

Understanding alcohol-specific antecedents among Chinese vocational school adolescents

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Highlights

- Alcohol-specific antecedents accounted for 38% of variation in drinking intentions.
- Norms and positive beliefs of drinking were salient predictors of drinking intentions.
- Mediation relationships existed among alcohol-specific antecedents.
- Gender moderated some antecedent-intention relationships.

Abstract

Background: Alcohol use among Chinese vocational school students is widespread and associated with many negative consequences. However, alcohol-specific antecedents for this population are understudied. **Objectives:** The current study explored: (a) which alcohol-specific antecedents are the most salient predictors for alcohol use intentions, (b) whether any mediational relationships exist among these alcohol-specific antecedents, and (c) whether gender-based differences exist among these relationships. **Methods:** This study analyzed data from 1,230 vocational school adolescents in three Chinese cities. Survey data were analyzed using dominance analysis and structural equation modeling. **Results:** Personal norms were the most salient antecedents for alcohol use intentions, followed by injunctive norms from friends and parents, descriptive norms from friends and classmates, and positive belief about drinking. We observed a statistically significant partial mediational chain from descriptive norms to injunctive norms, and in turn to personal norms and positive beliefs, and finally to alcohol use intentions. Gender moderated some of the paths. **Conclusions:** Alcohol use norms and beliefs among Chinese vocational school students have distinct predictive relationships with alcohol use intentions. Alcohol use prevention programs designed for this population need to address normative beliefs (descriptive, injunctive, and personal norms) and the perceived benefit of alcohol use.

Keywords: alcohol use; alcohol-specific antecedents, adolescent; drinking intention; prevention

1. Introduction

Adolescent alcohol use is an intractable social and public health problem with detrimental effects on adolescent development. Globally, alcohol use is a leading risk factor for death and disability and places a huge economic burden on society (1, 2). Alcohol use during adolescence can have adverse immediate and long-term consequences such as alcohol and other substance abuse, unintentional injuries, risky sexual behaviors, poor academic performance, and mental health problems (3-7). In China, alcohol consumption per capita has increased in recent decades (8). Although research on Chinese adolescent drinking is limited, existing studies have shown that the prevalence of adolescent drinking is increasing and that education-based alcohol use disparities exist (9, 10). Namely, vocational school students have higher past 30-day alcohol use prevalence (44.7% for males; 28.8% for females) than high school students (36.5% for males; 21.2% for females) of the same age group (9).

Most of the extant literature on Chinese adolescent drinking has focused on social and demographic factors (e.g., gender, parenting behaviors, peer influences) related to drinking (11-14). Alcohol-specific antecedents such as alcohol use norms, beliefs, and perceived behavioral control remain understudied among Chinese adolescents. To address this knowledge gap, the current study explores the alcohol-specific antecedents of alcohol use intentions among Chinese vocational school students: an adolescent population at disproportionately high risk of alcohol use in a country where alcohol use is on the rise.

1.1 Alcohol-Specific Antecedents Based on the Reasoned Action Framework

More than 65% of the variation in adolescent problem behaviors (including alcohol use) is due to behavioral-specific antecedents, more than the variation due to common antecedents (e.g., personality, social antecedents) (15). Therefore, to maximize their treatment effects, alcohol use prevention programs must address both common and alcohol-specific antecedents (15, 16). The reasoned action framework (e.g., theory of reasoned action; theory of planned behavior) posits that behavioral norms, beliefs, and perceived behavioral control are three immediate antecedents of behavioral intentions, and that intention to perform a given behavior is the most immediate determinant of its corresponding behavior (17, 18).

The reasoned action framework differentiates between two types of behavioral norms: injunctive norms and descriptive norms (17). *Injunctive norms* of alcohol use refer to individuals' perceptions about whether their important others (e.g., parents, friends, classmates) think they should or should not use alcohol (17). *Descriptive norms* of alcohol use refer to individuals' perceptions about what percentage of others like them (e.g., friends, classmates) are or are not using alcohol (17). If adolescents believe that their friends or parents approve of them using alcohol or perceive that most of their peers are using alcohol, they may have stronger intentions to use alcohol. Although not formally included in the reasoned action framework, prior literature has also documented the effects of *personal norms* of alcohol use, which refer to an individual's own judgements about whether they (or someone like them) should or should not drink (17). *Alcohol use beliefs* refer to individuals' perceived advantages and disadvantages of using alcohol. If adolescents

perceive more benefits of drinking (e.g., making parties more fun, relieving stress) and fewer negative consequences of drinking (e.g., causing sickness), they are more likely to intend to drink.

Perceived behavioral control is comprised of Bandura's conception of self-efficacy (i.e., ease or difficulty of performing a behavior) and controllability (i.e., beliefs about the extent to which performing the behavior is up to the actor) (17, 18). If adolescents believe they are capable of or have control over using alcohol, they are more likely to have positive drinking intentions.

1.2 Empirical Evidence of Norms, Beliefs, and Perceived Control of Alcohol Use

The reasoned action framework has been widely used to explain alcohol use behaviors, but mostly among college students and adult populations (19). In a meta-analysis of 40 studies using the theory of planned behavior to predict alcohol use, only five studies focused on adolescents. Based on these few studies, the meta-analysis found small to moderate correlations between drinking beliefs and intentions ($r = 0.4$), between drinking norms and intentions ($r = 0.49$), and between drinking self-efficacy and intentions ($r = 0.22$) among adolescents (19).

The salience of different alcohol-specific antecedents to the prediction of adolescent drinking is expected to vary within each domain and to vary by demographic factors (e.g., gender), as indicated by the results of relevant studies, most of which were conducted among U.S. adolescents (20-25). Perceived benefits of drinking generally predicted drinking better than perceived negative effects of drinking (25, 26). However, it remains unclear which specific perceived benefits are more salient because most studies combined alcohol use beliefs into categories. For drinking norms, one

study found that personal norms more strongly influenced drinking than injunctive and descriptive norms (21). Findings regarding the relative influence of descriptive and injunctive norms on drinking were mixed (22, 24). One study found that peer injunctive norms had a stronger correlation with drinking than parental injunctive norms (20). Regarding gender differences, findings indicated that peer descriptive and injunctive norms more greatly influenced girls' drinking (20, 21), whereas parental injunctive norms more greatly influenced boys' drinking (23). In summary, research evidence on the relative importance of specific alcohol use norms, beliefs, and perceived behavioral control is still limited and inconclusive. Program designers need more specific guidance about which alcohol-specific antecedents to prioritize in prevention programs.

Causal relationships (e.g., direct, indirect/mediated, moderated relationships) may exist among adolescents' alcohol use norms, beliefs, and perceived behavioral control. Although most studies of alcohol-specific antecedents cannot establish causality, causal thinking guides many such studies (27). For instance, several studies found that positive drinking beliefs mediated the relationship between drinking norms and alcohol use (28-31). Mediational relationships also exist among various alcohol use norms: personal norms mediate the influence of descriptive and injunctive norms on substance use intentions (32), and injunctive norms mediate the effects of descriptive norms on alcohol use intentions (30). Interactions may also exist among alcohol-specific antecedents (33). Exploring the tangled causal dynamics between alcohol-specific antecedents is essential: research that overlooks indirect relationships will underestimate the overall effects of an alcohol-specific antecedent on alcohol use and misinform interventions built upon this research.

1.3 Present Study

Most previous research on alcohol-specific antecedents studied adults or college students (34). Fewer studies have focused on adolescents (22, 35, 36), and almost no study has explored this topic among Chinese vocational school students (37). Moreover, nearly all previous studies examined alcohol-specific antecedents using composite scores or latent variables that represent the common variances of each construct, without specifying the relative importance of each specific alcohol use beliefs or norms (24, 37, 38). With current analytic practices, program designers receive little guidance about which alcohol-specific antecedents to prioritize in alcohol use prevention programs. To better inform effective alcohol use prevention strategies, the current study assessed the relative importance of each alcohol-specific antecedent among Chinese vocational school students and explored whether any mediating relationships exist among these factors. Because prior research has identified gender differences in alcohol use prevalence and alcohol-related norms and beliefs among Chinese adolescents (13, 39), this study also examined whether gender moderates any antecedent-intention relationships.

2. Methods

2.1 Procedure and Respondents

This study used the survey data from the Chinese Youth Substance Use & Behavioral Health project, a study designed to evaluate the prevalence, risk, and protective factors of substance use behaviors among Chinese vocational school students. Researchers from three Chinese universities in

partnership with an American university designed the study and collected data from vocational school students in three major Chinese cities in 2019. The research team administered a 30-minute paper-and-pencil survey among a convenience sample of 1,308 participants. The current study focused on adolescents aged 15 to 17 years, reducing the analytic sample to 1,230 adolescents. The institutional review board at Arizona State University approved the original study. The three Chinese partner universities also reviewed and approved the U.S. ethical standards for data collection and obtained informed consent from the participants.

2.2 Measures

All measures were adapted from the Arizona Youth Survey (40). The questionnaire was forward and backward translated into Chinese and pilot tested for readability and comprehension. The survey was anonymous and voluntary. Self-reported alcohol use measures have been demonstrated to have good validity and reliability (41, 42). Self-reported measures of alcohol use norms and beliefs have been frequently used among Chinese adolescents (37, 43). Single-item measures for norms, beliefs, and perceived control of drinking have been frequently used in previous research and student health surveys (32, 44). Despite critiques of single-item measures, many methodological studies have found their predictions to be no worse than multiple-item scales of the same construct (45, 46).

The survey included six items addressing alcohol use norms. One item measured personal norms: “Is it ok for someone your age to drink alcohol?” Available responses included “absolutely

no,” “no,” “yes,” and “absolutely yes.” Three items measured injunctive norms: “How do your (1) parents, (2) best friends, and (3) class teacher feel about your drinking alcohol?” Available responses included “strongly disapprove,” “moderately disapprove,” “neither,” “moderately approve,” and “strongly approve.” Two items measured descriptive norms: “How many (1) students at your school and (2) your close friends do you think have ever used alcohol?” Available responses were “none,” “almost none,” “some,” “half of them,” “most of them,” and “all of them.”

Three items measured alcohol use beliefs: “drinking alcohol makes parties more fun,” “drinking alcohol takes away stress,” and “drinking alcohol does not affect school performance.” To each statement, respondents chose from “strongly disagree,” “moderately disagree,” “neither,” “moderately agree,” and “strongly agree.”

One item measured perceived ease of access to alcohol: “How easy do you think it would be for you to get alcohol if you want to drink?” Available responses were “very difficult,” somewhat difficult,” somewhat easy,” and “very easy.”

One item measured adolescents’ drinking intentions: “If you have the opportunity to drink alcohol this weekend, you will drink alcohol.” Available responses were “strongly disagree,” “moderately disagree,” “moderately agree,” and “strongly agree.”

All the items above were rescaled on a 0 to 10 metric. We recoded positively skewed variables by collapsing nearby categories that had very few observations (e.g., for alcohol use intentions, responses on “moderately agree” and “strongly agree” were collapsed into one category).

Demographic variables controlled in the models included gender (male, female), age (15, 16,

17), city (Nanchang, Lanzhou, Qingdao), household registration (“Hukou” at birth: rural, urban), and perceived family socio-economic status (below average, average, above average).

2.3 Analytic Methods

Preliminary analyses and dominance analyses were conducted in Stata 14. All the measured alcohol use norms (six items), beliefs (three items), and perceived ease of access to alcohol (one item) were used as multivariate predictors of alcohol use intentions using dominance analysis. Dominance analysis calculates the average change in R^2 produced by adding a predictor to all possible subset regression models (47). Each predictor was assigned a standardized dominance weight between 0 and 100% to reflect its analytically derived relative importance in predicting alcohol use intentions and the extent to which it “dominates” the other predictors, with the restriction that the weights across predictors sum to 1. Higher numbers indicate greater importance.

We selected salient alcohol-specific antecedents based on the dominance analysis to predict alcohol use intentions and explored mediational relationships among these antecedents using structural equation modelling (SEM) in Mplus (48). Full information maximum likelihood was used. Non-normality was accommodated using the Huber-White robust estimation. The estimated power for every given path coefficient in these analyses was sufficient. An excellent data-model fit should have a statistically non-significant chi-square, a standardized root mean square residual (SRMR) less than or equal to .08, a comparative fit index (CFI) and a Tucker Lewis index (TLI) greater than or equal to .95, a root mean square error of approximation (RMSEA) less than or equal to .08, and a

statistically non-significant p-value for the test of close fit (49). Significance tests for mediation analysis were conducted using the joint significance test (50). Joint significance tests use standard significance tests to examine the statistical significance of each path in the causal chain of interest; mediation is said to exist if all paths are statistically significant in the chain. Multiple group analyses were conducted to test interaction effects.

3. Results

3.1 Sample Characteristics

Table 1 presents the demographic profile of the sample ($N = 1,230$). Participants' mean age was 16 years old, 60% were female, and 32% were born in urban households. Table 2 presents the descriptive statistics for the key variables. As seen in Table 2, compared to female adolescents, male adolescents had higher alcohol use intentions and scored higher on all the alcohol-specific antecedents. Table 3 presents the Pearson correlations among study variables.

Table 1. Demographic characteristics of the sample ($N = 1,230$).

	All n (%)	Male n (%)	Female n (%)
Gender		487 (40)	743 (60)
Age			
15	277 (22)	76 (15)	201 (27)
16	612 (50)	252 (52)	360 (48)
17	341 (28)	159 (33)	182 (25)
City			
Nanchang	386 (31)	134 (28)	252 (34)
Lanzhou	431 (35)	201 (41)	230 (31)
Qingdao	413 (34)	152 (31)	261 (35)
Household Registration (Hukou at Birth)			
Rural	839 (68)	331 (68)	508 (68)
Urban	391 (32)	156 (32)	235 (32)
Perceived SES			
Below average	421 (34)	193 (40)	228 (31)
Average	647 (53)	227 (46)	420 (56)
Above average	162 (13)	67 (14)	95 (13)

Table 2. Descriptive statistics for study variables.

Variables	All (N = 1,230)		Male (n = 487)		Female (n = 743)	
	Mean	SD	Mean	SD	Mean	SD
Intend to drink	2.29	3.86	3.34	4.35	1.60	3.34
Descriptive norm – Classmates	4.12	2.75	4.44	2.87	3.91	2.65
Descriptive norm – Friends	3.77	2.85	4.35	3.04	3.39	2.65
Personal norms	3.82	4.34	5.00	4.53	3.06	4.04
Injunctive norm – Parents	2.33	3.36	3.36	3.76	1.66	2.88
Injunctive norm – Friends	3.61	4.02	4.82	4.28	2.83	3.64
Injunctive norm – Teacher	0.98	2.24	1.34	2.62	0.75	1.91
Belief – Does not affect school performance	3.47	3.47	3.96	3.46	3.15	3.45
Belief – Makes parties more fun	4.30	3.48	5.00	3.43	3.83	3.44
Belief – Takes away stress	4.21	3.47	4.95	3.42	3.73	3.42
Perceived ease of access to alcohol	7.02	3.35	7.44	3.11	6.75	3.47

Note: All scales range from 0 to 10 and all mean differences between male and female are statistically significant ($p < .05$).

Table 3. Pearson correlations among study variables ($N = 1220$).

	1	2	3	4	5	6	7	8	9	10	11
1. Descriptive norm – Classmates	–										
2. Descriptive norm – Friends	0.70	–									
3. Personal norms	0.45	0.46	–								
4. Injunctive norm – Parents	0.28	0.36	0.44	–							
5. Injunctive norm – Friends	0.42	0.47	0.51	0.56	–						
6. Injunctive norm – Teacher	0.23	0.25	0.26	0.30	0.36	–					
7. Belief – Does not affect school performance	0.12	0.14	0.23	0.25	0.21	0.16	–				
8. Belief – Makes parties more fun	0.19	0.23	0.30	0.27	0.29	0.16	0.72	–			
9. Belief – Takes away stress	0.17	0.21	0.29	0.23	0.25	0.14	0.72	0.80	–		
10. Perceived ease of access to alcohol	0.30	0.33	0.27	0.20	0.29	0.10	0.20	0.26	0.24	–	
11. Intend to drink	0.36	0.42	0.54	0.42	0.45	0.24	0.23	0.30	0.25	0.21	–

3.2 Dominance Analysis Results

Table 4 presents the standardized general dominance weights (GDW) for all the measured alcohol-specific antecedents. Among the full sample, alcohol-specific antecedents accounted for 38% of the variation in drinking intentions. Generally, drinking norms had a more salient influence on drinking intentions than did drinking beliefs and perceived ease of access to alcohol. In the full sample, salient drinking norms included personal norms (GDW = 0.33), injunctive norms by friends (GDW = 0.15), injunctive norms by parents (GDW = 0.14), descriptive norms by friends (GDW = 0.13), and descriptive norms by classmates (GDW = 0.08). Injunctive norms from class

teachers (GDW = 0.03) were less salient than injunctive norms from friends and parents. Believing that “drinking alcohol makes parties more fun” (GDW = 0.06) was more salient than the other two drinking beliefs (i.e., takes away stress, does not affect school performance, GDW = 0.03). The relative importance of the alcohol-specific antecedents varied slightly by gender.

Table 4. General dominance weights for alcohol-specific antecedents of alcohol use intentions.

	Overall (N = 1,220)	Male (n = 482)	Female (n = 738)
Personal norms	0.33	0.33	0.36
Injunctive norm – Friends	0.15	0.16	0.12
Injunctive norm – Parents	0.14	0.10	0.16
Descriptive norm – Friends	0.13	0.15	0.11
Descriptive norm – Classmates ^a	0.08	0.14	0.05
Belief – Makes parties more fun	0.06	0.04	0.07
Injunctive norm – Teacher	0.03	0.03	0.03
Belief – Takes away stress	0.03	0.02	0.03
Belief – Does not affect school performance	0.03	0.02	0.04
Perceived ease of access to alcohol	0.02	0.02	0.02
R ²	0.38	0.39	0.32

Note: ^a indicates statistically significant gender difference of the dominance weight based on bootstrapped standard errors. The ranking for dominance weights was the same after controlling for covariates and the table shows the results from the uncontrolled models.

3.3 Structural Equation Modeling Results

We included only the most salient (i.e., $GDW > 0.05$) alcohol-specific antecedents (i.e., personal norms, friends' and parents' injunctive norms, friends' and classmates' descriptive norms, and the belief that “drinking alcohol makes parties more fun”) in the SEM model. To explore the causal dynamics among the included predictors, we tested different models based on behavioral decision theories and empirical evidence. Figure 1 displays four SEM models that were formally tested. Model 1 did not include any mediational relationship among alcohol-specific antecedents. Models 2.1 and 2.2 included mediation relationships among alcohol use norms. Model 3 included mediational relationships among alcohol use norms and belief. All four models controlled for gender, age, city, Hukou, and perceived SES. Table 5 provides the model fit indices. Model 3 had the best model fit and thus served as the final model used for multiple group analysis.

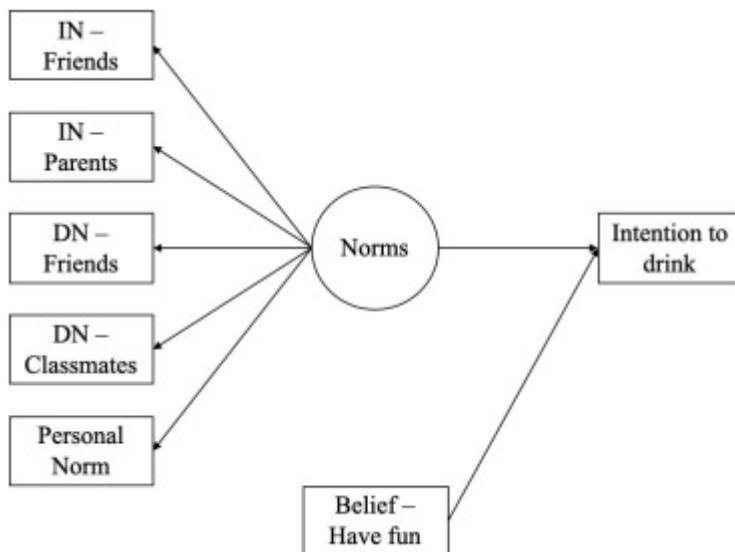


Fig. 1. Model 1: No mediational relationship among all predictors.

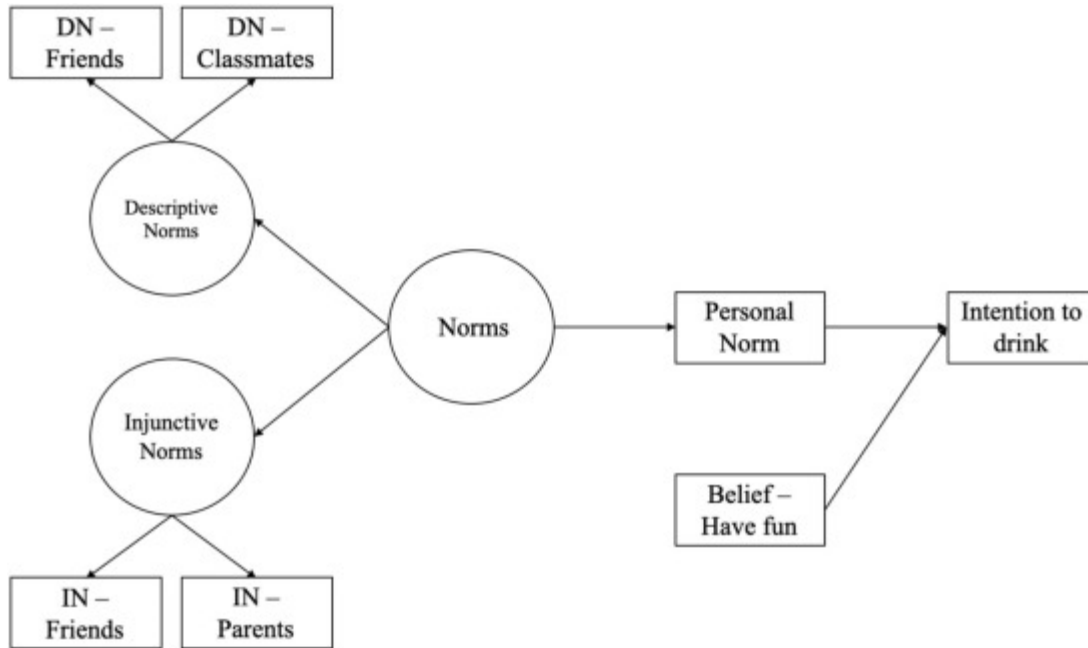


Fig. 2. Model 2.1: Mediation relationships among norms 1.

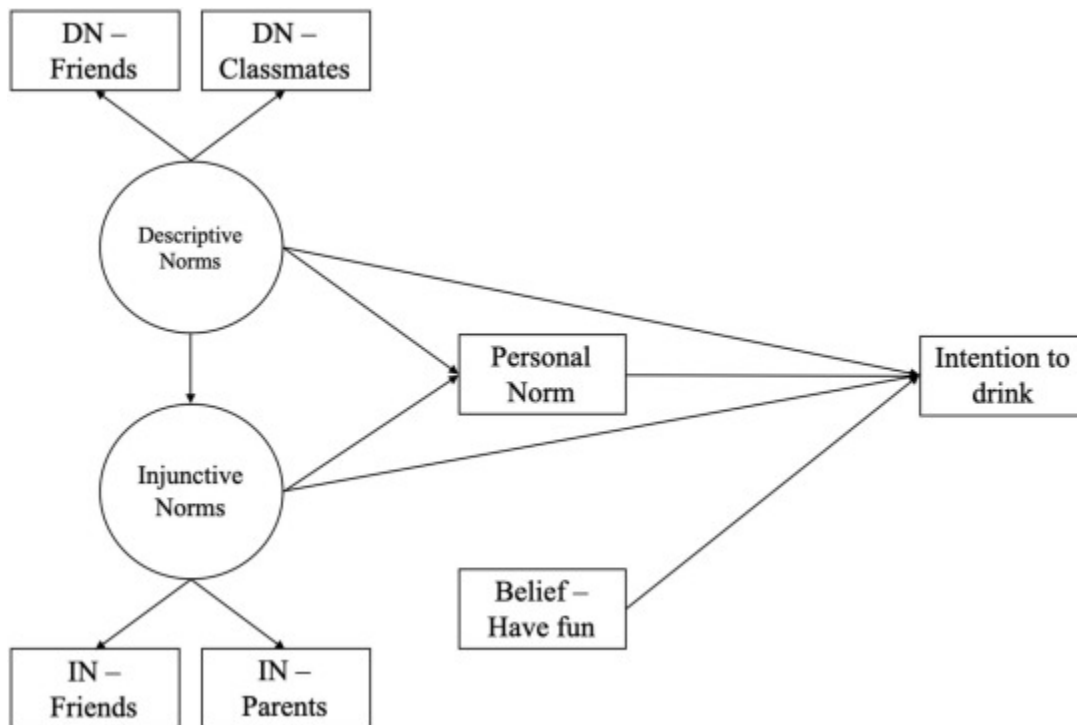


Fig. 3. Model 2.2: Mediation relationships among norms 2.

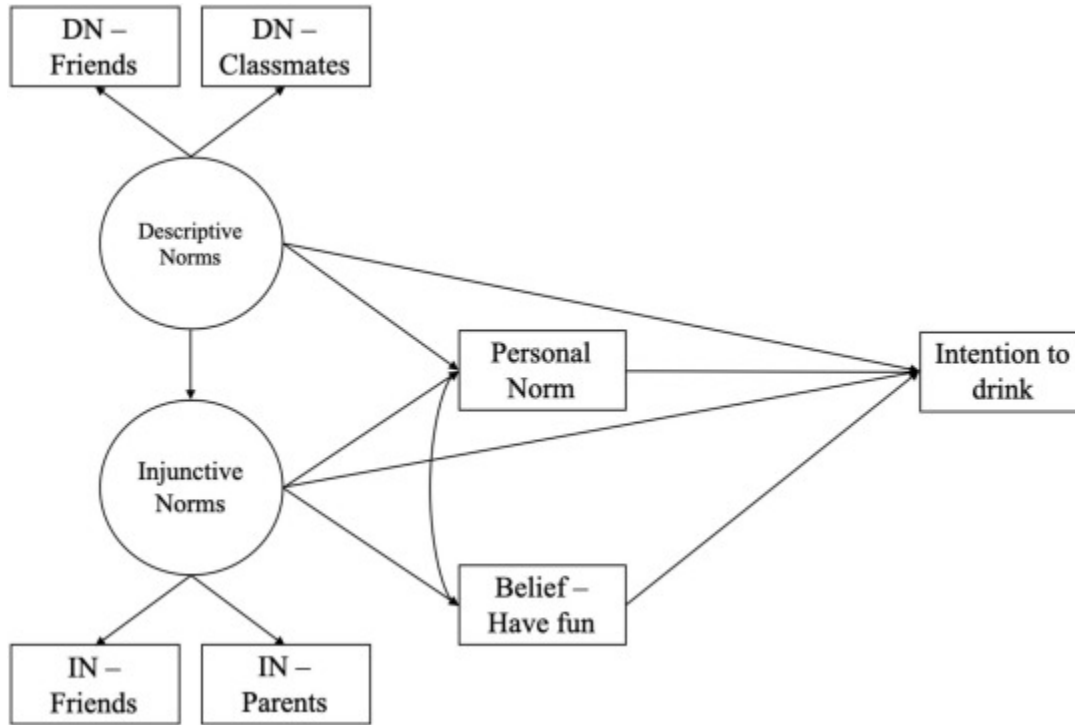


Fig. 4. Model 3 (Final Model): Mediational relationships among norms and belief.

Table 5. Model comparison.

	Chi-Square	RMSEA	CFI	TLI	SRMR
Model 1: No mediational relationship among all predictors (N = 1,228)	684.926* (df = 39, p < .001)	0.116 90% CI: [0.109, 0.124]	0.762	0.688	0.093
Model 2.1: Mediational relationships among norms with higher-order latent variable (N = 1,228)	285.600* (df = 31, p < .001)	0.082 90% CI: [0.073, 0.091]	0.906	0.845	0.083
Model 2.2: Mediational relationships among norms without higher-order latent variable (N = 1,228)	218.082* (df = 25, p < .001)	0.079 90% CI: [0.070, 0.089]	0.929	0.855	0.069
Model 3: Mediational relationships among norms and belief (N = 1,230)	90.993* (df = 23, p < .001)	0.049 90% CI: [0.039, 0.060]	0.975	0.940	0.033

Note: *p < .05; all models controlled for gender, age, city, Hukou, and perceived SES.

Table 6. SEM final model results.

Parameter	Coefficient ± Margin of Error		
	Overall Model (N = 1,230)	Group Female (n = 743)	Group Male (n = 487)
Loadings for norms (Standardized)			
Descriptive norm to Descriptive norm – Classmates	0.80*±0.04	0.77*±0.05	0.82*±0.05
Descriptive norm to Descriptive norm – Friends	0.88*±0.04	0.88*±0.05	0.88*±0.05
Injunctive norm to Injunctive norm – Parents	0.68*±0.05	0.66*±0.06	0.68*±0.06
Injunctive norm to Injunctive norm – Friends	0.80*±0.05	0.75*±0.07	0.83*±0.06
Causal Path (Unstandardized)			
Descriptive norm to Injunctive norm ^a	0.62*±0.08	0.53*±0.10	0.74*±0.12
Injunctive norm to Personal norm	0.90*±0.20	0.93*±0.27	0.88*±0.29
Descriptive norm to Personal norm	0.44*±0.18	0.42*±0.22	0.46*±0.29
Injunctive norm to Belief – Makes parties more fun ^b	0.54*±0.11	0.73*±0.16	0.37*±0.14
Descriptive norm to Intend to drink	0.18*±0.15	0.09 ± 0.18	0.33*±0.26
Injunctive norm to Intend to drink	0.49*±0.20	0.54*±0.28	0.41*±0.29
Personal norm to Intend to drink	0.24*±0.07	0.22*±0.09	0.26*±0.12
Belief – Makes parties more fun to Intend to drink	0.08*±0.05	0.07*±0.07	0.10*±0.08

Residual Variances (Standardized)			
Intend to drink	0.61*±0.05	0.66*±0.08	0.59*±0.07
Descriptive norm – Classmates	0.36*±0.06	0.41*±0.07	0.32*±0.08
Descriptive norm – Friends	0.23*±0.07	0.22*±0.08	0.23*±0.09
Belief – Makes parties more fun	0.86*±0.04	0.83*±0.07	0.92*±0.06
Personal norm	0.58*±0.06	0.65*±0.08	0.53*±0.09
Injunctive norm – Parents	0.53*±0.06	0.57*±0.07	0.53*±0.08
Injunctive norm – Friends	0.36*±0.08	0.44*±0.10	0.31*±0.10
Injunctive norm	0.57*±0.07	0.68*±0.09	0.54*±0.11
Covariance (Standardized)			
Personal norm with Belief – Makes parties more fun	0.08*±0.06	0.07 ± 0.09	0.10*±0.09
Total Effects (Unstandardized)			
Descriptive norm to Intend to drink ^c	0.76*±0.11	0.61*±0.14	0.95*±0.17
Injunctive norm to Intend to drink	0.75*±0.18	0.80*±0.25	0.68*±0.27

Note: * $p < .05$; ^{abc} indicates statistically significant gender difference of the path coefficient.

Overall model controlled for gender, age, city, Hukou, and perceived SES; Model fit indices for overall model: Chi-Square Test of Model Fit: 90.993* ($df = 23, p < .001$); RMSEA: 0.049, 90% CI [0.039, 0.060]; CFI: 0.975; TLI: 0.940; SRMR: 0.033; Multiple group analysis controlled for age, city, Hukou, and perceived SES; Model fit indices for multiple group analysis: Chi-Square Test of Model Fit: 87.777* ($df = 44, p < .001$); RMSEA: 0.040, 90% CI [0.028, 0.052]; CFI: 0.982; TLI: 0.959; SRMR: 0.026.

Table 6 shows the parameter estimates of the final model. The joint significance test indicated that there were significant mediational relationships from descriptive norms to injunctive norms, and in turn, to personal norms and positive alcohol-related beliefs, and in turn, to alcohol

use intentions. Multiple group analysis found that the relationship between descriptive norms and alcohol use intentions were fully mediated among females and partially mediated among males. Descriptive norms had a greater influence on injunctive norms among males ($0.74^* \pm 0.12$) than females ($0.53^* \pm 0.10$). Injunctive norms had a greater influence on positive beliefs among females ($0.73^* \pm 0.16$) than males ($0.37^* \pm 0.14$). Regarding the total effects, males had a significantly larger coefficient from descriptive norms to alcohol use intentions (males: $0.95^* \pm 0.17$; females: $0.61^* \pm 0.14$).

4. Discussion

Our study identified the most salient alcohol-specific antecedents and explored the mediational relationships among these antecedents when predicting alcohol use intentions among Chinese vocational school adolescents. This is the first study to apply the reasoned action approach in assessing Chinese adolescent drinking. This study also employed nuanced analytical methods including dominance analysis and SEM to explore the relative importance of and the causal dynamics among alcohol-specific antecedents, respectively. Our findings have implications for future alcohol use prevention programs for Chinese adolescents.

Our study investigated the unique contribution of each alcohol-specific antecedents using dominance analysis. Though rarely used in behavioral health research, dominance analysis offers rich information about the relative importance of predictors in multiple regressions. Dominance analysis yielded several meaningful findings in this study. First, adolescents' personal norms regarding

alcohol use (i.e., adolescents' own judgments on whether it is acceptable for someone like them to use alcohol) is the most salient factor in predicting their drinking intentions, corroborating previous findings (21). Although the reasoned action approach does not formally include personal norms because they are considered as a proxy for behavioral intentions (17), the moderate correlation (about 0.5) between alcohol use intentions and personal norms in our sample and the dominance analysis findings suggested the unique contribution of personal norms in predicting alcohol use intentions. Second, among male Chinese vocational school students, adolescent perceptions about parental disapproval of drinking are as important as peer disapproval of drinking. This finding contradicts the conventional wisdom that peer influence is the most important factor in adolescent drinking behaviors. Third, adolescents' perceptions of the prevalence of drinking among close friends are more important than their perceived prevalence of drinking among students at their school. In other words, the descriptive norms of the proximal (rather than the distal) reference group are more salient for adolescent drinking intentions (51, 52). Fourth, the perception that alcohol use makes parties more fun was more salient than believing that alcohol relieves stress and won't affect school performance. Whereas most previous studies grouped alcohol use beliefs into categories and addressed the common variances of them (24, 37), our study explored the unique variance of each alcohol use belief and found that these beliefs are not of equal importance in shaping adolescents' drinking intentions. Fifth, alcohol use norms were more salient than alcohol use beliefs and perceived ease of access to alcohol among the studied sample, suggesting that alcohol use prevention programs for Chinese vocational school adolescents should prioritize addressing alcohol

use norms. Because China lacks an enforced policy on age restrictions for purchasing (8), perceived ease of access to alcohol was understandably less salient among Chinese adolescents.

We also explored the potential mediational relationships among alcohol-specific predictors using SEM, and found that ignoring the causal dynamics among alcohol-specific predictors when predicting alcohol use intentions yielded a poor model fit. Despite the cross-sectional study design, our comparison of different models indicated that a mediational relationship potentially exists among alcohol-specific predictors. Adolescents' perception of higher alcohol use prevalence among peers is associated with their greater perceived approval of alcohol use by parents and friends, which in turn is associated with greater personal acceptance and perceived benefits of alcohol use, which in turn leads to increased alcohol use intentions. This finding is somewhat consistent with previous findings of a mediating effect of perceived benefits of drinking between alcohol use norms and alcohol use (30-32). Likely, a higher prevalence of adolescent drinking (descriptive norm) implies that alcohol use is less disapproval by peers and parents (injunctive norm), which in turn, promotes the perception that alcohol use is beneficial (positive belief) and acceptable (personal norm). Collectively, these interrelated factors encourage adolescent drinking. We also observed certain gender differences in the path models (i.e., the total effects of descriptive norms on drinking intentions were greater among boys than among girls) which were consistent with previous research (44). Research on the causal dynamics among alcohol-specific antecedents and gender's moderation of these paths has been inconclusive (21, 44).

4.1 Limitations

This study used cross-sectional data, hampering confidence in any inferences of causal or temporal relationships. Future research should use longitudinal data to determine if the mediational relationships exist and whether any are reciprocal. Second, because this study used a convenience sample its findings are not generalizable to all Chinese adolescents. Third, this study did not measure alcohol use behaviors after the initial survey and thus cannot test the intention-behavior relationships. Fourth, this study used limited items for each alcohol use constructs. For example, our measure of perceived ease of access to alcohol only represents one part of the self-efficacy component (i.e., perceived difficulty), and thus needs more items to measure self-efficacy and controllability components to fully apply the reasoned action approach to adolescent drinking (53). Finally, because our modeling is subject to omitted variable bias, our results must be interpreted with caution. Other factors (e.g., past drinking behavior, cognitive capacities) must be considered in subsequent analyses of alcohol-specific antecedents (54, 55).

4.2 Implications

Our findings have implications for future alcohol use prevention programs for Chinese vocational school students and future research on adolescent alcohol use decision making. To date, most norms-based alcohol prevention strategies have targeted college students, focused on descriptive norms, and shown mixed effects (56-59). Our findings indicate that addressing personal and injunctive norms will have a greater impact than targeting descriptive norms. Alcohol prevention

programs for Chinese adolescents must address their' personal norms, friends' and parents' injunctive norms, friends' and classmates' descriptive norms, and perceptions that drinking makes parties more fun. Longitudinal studies that measure multiple items for each alcohol-specific antecedent will help researchers better understand the relative importance and causal dynamics of these factors.

Funding sources

Funding was provided by the Global Center for Applied Health Research, Arizona State University, the China National Social Science Foundation General Program (Grant No. 15BSH052), and the Fund for Building World-Class Universities of Renmin University of China.

CRedit authorship contribution statement

Ai Bo: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing. **Shiyu Wu:** Conceptualization, Writing - original draft, Writing - review & editing. **Ding-Geng Chen:** Conceptualization, Methodology. **Flavio F. Marsiglia:** Writing - review & editing, Funding acquisition. **Yuhong Zhu:** Project administration, Data curation. **Lin Zhang:** Project administration, Data curation. **Binyu Zhu:** Project administration, Data curation.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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