarette Smoking

As shown in Table 3, smoking status was associated with advanced age, male gender, school performance, education aspiration and pro-smoking social influence. However, there was no association between smoking status and family constellation measures or self-reported health status. Family SES measures were strongly associated with smoking status except with the "monthly family income". More students from families with a relatively lower SES (e.g., lower parental education, non-professional parental occupations) had smoked (either experimenting or current smoking).

Association Between Psychosocial Factors and Cigarette Smoking

As shown in Table 4, parental responsiveness, problem behaviors, and psychological factors were all associated with smoking status for both males and females. All of the significant associations were in a linear fashion (e.g., with non-smokers reporting the best outcomes and the current smoking reporting the worst). Post-hoc comparison revealed that most of the differences by smoking status were results of the differences between non-smokers and other two groups. The male experimenters and current smokers differed on self-esteem and a number of problem behaviors (i.e., violent behaviors, delinquent behaviors, school truancy, and cheating). The female experimenters and current smokers differed on alcohol consumption, school truancy, and cheating. While the number of significant group differences (including pair-wise intergroup

Table 4 Association of smoking with parenting, behavioral and, psychological factors among Chinese adolescents

	Smoking status			*F*-statistics	*p* Value	Post-hoc comparison[a]
	Non-smokers (1)	Experimenters (2)	Current smokers (3)			
Male						
N (%)[b]	344 (70%)	47 (10%)	104 (21%)	*df* = (2,493)		
Parenting						
Maternal responsiveness	2.97 (.65)	2.69 (.62)	2.74 (.63)	7.776	.000	(1 > 2) (1 > 3)
Maternal demandingness	2.37 (.70)	2.29 (.57)	2.46 (.70)	1.163	.313	
Paternal responsiveness	2.78 (.70)	2.48 (.70)	2.59 (.68)	5.782	.003	(1 > 2) (1 > 3)
Paternal demandingness	2.26 (.72)	2.21 (.80)	2.35 (.78)	.746	.475	
Social monitoring	12.64 (3.39)	11.72 (3.22)	10.95 (3.63)	10.055	.000	(1 > 3)
Academic monitoring	13.52 (3.47)	12.26 (3.40)	11.82 (3.82)	10.312	.000	(1 > 2) (1 > 3)
Problem behaviors						
Violence/risk-taking	1.94 (.63)	2.08 (.67)	2.48 (.66)	28.725	.000	(1 < 3) (2 < 3)
Delinquency	1.02 (.18)	1.03 (.17)	1.15 (.44)	10.538	.000	(1 < 3) (2 < 3)
Alcohol consumption	1.93 (.73)	2.36 (.65)	2.43 (.74)	23.081	.000	(1 < 2) (1 < 3)
School truancy	1.12 (.38)	1.39 (.53)	1.81 (.92)	62.343	.000	(1 < 2) (1 < 3) (2 < 3)
Stealing	1.05 (.23)	1.16 (.38)	1.16 (.40)	7.832	.000	(1 < 2) (1 < 3)
Cheating	1.95 (.64)	2.18 (.53)	2.45 (.65)	25.196	.000	(1 < 2) (1 < 3) (2 < 3)
Psychological factors						
Depression	10.83 (8.76)	13.34 (10.32)	15.45 (10.47)	10.364	.000	(1 < 3)
Alienation	34.83 (6.72)	35.63 (7.35)	37.75 (5.33)	8.013	.000	(1 < 3)
Self-esteem	31.46 (4.95)	30.70 (6.39)	28.88 (4.99)	10.221	.000	(1 > 3) (2 > 3)
Female						
N (%)	407 (84%)	41 (8%)	39 (8%)	*df* = (2,485)		
Parenting						
Maternal responsiveness	3.05 (.68)	2.92 (.71)	2.72 (.87)	4.544	.011	(1 > 3)
Maternal demandingness	2.24 (.64)	2.16 (.60)	2.72 (.87)	.429	.651	
Paternal responsiveness	2.87 (.73)	2.57 (.74)	2.47 (.78)	7.562	.001	(1 > 2) (1 > 3)
Paternal demandingness	2.00 (.66)	2.00 (.61)	2.24 (.73)	2.223	.109	
Social monitoring	14.07 (3.43)	13.00 (3.09)	13.03 (3.58)	3.127	.045	
Academic monitoring	14.21 (3.33)	12.77 (3.54)	13.03 (4.39)	4.869	.008	(1 > 2) (1 > 3)
Problem behaviors						
Violence/risk-taking	1.38 (.44)	1.79 (.57)	1.93 (.79)	33.268	.000	(1 < 2) (1 < 3)
Delinquency	1.01 (.15)	1.03 (.11)	1.05 (.22)	1.348	.261	
Alcohol consumption	1.80 (.65)	2.35 (.64)	2.67 (.80)	40.759	.000	(1 < 2) (1 < 3) (2 < 3)
School truancy	1.13 (.40)	1.30 (.62)	1.67 (1.02)	22.189	.000	(1 < 2) (1 < 3) (2 < 3)
Stealing	1.04 (.20)	1.11 (.27)	1.13 (.38)	4.574	.011	(1 < 2) (1 < 3)
Cheating	1.90 (.64)	2.30 (.57)	2.69 (.76)	31.900	.000	(1 < 2) (1 < 3) (2 < 3)
Psychological factors						
Depression	11.16 (9.41)	13.60 (8.49)	16.56 (10.16)	6.673	.001	(1 < 3)
Alienation	34.32 (6.28)	36.65 (6.46)	37.77 (5.55)	7.378	.001	(1 < 2) (1 < 3)
Self-esteem	30.96 (4.75)	30.27 (4.91)	28.59 (5.00)	4.568	.011	(1 > 3)

[a] Pairs that were significant at $p < .05$ with LSD criterion were listed

[b] Sample sizes for male and female were not added to 995 because of missing data ($n = 13$)

differences) differed slightly by gender, males and females showed similar patterns in terms of the association of smoking status with parental, behavioral and psychological factors.

Discussion

Our data in the current study suggest a strong association of adolescent cigarette smoking with advanced age, male

gender, low family SES, low school performance, low education aspiration, parental monitoring, peer and family smoking, approval of smoking from parents and friends, and a number of psychological factors. These findings are consistent with previous studies of adolescent smoking in China (Grenard et al. 2006; Hesketh et al. 2007; Lam et al. 2005; Li et al. 1999, 2003; Zhang et al. 2000), and provide further evidence that future prevention efforts targeting adolescent smoking in China should take the related parental and psychosocial factors into consideration. The current study confirmed the finding or previous studies of adolescent smoking in China that the majority of the adolescents who ever smoked were experimenting (Fang et al. 2003). The linear trend in most of the measures among "non-smokers", "experimenters", and "current smokers" suggested that "experimenting" was a legitimate and unique stage of adolescent smoking progression and would present an important window of opportunity for early prevention of adolescent smoking.

Our study reveals that parental responsiveness of parenting style was negatively associated with smoking among Chinese adolescents. The parental responsiveness was defined as a parenting style characterized as parental warmth, acceptance, or involvement (Jackson et al. 1998). In traditional Chinese culture, family is the primary resource for emotional and material support (Entwisle et al. 1995). It is likely that more effective parent–child communication and higher levels of perceived parental support may decrease the likelihood of adolescent smoking (Kafka and London 1991; Piko 2000). In addition, higher parental responsiveness may influence the adolescents' choice of nonsmoking friends (Biglan et al. 1995). In contrary, both male and female current smokers tended to report a higher level of parental demandingness than non-smokers or experimenters (although none of the differences reached statistical difference). Adolescents who perceived a higher level of parental demandingness (e.g., parental control or strictness) might have a higher level of stress and pressure to meet the parental expectation, or have a higher level of rebellion in dealing with the parental demands. Sometimes these stress or rebellion might be the causes of smoking among adolescents. Alternatively, the higher level of parental demandingness among current smokers might be the parental reaction toward adolescent smoking behaviors. Future studies need to further explore the relationship between different parenting style and adolescent smoking. Nevertheless, the findings in the current study support the notion that the prevention of Chinese adolescent smoking should also involve parents and focus on cultivating a positive parenting style.

Our data in the current study show that more females than males reported their parental and friends' disapproval of smoking. A possible explanation is that smoking historically has been a male dominated behavior in China (Mao et al. 2008). The finding may reflect the fact that in the Chinese culture family and society might be more tolerant of male smoking than female smoking, which may also explain the lower smoking rate among females than among males. However, previous studies suggested that the smoking rate among Chinese females was increasing rapidly, particularly among young females (Sun et al. 2006; Lau et al. 2003). Therefore, in spite of the current lower smoking rate among female adolescents in China, smoking prevention programs should target young females as well. Although these were significant gender differences in smoking practice and perceptions of pro-smoking social influence, the data in the current study indicate similar patterns of the association of smoking status with parental, behavioral and psychological factors between males and females. This finding suggests a similarity in correlates or determinants of adolescents smoking for both genders.

As we show in the current study, only 13% of participants were unable to buy cigarettes in stores in the past 30 days because they were underage. This finding indicated the absence of effective policies and legislations of adolescent smoking control in China or these laws were widely ignored (Wang 2008). Because of the historical cultural background of tobacco use in China, smoking was considered as a catalyst of friendship and social relationship (Mao et al. 2008). Offering cigarettes is considered as a sign of courtesy and respect to others (Cheng 1999). These traditional and prevalent positive cultural norms of smoking surely compromise the effective enforcement of the tobacco control polices and legislations. Therefore, the cultural, social and policy context of smoking should be considered in preventing adolescent smoking in China.

We reported in the current study that adolescents who engage in smoking were also likely to engage in other health risk behaviors such as drinking and delinquent behavior. The result is consistent with previous studies in China (Li et al. 1996a, b). As both substance use and other problem behaviors are typically influenced by peers, one possible explanation of this finding may be the deviant peer influences (Allen et al. 2003; Siziya et al. 2008). For example, young adolescents who drink together may stimulate each other in smoking cigarettes or vice versa. This finding suggests that adolescent smoking prevention interventions should also address covariance of smoking with other risk behaviors including alcohol use.

Our data in the current study also reveal that both male and female current smokers reported higher depression, social alienation and lower self-esteem than non-smokers. On one hand, this finding may support the hypothesis that smokers might use nicotine as self-medication for their mental problems (Sacco et al. 2004). On the other hand, this finding suggests that smoking might increase the risk

for later psychological problems such as depression (Brown et al. 1996; Dierker et al. 2002; Wu and Anthony 1999). Future longitudinal research is needed to study the causal relationship between smoking and mental health among adolescents.

There are several potential limitations in this study. First, the data were based on self-report and thus subject to self-reporting bias. Second, our ability to generalize these findings to other adolescent populations and other geographic locations in China may be limited, because smoking rates vary by different geographic locations in China (Hesketh et al. 2007; Johnson et al. 2006). Finally, the associations reported in the current study are cross-sectional and therefore causality cannot be inferred.

Despite these potential limitations, this study provided valuable data regarding family, parental, behavioral, and psychosocial factors that are important predictors of cigarette smoking among adolescents in China. Evidence in the US and other Western nations suggests that school-based, theoretically driven intervention programs can be effective in the prevention of smoking initiation among youth. These data may help to develop more effective intervention approaches to the prevention and cessation of adolescent smoking. Interventions that involve family members, school teachers and peers may provide a comprehensive effect in future adolescent tobacco use preventive programs in China.

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