

Relationship of Family Environment, Psychological Resilience, Campus Bullying with Tobacco Use among Preadolescents

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Abstract: Objective: To explore the relationship between family environment, psychological resilience, campus bullying and tobacco use in early adolescence. **Methods:** According to the principle of cluster sampling, 4,792 students from grade 4 to grade 6 in five primary schools in Baise City and county were selected from February to November 2018, including 2,522 males (52.63%), 2,236 females (46.66%) and 34 missing genders (0.71%); the average age was (11.8 ± 0.5) years; 2,721 students in urban areas (56.78%) and 2,071 students in county towns (43.22%); 4,313 Zhuang (90.00%), 365 Han (7.62%), 98 other ethnic groups (Yao, Miao, Yi, etc.) (2.05%). The General Family Environment Questionnaire, Adolescent Mental Resilience Scale, School Bullying Questionnaire, and Tobacco Use Questionnaire were used for evaluation, and logistic regression was used to analyze the effect relationship between the study variables. **Results:** 467 people tried to smoke, and the total detection rate was 9.75%. The number of smokers was 334, and the total detection rate was 6.97%. Boys' tobacco attempt and smoking behavior were higher than girls (χ^2 were 57.230 and 56.013, $P < 0.001$). Multivariate logistic regression analysis showed that the risk of tobacco attempt of boys was 2.37 times than that of girls (OR = 0.468, 95% CI 0.377 ~ 0.582), the risk of smoking in boys is 2.5 times that in girls 32 times (OR = 0.422, 95% CI 0.324 ~ 0.551); older adolescents had more tobacco attempts (OR = 1.609, 95% CI 1.446 ~ 1.791) and smoking behavior (OR = 2.026, 95% CI 1.776 ~ 2.310); campus bullying increased the risk of smoking behavior among adolescents (OR = 1.106, 95% CI 1.073 ~ 1.140). Psychological resilience (personal strength), family intimacy and family rules can effectively reduce the risk of adolescent tobacco attempts (personal strength, OR = 0.964, 95% CI = 0.951 ~ 0.976; family intimacy, OR = 0.946, 95% CI 0.892 ~ 0.984; family rules, OR = 0.949, 95% CI 0.930 ~ 0.965) and smoking behavior (personal strength, OR = 0.962, 95% CI 0.947 ~ 0.977; family intimacy, OR = 0.937, 95% CI 0.885 ~ 0.992; family rules, OR = 0.952, 95% CI 0.932 ~ 0.973). **Conclusion:** Campus bullying increases the risk of smoking behavior among adolescents. Psychological resilience (personal strength), family intimacy and family rules can effectively reduce teenagers' tobacco attempts and smoking behavior.

Keywords: Family environment; Mental resilience; School bullying; Tobacco; Preadolescents

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1. Introduction

In the research on the causes and mechanisms of problem behavior, family influence has a significant impact on adolescent smoking^[1,2]. Teenagers yearn for autonomy and pursue independence. When parents' discipline attitude is lack of family affection, laissez faire or too authoritative, autocratic and antagonistic, teenagers are prone to problem behavior due to oppression and alienation. At the same time, research shows that campus environmental bullying is an effective predictor of adolescent tobacco attempts^[3]. In addition, teenagers' psychological characteristics have a direct impact on behavior, and play an intermediary role in the impact of the external environment^[4]. Early adolescence (11-13 years old) is a rapid and extreme transition period of physiology (adolescence) and society (peer groups and schools). The acquisition of new behaviors in this period may be conducive to teenagers' physical and mental health and social adaptation, or may seriously weaken the adaptability in late adolescence and adulthood^[5]. Tobacco use among adolescents in China shows a trend of younger age^[6]. Early substance use prompted adolescents to form attitudes and norms related to drug abuse, which are difficult to change once established^[7]. Based on the above considerations, this study considers the group background of the influencing factors of adolescent problem behavior in early adolescence, and comprehensively investigates its correlation with adolescent tobacco use behavior in early adolescence from the perspectives of family environment (parental control, family intimacy, parent-child activities, family rules, etc.), psychological factors (psychological resilience) and campus bullying, so as to provide theoretical reference for adolescent tobacco use prevention and intervention.

2. Object and Method

2.1. Research object

From February to November 2018, five primary schools in Baise city and county were selected for cluster sampling. The students in grades 4, 5 and 6 in the selected schools were taken as the research objects. 5,378 questionnaires were distributed, 4,792 were valid, and the effective response rate was 89.10%. Among them, 2,522 were male (52.63%), 2,236 were female (46.66%), and 34 were lack of gender (0.71%); the average age was (11.8 + 0.5) years. 2,721 students in urban areas (56.78%) and 2,071 students in county towns (43.22%); 4,313 Zhuang (90.00%), 365 Han (7.62%), 98 other ethnic groups (Yao, Miao, Yi, etc.) (2.05%), and 16 were lack of ethnicity (0.33%).

The project was reviewed and supervised by the medical ethics committee of Youjiang Medical College for Nationalities (No. 2020090801), and the adolescents participating in the survey informed consent to participate in the survey.

2.2. Research tools

2.2.1. General demographic characteristics

Self-made questionnaires were used to understand students' gender, age, nationality and family life status (parents' educational level, occupation and family members living together for a long time (6 months and above)).

2.2.2. The resilience scale for Chinese adolescent (RSCA)

The Resilience Scale for Chinese adolescent (RSCA) compiled by Hu *et al.*^[8] was used for evaluation. The scale includes two dimensions: personal strength and support, of which personal strength includes three sub-

dimensions: goal focus, emotion control and positive cognition, and support includes two sub-dimensions: family support and interpersonal support. The scale shows the effectiveness of adolescents' cognition, emotion, behavior and environment in adversity in helping them resist adversity and obtain good adaptation. A 5-point scoring is adopted, "completely inconsistent = 1", "relatively consistent = 2", "sometimes consistent = 3", "often consistent = 4" and "fully consistent = 5". Among them, 12 items adopt reverse scoring, the higher the score, the higher the level of psychological elasticity of this dimension. In this study, the α reliability coefficients of the five sub-dimensions of goal focus, emotional control, positive cognition, family support and interpersonal support are 0.78, 0.80, 0.69, 0.75 and 0.79 respectively.

2.2.3. Family environment

Referencing to the family related items in *Adolescent Health and Development Questionnaire* compiled by Jessor *et al.*^[9], and revised according to the characteristics of Chinese students, the family life questionnaire used in this research was made. The questionnaire includes four dimensions: family intimacy, parent-child activities, family rules and parental support and monitoring. (1) Family intimacy includes three items, which are scored by 4 points, "very agree = 1", "agree = 2", "disagree = 3", "very disagree = 4". The higher the score, the higher the family intimacy; (2) evaluation of parent-child activities: in the past 6 months, teenagers engaged in activities with their parents (games, handicrafts, outdoor activities, watching TV, etc.), using 4-point scoring, "at least once a week = 1", "once every two weeks = 2", "once a month = 3", "almost never = 4". The higher the score, the richer the family parent-child activities; (3) family rules are mainly aimed at the management and restriction of 7 aspects: time/times of playing games, time and times of watching TV, time and place of going out, homework, time, place and object of appointment/party, time of returning home at night and time of sleeping at night, in which 5-point scoring is adopted, "very strict = 5", "strict = 4", "unclear = 3", "not strict = 2" and "very loose = 1". The higher the score, the stricter the family rules are; (4) parental support includes 5 items, parental monitoring includes 4 items. Both parental monitoring and support adopt 5-point scoring, "never = 1", "rarely = 2", "sometimes = 3", "often = 4" and "always = 5". The higher the score, the stronger parental monitoring/support. The consistency test results of each dimension of the questionnaire show that Cronbach's α ranged from 0.71 to 0.88.

2.2.4. The Chinese version of parental control questionnaire

The Chinese version of parental control questionnaire compiled by Wang *et al.*^[10] was adapted. It mainly includes two sub-questionnaires: psychological control and behavioral control. The psychological control questionnaire contains 18 items, including three dimensions: guilt, withdrawal of love and power arbitrariness. 5-point scoring is adopted, "completely inconsistent = 1", "less consistent = 2", "sometimes consistent = 3", "often consistent = 4" and "fully consistent = 5". The higher the score, the higher the level of parents' psychological control over their children. The behavior control questionnaire contains 16 items, which are divided into two dimensions: active inquiry and limited control. Using 5-point scoring, "never = 1", "rarely = 2", "sometimes = 3", "often = 4", "always = 5", the higher the score, the stronger the parents' control over their children in behavior control. In this survey, the consistency test analysis result of the questionnaire is 0.64 ~ 0.78.

2.2.5. Campus bullying

The adolescent health-related risk behavior questionnaire^[11] prepared by China Center for Disease Control and Prevention was used to measure the campus bullying suffered in the past 30 days. A total of 7 items, including being maliciously teased by others, being asked for property, being isolated, being threatened and intimidated, etc. 5-point scoring is adopted, "never = 1", "rarely = 2", "sometimes = 3", "often = 4", "always = 5". The higher

the score, the more serious the bullying. In this survey, the consistency test of the questionnaire analyzed by Cronbach's α is 0.83.

2.2.6. *The status of adolescent tobacco use*

Two behaviors: Tobacco attempting and smoking were formulated according to the *Comprehensive Report on the Survey of Health-Related/Dangerous Behaviors of Chinese Adolescents 2005*^[11]. Tobacco attempting refers to having smoked in the past, even if it was a puff; smoking is defined as the complete puff of a cigarette. The tobacco attempting test item is "have you ever tried smoking so far, even if it is only been one or two puffs?". The alternatives are "yes, no"; the smoking measurement item is "how old were you when you first smoked a cigarette?", the alternatives are "never smoked a cigarette, 7 years old or younger, 8-9 years old, 10-11 years old, 12-13 years old, 14 years old and older".

2.3. Quality control

Before the investigation, the investigators shall be trained uniformly, the investigation methods shall be standardized, and the guidelines shall be unified. During the investigation, ensure that the school personnel are not at the investigation site and try to seek the support and cooperation of the interviewees. The closed self-administered questionnaire survey method is adopted, and the students fill in the questionnaire independently in an anonymous way with the class as the unit. After the questionnaire is completed, it will be collected by the investigator on site. When the investigator collects the questionnaire, check the integrity of the questionnaire, and fill in the incomplete questionnaire. The supervisor follows the investigator to investigate, tracks the on-site guidance and coordinates the on-site work. The unanswered questionnaire shall be deleted. The filling time of the questionnaire is about 40 minutes. Epidata3.1 was used to perform double entry, and verification and logical consistency of data were checked.

2.4. Statistical analysis

Using software SPSS 23.0 to analyze the data. The sample size of this survey is large, so the measurement data are analyzed by t -test (square difference) or t' -test (variance is uneven), and the counting data are analyzed by χ^2 test. Logistic regression analysis was used in multivariate analysis. The inspection level is 0.05.

3. Results

3.1. Epidemiological characteristics of tobacco use among adolescents in early adolescence

Among the 4,792 pre-puberty adolescents surveyed, the ages of adolescents who tried to smoke tobacco [(11.28 \pm 1.02) and (11.46 \pm 0.97) years respectively] were significantly higher than those who did not try [(10.82 \pm 0.97) years] and non-smokers [(10.82 \pm 0.97) years] (t values were 9.751 and 11.673 respectively, $P < 0.001$).

It can be seen from **Table 1** that among the 4,792 pre-adolescent adolescents surveyed, 467 tried tobacco, with a total detection rate of 9.75%, of which boys are higher than girls ($\chi^2 = 57.230$, $P < 0.001$); the number of smokers was 334, and the total detection rate was 6.97%, boys higher than girls ($\chi^2 = 56.013$, $P < 0.001$).

Among the investigated population, the age of smoking a cigarette for the first time was most concentrated in "10 years old and above" (118), followed by "12 years old and above" (80).

Table 1. Demographic characteristics of tobacco attempting/smoking behavior of adolescents in early adolescence in Baise in 2018 [*n* (*r*/%)]

Variables	Tobacco attempting		Smoking					
	Yes (<i>n</i> = 467)	No (<i>n</i> = 4,325)	χ^2 value	<i>P</i> value	Yes (<i>n</i> = 334)	No (<i>n</i> = 4,458)	χ^2 value	<i>P</i> value
Gender								
Male	322 (12.77)	2,200 (87.23)	57.230	<0.001	241 (9.56)	2,281 (90.44)	56.013	<0.001
Female	140 (6.26)	2,096 (93.74)			90 (4.03)	2,146 (95.97)		
Nationalities								
Zhuang	423 (9.81)	3,890 (90.19)	0.244	0.885	302 (7.00)	4,011 (93.00)	0.687	0.709
Han	33 (9.04)	332 (90.96)			22 (6.03)	343 (93.97)		
Other	8 (9.30)	78 (90.70)			7 (8.14)	79 (91.86)		

3.2. Single factor analysis of tobacco attempting/smoking behavior of adolescents in early adolescence

The two dimensions of psychological resilience (personal strength and support) of tobacco experimenters and smokers were lower (*t* value of personal strength comparison was 10.591 and 11.013 respectively, $P < 0.001$; *t* value of support comparison was 7.924 and 9.272 respectively, $P < 0.001$); tobacco experimenters and smokers had higher dimensions of behavioral control in parental control (*t* values were 7.990 and 8.127 respectively, $P < 0.001$); adolescents with higher family intimacy were less likely to have tobacco attempts and smoking behaviors (*t* values were 7.762 and 8.139 respectively, $P < 0.001$); family rules could reduce adolescents' tobacco use and smoking behavior (*t* values were 7.762 and 8.139 respectively, $P < 0.001$); family support can reduce adolescent tobacco use and smoking behavior (*t* values are 8.265 and 9.278 respectively, $P < 0.001$); parental supervision can reduce adolescent tobacco use and smoking behavior ($t = 2.486$, $P < 0.05$; $t = 3.752$, $P < 0.001$). Since campus bullying measures the phenomena that occurred in the past 30 days, and the occurrence of adolescent tobacco attempts is not limited to the past 30 days, the impact of campus bullying and tobacco attempts is not analyzed in this study. Bullying in campus increased adolescent smoking behavior ($t' = 8.009$, $P < 0.001$).

3.3. Multivariate analysis of tobacco attempt/smoking behavior of adolescents in early adolescence

Taking tobacco attempt/smoking as the dependent variable and gender, age, psychological resilience, parental control, family environment (intimacy, family rules, parental support, parental supervision) and campus bullying as the independent variables, logistic regression analysis was carried out. Results can be seen from **Table 2** that the risk of tobacco attempt of boys is 2.37 times than that of girls ($OR = 0.468$, 95% CI 0.377 ~ 0.582), the risk of smoking in boys is 2.5 times that in girls 320 ($OR = 0.422$, 95% CI 0.324 ~ 0.551); older adolescents had more tobacco attempts ($OR = 1.609$, 95% CI 1.446 ~ 1.791) and smoking behavior ($OR = 2.026$, 95% CI 1.776 ~ 2.310); campus bullying increased the risk of adolescent smoking behavior ($OR = 1.106$, 95% CI 1.073 ~ 1.140). Psychological resilience (personal strength), family intimacy, family rules can effectively reduce the risk of adolescent tobacco attempts (personal strength, $OR = 0.964$, 95% CI 0.951 ~ 0.976; family intimacy, $OR = 0.946$, 95% CI 0.892 ~ 0.984; family rules, $OR = 0.949$, 95% CI 0.930 ~ 0.965) and smoking behavior (personal strength, $OR = 0.962$, 95% CI 0.947 ~ 0.977; family intimacy, $OR = 0.937$, 95% CI 0.885 ~ 0.992; family rules, $OR = 0.952$, 95% CI 0.932 ~ 0.973).

4. Discussion

The total detection rate of tobacco attempting in this survey was 9.75%, the total detection rate of smoking

was 6.97%. Multivariate analysis showed that gender, age, personal strength dimension of psychological resilience, family intimacy and family rules had statistical effects on tobacco attempt and smoking behavior. First of all, tobacco attempts and smoking behavior show the characteristics that boys are higher than girls. The educational expectation level of female students in China is much higher than that of male students^[12]. In the process of growing up, girls' psychological maturity will be earlier than boys. At the same time, girls have more subjective initiative in dealing with things. They will take defensive measures against the negative external influence or peers influence, while boys are more sensitive to surrounding negative influences and are more inclined to have problematic behaviors.

Table 2. Multivariate logistic regression analysis of influencing factors of tobacco attempting/smoking among adolescents in early adolescence in Baise city

Variables	Tobacco attempting			Smoking		
	<i>B</i>	<i>S.E.</i>	<i>OR (95% CI)</i>	<i>B</i>	<i>S.E.</i>	<i>OR (95% CI)</i>
Gender	-0.758 ⁽¹⁾	0.111	0.468 (0.377 ~ 0.582)	-0.862 ⁽¹⁾	0.135	0.422 (0.324 ~ 0.551)
Age	0.476 ⁽¹⁾	0.055	1.609 (1.446 ~ 1.791)	0.706 ⁽¹⁾	0.067	2.026 (1.776 ~ 2.310)
Psychological resilience						
Personal strength	-0.037 ⁽¹⁾	0.006	0.964 (0.951 ~ 0.976)	-0.039 ⁽¹⁾	0.008	0.962 (0.947 ~ 0.977)
Support	-0.006	0.009	0.994 (0.976 ~ 1.012)	-0.009	0.011	0.991 (0.970 ~ 1.012)
Parental control						
Behavior control	-0.006	0.004	0.994 (0.986 ~ 1.001)	-0.009	0.005	0.991 (0.982 ~ 1.000)
Family environment						
Intimacy	-0.065 ⁽²⁾	0.025	0.937 (0.892 ~ 0.984)	-0.065 ⁽²⁾	0.029	0.937 (0.885 ~ 0.992)
Family rules	-0.054 ⁽¹⁾	0.009	0.947 (0.930 ~ 0.965)	-0.049 ⁽¹⁾	0.011	0.952 (0.932 ~ 0.973)
Parental support	-0.016	0.012	0.984 (0.960 ~ 1.008)	-0.016	0.015	0.984 (0.956 ~ 1.013)
Parental supervision	0.018	0.014	1.018 (0.990 ~ 1.047)	-0.008	0.017	0.992 (0.960 ~ 1.026)
Campus bullying ⁽³⁾				0.101 ⁽¹⁾	0.016	1.106 (1.073 ~ 1.140)

Note: (1) $P < 0.01$; (2) $P < 0.05$; (3) campus bullying measures the phenomenon occurred in the past 30 days, while tobacco attempts are not limited to the past 30 days, therefore, the relationship between campus bullying and tobacco attempts is not analyzed.

Teenagers first get care and support from the family, so the family is an important factor affecting whether individuals can successfully deal with difficulties. Individuals constantly adjust their behavior according to the family environment. The emotional relationship, family rules and family communication among family members are the deep-seated variables affecting the psychological development of family members. According to the social learning theory, parents have a direct impact on their children's behavior. The good interaction between family members can provide good behavior demonstration and feedback for children in the family. Children integrate the learned behavior pattern into the interaction process between themselves and others to promote the cultivation of children's positive social behavior^[14]. Bad family atmosphere often makes children have centrifugal force on the family and are easy to be contaminated with some bad hobbies. Although some parents do not have some characters and habits of tobacco use behavior, if they are not properly educated, their children will form a potential personality inclined to tobacco use. When parents' discipline attitude is lack of family affection, laissez faire, or too authoritative, autocratic and antagonistic, it will directly destroy the harmonious relationship, cause friction and conflict, and make teenagers feel oppressed and alienated and easy to approach tobacco. This study found that behavior control is adolescent tobacco attempt ($OR = 0.994$) and tobacco addiction behavior ($OR = 0.991$). Based on traditional norms, parents effectively reduce the occurrence of problem behaviors by imposing various restrictions on their children, controlling and disciplining their children's various behaviors, including making friends, living and learning. At the same time, family intimacy and family rules can reduce adolescent tobacco use. Teenagers with high family intimacy and few contradictions can get more attention, feel enough care, and get more care from their families, so as to reduce the possibility of dangerous behaviors. As an important part of family culture and family environment, family rules have a subtle impact on the psychological and behavioral

development of family members. The setting of rules and restrictions helps teenagers develop self-regulation, so as to better avoid the occurrence of problem behavior. Family environment assessment, understand the family environmental factors that induce and maintain tobacco use behavior, establish family based intervention projects, emphasize the importance of family rearing methods to children's mental health, pay attention to the strengthening of family cohesion and family relations, and reduce the potential risks of children's problem behaviors (bad companions, temperament, psychology, etc.) by changing the family environment such as parents' specific rearing behavior.

Psychological resilience is the successful adaptation and good development of individuals after experiencing negative life events, setbacks and adversity. This study shows that the level of psychological resilience of adolescents in smoking group was lower ($P < 0.001$), and personal strength was the main factor of adolescent tobacco attempt ($OR = 0.964$) and tobacco addiction behavior ($OR = 0.962$). As a positive psychological resource for individuals to deal with stress, psychological resilience can effectively alleviate the negative impact of stress situations, and has a wide range of positive effects on individual physical and mental health and social adaptation^[15].

There is a significant link between bullying and smoking among middle school students^[16,17]. In this study, the senior students of primary and secondary schools also show a correlation between bullying and smoking. Being bullied forces individuals to withdraw from the mainstream social group and be marginalized in the peer group, resulting in serious psychological maladjustment. Psychological adaptation is the prediction source of future behavior problems^[18]. Some relevant surveys at home and abroad have found that most victims of bullying do not take the initiative to report their bullying experiences to parents and teachers to solve problems, but take the improper way of forbearance and tolerance, resulting in the vicious circle of bullying-being bullying^[19,20], and the victims have learning difficulties, peer exclusion and negative emotions^[21,22] who try to gain peer recognition and/or reduce stress and depression through smoking.

The diathesis-stress model^[23] believes that the development of behavioral problems is determined by the interaction between psychological characteristics and exposure to stressors. Whether an individual's evaluation of an event is a pressure or a challenge depends on the individual's goals, values and internal resources. Teenagers' internal resources (psychological resilience) help to deal with the challenges of external events with greater space and flexibility, reduce the "stress" experience and increase the possibility of experiencing positive emotional states, so as to reduce the occurrence of psychopathology or behavioral problems. If necessary intervention can be carried out on teenagers' internal resources in this critical period, it will help teenagers form a correct world outlook, outlook on life and various beliefs, and these internal resources can help teenagers resist the infection and influence of the external adverse environment and form behaviors and attitudes recognized by the society.

This study still has the following deficiencies: (1) the study was based on self-reported measures, including school bullying, and was therefore affected by recall bias; (2) questionnaires used in this study did not measure the severity or frequency of bullying. Therefore, the current research lacks the analysis of the frequency of school bullying and the dose effect of tobacco use; (3) this study used a cross-sectional survey. The results did not show the causal relationship between psychological resilience, family environment, bullying behavior and smoking use. Future research should consider using longitudinal data to verify the results of this study; (4) other potential confounding factors (parental tobacco use behavior, family economic status, etc.) have not been involved in this study. Later studies will measure more confounding factors to verify the results of this study with a more rigorous design.

Conflict of Interest

No conflict of interest was declared by the authors.

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