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Gender differences in alcohol drinking among adolescents: a school-based survey in China

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ABSTRACT

Background Alcohol drinking among adolescents is associated with their health development. However, the prevalence of alcohol drinking among adolescents in Southwestern China remains largely unexplored. This study aimed to investigate the prevalence of alcohol drinking, with a particular focus on gender differences, among primary and middle school students in Zigong, a city in Southwestern China. Additionally, we examined the association between alcohol consumption and demographic and family factors.

Methods A school-based cross-sectional survey was conducted in a city in Southwestern China, encompassing a total of 89 360 students from 132 different ordinary schools, including both primary and middle schools. Participants were recruited through cluster sampling. The Alcohol Use Disorders Identification Test Consumption was employed to assess alcohol consumption. Gender differences in the prevalence of alcohol drinkers across various schools and grades were analysed. Multivariable logistic regression analysis was used to investigate factors associated with hazardous drinking.

Results Out of the 89 360 participants, 19.0% reported alcohol drinking, with 2.1% classified as hazardous drinkers. There was a higher prevalence of alcohol drinking among boys compared with girls, as well as hazardous drinking. There were significant gender disparities in alcohol drinking observed across various schools and grade levels. A notable divergence between boys and girls was observed starting from grade 10, with a rising prevalence of hazardous drinking among boys and a decline among girls. Additionally, older age, male gender and being left-behind children were identified as risk factors for hazardous drinking, while belonging to a nuclear family and having parents who do not drink were protective factors against hazardous drinking.

Conclusions Alcohol consumption is prevalent among Chinese adolescents, with some even classified as hazardous drinkers. These findings may offer valuable insights for policymakers and caregivers, guiding them in formulating appropriate interventions and support strategies.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This survey examined the prevalence of alcohol drinking and hazardous drinking among adolescents in a city in Southwestern China, using a large sample size. It explored gender differences across various school levels (primary, junior high and senior high school) and grades.
⇒ Minor discrepancies with actual alcohol drinking may exist due to the reliance on self-reported data.
⇒ The students from vocational and special schools were excluded from the present survey due to their different learning and cultural contexts; future research should focus on the populations.
⇒ This cross-sectional survey does not provide sufficient evidence to establish causality between associated factors and hazardous drinking.

INTRODUCTION

Alcohol drinking is common worldwide.[1] For a long time, alcohol has been an aspect of human culture.[2] However, concurrently, alcohol consumption has consistently been recognised as a significant risk factor for chronic diseases or injuries,[3] including its prominent role as one of the primary risk factors for the global burden of cancer. In fact, it accounted for 7.4% of male cancer disability-adjusted life years (DALYs) in 2019.[4] Alcohol consumption led to 1.78 million deaths in 2020.[5] Globally, among individuals aged 15–39 years, alcohol-related health risk factors primarily involve harmful events. For males, alcohol-related DALYs accounted for 66.3%, whereas for females, it was 47.9%. These events encompass traffic accidents, self-harm and interpersonal violence.[5] In recent years, alcohol consumption among adolescents has become an increasingly critical public health issue.[1] The prevalence of alcohol consumption is highest in the WHO European region (43.8%), followed by the Region of the Americas (38.2%) and the Western Pacific region (37.9%). Globally, 26.5% of individuals aged 15–19 years are current alcohol drinkers.[1] Gender differences in alcohol consumption among adolescents

lack consistency. The Centers for Disease Control and Prevention in America[6] reported that the prevalence of current alcohol consumption was 22.4% among female high school students and 16.4% among male students. On average, 79% of boys aged 15–16 years in Europe reported having alcohol at least once during their lifetime, compared with 78% of girls. However, in 16 European countries, more girls were drinkers than boys.[7] A meta-analysis of alcohol consumption among Chinese adolescents revealed that 23.6% of boys and 15.3% of girls reported drinking alcohol in junior high school. Among senior high school students, the figures were 36.5% for boys and 21.2% for girls.[8]

Adolescents often undergo an increase in impulsive behaviour and typically initiate alcohol consumption during adolescence,[9] a critical period for their development and maturation. Alcohol use during this pivotal period can have detrimental effects. It is notably associated with alcohol-related damage to the brain, including a decrease in the volume of grey matter[10] and alterations in white matter integrity.[11] Studies in adolescent rodent models also indicate that the functional consequences of adolescent alcohol use include reduced cognitive flexibility, behavioural inefficiency, disinhibition, and increased impulsivity and risk-taking behaviour.[11] In addition, alcohol use in adolescents is more likely to have mood problems such as depression, anxiety[12 13] and sleep disturbances.[14] Compared with alcohol-naive adolescents, those with a history of alcohol use have an estimated 30%–60% increased likelihood of experiencing aggressive behaviour syndrome.[15] Furthermore, adolescent drinking is also a significant risk factor for alcohol and drug dependence in adulthood.[16] Those who initiated drinking before the age of 14 years were more likely to develop alcohol dependence within 10 years after their first drinking, compared with those who began drinking at the age of 21 years or older.[17] Similar research[18] indicates that individuals who experience their first episode of drunkenness before the age of 14 years are three times more likely to develop alcohol use disorder (AUD) compared with those who experience it at age 19 years or later. AUD is a chronic and relapsing brain disease, characterised primarily by uncontrollable alcohol use despite awareness of its harmful effects. A Chinese study[19] involving 367120 adult men from 31 provinces found that 10.7% of participants had AUD, which was associated with a 20% increased risk of all-cause death and a 30% increased risk of death from cancer.[19] A retrospective study[20] from the USA has found that AUD was an independent risk factor associated with traumatic brain injury (TBI) hospitalisation, and children and adolescents with AUD were found to have a 50% increased risk of TBI hospitalisation compared with non-alcohol users. These at-risk groups are also more susceptible to comorbid mood disorders and increased drug use, including stimulants, marijuana and tobacco. In a 2.5-year longitudinal study[21] from Australia, 18.4% (n=104) of adolescents met the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders AUD diagnosis during their lifetime, and 16.8% met the 11th revision of the International Classification of Diseases diagnosis of alcohol dependence.

Factors related to adolescent alcohol drinking include personal and family factors. For instance, individuals characterised by impulsivity, a propensity for seeking new and exciting experiences,[9] and those grappling with mental health challenges are more inclined to engage in alcohol consumption. Young adults who have experienced serious mental health issues in the past year were found to be four times more likely to engage in alcohol consumption at harmful levels within the previous month.[22] A study conducted in the USA identified that male individuals, along with stronger social motives, impulsiveness and lower levels of self-efficacy, were associated with high-intensity drinking behaviours.[23] As grade level increases, the prevalence of binge drinking among students also tends to rise. For instance, data indicate that 2.2% of students reported binge drinking in the past 30 days during 8th grade, while this figure increases to 10.3% among students in 10th grade.[24] Moreover, the role of parents holds particular significance in shaping the behaviours of their children. Parental alcohol use represents a significant risk factor for adolescent drinking behaviour,[25 26] which can indirectly contribute to heavy drinking patterns when they transition into adulthood.[27] Paternal drinking tended to have a greater influence on their daughters, whereas there was no gender difference in the effect of maternal drinking.[28] Another study has also shown a link between adolescent drinking and paternal drinking.[29] However, findings from Japan suggested that maternal drinking may also elevate the risk of binge drinking among adolescents.[30] These discrepancies could be attributed to diverse sample populations and cultural contexts. In addition, parental alcohol supply is associated with higher rates of alcohol consumption among adolescents.[31] A longitudinal study conducted in Australia found that a considerable proportion of children reported being given alcohol by their parents, with the prevalence increasing as children age.[32]

While there have been numerous studies investigating the prevalence of alcohol drinking among Chinese adolescents, much of the previous research has focused on eastern or developed regions of China, such as Shanghai and Zhejiang Province. Additionally, the majority of participants in these studies were middle school students. The prevalence of alcohol drinking among adolescents from Southwestern China remains largely unexplored. Considering the negative influence of adolescent drinking on their future, as well as the economic and cultural diversity across different regions in China, our study aimed to address this gap. Specifically, our study aimed to (1) investigate the overall prevalence of alcohol drinking among primary and middle school students, (2) examine the association of alcohol drinking with demographic and family factors and (3) further explore gender differences in the prevalence of alcohol drinking across different schools and grades in Zigong, a city in Southwestern China. By conducting this study, we aim to supplement the existing body of research on alcohol consumption

among adolescents, particularly in regions that have been under-represented in previous studies. This will contribute to a more comprehensive understanding of adolescent alcohol use in China and inform targeted interventions to address this public health concern.

MATERIALS AND METHODS
Procedure and participants

This cross-sectional survey was conducted between October and December 2020 in Zigong City, located in Sichuan Province, China. Zigong City comprises four administrative districts and two county-level cities. Using cluster sampling, we randomly selected two administrative regions and one county-level city to conduct this survey, encompassing all 132 ordinary schools in the selected area. Vocational schools and schools with special populations were excluded from the survey due to their distinct learning and cultural contexts.

Before commencing the survey, professional psychometricians from our team conducted offline training sessions for the investigators. They provided a comprehensive introduction to the research purpose, measurement criteria and specific questionnaire items to ensure a thorough understanding of the study. Subsequently, investigators visited local schools to introduce the purpose of the study and explain the questionnaire to the participants. Efforts were made to ensure that all participants fully understood the questionnaire and accurately completed it.

Students who were present at school on the day of the survey were invited to participate and completed an electronic survey using computers in their school computer lab. Considering that younger students may not have the cognitive ability to fully comprehend the study and questionnaire, and children may enter the period of adolescence at 10 years old.[33] So, participants included primary school students (grades 5–6), junior high school students (grades 7–9) and senior high school students (grades 10–12). To facilitate data collection, the Psychological Assessment System, a mobile mental health management platform, was preinstalled on computers. Participants independently completed all questionnaires, and the data were automatically saved within the system. Following completion of the survey, investigators could access the system to export all data for subsequent analysis, including conducting quality control checks on site. Informed consent was obtained from all participants and their parents prior to their involvement in the survey.

Out of the initial enrolment of 90 039 students, 275 data were eliminated due to incomplete Alcohol Use Disorders Identification Test Consumption (AUDIT-C) questionnaires, 27 data were removed for missing parental alcohol consumption information, 281 data were excluded due to abnormal age values and 96 data were excluded because the age of the participants was <10 years old. As a result, data from 89 360 students were included in the subsequent analysis, yielding an overall effective rate of 99.25%.

Patient and public involvement

No patients or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research.

Measurement
Demographic information

A self-made questionnaire was performed to collect demographic information from participants, covering variables such as gender (boy or girl), age, place of residence (urban or rural), whether the participant is a left-behind child (yes or no), whether they belong to a nuclear family (yes or no) and parental drinking habits (yes or no).

Drinking behaviour

AUDIT[34 35] is usually used to measure risky and harmful drinking behaviours, as well as alcohol use disorder. It consists of 10 items and has demonstrated varying levels of sensitivity and specificity across different standards, typically ranging from 51% to 97% for sensitivity and 78% to 96% for specificity.[36] Three alcohol consumption questions were selected from AUDIT to create the AUDIT-C,[37 38] a modified version used in the present study. First, participants indicated whether they were drinkers. If they answered affirmatively, they proceeded to complete the AUDIT-C questionnaire, which included the following items: (1) How often did you have a drink in the past year (scores: never, 0; ≤1 time per month, 1; 2–4 times per month, 2; 2–3 times per week, 3; ≥4 times per week, 4)? (2) How many drinks did you consume on one occasion when you were drinking in the past year (0.5–1 beer, 0; 1.5–2, 1; 2.5–3, 2; 3.5–4, 3; 5 or more, 4)? (3) How often did you consume about three or more bottles of beer or 100 mL of (Chinese) spirits at a time (never, 0; ≤1 time per month, 1; 1 time per month, 2; 1 time per week, 3; 1 time per day, 4)? Studies have verified the sensitivity and specificity of the AUDIT-C for populations aged 10–18 years, with reported values of 87% and 97%, respectively.[39]

Definition
Alcohol drinker

A person was defined as a drinker if they have consumed an amount of alcohol ≥30 g alcohol weekly (equal to 900 mL beer or 300 mL wine or 30 mL of (Chinese) spirits) and has been drinking for a period of at least 1 year.

Hazardous drinker

A total score of AUDIT-C ≥5 for a boy and ≥4 for a girl was defined as a hazardous drinker.

Statistical analysis

The statistical package for social science (SPSS), Windows V.25.0, was performed for statistical analysis. Graphical representations of the data were created using GraphPad Prism for Windows (V.8.0.2). A significant level was set for <0.05, and two-tailed results were adjusted for multicomparison. Continuous variables were described using mean

Table 1 Demographic characteristics of overall and different schools

Variables	Overall (n=89 360)	Primary (n=26 235, 29.4)	Junior high (n=42 683, 47.7)	Senior high (n=20 442, 22.9)
Age*	13.4±2.1	11.0±0.74	13.4±0.99	16.2±1.13
Gender				
Boys	44 653 (50.0)	13 492 (51.4)	21 941 (51.4)	9220 (45.1)†
Girls	44 707 (50.0)	12 743 (48.6)	20 742 (48.6)	11 222 (54.9)
Residence*				
Urban	53 189 (59.5)	15 740 (60.0)	24 208 (56.7)	13 241 (64.8)
Rural	36 171 (40.5)	10 495 (40.0)	18 475 (43.3)	7201 (35.2)
Nuclear family*				
Yes	70 278 (78.6)	19 907 (75.9)	33 467 (78.4)	16 904 (82.7)
No	19 028 (21.4)	6328 (24.1)	9216 (21.6)	3538 (17.3)
LBC				
Yes	29 986 (33.6)	7831 (29.8)†	14 981 (35.1)	7174 (35.1)
No	59 374 (66.4)	18 404 (70.2)	27 702 (64.9)	13 268 (64.9)
Paternal drinks*				
Yes	66 804 (74.8)	18 265 (69.6)	32 453 (76.0)	16 086 (78.7)
No	22 556 (25.2)	7970 (30.4)	10 230 (24.0)	4356 (21.3)
Maternal drinks*				
Yes	21 420 (24.0)	5045 (19.2)	10 312 (24.2)	6063 (29.7)
No	67 940 (76.0)	21 190 (80.8)	32 371 (75.8)	14 379 (70.3)
Drinker				
Yes	17 007 (19.0)	4935 (18.8)	8230 (19.3)	3842 (18.8)
No	72 353 (81.0)	21 300 (81.2)	34 453 (80.7)	16 600 (81.2)
Hazardous drinking				
Yes	1848 (2.1)	330 (1.3)†	999 (2.3)	519 (2.5)
No	87 512 (97.9)	25 905 (98.7)	41 684 (97.7)	19 923 (97.5)

Data are number (percentage) or mean±SD. Nuclear family, which means that students live with their two biological parents.
*There are significant differences among the three schools.
†The variable of this group is significantly different from the others (p<0.05).
LBC, left-behind children.

and standard deviation (SD), while categorical variables were presented as numbers and percentages.

Descriptive analysis

Demographic information was analysed and described for the overall participants, as well as for different school levels (primary, junior high and senior high schools). Regarding drinking behaviour, scaled scores were calculated based on responses to the AUDIT-C questionnaire. These scores were then used to determine the degree of drinking for different genders across the overall participants and within different school and grade levels.

The one-way analysis of variance (ANOVA) was performed to compare the statistical difference in continuous variables, such as age, across different school levels. If the main effect was found to be significant, post hoc tests, such as Bonferroni correction, were conducted to identify specific pairwise differences between the school levels. For categorical variables, such as gender, place of residence, gender differences in the prevalence of alcohol drinking and parental drinking behaviour, the χ^2 test was used to explore significant contrasts across different schools and grades. Similarly, if the χ^2 test yielded significant results, post hoc tests with Bonferroni correction were performed to determine specific differences between groups.

Regressive analysis

Univariate and multivariate logistic regression analysis was used to explore the associated factors of a hazardous drinker. The independent variables included age, gender, place of residence, left-behind children, types of family and parental drinking behaviour. The dependent variable was whether a participant was a hazardous drinker or not.

Table 2 Associated factors of hazardous drinkers among overall participants

Variables	Crude OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Age (+1)	1.15 (1.13 to 1.18)	<0.001	1.14 (1.12 to1.17)	<0.001
Gender (ref. girl)	1.32 (1.20 to 1.44)	<0.001	1.38 (1.23 to 1.52)	<0.001
Residence (ref. urban)	1.03 (0.94 to 1.13)	0.535	1.04 (0.95 to 1.15)	0.407
Nuclear family (ref. no)	0.61 (0.56 to 0.68)	<0.001	0.61 (0.55 to 0.67)	<0.001
LBC (ref. yes)	0.85 (0.77 to 0.94)	<0.001	0.90 (0.82 to 1.00)	0.047
Paternal drinking (ref. yes)	0.70 (0.62 to 0.79)	<0.001	0.82 (0.73 to 0.93)	0.001
Maternal drinking (ref. yes)	0.48 (0.43 to 0.52)	<0.001	0.51 (0.46 to 0.56)	<0.001

Nuclear family, which means that students live with their two biological parents.
LBC, left-behind children; Ref., reference.

RESULTS
Characteristics information
Table 1 presents demographic characteristics of the 89 360 students included in the study. The age of participants ranged from 10 years to 20 years, with a mean age of 13.4 years (SD=2.1) across all participants. Approximately half of the participants were boys. More students lived in urban areas, and more students came from nuclear families, while fewer students were LBC. Table 1 also indicates that a greater number of parents reported drinking, particularly among senior high school students. There was no significant difference observed in the prevalence of alcohol drinking among students across the three school levels. Additionally, it was noted that more middle school students were classified as hazardous drinkers compared with primary school students.

One-way ANOVA indicated a statistically significant difference in age across different schools (p<0.001). χ^2 test showed statistically significant differences (p<0.001) in gender, nuclear family, LBC and parental drinking behaviour across different schools.

Associated factors of hazardous drinkers
Table 2 provides the results of both crude and adjusted regression analyses examining the association between various factors and hazardous drinkers both crude and adjusted. After adjusting for confounders, being a hazardous drinker remained significantly associated with age (adjusted OR (AOR), 1.14; 95% CI, 1.12 to 1.17) (p<0.001), male gender (AOR, 1.38; 95% CI, 1.23 to 1.52) (p<0.001), belonging to a nuclear family (AOR, 0.61; 95% CI, 0.55 to 0.67) (p<0.001), father not drinking (AOR, 0.82; 95% CI, 0.73 to 0.93) (p=0.001), mother not drinking (AOR, 0.51; 95% CI, 0.46 to 0.56) (p<0.001) and not being LBC (AOR, 0.90; 95% CI, 0.82 to 1.00) (p=0.047). Particularly noteworthy is that being a boy was associated with a higher risk of being a hazardous drinker (AOR=1.38) compared with being a girl.

Gender differences in drinking behaviours
Table 3 presents the prevalence of alcohol drinking and hazardous drinking behaviour among boys and girls in total and across different school levels. Across all schools, a higher proportion of boys were drinkers than girls in total and three different schools (p<0.001). Specifically, the proportion of drinkers among boys was 22.1% in total, 21.6% in primary schools, 22.0% in junior high schools and 22.9% in senior high schools, while among girls, it was 16.0% in total, 15.9% in primary schools, 16.4% in junior high schools and 15.4% in senior high schools. Figure 1 indicates that more drinkers were boys than girls across all grades. Moreover, among senior high school students, there was an increasing trend in the prevalence of alcohol drinkers with increasing grades. Additionally, table 3 demonstrates that more boys than girls may be hazardous drinkers overall, in primary schools and senior high schools (all p<0.05), particularly in senior high school (3.7% for boys vs 1.6% for girls, p<0.001). However, this difference was not observed in junior high schools. Figure 2 illustrates the prevalence of hazardous drinkers among boys was higher than girls from grades 9 to 12.

Table 3 Gender differences in the prevalence of drinkers and hazardous drinkers in overall and different schools

Variables	Overall (n=89 360)		Primary (n=26 235, 29.4)		Junior high (n=42 683, 47.8)		Senior high (n=20 442, 22.9)	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Drinker	22.1* (9846)	16.0 (7161)	21.6* (2912)	15.9 (2023)	22.0* (4824)	16.4 (3406)	22.9* (2110)	15.4 (1732)
Hazardous drinker	2.3* (1047)	1.8 (801)	1.4* (188)	1.1 (142)	2.4 (520)	2.3 (479)	3.7* (339)	1.6 (180)

Data are percentage (number).
*There exist significant gender differences in overall and different groups (p<0.05).
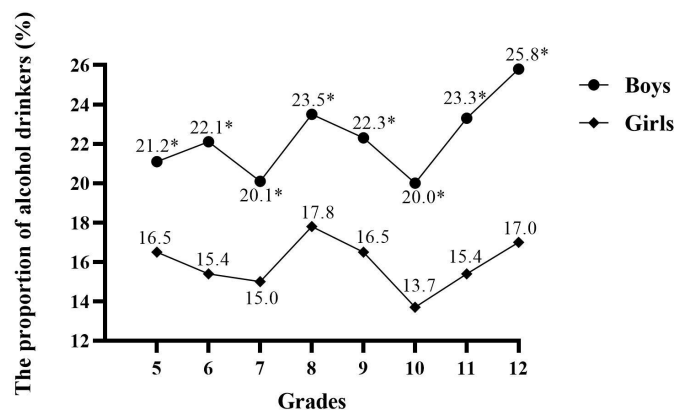AUDIT-C, Alcohol Use Disorders Identification Test for Consumption.

Figure 1 Gender differences in the prevalence of drinkers in different grades.

Figure 2 Gender differences in the prevalence of hazardous drinkers in different grades.

While a gender difference in being a hazardous drinker was observed in grade 9 (p=0.049), with boys exhibiting a higher prevalence compared with girls, this difference became more pronounced starting from 10 to 12 (p<0.001), with an increasing number of hazardous drinkers among boys and a decreasing trend observed for girls.

DISCUSSION

Our survey investigated the prevalence of alcohol and hazardous drinkers by gender among primary (5–6 grades), all junior high and senior high school students with a large sample size in Zigong, a city in Southwestern China. The findings indicate that boys are more likely to be alcohol drinkers and hazardous drinkers, as measured by the AUDIT-C questionnaire. Notably, significant gender differences were observed across different school levels (primary, junior high and senior high schools), as well as within specific grades (grades 10–12). Furthermore, the multiple regression analysis revealed associations between a hazardous drinker and certain demographic characteristics, including older age, being male and parental alcohol drinking.

We observed that the majority of alcohol drinkers were junior high school students, whereas senior high school students exhibited the highest prevalence of hazardous drinkers. Additionally, we identified ~1.5 times higher risk for boys compared with girls to be hazardous drinkers. Consequently, we delved deeper into gender differences across three schools, revealing that boys outnumbered girls in alcohol consumption, and they also displayed severe drinking behaviours, except among junior high school students. In grades 9–12, we noted a distinct trend: while being a hazardous drinker among boys is steadily increasing with each higher grade level, it showed a contrasting decrease among girls. Interestingly, the gender difference among hazardous drinkers was not particularly significant in grade 9 (p=0.049) but became more pronounced in grades 10 through 12. In China, students undergo a pivotal entrance examination for senior high school at the culmination of their ninth grade. Consequently, while some students progress to senior high school, others may opt for vocational high school or enter the workforce. Notably, senior high school students, particularly
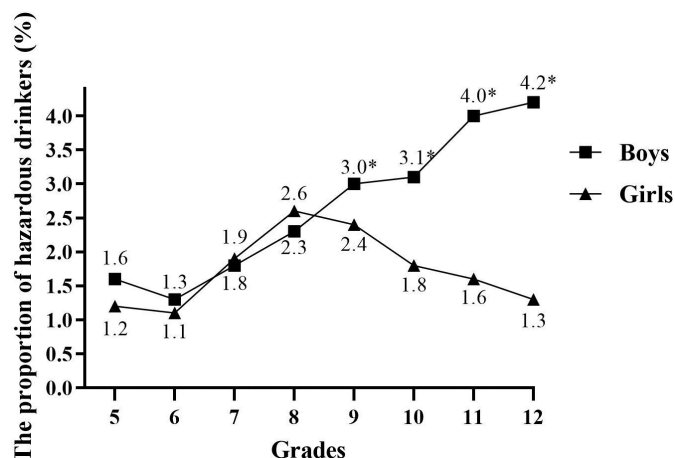
boys, tend to be more socially active and mirror adult men in their behaviour. This increased social exposure likely provides more opportunities for alcohol consumption, potentially contributing to the observed trends in drinking behaviour among adolescents. In our previous study[40] conducted between May and August 2020, we conducted an online survey to explore the drinking behaviour of Chinese adults. The findings revealed that high-risk drinking was prevalent, with 36% of the 2229 surveyed individuals exhibiting such behaviour. Among these drinkers, a notable gender disparity was observed, with 43.2% of males and 9.3% of females classified as high-risk drinkers. Furthermore, the study identified that a significant proportion of males (70.2%) and females (46.6%) were categorised as hazardous drinkers.

A previous study[41] conducted in 2016 surveyed 3291 Japanese high school students, revealing a lower prevalence of current alcohol use compared with our present survey. Specifically, the study found that the overall prevalence of alcohol use in the past 30 days was 9.6%, with 10.7% for boys and 8.6% for girls. In a study involving Korean students,[42] the prevalence of drinking among grade 12 students was reported to be 25.1% in boys and 18.7% in girls, a trend that closely mirrors the findings of our present survey (25.8% for boys and 17.0% for girls). Similarly, a cross-sectional survey conducted between May and June 2013 in Beijing, Shanghai and Guangzhou, China's metropolises, surveyed 13 811 middle school students (excluding 9th and 12th graders). The results indicated that a higher percentage of male students (56.3%) compared with female students (48.9%) had consumed alcohol in their lifetime. Furthermore, a greater proportion of male students (43.5% vs 33.4%) reported being drinkers in the past 12 months, with 6.7% of male students engaging in binge drinking.[43] The prevalence of drinkers in the past year reported in that study was higher compared with our present survey, aligning with our finding on gender differences, which indicated a higher proportion of male drinkers. It is worth noting that the surveyed cities in that study are all more developed than the area in our study. Consequently, students

in these cities may have greater access to alcohol and be more vulnerable to drinking. In a school-based survey[44] conducted in Zhejiang Province, China, involving 23 543 middle school students, findings revealed that 27.0% of boys and 18.2% of girls reported alcohol use in the past month. Additionally, 11.8% of boys and 6.5% of girls reported engaging in binge drinking during the past 30 days. These results are similar to our present survey findings. The prevalence of alcohol use in total reported in the referenced survey is higher compared with our findings (22.8% vs 19.3%). This difference could potentially be attributed to the inclusion of primary school students in our survey, whereas the referenced survey focused on middle school students. Additionally, vocational senior high school students were excluded from our survey, which could also contribute to the variation in prevalence rates. Previous studies[43 45] have indicated that older age and enrollment in vocational senior high schools are associated with a higher likelihood of alcohol consumption. A study[46] using data from the China Health and Retirement Longitudinal Study revealed that among 19 841 older adults aged 50 years and above, the prevalence of current alcohol consumption was 48.5%, with many of them experiencing chronic diseases or conditions such as liver disease. This prevalence of drinking among adults and older adults surpasses that observed among adolescents, which aligns with common knowledge. However, it is crucial to recognise that many adults initiated drinking during adolescence. Therefore, implementing measures to curb adolescent drinking is paramount, as it may help prevent the development of problematic behaviour later in life.

The present study identified older age as one of the risk factors for being hazardous drinkers. Additionally, belonging to a nuclear family,[47] not being LBC and having parents who do not drink were identified as protective factors against hazardous drinkers. Previous researches have also underscored the influence of parental drinking behaviours on their children's drinking habits.[25 30] Moreover, the study found that paternal non-drinking was more protective than maternal non-drinking, suggesting that fathers' drinking behaviour may exert a greater influence on their children compared with mothers', a trend consistent with prior study.[29] Given the longstanding patriarchal nature of Chinese society, children may be more inclined to model their behaviour after their fathers.

There are several limitations to consider in this study. First, the data collected in the survey relied on self-reporting, which may introduce minor discrepancies compared with actual alcohol consumption. Second, students from vocational and special schools were excluded from the present study due to their different learning and cultural contexts. The previous research indicated that these populations might be more vulnerable to alcohol drinking; future studies should focus on the populations. Lastly, being a cross-sectional survey, it cannot establish causality between associated factors and hazardous drinking behaviours. Future research would benefit from prospective cohort studies to better understand the relationship between these factors and alcohol consumption among primary and middle school students, ultimately aiding in the development of interventions to prevent alcohol misuse among adolescents.

CONCLUSION

This school-based survey revealed that approximately one-fifth of adolescents in primary and middle schools in Southwestern China were alcohol drinkers. Furthermore, a portion of these adolescents are even hazardous drinkers, particularly among boys in senior high schools. Being hazardous drinkers were found to be more prevalent among older individuals, boys, those from nonnuclear families, LBC and those with parents who consume alcohol. Our findings underscore the imperative for implementing stricter measures aimed at reducing alcohol drinking among this population.

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