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Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Associations between depression risk, bullying and current smoking among Chinese adolescents: Modulated by gender

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ARTICLE INFO

Article history:

Received 27 April 2015

Received in revised form

18 December 2015

Accepted 13 January 2016

Available online 14 January 2016

Keywords:

Adolescent

Current smoking

Depression

Bullying

ABSTRACT

This school-based study aimed to investigate the prevalence of being at risk for depression, bullying behavior, and current smoking among Chinese adolescents in order to explore gender differences in the vulnerability of adolescents with these behaviors to develop a smoking habit. A total of 35,893 high school students sampled from high schools in eighteen cities in China participated in the study from 2011 to 2012. Overall, the prevalence of current smoking was estimated at 6.4%. In total, 1.7% (618) of the participants admitted to bullying others, 5.8% (2071) reported being bullied, 3.5% (1269) were involved in both bullying others and being bullied, and 5.6% (2017) were at high risk for depression. Logistic regression analysis indicated that among girls, with high depression risk, bullying others, being bullied, and both bullying others and being bullied were independently and positively associated with current smoking habits, while the final results among boys showed that bullying others and both bullying others and being bullied were independently associated with an increased risk of current smoking. School-based prevention programs are highly recommended, and we should focus on high-risk students, particularly girls with high risk of depression or involved in school bullying and boys who are involved in school bullying.

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1. Introduction

Adolescence, often described as occurring between 10 and 19 years of age, is a period filled with immense behavioral, psychological and social changes and challenges (Crockett and Beal, 2012). Among adolescents, cigarette smoking is a common behavior in modern society. A prior meta-analysis illustrates that there has been a rapid increase in smoking among adolescents in China since 1996–2000, and a total of 11.18 (95% CI: 10.87–12.06) million adolescents are current smokers (Han and Chen, 2015). However, this behavior should be prevented because it inhibits an individual's growth and maturation (Newcomb and Bentler, 1989). Smoking is estimated to cause approximately 42% of chronic respiratory diseases and approximately 10% of cardiovascular diseases (Alwan et al., 2014), and one study in the United States predicts that approximately 33% of youths who smoke will die

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prematurely from smoking (Arday et al., 1994). Furthermore, the high and growing level of current smoking among Chinese adolescents also could lead to a huge economic and social burden for families and communities.

Prior studies have demonstrated that emotional and behavioral factors are associated with cigarette smoking (Patton et al., 1998; Maes et al., 2004); this paper examines gender-related variation in the relationships between depression risk, bullying and current smoking habits.

Depression is one of the most consistent risk factors implicated in smoking behavior. In longitudinal investigations and cross-sectional studies, both depressive symptoms (Nezami et al., 2005; Arnold et al., 2014), as well as a diagnosis of major depression (Munafò et al., 2008; Chaiton et al., 2009), have been shown to be associated with smoking among adolescents. Previous studies have also reported the role of depression (either through causal or shared effects) in elevating the probability of smoking (i.e. increasing the likelihood of initiating and/or influencing the number of cigarettes) (Pomerleau, 1995). Additionally, in 2008, Dierker et al. (2015) reported that depression is an earmark for nicotine dependence symptoms. Furthermore, in 2013, Nunes et al. (2013) demonstrated that nicotine dependence and depression had

overlapping neurobiological underpinnings, and it was possible that the emergence of one type of symptoms involved a functional recalibration of the central nervous system (CNS), which triggered the emergence of the other symptoms. Building on the association between depression and smoking, other studies have hypothesized that depressed persons may use substances (e.g., alcohol and cigarette) to cope with the depression mood (Holahan et al., 2003; Kapon and Haaga, 2010). For example, a depressed adolescent may smoke heavily to cope with unpleasant feelings. The relationship between depression and smoking is complex. Moreover, we found that gender may play a role in this relationship, and this relationship seemed to be stronger in female adolescents than males (Needham, 2007; Wu et al., 2008). Although boys were generally thought to more likely be current smokers than girls (Arday et al., 1994), Acierno's research in the United States found that depression was a risk factor for smoking among female but not males (Acierno et al., 2000). Similarly, another study of U.S. adolescents in 2010 also suggested that depression had a strong association with substance use only in females (Luk et al., 2010).

Bullying (i.e., bullying others, being bullied, and both bullying others and being bullied) includes verbal or written name-calling, teasing, threats, and social exclusion, as well as hitting, kicking, or other violent bodily contact (Espelage et al., 2001). Researchers have reported that involvement in bullying is a common problem among adolescents (Nansel et al., 2001). Many studies found that bullying is associated with smoking among adolescents (Weiss et al., 2005; Timmermans et al., 2008). In Italy, a report using data from the 2006 Health Behavior in School-aged Children survey (HBSC) showed that victims, and particularly bullies and bully victims (those involved in both bullying others and being bullied), were at increased risk of smoking compared to their completely uninvolved peers (Vieno et al., 2011). A previous cross-sectional study using data from the 2003 Ontario Student Drug Use Survey (OSDUS) maintained that smoking may be an indicator for identifying bullies. The researchers suggested that a possible explanation for the positive association between bullying and smoking may be related to bully's desire to gain social status and to be perceived as cool and attractive (Morris et al., 2006). However, a study from the United States reported that bully victims had higher rates of smoking than other students (Schwartz, 2000), and similar studies reported that bully victims may be particularly at risk for smoking because of their peer rejection and negative moods. Further, they may use smoking to cope with victimization and depression (Kaukiainen et al., 2002; Unger et al., 2003). These variations in the reported associations between bullying behavior and smoking might be caused by differences in the measurement methods, statistical analyses, and cultural contexts. There have been no consistent results indicating the role of gender in the relationship between bullying and smoking. A study that used data from the 2003 OSDUS found that gender had a modifying effect on the relationship between bullying and smoking (Morris et al., 2006), but the 2001/2002 HBSC study did not observe any significant effect of gender on the association between bullying and smoking (Currie et al., 2004).

As previously mentioned, adolescents with high risk of depression and those who are involved in school bullying are particularly vulnerable to smoking (Kaukiainen et al., 2002; Weiss et al., 2005). Notably, prior studies have demonstrated a strong association between bullying and depression risk (Fitzpatrick et al., 2010; Kaltiala-Heino and Frojd, 2011). Therefore, controlling for bullying is essential to determine the unique impact of depression risk on smoking and vice versa. Most previous studies exploring the influence of depression risk on smoking failed to consider the effects of bullying (Weiss et al., 2005; Wu et al., 2008), and researches studying the association between bullying and smoking also did not consider the effect of depression risk

(Morris et al., 2006; Timmermans et al., 2008; Vieno et al., 2011).

There is limited research examining how being at high risk of depression and involvement in school bullying correlate with smoking in adolescents, and few studies have assessed the effect of gender on these conditions. Therefore, our study aimed to investigate the prevalence of being at high risk for depression, bullying behaviors, and current smoking among Chinese adolescents in order to explore the associations between these behaviors and how they are influenced by gender.

2. Methods

2.1. Study design and participants

A school-based, cross-sectional study with a multistage, stratified cluster, random sampling method was used to obtain a representative sample of Chinese adolescents. In stage 1, we selected three large provinces (Guangdong, Fujian, and Chongqing) to represent the different regional features of southern China. Then we divided each province into three economic stratifications by per capita GDP (high-level, mid-level, and low-level) and then selected two representative cities (or primary sampling units) from each stratification by simple randomization. In total, eighteen representative cities were sampled. In stage 2, schools (or secondary sampling units) in each representative city were divided into three categories based on the education quality: key junior/senior high schools, regular junior/senior high schools, and vocational high schools. Two key junior high schools, two key senior high schools, two regular junior high schools, two regular senior high schools, and two vocational high schools were randomly selected from each representative city. In stage 3, two classes (or the minimum sampling units) were randomly selected from each grade within the selected schools. All available students in the selected classes were invited to participate in our study. A total of 37,702 students were invited to participate in the study, and 35,893 student questionnaires were completed and qualified for our survey. The response rate was 95.2%.

2.2. Data collection

To protect the privacy of the students, anonymity of the self-reported questionnaires was guaranteed, and the questionnaires were administered by research assistants in the classrooms without the presence of teachers (to avoid any potential information bias). All data were collected from 2011 to 2012.

2.3. Ethical statement

The study was approved by the Sun Yat-Sen University, School of Public Health Institutional Review Board. All the participants were fully informed of the purpose of the survey, and they were invited to voluntarily participate. Written consent letters were obtained from each participating student or from one of the student's parents.

2.4. Measures

2.4.1. Dependent variable

2.4.1.1. Current cigarette smoking. The question 'During the past 30 days, on how many days did you smoke cigarettes?' was used to determine current smoking status. Students who selected answers indicating 1 or more days were classified as current smokers. (Acierno et al., 2000; Kandra et al., 2013a, b; Kann et al., 2014).

2.4.2. Predictor variables

2.4.2.1. Depression. The *Center for Epidemiology Scale for Depression (CES-D)* in Chinese was used to determine whether an individual was at high risk for depression. The Chinese version of the CES-D scale that was used in our study was translated into Mandarin Chinese to better correspond to the meaning of the original items in CES-D, and the Chinese version of this scale has been validated (Lee et al., 2008; Zhang Jie, 2010; Cheng et al., 2012), and extensively utilized in Chinese studies (Yen et al., 2000). The respondents were asked to rate the frequency of 20 symptoms of depression by choosing one of four response options, ranging from 'rarely or none of the time' to 'most or all of the time' (Myers and Weissman, 1980). Higher scores indicate more severe depressive symptomatology, with a maximum score of 60 (Radloff, 1977). In 1991, according to Radloff (the founder of the CES-D) a cutoff score of 16 points (corresponding to the 80th percentile) and a cutoff score of 28 points (corresponding to the 95th percentile) were both recommended to appropriately differentiate respondents with depression risk, but a higher cutoff score (above 28) was used to identify more severe cases (Radloff, 1991). In our study, participants who scored 28 points or more were considered to be at high risk for depression, in alignment with previous studies in China (Chen et al., 2009; Guo et al., 2014; Shu-Ge et al., 2015). Additionally, in the current study, the area under the ROC curve was 0.78 (based on a pilot investigation of 270 students measured by a clinical psychologist and the CES-D scale). For the CES-D survey, surveys that failed to answer at least 17 of the 20 items were discarded.

2.4.2.2. Bullying. Involvement in bullying either as a bully or as the person being bullied or both was evaluated using questions adapted from a prior bullying study (Kaltiala-Heino et al., 1999), which was translated into Chinese by one of our authors and used in our previous studies (Wang et al., 2012; Wu et al., 2015). The students were asked how frequently they had been bullied during the last month at school and how frequently they had bullied others. The questions about bullying consisted of 12 parts, with the answers given on a 3-point scale as follows: 1-never, 2-sometimes or rarely (one or two times) and 3-often (more than three times). The following bullying questions were posed: 'Did you hit, push, or hurt another student?'; 'Did you threaten another student or say something mean to him or her?'; 'Did you make fun of or tease another student in a hurtful way?'; 'Did you make fun of another student with sexual jokes, comments or gestures?'; 'Did you blackmail another student for money?'; and 'Did you bully another student in some other way?' The being bullied items were the following: 'Did another student hit, push, or hurt you?'; 'Did another student threaten you or say something mean to you?'; 'Did another student make fun of or tease you in a hurtful way?'; 'Did another student make fun of you with sexual jokes, comments or gestures?'; 'Did another student blackmail money from you?'; and 'Did another student bully you in some other way?' Students who reported at least one type of bullying behavior with a frequency of 'often' in the last month were classified as bullies. Victims were those who reported at least one being bullied experience in the last month with a frequency of 'often'. Bully victims met the criteria for being bullied and also for bullying others, with a frequency of 'often'. All students who reported having never been bullied nor bullying others served as the comparison group.

2.4.3. Measures of control variables

Demographic variables were collected, including age, gender, grade level, living arrangements, and family economic status. Living arrangements were assessed by asking who lived in the student's primary home (responses were coded as 'living with two biological parents', 'living with father/mother', 'living with

others'), and family economic status was measured by asking the student's perception of their family's current economic status (rated from below average to above average).

Classmate relationships and the teacher-classmate relationship were assessed based on the student's self-rating about their relationships with classmates and teachers, ranging from poor to good.

Academic achievements were captured using a single item asking about a personal appraisal of the students' performances or pressure compared with their classmates (responses were coded as 'above average', 'average', and 'below average').

2.5. Statistical analysis

All data were independently entered by two investigators using EpiData software (version 3.1), and statistical analyses were conducted using SAS (version 9.2). To assess differential relationships across gender, all analyses were conducted separately for boys and girls. Descriptive analyses were used to describe the demographic characteristics of students and the prevalence of current smoking. Our study used a complex sampling design with multi-stage sampling, and the students were grouped into schools and therefore may not be independent; two-level analyses, in which the schools were treated as clusters, were performed in SAS using the PROC GLIMMIX procedure to compute generalized linear mixed models for current smoking among adolescents. All statistically significant factors in the univariate analyses were further analyzed using multivariate logistic regression models. Model 1 only adjusted for significant sociodemographic characteristics to examine the association between depression risk and current smoking. Model 2 only adjusted for significant sociodemographic characteristics to explore the association between bullying and current smoking. Model 3 incorporates all significant variables (including significant sociodemographic characteristics, depression risk, and bullying) to determine whether being at risk for depression, being a bully, being a victim, and being a bully victim were independent predictors for current smoking. The percentage of missing data was less than 2% for all relevant variables, and missing data were eliminated in the multilevel analysis. All statistical tests were two-sided, and a *p*-value of less than 0.05 was considered significant.

3. Results

3.1. Demographic characteristics of the study sample across gender

Basic demographic information is shown in Table 1. Of the total sample, 48.4% (17,389) were boys, and 51.6% (18,504) were girls, yielding a male-to-female ratio of 1:1.1. The students ranged in age from 12 to 19 years, and the mean age was 15.9 (SD: ± 2.0) years. Overall, 1.7% (618) of the participants were bullies (1.2% of the girls and 2.3% of the boys), 5.8% (2071) were victims (4.0% of the girls and 7.8% of the boys), and 3.5% (1269) were bully victims (1.3% of the girls and 6.0% of the boys). The mean CES-D scores were 15.8 (SD: ± 8.0) and 14.5 (SD: ± 9.1) for the girls and boys, respectively (*p* > 0.05). A total of 5.6% (2017) of the students were at high risk for depression according to the CES-D (6.2% of the girls versus 5.0% of the boys, *p* < 0.001).

3.2. Prevalence and characteristics of current smoking across gender

Table 2 shows the gender-based comparisons of current smoking prevalence by depression risk, school bullying, and sociodemographic characteristics. The prevalence of current smoking was estimated at 6.4% (2.1% among girls and 11.1% among boys), and the mean onset age of smoking was 12.9 years (SD: ± 2.0) years. Without adjusting for other variables, current smoking was more

Table 1
Demographic characteristics of the participants, N=35,893.

Variables	Total, n (%) (n= 105,752)	Girls, n (%)	Boys, n (%)	p-Value**
Total	35,893 (100)	18,504 (51.6)	17,389 (48.4)	–
Age (year)^a	15.9 (2.0)	15.8 (1.9)	16.0 (2.0)	< 0.001
Grade				< 0.001
7th	6961 (19.4)	3190 (17.4)	3771 (21.9)	
8th	6877 (19.2)	3385 (18.4)	3492 (20.3)	
9th	4486 (12.5)	2184 (11.9)	2303 (13.4)	
10th	8308 (23.1)	4637 (25.3)	3671 (21.3)	
11th	6557 (18.3)	3732 (20.3)	2825 (16.4)	
12th	2412 (6.7)	1235 (6.7)	1177 (6.8)	
Missing data	292 (0.8)	–	–	
Living arrangement				< 0.001
Two biological parents	26,860 (74.8)	14,067 (76.3)	12,793 (73.9)	
Only father or mother	3582 (10.0)	1784 (9.7)	1798 (10.4)	
Others	5307 (14.8)	2597 (14.1)	2710 (15.7)	
Missing data	144 (0.4)	–	–	
Family economic status				< 0.001
Above average	6390 (17.8)	3016 (16.4)	3374 (19.5)	
Average	23,222 (64.7)	12,385 (67.3)	10,837 (62.7)	
Below average	6087 (17.0)	3014 (16.4)	3073 (17.8)	
Missing data	194 (0.5)	–	–	
Classmate relationships				< 0.001
Good	22,240 (62.0)	11,259 (61.0)	10,981 (63.6)	
Average	12,395 (34.5)	6723 (36.4)	5672 (32.8)	
Poor	1091 (3.0)	465 (2.5)	626 (3.6)	
Missing data	167 (0.5)	–	–	
Teacher–classmate relationship				< 0.001
Good	14,471 (40.3)	7228 (39.2)	7243 (41.9)	
Average	19,121 (53.3)	10,456 (56.7)	8665 (50.1)	
Poor	2148 (6.0)	769 (4.2)	1379 (8.0)	
Missing data	153 (0.4)	–	–	
Academic achievement				< 0.001
Above average	11,347 (31.6)	6078 (33.0)	5269 (30.5)	
Average	13,085 (36.5)	7487 (40.6)	5598 (32.4)	
Below average	11,271 (31.4)	4854 (26.4)	6417 (37.1)	
Missing data	190 (0.5)	–	–	
CES-D Scores^a	14.7 (8.7)	15.8 (8.0)	14.5 (9.1)	0.093
Depressive symptoms				< 0.001
Yes	2017 (5.6)	1139 (6.2)	878 (5.0)	
No	33,876 (94.4)	17,365 (93.8)	16,511 (95.0)	
Bullying behaviors				< 0.001
Bullying	618 (1.7)	217 (1.2)	390 (2.3)	
Bullied	2071 (5.8)	744 (4.0)	1293 (7.8)	
Both bullying and bullied	1269 (3.5)	246 (1.3)	998 (6.0)	
Neither bullying nor bullied	31,935 (89.0)	17,297 (93.5)	14,000 (83.9)	
Province				0.504
Chongqing	11,851 (33.0)	5871 (31.7)	5980 (34.4)	
Fujian	11,793 (32.9)	5967 (32.2)	5826 (33.5)	
Guangdong	12,249 (34.1)	6666 (36.0)	5583 (32.1)	
Economic stratification^b				< 0.001
High-level	13,167 (36.7)	6495 (38.9)	6424 (34.7)	
Mid-level	11,301 (31.5)	5190 (31.3)	5892 (31.8)	
Low-level	11,425 (31.8)	4996 (30.0)	6188 (33.4)	

** Chi-squared tests were used to test the difference between girls and boys according to the above-mentioned categorical variables, and T-tests were used to test the differences in age and CES-D scores between girls and boys.

^a Age and CES-D scores data are presented as the means (SD). SD=Standard deviation.

^b Economic stratification by per capita GDP.

common in adolescents who were at high risk for depression (10.4%; 5.0% among girls and 17.4% among boys), reported bullying others (21.4%; 9.7% among girls and 27.4% among boys), reported being bullied (8.3%; 4.6% among girls and 10.4% among boys), and reported both bullying others and being bullied (18.5%; 7.7% among girls and 20.6% among boys). In addition, there were gender disparities in the correlation of current smoking, and family economic status was associated with current smoking only among boys.

3.3. Associations between depression risk, school bullying, and current smoking: girls

Our results first demonstrated that being at high risk for depression (AOR=2.37, 95% CI=1.75–3.22), bullying others

(AOR=5.22, 95% CI=3.18–8.58), being bullied (AOR=2.42, 95% CI=1.66–3.54), and both bullying others and being bullied (AOR=3.83, 95% CI=2.33–6.29) were positively associated with current smoking among girls after only adjusting for grade, living arrangement, classmate relationships, teacher–classmate relationship, and academic achievement (Table 3, models 1 and 2). Additionally, after incorporating all significant variables (including the above-mentioned characteristics, depression risk, and bullying) in the logistic regression model 3, the final results demonstrated that girls being at high for depression (AOR=1.90, 95% CI=1.38–2.62) were more likely to be current smokers than the corresponding group. The results also illustrated that girls who reported bullying others (AOR=4.96, 95% CI=3.02–8.17), being bullied (AOR=2.05, 95% CI=1.38–3.03), and both bullying others

Table 2
Prevalence, unadjusted odds ratios and 95% confidence intervals of current smoking among adolescents.

Variables	Total (N=35,893)		Girls (N=18,504)		Boys (N=17,389)	
	Current smoking, n (%)	OR (95% CI)	Current smoking, n (%)	OR (95% CI)	Current smoking, n (%)	OR (95% CI)
Current smoking	2303 (6.4)	–	383 (2.1)	–	1920 (11.1)	–
Gender						
Girl	383 (2.1)					
Boy	1920 (11.1)					
Grade						
7th	240 (3.4)	1.00	54 (1.7)	1.00	186 (4.9)	1.00
8th	398 (5.8)	1.67 [*] (1.19–2.35)	95 (2.8)	1.67 [*] (1.19–2.35)	303 (8.7)	1.84 [*] (1.52–2.23)
9th	165 (3.7)	0.67 (0.42–1.08)	25 (1.1)	0.67 (0.42–1.08)	140 (6.1)	1.26 [*] (0.90–1.59)
10th	755 (9.1)	1.36 (0.98–1.89)	106 (2.3)	1.36 (0.98–1.89)	649 (17.7)	4.26 [*] ((3.59–5.07)
11th	555 (8.5)	1.27 (0.90–1.80)	80 (2.1)	1.27 (0.90–1.80)	475 (16.8)	3.99 [*] (3.33–4.78)
12th	163 (6.8)	0.76 (0.43–1.34)	16 (1.3)	0.76 (0.43–1.34)	147 (12.5)	2.83 [*] (2.24–3.56)
Living arrangement						
Two biological parents	1567 (5.8)	1.00	248 (1.8)	1.00	1319 (10.3)	1.00
Only father or mother	288 (8.0)	1.91 [*] (1.43–2.54)	59 (3.3)	1.91 [*] (1.43–2.54)	229 (12.7)	1.27 [*] (1.09–1.48)
Others	438 (8.3)	1.66 [*] (1.28–2.15)	75 (2.9)	1.66 [*] (1.28–2.15)	363 (13.4)	1.32 [*] (1.17–1.50)
Family economic status						
Above average	347 (5.4)	1.00	64 (2.1)	1.00	285 (8.4)	1.00
Average	1350 (5.8)	0.95 (0.72–1.26)	251 (2.0)	0.95 (0.72–1.26)	1099 (10.1)	1.24 [*] (1.08–1.42)
Below average	595 (9.8)	1.03 (0.73–1.46)	66 (2.2)	1.03 (0.73–1.46)	529 (17.2)	2.29 [*] (1.96–2.68)
Classmate relationships						
Good	1302 (5.9)	1.00	216 (1.9)	1.00	1086 (9.9)	1.00
Average	861 (6.9)	1.16 (0.94–1.43)	149 (2.2)	1.16 (0.94–1.43)	712 (12.6)	1.30 [*] (1.18–1.44)
Poor	129 (11.8)	1.94 [*] (1.17–3.21)	17 (3.7)	1.94 [*] (1.17–3.21)	112 (17.9)	1.93 [*] (1.55–2.41)
Teacher–classmate relationship						
Good	714 (4.9)	1.00	98 (1.4)	1.00	616 (8.5)	1.00
Average	1234 (6.5)	1.72 [*] (1.36–2.18)	242 (2.3)	1.72 [*] (1.36–2.18)	992 (11.4)	1.40 [*] (1.25–1.56)
Poor	343 (16.0)	4.20 [*] (2.91–6.08)	42 (5.5)	4.20 [*] (2.91–6.08)	301 (21.8)	2.97 [*] (2.55–3.47)
Academic achievement						
Above average	457 (4.0)	1.00	86 (1.4)	1.00	371 (7.0)	1.00
Average	731 (5.6)	1.38 [*] (1.05–1.80)	145 (1.9)	1.38 [*] (1.05–1.80)	586 (10.5)	1.54 [*] (1.34–1.77)
Below average	1103 (9.8)	2.22 [*] (1.70–2.90)	150 (3.1)	2.22 [*] (1.70–2.90)	953 (14.9)	2.27 [*] (2.00–2.58)
CES-D scores						
< 28	2093 (6.2)	1.00	326 (1.9)	1.00	1767 (10.7)	1.00
≥ 28	210 (10.4)	2.75 [*] (2.06–3.67)	57 (5.0)	2.75 [*] (2.06–3.67)	153 (17.4)	1.67 [*] (1.39–2.02)
Bullying behaviors						
Neither bullying nor bullied	1765 (5.5)	1.00	309 (1.8)	1.00	1408 (10.1)	1.00
Bullying	132 (21.4)	5.89 [*] (3.70–9.37)	21 (9.7)	5.89 [*] (3.70–9.37)	107 (27.4)	3.38 [*] (2.69–4.25)
Bullied	171 (8.3)	2.63 [*] (1.83–3.78)	34 (4.6)	2.63 [*] (1.83–3.78)	134 (10.4)	1.03 [*] (1.00–1.35)
Both bullying and bullied	235 (18.5)	4.60 [*] (2.84–7.45)	19 (7.7)	4.60 [*] (2.84–7.45)	206 (20.6)	2.33 [*] (1.98–2.74)

OR=Odds ratio, 95% CI=95% confidence interval.

^{*} $p < 0.05$.

Table 3
Multivariate logistic regression analysis: associations among depression risk, school bullying and current smoking across gender.

Variables	Girls			Boys		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)	AOR (95% CI)
CES-D scores						
< 28	1.00		1.00	1.00		1.00
≥ 28	2.37 [*] (1.75–3.22)		1.90 [*] (1.38–2.62)	1.26 [*] (1.03–1.54)		1.08 (0.87–1.32)
Bullying behaviors						
Neither bullying nor bullied		1.00	1.0		1.00	1.0
Bullying		5.22 [*] (3.18–8.58)	4.96 [*] (3.02–8.17)		3.16 [*] (2.47–4.03)	3.14 [*] (2.46–4.01)
Bullied		2.42 [*] (1.66–3.54)	2.05 [*] (1.38–3.03)		1.02 (0.84–1.24)	1.01 (0.83–1.23)
Both bullying and bullied		3.83 [*] (2.33–6.29)	3.27 [*] (1.97–5.43)		1.88 [*] (1.58–2.24)	1.86 [*] (1.56–2.22)

AOR=Adjusted odds ratio, 95% CI=95% confidence interval.

Model 1 and model 2 for girls adjusts for grade, living arrangement, classmate relationships, teacher–classmate relationship, and academic achievement.

Model 1 and model 2 for boys adjusts for grade, living arrangement, family economic status, classmate relationships, teacher–classmate relationship, and academic achievement.

Model 3 for both girls and boys additionally includes depression risk and bullying behaviors.

^{*} $p < 0.05$.

and being bullied (AOR=3.27, 95% CI=1.97–5.43) were at a higher risk of current smoking compared with girls not involved in school bullying (Table 3, model 3).

3.4. Associations between depression risk, school bullying, and current smoking: boys

Our results demonstrated that being at high risk for depression (AOR=1.26, 95% CI=1.03–1.54), bullying others (AOR=3.16, 95% CI=2.47–4.03), and both bullying others and being bullied (AOR=1.88, 95% CI=1.58–2.24) were positively associated with current smoking among boys after adjusting for grade, living arrangement, classmate relationships, teacher–classmate relationship, academic achievement, and additionally family economic status (Table 3, models 1 and 2). However, after incorporating all significant variables (including the above-mentioned characteristics, depression risk, and bullying) in the logistic regression model 3, the final results showed that only boys who admitted to bullying others (AOR=3.14, 95% CI=2.46–4.01) and reported both bullying others and being bullied (AOR=1.86, 95% CI=1.56–2.22) were more likely to engage in current smoking (Table 3, model 3).

4. Discussion

Few studies have explored the associations between being at risk for depression, being involved in school bullying, and current smoking among Chinese adolescents. This study provides a good opportunity to estimate the cross-sectional relationships between self-reported depression risk, bullying behaviors, and current smoking, and the study sample is large and representative of the adolescents (aged 12–18) in Southern China. First, our study provided evidences of significant demographic differences between boys and girls, and these findings provide a plausible explanation for the following stratification analyses results across genders. In the current study, the results demonstrated that the overall prevalence of current smoking was 6.4%, which was higher than a previous report, Monitoring the Future (MTF), conducted in 2011 in the United States. MTF demonstrated that 6.0% of adolescents had already become current smokers (Johnston et al., 2012); this result was higher than the results of a recent cross-sectional study in China demonstrating that the prevalence of current smoking among adolescents was 5.6% (Su et al., 2015) and lower than that of the Youth Risk Behavior Surveillance System (YRBSS) in 2013 in the United States, which suggested that 15.7% of high school students had smoked cigarettes during the past 30 days (Kann et al., 2014). Adolescent tobacco use has been a major international public health problem and China is no exception. Additionally, our study observed significant gender differences in current smoking behaviors; boys had a higher level of current smoking than girls (2.1% among girls and 11.1% among boys). These findings align with prior studies reporting that the gender difference in cigarette use was significant and boys may be more likely to be current smokers (Alwan et al., 2011; Tee and Kaur, 2014; Kann et al., 2014). The gender disparity may be partly related to the facts that boys tend to try stimulating and dangerous activities, including cigarette smoking, and the sociocultural norms that tend to stigmatize girls who smoke may result in more girls underreporting their smoking behaviors (Faeh et al., 2006).

To the best of our knowledge, this study is the first to show that after incorporating both depression risk and bullying in the logistic regression model, being at high risk for depression is independently associated with increased odds of current smoking only among girls (AOR=1.8, 95% CI=1.3–2.5), and boys with high depression risk are not more likely to currently smoke than the corresponding group. The gender difference in the association

between depression risk and smoking is consistent with most previous studies that have reported that the association between depressive symptoms/depression and smoking is stronger in females than males (Acierno et al., 2000; Needham, 2007; Arnold et al., 2014). The results may be related to the fact that depressive symptoms are generally significantly higher among girls than among boys (Guo et al., 2014), and in this study we also found that 6.2% of the girls reported being at high risk for depression and only 5.0% of the boys reported being at high risk for depression ($p < 0.001$). Thus, depressive symptoms/depression in girls may play a significant role in the association between depression risk and current smoking in this study, while the association between depression risk in boys and current smoking may be influenced by the bullying variable, because bullying behaviors (e.g., bullying others and being bullied) are more prevalent among boys. On the contrary, Killen's study in the United States only reported that boys with depressive symptoms were significantly more likely to report smoking over the study interval (Killen et al., 1997). The different results may be related to the different definition of smoking and control variables; in this study, we focused on current smokers, and we incorporated bullying behaviors as the control variable when determining the unique impact of depression risk on smoking.

Few studies have discussed the relationships among bullying others, being bullied, both bullying others and being bullied, and current smoking across gender. A prior World Health Organization survey of adolescents showed that the associations between the determinants (bullying others or being bullied) and smoking were significant in both girls and boys, although this study did not adjust for the influence of depression risk (Ravens-Sieberer et al., 2004). Furthermore, in 2013, Pan's study did not demonstrate any significant gender differences in the associations between bullying and current smoking, and this study also did not adjust for the influence of depression risk and focused on the racial and religious bullying (Pan and Spittal, 2013). In this study, after only adjusting for sociodemographic characteristics, being a school bully and being a bully victim were risk predictors for current smoking among both girls and boys, and being a bully was at the highest risk of current smoking. Similarly, Radliff's study in the United States reported that bullying and victimization were associated with cigarette smoking, and a larger proportion of bullies used cigarettes compared to victims (Radliff et al., 2012). Next, considering the association between depression risk and bullying (Roberts et al., 2013), we included all significant variables in the logistic regression model 3 to examine the independent effects of bullying behavior on current smoking. Notably, the final results suggested that being a bully and being a bully victim increased the risk of current smoking among both girls and boys. Likewise, previous studies have also demonstrated that youths who bully others tend to exhibit higher levels of delinquent behaviors, such as tobacco use (Morris et al., 2006; Vieno et al., 2011). Moreover, our study showed that being a victim was positively associated with current smoking only in girls. One reason for this result may be related to the fact that boys were more involved as bullies and girls were more likely to be victims (Vieno et al., 2011; Kann et al., 2014); another possible explanation is that smoking among female students is rare in China (Su et al., 2015), and a large proportion of the bullied girls try to use cigarette as a coping strategy for being bullied compared with those girls who neither bully others nor are being bullied. Thus, being a victim had a strong association with current smoking in girls.

Several study limitations should be noted when interpreting the results. First, the data are cross-sectional; therefore, these associations should not be construed as causal. Second, we used a structured self-rating questionnaire to collect data; although self-reporting is a common and accepted method, we could not

completely rule out the possibility of recall bias. Third, depression risk was based on CES-D scores, without corroborating clinical evaluation, although the CES-D is a well-validated instrument for assessing depression risk. Fourth, we lost some information by adopting the strategy of dichotomizing the variables of depression risk and current smoking instead of using continuous variables. Fifth, our study sample only included school students and did not include adolescents who had dropped out of school or were not present in school on the day of the survey administration; being at high risk for depression, bullying others, being bullied, both bullying others and also being bullied, and smoking may be more common among adolescents who were absent. Therefore, the prevalences of depression risk, bullying, and current smoking detected in this study are likely to be underestimates. Fifth, the associations (a) between bullying involvement and smoking, and (b) between depression risk and smoking might be underestimation of the true statistical direct effects, because depression risk may have mediated the association between bullying and current smoking, and bullying may have mediated the association between depression risk and current smoking.

Despite these limitations, the strength of our study is that it is the first large-scale study to simultaneously explore the association between depression risk, bullying and current smoking among Chinese adolescents across gender, and our relatively high response rate ensured the generality of our findings in this population. Furthermore, we used two-level logistic regression stratification analyses to examine the associations between depression risk, bullying and current smoking among girls and boys.

In conclusion, the prevalence of current smoking among Chinese adolescents is high, and it is predominately a public health problem among male students. Given adolescents' vulnerability to depression risk, school bullying and smoking, we conducted this large-scale study to investigate whether adolescents being at high risk for depression, being school bullies, being victims, or being bully victims were more likely to be current smokers and whether there were gender differences in these relationships. In answer to these questions, two-level multivariate logistic regression analyses were separately conducted for boys and girls. Finally, we found that being at high risk for depression, bullying others, being bullied, both bullying others and being bullied were independent risk predictors for current smoking in girls, while only bullying others and both bullying others and being bullied independently increased the risk of current smoking in boys. Therefore, effective prevention measures require full consideration of the factors (including depression risk and bullying behaviors) associated with current smoking among Chinese adolescents. First, educational campaigns directed at students are needed to improve awareness of the serious consequences of smoking. Second, school-based prevention/intervention programs, such as the Olweus Bullying Prevention Program (BPP), which can serve important functions to attenuate the detrimental effects of school bullying, are highly recommended. The BPP utilizes a multi-pronged method that incorporates school-wide (e.g., formation of a bullying prevention coordinating committee and an anonymous student survey), classroom-level (e.g., class meetings with parents), and individual (e.g., direct interventions with identified bullies, victims and their parents) activities (Black et al., 2010). Third, we should focus on high-risk students, particularly girls who are at high risk for depression or who are involved in school bullying, as well as boys who are involved in school bullying. Furthermore, the government should establish a proper surveillance system, such as the Monitoring the Future program in the United States, to control and supervise the direction of cigarette use.

Role of funding sources

This study was supported by the Guangdong Food and Drug Administration (Grant no. GZSW11175FT4055). The funders had no role in the study design, data collection or analysis, decision to publish, or preparation of the manuscript.

Contributors

GL, HLY, and LCY searched the literature, conceived the study, designed the study, analyzed the data, interpreted the results, and drafted the report. GL and ZWH organized the study, collected the data and analyzed the data. GX, WH, ZJH, LPS collected the data, interpreted the results, and obtained funding.

Competing interests

None.

Acknowledgments

We gratefully acknowledge the contribution of the Guangdong Education Bureau and its participating schools. We would like to thank the local health professionals, principals and teachers of participating schools. We express great thanks to all participants of our study.

References

- Acierno, R., Kilpatrick, D.G., Resnick, H., Saunders, B., De Arellano, M., Best, C., 2000. Assault, PTSD, family substance use, and depression as risk factors for cigarette use in youth: findings from the National Survey of Adolescents. *J. Trauma Stress*. 13 (3), 381–396.
- Alwan, Ala, Armstrong, Tim, Bettcher, Douglas, Branca, Francesco, Chisholm, Daniel, Ezzati, Majid, World Health Organization, et al., 2014. Global Status Report On Noncommunicable Diseases 2010 Description of the Global Burden of NCDs, their Risk Factors and Determinants.
- Alwan, H., Viswanathan, B., Rousson, V., Paccaud, F., Bovet, P., 2011. Association between substance use and psychosocial characteristics among adolescents of the Seychelles. *BMC Pediatr*. 11, 85.
- Arday, David R., Ary, Dennis V., Booth, Michael, Dee, B., Chaloupka IV, Frank J., Cummings, K. Michael, 1994. Preventing Tobacco Use Among Young People: A Report of the Surgeon General. US Department of Health and Human Services, Atlanta, GA.
- Arnold, E.M., Greco, E., Desmond, K., Rotheram-Borus, M.J., 2014. When life is a drag: depressive symptoms associated with early adolescent smoking. *Vulnerable Child Youth Stud*. 9 (1), 1–9.
- Black, S., Washington, E., Trent, V., Harner, P., Pollock, E., 2010. Translating the Olweus Bullying Prevention Program into real-world practice. *Health Promot. Pract.* 11 (5), 733–740.
- Chaiton, M.O., Cohen, J.E., O'Loughlin, J., Rehm, J., 2009. A systematic review of longitudinal studies on the association between depression and smoking in adolescents. *BMC Public Health* 9, 356.
- Chen, Z., Yang, X., Li, X., 2009. Psychometric features of CES-D in Chinese adolescents. *Chin. J. Clin. Psychol.* 17 (1005-3611(2009)17:4 < 443:LDZXYY > 2.0.TX:2-N4), 443–445, 448.
- Cheng, C.P., Yen, C.F., Ko, C.H., Yen, J.Y., 2012. Factor structure of the Center for Epidemiologic Studies Depression Scale in Taiwanese adolescents. *Compr. Psychiatry* 53 (3), 299–307.
- Crockett, L.J., Beal, S.J., 2012. The life course in the making: gender and the development of adolescents' expected timing of adult role transitions. *Dev. Psychol.* 48 (6), 1727–1738.
- Currie, Candace, Roberts, Chris, Morgan, Antony, Smith, Rebecca, Settertobulte, Wolfgang, Samdal, Oddrun, et al., 2004. Young People's Health in Context. Health Behaviour in SchoolAged Children (HBSC) Study: International Report from the 2001/2002 Survey. WHO Regional Office for Europe, Copenhagen, Denmark.
- Dierker, L., Rose, J., Selya, A., Piasecki, T.M., Hedeker, D., Mermelstein, R., 2015. Depression and nicotine dependence from adolescence to young adulthood. *Addict. Behav.* 41, 124–128.
- Espelage, D.L., Bosworth, K., Simon, T.R., 2001. Short-term stability and prospective

- correlates of bullying in middle-school students: an examination of potential demographic, psychosocial, and environmental influences. *Violence Vict.* 16 (4), 411–426.
- Faeh, D., Viswanathan, B., Chiolerio, A., Warren, W., Bovet, P., 2006. Clustering of smoking, alcohol drinking and cannabis use in adolescents in a rapidly developing country. *BMC Public Health* 6, 169.
- Fitzpatrick, K.M., Dulin, A., Piko, B., 2010. Bullying and depressive symptomatology among low-income, African-American youth. *J. Youth Adolesc.* 39 (6), 634–645.
- Guo, L., Deng, J., He, Y., Deng, X., Huang, J., Huang, G., et al., 2014. Prevalence and correlates of sleep disturbance and depressive symptoms among Chinese adolescents: a cross-sectional survey study. *BMJ Open* 4 (7), e5517.
- Han, J., Chen, X., 2015. A Meta-Analysis of Cigarette Smoking Prevalence among Adolescents in China: 1981–2010. *Int. J. Environ. Res. Public Health* 12 (5), 4617–4630.
- Holahan, C.J., Moos, R.H., Holahan, C.K., Cronkite, R.C., Randall, P.K., 2003. Drinking to cope and alcohol use and abuse in unipolar depression: a 10-year model. *J. Abnorm. Psychol.* 112 (1), 159–165.
- Johnston, Lloyd D., O Malley, Patrick M., Bachman, Jerald G., Schulenberg, John E., 2012. *Monitoring the Future: National Results On Adolescent Drug Use: Overview of Key Findings, 2011.* The University of Michigan Institute for Social Research, United States.
- Kaltiala-Heino, R., Frojd, S., 2011. Correlation between bullying and clinical depression in adolescent patients. *Adolesc. Health Med. Ther.* 2, 37–44.
- Kaltiala-Heino, R., Rimpela, M., Marttunen, M., Rimpela, A., Rantanen, P., 1999. Bullying, depression, and suicidal ideation in Finnish adolescents: school survey. *BMJ* 319 (7206), 348–351.
- Kandra, K.L., McCullough, A., Ranney, L., Goldstein, A.O., 2013a. Support among middle school and high school students for smoke-free policies, North Carolina, 2009. *Prev. Chronic Dis.* 10, 120135.
- Kandra, K.L., McCullough, A., Ranney, L., Goldstein, A.O., 2013b. North Carolina health professionals' communication with adolescents about smoking. *N. C. Med. J.* 74 (3), 193–199.
- Kann, Laura, Kinchen, Steve, Shanklin, Shari L., Flint, Katherine H., Hawkins, Joseph, Harris, William A., et al., 2014. *Youth Risk Behavior Surveillance – United States, 2013.* Centers for Disease Control and Prevention, United States.
- Kapson, H.S., Haaga, D.A.F., 2010. Depression vulnerability moderates the effects of cognitive behavior therapy in a randomized controlled trial for smoking cessation. *Behav. Ther.* 41 (4), 447–460.
- Kaukiainen, A., Salmivalli, C., Lagerspetz, K., Tamminen, M., Vauras, M., Maki, H., et al., 2002. Learning difficulties, social intelligence, and self-concept: connections to bully-victim problems. *Scand. J. Psychol.* 43 (3), 269–278.
- Killen, J.D., Robinson, T.N., Haydel, K.F., Hayward, C., Wilson, D.M., Hammer, L.D., et al., 1997. Prospective study of risk factors for the initiation of cigarette smoking. *J. Consult. Clin. Psychol.* 65 (6), 1011–1016.
- Lee, S.W., Stewart, S.M., Byrne, B.M., Wong, J.P., Ho, S.Y., Lee, P.W., et al., 2008. Factor structure of the Center for Epidemiological Studies Depression Scale in Hong Kong adolescents. *J. Personal. Assess.* 90 (2), 175–184.
- Luk, J.W., Wang, J., Simons-Morton, B.G., 2010. Bullying victimization and substance use among U.S. adolescents: mediation by depression. *Prev. Sci.* 11 (4), 355–359.
- Maes, H.H., Sullivan, P.F., Bulik, C.M., Neale, M.C., Prescott, C.A., Eaves, L.J., et al., 2004. A twin study of genetic and environmental influences on tobacco initiation, regular tobacco use and nicotine dependence. *Psychol. Med.* 34 (7), 1251–1261.
- Morris, E.B., Zhang, B., Bondy, S.J., 2006. Bullying and smoking: Examining the relationships in Ontario adolescents. *J. Sch. Health* 76 (9), 465–470.
- Munafò, M.R., Hitsman, B., Rende, R., Metcalfe, C., Niaura, R., 2008. Effects of progression to cigarette smoking on depressed mood in adolescents: evidence from the National Longitudinal Study of Adolescent Health. *Addiction* 103 (1), 162–171.
- Myers, J.K., Weissman, M.M., 1980. Use of a self-report symptom scale to detect depression in a community sample. *Am. J. Psychiatry* 137 (9), 1081–1084.
- Nansel, T.R., Overpeck, M., Pilla, R.S., Ruan, W.J., Simons-Morton, B., Scheidt, P., 2001. Bullying behaviors among US youth: prevalence and association with psychosocial adjustment. *JAMA* 285 (16), 2094–2100.
- Needham, B.L., 2007. Gender differences in trajectories of depressive symptomatology and substance use during the transition from adolescence to young adulthood. *Soc. Sci. Med.* 65 (6), 1166–1179.
- Newcomb, M.D., Bentler, P.M., 1989. Substance use and abuse among children and teenagers. *Am. Psychol.* 44 (2), 242–248.
- Nezami, E., Unger, J., Tan, S., Mahaffey, C., Ritt-Olson, A., Sussman, S., et al., 2005. The influence of depressive symptoms on experimental smoking and intention to smoke in a diverse youth sample. *Nicotine Tob. Res.* 7 (2), 243–248.
- Nunes, S.O., Vargas, H.O., Prado, E., Barbosa, D.S., de Melo, L.P., Moylan, S., et al., 2013. The shared role of oxidative stress and inflammation in major depressive disorder and nicotine dependence. *Neurosci. Biobehav. Rev.* 37 (8), 1336–1345.
- Pan, S.W., Spittal, P.M., 2013. Health effects of perceived racial and religious bullying among urban adolescents in China: a cross-sectional national study. *Glob. Public Health* 8 (6), 685–697.
- Patton, G.C., Carlin, J.B., Coffey, C., Wolfe, R., Hibbert, M., Bowes, G., 1998. Depression, anxiety, and smoking initiation: a prospective study over 3 years. *Am. J. Public Health* 88 (10), 1518–1522.
- Pomerleau, O.F., 1995. Individual differences in sensitivity to nicotine: implications for genetic research on nicotine dependence. *Behav. Genet.* 25 (2), 161–177.
- Radloff, K.M., Wheaton, J.E., Robinson, K., Morris, J., 2012. Illuminating the relationship between bullying and substance use among middle and high school youth. *Addict. Behav.* 37 (4), 569–572.
- Radloff, L.S., 1991. The use of the Center for Epidemiologic Studies Depression Scale in adolescents and young adults. *J. Youth Adolesc.* 20 (2), 149–166.
- Radloff, L.S. (Ed.), 1977. *The CES-D Scale: A Self-report Depression Scale for Research in the General Populations.*
- Ravens-Sieberer, U., Kökönyei, G., Thomas, C., 2004. School and health. In: Currie, C., Roberts, C., Morgan, A., Smith, R., Settertobulte, W., Samdal, O., et al., eds. *Young People's Health in Context. Health Behaviour in School-Aged Children (HBSC) Study: International Report from the 2001/2002 Survey.* No. 4. Copenhagen, Denmark: WHO Regional Office for Europe, pp. 184–195.
- Roberts, A.L., Rosario, M., Slopen, N., Calzo, J.P., Austin, S.B., 2013. Childhood gender nonconformity, bullying victimization, and depressive symptoms across adolescence and early adulthood: an 11-year longitudinal study. *J. Am. Acad. Child Adolesc. Psychiatry* 52 (2), 143–152.
- Schwartz, D., 2000. Subtypes of victims and aggressors in children's peer groups. *J. Abnorm. Child. Psychol.* 28 (2), 181–192.
- Shu-Ge, S., Xiao-Fei, R., Fu-Li, C., Hong-Jie, L., Yi-Jun, W., 2015. Study on 4-year follow-up of students' social anxiety detection rates about 694 students in Harbin (in Chinese). *China J. Child. Care* 5 (23), 465–538.
- Su, X., Li, L., Griffiths, S.M., Gao, Y., Lau, J.T., Mo, P.K., 2015. Smoking behaviors and intentions among adolescents in rural China: the application of the Theory of Planned Behavior and the role of social influence. *Addict. Behav.* 48, 44–51.
- Tee, G.H., Kaur, G., 2014. Correlates of current smoking among Malaysian secondary school children. *Asia Pac. J. Public Health* 26 (5 Suppl), 70S–80S.
- Timmermans, M., van Lier, P.A., Koot, H.M., 2008. Which forms of child/adolescent externalizing behaviors account for late adolescent risky sexual behavior and substance use? *J. Child Psychol. Psychiatry* 49 (4), 386–394.
- Unger, J.B., Sussman, S., Dent, C.W., 2003. Interpersonal conflict tactics and substance use among high-risk adolescents. *Addict. Behav.* 28 (5), 979–987.
- Vieno, A., Gini, G., Santinello, M., 2011. Different forms of bullying and their association to smoking and drinking behavior in Italian adolescents. *J. Sch. Health* 81 (7), 393–399.
- Wang, H., Zhou, X., Lu, C., Wu, J., Deng, X., Hong, L., et al., 2012. Adolescent bullying involvement and psychosocial aspects of family and school life: a cross-sectional study from Guangdong Province in China. *Plos One* 7 (7), e38619.
- Weiss, J.W., Mouttapa, M., Chou, C.P., Nezami, E., Anderson, J.C., Palmer, P.H., et al., 2005. Hostility, depressive symptoms, and smoking in early adolescence. *J. Adolesc.* 28 (1), 49–62.
- Wu, J., He, Y., Lu, C., Deng, X., Gao, X., Guo, L., et al., 2015. Bullying behaviors among Chinese school-aged youth: a prevalence and correlates study in Guangdong Province. *Psychiatry Res.* 225 (3), 716–722.
- Wu, P., Hoven, C.W., Liu, X., Fuller, C.J., Fan, B., Musa, G., et al., 2008. The relationship between depressive symptom levels and subsequent increases in substance use among youth with severe emotional disturbance. *J. Stud. Alcohol Drugs* 69 (4), 520–527.
- Yen, S., Robins, C.J., Lin, N., 2000. A cross-cultural comparison of depressive symptom manifestation: China and the United States. *J. Consult. Clin. Psychol.* 68 (6), 993–999.
- Zhang Jie, W.Z.F.G., 2010. Development of the Chinese age norms of CES-D in urban area. *Chin. Ment. Health J. (Chinese)* 02, 139–143.