Letter to the Editor

Drinking Behavior and Associated Factors among Middle School Students in Shanghai, China

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The purpose of our study was to assess drinking status in middle school students and to understand the associated factors. The adjusted drinking rates were 50.9%, 39.8%, and 15.1% for lifetime, past-year, and current drinking, respectively. Multivariable logistic regression revealed the following variables positively related to drinking during the past year: family income, maternal educational level, family members who drink, parents who support drinking, best friends who drink, friends who encourage drinking, frequently attending friends' parties, smoking, and actuation trend (P<0.05). The main risk factors were friends (OR=6.77, 95% CI: 6.17, 7.43) and smoking (OR=4.70, 95% CI: 3.44, 6.43). These results contribute to obtaining the potential associated factors and aid in targeted intervention into the drinking behavior of middle school students.

Adolescents are the future of any country, and China, as a developing country, should do its best to protect them. Western countries typically use laws and regulations to control the use of alcohol. In China, however, the alcohol policy is relatively loose, and control is traditionally dependent on customs and social pressure.

Drinking has a close relationship with health. The harmful use of alcohol is one of the world's leading health risks and is a causal factor in more than 60 major types of diseases and injuries, resulting in approximately 2.5 million deaths each year. China is one of the countries with high rates of alcohol-attributable deaths per year[1]. A systematic literature review found that moderate to heavy alcohol consumption increases the risk of developing cancer of the oral cavity and pharynx, esophagus, stomach, larynx, colon and rectum, central nervous system, pancreas, breast, and prostate[2].

Adolescence is the key period for initiation of alcohol use; the quantity of alcohol consumption increases, and drinking problems begin[3]. Compared to older people, adolescents tend to be more easily influenced by the outside world, such as their parents' and friends' drinking behavior and attitudes about drinking, their school environment, alcohol advertising, and alcohol policies. It is also difficult for them to control their behavior after drinking. Hazardous and harmful drinking patterns, such as drinking to the point of intoxication and binge drinking, seem to be on the rise among adolescents and young adults[4].

Although there are many studies on adolescent drinking worldwide, studies on Chinese adolescents are few, especially large studies. In order to fill this research gap, we conducted a study between May and June of 2013.

A total of 46 schools, 138 grades, and 4801 students were surveyed in our study. Of the 4801 questionnaires received, 96.04% (n=4611) were valid. There were 2527 students in junior high school (JS) (boys=1281; girls=1246), 1050 in ordinary senior high school (OS) (boys=551; girls=499), and 1034 in vocational senior high school (VS) (boys=526; girls=508) (Table 1).

The age and gender proportions of the sample were adjusted by the entire student population of Shanghai, as monitored by the School Hygiene Department of the Shanghai Municipal Center for Disease Control and Protection. The adjusted lifetime drinking rate was 50.9%, the past-year rate was 39.8%, and the current rate was 15.1%. The current drinking rate is lower than found in another study in China (boys=36.4%, girls=23.8%)[5]. This difference may be related to the time of the survey. The present survey was mainly conducted in late May. Therefore, in the month before the survey, there were no large, national traditional holidays,

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such as the Spring Festival, Dragon Boat Festival, or Mid-Autumn Festival, during which families might have parties.

The drinking rate was significantly higher in boys than in girls (P<0.01), regardless of type of school, except for the lifetime drinking rates in VS. The drinking rates of both boys and girls and the total drinking rate showed a rising trend across type of school from JS to OS to VS (Table 2). It has been reported that male and female adolescents have different expectations about drinking[6]. Boys generally tended to rate positive expectations higher and negative expectations lower than did girls because of the social values of traditional gender roles, different responses to alcohol, and differing maturation times of brain structures and executive functions.

Although the current drinking rate is not very high, the lifetime drinking rate remains very high, especially among VS students (74.0%). Thus, the drinking problem among middle school students should still cause concern in the government, which should develop interventions.

Univariate analysis was performed on 24 variables predicting drinking during the past year. These variables included students' demographic characteristics, family environment, school environment, friend environment, advertising, smoking, and psychological conditions. Twenty-two variables were significant in the univariate analyses, and these were included in a multivariable logistic regression model to predict past-year drinking. The criterion for inclusion in the regression model was 0.05, and the criterion for exclusion was 0.10. Finally, 14 variables were included in the model.

The multivariable logistic analysis found that the risk factors for past-year drinking among middle school students were higher family income, higher maternal educational level, living with family who usually drink, parents who support drinking, best friends who drink, friends who encourage drinking, frequently attending friends' parties, smoking, and actuation trend (P<0.05). Parents' attitudes and behavior have a great influence on children's cognition[7]. A study on the association between parent and offspring alcohol use showed a moderate heritability with approximately 50% of the variance in alcohol consumption accounted for by genetic factors[8]. This study revealed that offspring are more likely to drink if their parents drink. Students from wealthier families were also more likely to drink in the present study, which may be linked to the availability of 'pocket money'.

The protective factors for middle school students were school education about the dangers of drinking, bans on student drinking, and solitude trend (P<0.05). The main variables that were risk factors were friends (OR=6.77, 95% CI: 6.17, 7.43) and smoking (OR=4.70, 95% CI: 3.44, 6.43).

Once children enter the stage of adolescence, they tend to gradually withdraw from their parents and are more influenced by their peers. Having friends who drink is recognized as one of the most direct factors contributing to the drinking behavior of middle school students. Many studies have shown that the behavior and attitudes of friends have more

Table 1. Demographic Description of the Students by School Type ($\bar{x}\pm s$)

Items	JS		OS		VS	
	boys	girls	boys	girls	boys	girls
No. in our sample	1281	1246	551	499	526	508
Age (y)	14.5±1.2	14.4±1.1	17.1±1.0	17.0±0.9	17.5±1.4	17.4±1.3
Height (cm)	167.7±9.0	160.3±6.2	176.0±5.9	162.9±5.2	174.1±6.7	163.0±5.5
Weight (kg)	57.1±10.3	49.5±9.3	66.3±10.9	52.9±9.3	64.4±15.2	53.0±10.0

Table 2. The Comparison of Different Drinking Rates (%)

Items	JS			OS			VS			Total
	boys	girls	total	boys	girls	total	boys	girls	total	
Lifetime	48.2	39.5 (1)	44.1	63.1	53.6 (1)	58.2	74.7 (2)	73.1(2)	74.0 (2)	50.9
Past year	37.1	28.5 (1)	33.1	53.8	41.0 (1)	47.2	64.9 (2)	56.6(1)(2)	61.4 (2)	39.8
Current	18.1	11.5 (1)	14.9	25.2	14.6 (1)	19.7	39.3 (2)	32.8(1)(2)	36.5 (2)	18.1

Note. (1)Comparison in the group P<0.01; (2)Comparison in different groups P<0.01

influence on drinking even than those of parents[9]. Having friends who drink creates pressure on students, and having more friends who drink frequently creates even greater pressure, which further encourages students to adopt drinking behavior[10]. Smoking was the second most serious risk factor (OR=4.70), in this study. This suggests that we should implement health education about drinking and smoking together. Like smoking, drinking alcohol also increases the risk of behaviors that are harmful to students' physical and mental health.

Policies and regulations are some of the most effective methods to limit minor drinking, such as increasing taxes on alcoholic beverage, limiting purchase channels, banning the selling of alcohol to minors, and so on. Increasing the age limits can have an important effect on adolescent drinking. Smoking was the second most serious risk factor in this study.

Although causal relationships can not be determined from this study, policymakers should consider limiting alcohol advertising, product placement, alcohol sponsorship, and sale promotions that could contribute to drinking in early adolescence. There are few studies of drinking behavior and the influencing factors among middle school students in Shanghai. Our research has filled some gaps in the information, but the scope of the survey was limited in time. It would be better to conduct surveys each month or each season to eliminate the influence of special festivals on drinking.

In short, the drinking behavior of middle school students is influenced by many factors. The results of the present study suggest that the high rate of drinking may result in more harm if effective interventions to reduce it are not implemented.

Table 3. Factors Associated with Middle School Students' Drinking Behaviors

Factor	*B*	Univariate Analysis OR (95% CI)	Multivariable OR (95% CI)
Gender	0.23	1.51 (1.41, 1.61)	1.25 (1.15, 1.36)
OS *vs.* JS	0.20	1.81 (1.68, 1.94)	1.22 (1.11, 1.34)
VS *vs.* JS	0.42	3.22 (2.82, 3.67)	1.52 (1.29, 1.80)
Family economy	0.25	1.36 (1.29, 1.44)	1.29 (1.20, 1.37)
Educational level of mothers	0.10	1.12 (1.07, 1.17)	1.10 (1.04, 1.17)
Parental drinking	0.39	1.68 (1.55,1.81)	1.48 (1.34,1.63)
Parents' attitude to adolescent drinking	0.27	1.62 (1.55, 1.70)	1.31 (1.24, 1.39)
School education about drinking	-0.13	0.75 (0.73, 0.78)	0.88 (0.84, 0.92)
School provision of student drinking ban	-0.08	0.71 (0.68, 0.74)	0.92 (0.87, 0.98)
Best friends who drink	1.92	8.23 (7.59, 8.93)	6.82 (6.22, 7.48)
Advised to drink by friends	0.25	1.91 (1.74, 2.09)	1.28 (1.14, 1.45)
Frequency of attendance at friends' parties	0.19	1.67 (1.52, 1.83)	1.21 (1.07, 1.35)
Smoking	1.56	10.17 (7.83, 13.20)	4.76 (3.48, 6.52)
Solitude trend	-0.41	0.69 (0.56, 0.85)	0.66 (0.50, 0.87)
Actuation trend	0.59	1.59 (1.19, 2.12)	1.80 (1.26, 2.58)

Note. (1) *B* is the result of multivariable logistic analysis. (2) The variable assignment: Gender (male=1, female=0), Family economy (normal=1, good=2, very good=3), Maternal educational level (junior middle school and below=1, high school, technical secondary school, and junior college=2, Bachelor's degree and above=3), Parental drinking (neither drinks=0, at least one drinks=1), Parents' attitude toward adolescent drinking (opposing=1, neutrality=2, support=3), School education about drinking(no=1, do not remember=2, yes=3), School provision of student drinking ban (no=1, do not remember=2, yes=3), Best friends who drink (none=1, some=2, almost all=3), Advised to drink by friends (no=0, yes=1), Frequency of attendance at friends' parties (≤once every month=1, ≥once every two weeks=2), Smoking (no=0, yes=1), Solitude trend (normal=0, solitude=1), Actuation trend (normal=0, actuation=1).

Conflicts of Interest: The authors have no conflicts of interest relevant to this study.

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