International Journal of Drug Policy 25 (2014) 386–392

Contents lists available at ScienceDirect

International Journal of Drug Policy

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

Research paper

Using media exposure to predict the initiation and persistence of youth alcohol use in Taiwan

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ARTICLE INFO

Article history:
Received 1 April 2013
Received in revised form 7 January 2014
Accepted 19 April 2014

Keywords:
Media exposure
Alcohol use
Youth

ABSTRACT

Background: Youth consumption of alcohol is a major public health problem in Taiwan, yet little research has been conducted to examine the potential influence of exposure to alcohol advertising. The present study examined the prospective influence that exposure to alcohol advertising has on the initiation and persistence of youthful drinking in Taiwan.
Methods: A total of 2315 students from 26 high schools in Taipei, Taiwan were assessed in the 10th grade with follow-up conducted in the 11th grade. Self-administered questionnaires were collected in 2010 and 2011 to assess the patterns of change in youth alcohol drinking behaviors, media exposure to alcohol, and risk and protective factors.
Results: Of the 1712 non-drinking students in the 10th grade, 285 (16.6%) had initiated drinking by the 11th grade. Of the 590 drinkers in the 10th grade, 396 (67.1%) were persistently drinking by the 11th grade. Multivariate analysis results indicated that when other potential confounders were accounted for, greater media exposure to alcohol advertising in the 10th grade was found to be significantly associated with the initiation of alcohol use and when combined with an increase in media exposure from grades 10 to 11, this was significantly associated with the persistence of alcohol use.
Conclusion: Exposure to alcohol advertising in the media was associated with both the initiation and the persistence of alcohol use by youth.

Introduction

Alcohol is the main risk factor for disability-adjusted life years (DALYs) for young people aged between 10 and 24 years (Gore et al., 2011). Youth alcohol use is a major public health problem. Early age onset of drinking has been associated with greater alcohol involvement in adulthood (Deutsch et al., 2013), prescription drug misuse (Hermos, Winter, Heeren, & Hingson, 2008), subsequent alcohol-related driving risks (Lynskey, Bucholz, Madden, & Heath, 2007), and various risky behaviors (Calvert, Keenan Bucholz, & Steger-May, 2010). In addition, youth alcohol use can result in a number of health and social problems, including academic problems (Ellickson, Tucker, & Klein, 2003), illicit drug use (Adam et al., 2011; Ellickson et al., 2003), motor vehicle accidents (Sommers, Fargo, Lyons, Shope, & Sommers, 2011), violent crimes (Ellickson et al., 2003; Patra, Rehm, & Popova, 2011), and risky sexual behavior (Connor, George, Gullo, Kelly, & Young, 2011; Stueve & O'Donnell, 2005).

Young people are increasingly at risk of being exposed to alcohol advertisements and pro-alcohol messages. Youth exposure to alcohol advertising on television (TV) in the U.S. increased by 71% between 2001 and 2009 (Center on Alcohol Marketing & Youth, 2012). A UK study indicated that 60% of young people reported being exposed to alcohol advertisements daily through TV (Atkinson, Elliott, Bellis, & Sumnall, 2011). Alcohol advertising shapes youthful attitudes and perceptions by using pro-alcohol messages that may contribute to more favorable beliefs about drinking, positive alcohol expectancies, intentions to drink, and consumption (Fleming, Thorson, & Atkin, 2004; Grube & Wallack, 1994)

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http://dx.doi.org/10.1016/j.drugpo.2014.04.017
0955-3959/

Evidence suggests that exposure to alcohol advertisements, portrayals, and promotion campaigns contribute to adolescent alcohol drinking. For example, cross-sectional studies (Hurtz, Henriksen, Wang, Feighery, & Fortmann, 2007; Jones & Magee, 2011; Morgenstern, Isensee, Sargent, & Hanewinkel, 2011), longitudinal studies (Anderson, de Bruijn, Angus, Gordon, & Hastings, 2009; Collins, Ellickson, McCaffrey, & Hambarsoomians, 2007; Dal Cin et al., 2009; Gordon, MacKintosh, & Moodie, 2010; Nunez-Smith et al., 2010; Sargent, Wills, Stoolmiller, Gibson, & Gibbons, 2006; Smith & Foxcroft, 2009), and experimental studies (Engels, Hermans, van Baaren, Hollenstein, & Bot, 2009) have shown that exposure to alcohol advertising, portrayals, and promotion campaigns were all associated with adolescent intentions to drink alcohol, drinking initiation, increased drinking, and subsequent alcohol consumption by young people.

In addition, studies have found that exposure to alcohol use via films was significantly associated with the onset of youthful drinking (Dal Cin et al., 2009; Hanewinkel & Sargent, 2009; Sargent et al., 2006), while parental restrictions from viewing adult-rated movies were associated with reduced exposure to alcohol use in films and with a lowered risk for drinking (Hanewinkel, Morgenstern, Tanski, & Sargent, 2008; Tanski, Dal Cin, Stoolmiller, & Sargent, 2010). Social cognitive theory states that media promotes changes by informing, enabling, motivating, and guiding participants (Bandura, 2001).

Despite studies in developed countries examining the relationship between media exposure and adolescent substance use (Anderson et al., 2009; Hurtz et al., 2007; Morgenstern et al., 2011; Nunez-Smith et al., 2010; Smith & Foxcroft, 2009), relatively few studies have been conducted in Asian societies. Taiwan was forced to open foreign alcohol and tobacco markets and allow advertising in 1987, and this has been associated with an increased level of smoking by young people (Hsu et al., 2005). In 2002, the Taiwan Tobacco and Wine Monopoly Bureau became privatized. This led to an increase in alcohol advertising and marketing by both domestic and foreign companies. Twenty-two percent of high school students reported having used alcohol in the previous month in Taiwan (Bureau of Health Promotion, 2011), where adolescents reported spending 43.7 h per week viewing media (Wu, 2009). The potential influence that the advertising, marketing, and portrayals of alcohol can have on youthful drinking has been neglected in Taiwan. The present study was an examination of the baseline cross-sectional (10th grade) effect and longitudinal (10th–11th grade) effect of media exposure to alcohol on the initiation and persistence of alcohol use among high school students in Taiwan. We hypothesized that a greater baseline media alcohol exposure and an increase in the longitudinal change in media alcohol exposure would be associated with an increased likelihood of the initiation and persistence of youth alcohol use.

Methods

Participants and procedure

In 2010, a total of 72,327 10th grade high school students attended 122 high schools (including vocational high schools) in Taipei City and New Taipei City, Taiwan. Based on the sampling frame, which was a list of schools and their 10th grade student enrollments, a probability-proportionate-to-size sampling method was used to systematically draw a random sample of schools. Three to four classes were randomly selected from each sample school.

Following class selection, consent forms were taken home by students to give to parents requesting their consent to allow the children to participate in the survey. After the parental consent forms were collected, researchers visited the schools to conduct the self-administered survey and address students' questions. Students were assured the information would remain confidential.

In 2010, a total of 2992 10th grade students from 102 classes in 26 sample schools completed the questionnaire. The response rate for the first-year survey was 80%. In 2011, when the students were in the 11th grade, they were asked to complete the questionnaire a second time. However, at the time of the follow-up surveys some students had dropped out of school, some had transferred to other schools, and some refused to participate or were absent on that day. Overall, a total of 2315 students from 26 sample schools completed the questionnaire in the 2010 and 2011 surveys. The response rate for the follow-up survey was 77%. The experiences of the 2315 students who completed both surveys were used to explore the change pattern for drinking behaviors, media alcohol exposure, and risk and protective factors.

The responses to alcohol use and media alcohol exposure on the baseline survey from students who subsequently dropped out of school were compared with the responses from the students who completed the follow-up survey. The results indicated that at the time of the baseline (10th grade) survey, the percentage of alcohol drinking during the past year among the dropouts (31.8%) had been higher than that among the students who later completed the follow-up survey (25.6%). The mean score of media alcohol exposure at the time of the baseline survey among the dropouts (mean = 3.08) was higher than that among the students who later completed the follow-up survey (mean = 2.97).

Measures

The self-administered questionnaire was developed based on previous studies. A group of 10 experts was invited to assess the content validity of the questionnaire. The experts specialized in the following fields: substance use, media, information science technology, health education, and computer education. Experts reviewed the draft questionnaire and provided comments and suggestions for improvements. A pretest survey was conducted at 2 schools to interpret the students' responses to the survey and to evaluate the reliability of the scales in the questionnaire.

Alcohol use

The dependent variable in this study was the change pattern of alcohol drinking behavior from grades 10 to 11 (not drinking, initiation, stop drinking, persistently drinking alcohol). Alcohol use was measured based on each respondent's answer to how often they had ever drunk alcohol. Response options for each item included the following: "never," "not in last year," "a few times within a year," "a few times a month," and "a few times a week." If participants answered "a few times within a year" or more frequently, they were coded as alcohol drinkers. Using students' self-reported alcohol drinking behaviors in the 10th and 11th grades, respondents were categorized into four groups: (a) a non-drinker, for a student who reported that he/she did not drink alcohol in the 12 months prior to the 2 surveys in the 10th and 11th grades; (b) an initiator, for a student who reported that he/she did not drink alcohol in the past 12 months in the 10th grade survey but reported drinking in the 11th grade survey; (c) a quitter, for a student who reported that he/she drank alcohol in the past 12 months in the 10th grade survey but reported that he/she did not drink alcohol in the 11th grade survey; and, (d) a persistent user, for a student who reported that he/she drank alcohol in the past 12 months in the 10th and 11th grade surveys.

Media alcohol exposure

The measurement of media alcohol exposure was based on previous studies (Anderson et al., 2009; Smith & Foxcroft, 2009; Snyder, Milici, Slater, Sun, & Strizhakova, 2006), and used 5 items. Participants were asked the following: During the past year, how often did you (1) see alcohol advertisements on TV; (2) see alcohol advertisements in newspapers or magazines; (3) see alcohol advertisements in campaigns, on broadcasts, or on outdoor billboards; (4) see actors drinking alcohol or alcohol brands on TV or in movies or films; and, (5) see discussions of alcohol drinking on the Internet. Response options for each item included the following: "never" (scoring 1), "a few times yearly" (scoring 2), "a few times monthly" (scoring 3), "a few times weekly" (scoring 4), and "almost daily" (scoring 5).

Covariates

Several relevant covariates were assessed. Demographic information included gender (male vs. female), parental education (elementary, middle, high school, or college and higher), parental marital status (married vs. divorced/separated), and household poverty (yes vs. no). Six risk factors and 5 protective factors were collected. Most factors were measured on a 4- or 5-point Likert scale. The 6 risk factors included the following: alcohol media influence (5 items, 4-point scale from 'strongly disagree' to 'strongly agree' to statements such as "People drinking alcohol in alcohol ads seem to have lots of fun."); positive alcohol expectancies (3 items, 4-point scale from 'strongly disagree' to 'strongly agree,' to statements such as "Drinking alcohol makes a party more fun"); perceived peer alcohol use norm (1 item, 4-point scale from 'strongly disagree' to 'strongly agree,' to statements such as "Most youth drink alcohol."); poor academic performance (1 item, yes vs. no); parental alcohol use (1 item, yes vs. no); and, peer alcohol use (1 item, yes vs. no). The 5 protective factors included the following: alcohol media resistance efficacy (3 items, 5-point scale from 'completely not confident' to 'completely confident,' to statements such as "I can analyze the tactics of alcohol ads, marketing, and promotion activities."); alcohol refusal efficacy (1 item, 5-point scale from 'completely not confident' to 'completely confident,' to statements such as "When someone invites me to drink alcohol, I will say no."); anti-drinking attitude (1 item, 4-point scale from 'strongly disapprove' to 'strongly approve'); perceived parental disapproval of drinking (1 item, 4-point scale from 'strongly disapprove' to 'strongly approve'); and, perceived peer disapproval of drinking (1 item, 4-point scale from 'strongly disapprove' to 'strongly approve').

Statistical analysis

SAS software was used to perform the statistical analysis. A series of bivariate logistic regressions were performed to examine youth media alcohol exposure and risk and protective factors in grade 10, and the change from grades 10 to 11, related to the initiation and persistence of youth alcohol drinking by grade 11. Significant variables in the bivariate analysis were included in a series of multivariate logistic regressions that were adjusted for the effects of each of these independent variables simultaneously. Only significant variables in the multivariate models were included in the final model. The reference groups for categorical variables included female, no poor academic performance, no parent alcohol use, and no peer alcohol use. Single-item Likert scale questions were entered as continuous variables with a range of the Likert scale itself, while multiple item scales were entered as continuous variables with the mean score across items used to summarise the variable in the regression. The data presented were not weighted.

Ethical approval

Approval was obtained from the Institutional Review Board (IRB) at Taipei Medical University.

Results

Demographic characteristics by alcohol drinking changed status

Of all participating students who completed the 10th and 11th grade surveys, 52% were male and 48% were female. In the baseline (10th grade) survey, two-thirds of the students reported parents with a high school education level or lower, while one-third of students came from families with low or lower-middle household incomes. Students were 15–17 years of age (M = 15.5 years). Of the 1712 non-drinkers in the 10th grade, 285 students (16.6%) initiated drinking by the 11th grade. Of the 590 drinkers in the 10th grade, 396 students (67.1%) were persistently drinking in the 11th grade. The alcohol drinking initiators and persistent users were mostly male (58.8% and 57.1%, respectively) (Table 1).

Table 1
Demographic status by alcohol drinking changed status.

10th grade	Non drinking in the past year		Drinking in the past year	
11th grade	Not drinking %	Drinking initiation %	Stop drinking %	Drinking persistence %
Gender				
Female	51.7	41.2	52.6	42.9
Male	48.3	58.8	47.4	57.1
Father's education				
High school & lower	63.6	61.4	63.7	66.1
College & higher	36.4	38.6	36.3	33.9
Mother's education				
High school & lower	69.4	65.0	74.6	73.5
College & higher	30.6	35.0	25.4	26.5
Parental marital status				
Married	81.7	79.3	76.3	77.2
Divorced/separated	18.3	20.7	23.7	22.8
Household poverty				
No	64.9	64.5	63.7	63.7
Yes	35.1	35.5	36.3	36.3

Note: Not drinking n = 1427, drinking initiation n = 285, stop drinking n = 194, drinking persistence n = 396.

Table 2
Media alcohol exposure and other factors by alcohol drinking changed status.

Variable (score range)	Not drinking		Drinking initiation		Stop drinking		Drinking persistence	
	10th Mean (SD)	11th Mean (SD)	10th Mean (SD)	11th Mean (SD)	10th Mean (SD)	11th Mean (SD)	10th Mean (SD)	11th Mean (SD)
Risk factor								
Media alcohol exposure (1–5)	2.87 (0.74)	2.94 (0.79)	3.07 (0.78)	3.20 (0.79)	3.12 (0.77)	3.09 (0.78)	3.22 (0.71)	3.29 (0.77)
Alcohol media influence (1–4)	2.25 (0.50)	2.29 (0.49)	2.42 (0.50)	2.49 (0.50)	2.50 (0.48)	2.44 (0.48)	2.53 (0.46)	2.60 (0.47)
Positive alcohol expectancies (1–4)	1.66 (0.49)	1.78 (0.48)	1.86 (0.53)	2.09 (0.48)	2.04 (0.48)	2.04 (0.49)	2.12 (0.45)	2.23 (0.44)
Perceived peer alcohol use norm (1–4)	2.32 (0.75)	2.37 (0.72)	2.49 (0.78)	2.60 (0.70)	2.55 (0.70)	2.42 (0.72)	2.67 (0.69)	2.73 (0.66)
Poor academic performance (%)	22.1	21.4	31.1	34.5	26.4	26.6	35.3	31.1
Parent alcohol use (%)	41.9	38.3	45.4	51.1	55.7	44.3	67.4	65.0
Peer alcohol use (%)	26.2	24.9	46.6	63.7	63.2	48.2	71.5	71.3
Protective factor								
Alcohol media resistance efficacy (1–5)	3.85 (0.99)	3.97 (0.97)	3.54 (1.03)	3.33 (1.02)	3.32 (0.98)	3.48 (1.04)	3.17 (1.03)	3.27 (1.03)
Alcohol refusal efficacy (1–5)	4.16 (1.06)	4.16 (1.08)	3.57 (1.19)	2.99 (1.15)	2.95 (1.21)	3.37 (1.18)	2.66 (1.13)	2.69 (1.15)
Anti-drinking attitude (1–4)	3.37 (0.76)	3.30 (0.78)	2.81 (0.83)	2.19 (0.66)	2.29 (0.64)	2.73 (0.83)	2.10 (0.60)	1.98 (0.52)
Parent disapproval of drinking (1–4)	3.45 (0.68)	3.38 (0.72)	3.12 (0.76)	2.66 (0.69)	2.74 (0.71)	2.98 (0.69)	2.58 (0.67)	2.44 (0.64)
Peer disapproval of drinking (1–4)	3.23 (0.77)	3.17 (0.80)	2.75 (0.83)	2.27 (0.65)	2.35 (0.66)	2.70 (0.83)	2.22 (0.64)	2.06 (0.59)

Note: Not drinking $n = 1427$, drinking initiation $n = 285$, stop drinking $n = 194$, drinking persistence $n = 396$.

Change in media alcohol exposure and covariates

In the baseline (10th grade) survey, adolescents averaged a few weekly exposures to TV alcohol commercials and advertisements. In addition, adolescents averaged a few monthly exposures to alcohol ads in magazines, outdoor billboards, and alcohol drinking portrayals in film and TV. Adolescents' exposure to online alcohol messages averaged a few times yearly (Table 2).

In the 10th and 11th grade surveys, non-drinkers showed the lowest level of media alcohol exposure and other risk factors (i.e., alcohol media influence, positive alcohol expectancies, perceived peer alcohol use norm, parent/peer alcohol use), while persistent alcohol users exhibited the highest level of media alcohol exposure and other risk factors. In contrast, non-drinkers had the highest level of protective factors (i.e., alcohol media resistance efficacy), while persistent alcohol users exhibited the lowest level of protective factors.

In addition, the mean score of media alcohol exposure increased from 2.87 to 2.94 for non-drinkers, from 3.07 to 3.20 for initiators, and from 3.22 to 3.29 for persistent users, while it decreased from 3.12 to 3.09 for quitters (Table 2). For the initiators, other risk factors (i.e., alcohol media influence, positive alcohol expectancies) increased while protective factors (i.e., alcohol media resistance efficacy, parent/peer disapproval of drinking attitude) decreased. In a similar manner most risk factors increased for persistent alcohol users while protective factors decreased.

Table 3
Students' factors in grade 10 and longitudinal change from grades 10–11 to predict alcohol drinking initiation and persistence by grade 11–bivariate analysis.

Variable (score range)	Initiator vs. Non-drinker				Persistent vs. quitter			
	10th (x_{i0})		11th–10th ($x_i - x_{i0}$)		10th (x_{i0})		11th-10th ($x_i - x_{i0}$)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender (male = 1, female = 0)	1.53	1.18–1.98			1.47	1.04–2.08		
Risk factor								
Media alcohol exposure (1–5)	1.68	1.38–2.05	1.39	1.15–1.67	1.44	1.09–1.90	1.35	1.05–1.74
Alcohol media influence (1–4)	3.06	2.20–4.25	1.93	1.44–2.60	1.77	1.13–2.78	2.25	1.48–3.43
Positive alcohol expectancies (1–4)	4.77	3.42–6.65	3.60	2.61–4.97	2.48	1.56–3.94	1.91	1.45–2.53
Perceived peer alcohol use norm (1–4)	1.75	1.41–2.18	1.46	1.21–1.77	1.98	1.44–2.74	0.52	0.40–0.69
Poor academic performance (yes = 1, no = 0)	2.01	1.47–2.74	1.80	1.27–2.56	1.49	0.96–2.32	1.04	0.66–1.62
Parent alcohol use (yes = 1, no = 0)	1.47	1.11–1.97	2.05	1.46–2.88	2.28	1.53–3.39	2.41	1.54–3.88
Peer alcohol use (yes = 1, no = 0)	6.47	4.65–9.00	4.74	3.54–6.35	2.70	1.74–4.19	2.76	1.87–4.09
Protective factor								
Alcohol media resistance efficacy (1–5)	0.52	0.44–0.60	0.57	0.50–0.65	0.78	0.63–0.96	0.85	0.71–1.02
Alcohol refusal efficacy (1–5)	0.42	0.37–0.48	0.48	0.42–0.54	0.59	0.49–0.71	0.63	0.53–0.74
Anti-drinking attitude (1–5)	0.16	0.13–0.20	0.18	0.14–0.22	0.21	0.14–0.31	0.18	0.12–0.25
Parent disapproval of drinking (1–4)	0.27	0.22–0.34	0.30	0.25–0.37	0.34	0.25–0.48	0.27	0.20–0.37
Peer disapproval of drinking (1–4)	0.20	0.16–0.26	0.25	0.20–0.31	0.30	0.21–0.43	0.27	0.20–0.37

Note: (1) Equation: *Logit* $(p(Y_i = 1 | X_i = x_i, X_{i0} = x_{i0})) = \beta_0 + \beta_1 x_{i0} + \beta_2 (x_i - x_{i0})$, where i = individuals. Thus, x_{i0} is an individual's initial score of predictor variables in the 10th grade, while $(x_i - x_{i0})$ is the longitudinal change in the score of the predictor variable from the 10th to the 11th grade.
(2) Alcohol drinking initiation model: students not drinking in grade 10; Alcohol drinking persistence model: students drinking in grade 10. $Y_i = 1$ indicates drinking in grades 11, $Y_i = 0$ indicates not drinking in grades 11.
(3) Not drinking $n = 1427$, drinking initiation $n = 285$, stop drinking $n = 194$, drinking persistence $n = 396$.

Table 4
Students' factors in grade 10 and longitudinal change from grades 10–11 to predict alcohol drinking initiation and persistence by grade 11–multivariate analysis.

Variable (score range)	Initiator vs. Non-drinker				Persistent vs. quitter			
	10th (x_{i0})		11th–10th (x_i–x_{i0})		10th (x_{i0})		11th–10th (x_i–x_{i0})	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Gender (male = 1, female = 0)	1.34	0.97–1.85			1.40	0.92–2.13		
Media alcohol exposure (1–5)	1.41	1.08–1.84	1.22	0.96–1.55	1.64	1.15–2.33	1.44	1.06–1.96
Anti-drinking attitude (1–4)	0.24	0.17–0.35	0.23	0.17–0.32	0.34	0.20–0.58	0.23	0.14–0.35
Alcohol refusal efficacy (1–5)	0.74	0.61–0.89	0.68	0.58–0.79	0.88	0.69–1.13	0.85	0.69–1.05
Peer alcohol use (yes = 1, no = 0)	2.97	1.98–4.46	3.13	2.20–4.46	2.25	1.31–3.86	2.20	1.37–3.54
Parent disapproval of drinking (1–4)	0.79	0.56–1.13	0.96	0.72–1.29	0.57	0.37–0.89	0.68	0.45–1.04

Note: (1) Equation: *Logit* $(p(Y_i = 1 \mid X_i = x_i, X_{i0} = x_{i0})) = \beta_0 + \beta_1 x_{i0} + \beta_2 (x_i - x_{i0}) + \cdots + \beta_k x_{i0k} + \beta_k (x_{ik} - x_{i0k})$, where k is the number of independent variables considered in the model, i = individuals. Thus, x_{i0} is an individual's initial score of predictor variables in the 10th grade, while $(x_i - x_{i0})$ is the longitudinal change in the score of the predictor variable from the 10th to the 11th grade.
(2) Alcohol drinking initiation model: students not drinking in grade 10; Alcohol drinking persistence model: students drinking in grade 10. $Y_i = 1$ indicates drinking in grades 11, $Y_i = 0$ indicates not drinking in grades 11.
(3) Alcohol drinking initiation model, total $n = 1609$, use $n = 268$, no use $n = 1341$. −2 Log = 956.0 Alcohol drinking persistence model, total $n = 571$, use $n = 383$, no use $n = 188$. −2 Log = 544.0

Baseline and longitudinal effects on alcohol drinking initiation and persistence

Table 3 presents the bivariate analysis results of the baseline and longitudinal effects of each factor on youth alcohol drinking initiation and persistence, and shows that male students were more likely to experience the initiation and the persistence of alcohol use compared with female students. In addition, students who had higher media alcohol exposure in grade 10 and an increase in media alcohol exposure from grades 10 to 11 were more likely to initiate the drinking of alcohol by grade 11. Also, among students who drank alcohol in grade 10, students who had higher media alcohol exposure in grade 10 and an increase in media alcohol exposure from grades 10 to 11 were more likely to drink alcohol persistently in grade 11. Similarly, higher risk factors in grade 10 and an increase in risk factors from grades 10 to 11 were significantly associated with both the initiation and the persistence of alcohol use, while lower protective factors in grade 10 and a decrease in protective factors from grades 10 to 11 were also significantly associated with both the initiation and the persistence of alcohol use.

The multivariate analysis results indicated that after controlling for gender, parental attitude, peer alcohol use, alcohol refusal efficacy, and an anti-drinking attitude, students with greater media alcohol exposure in grade 10 were more likely to initiate drinking alcohol by grade 11 (Table 4). Similarly, students with higher media alcohol exposure in grade 10 and an increase in media alcohol exposure from grades 10 to 11 were more likely to drink alcohol persistently in grade 11.

In addition, this study indicated that the peer alcohol use variable was a very strong factor in the models. Peer alcohol use was positively associated with the initiation and persistence of youth alcohol use. In contrast, an anti-drinking attitude was negatively associated with the initiation and persistence of alcohol use. Furthermore, alcohol refusal was more important in the prevention of initiation, while parental disapproval was more important in the prevention of persistence of alcohol use. Students who had more friends who drank alcohol, who had a lower level of alcohol refusal efficacy and less of an anti-drinking attitude in grade 10, and who experienced an increase in peer alcohol use and a decrease in alcohol refusal efficacy and anti-drinking attitudes from grades 10 to 11, were more likely to initiate drinking alcohol. Similarly, peer alcohol use, less of an anti-drinking attitude and a lower level of parental disapproval in grade 10 and an increase in peer alcohol use and a decrease in anti-drinking attitudes from grades 10 to 11 were significantly associated with the persistence of alcohol use.

Discussion

The present study found that one-sixth of non-drinkers in grade 10 initiated drinking in grade 11, while two-thirds of the drinkers in grade 10 were persistently drinking in grade 11. Multivariate analysis indicated that after controlling for gender, peer and parental factors, media alcohol exposure was significantly associated with both the initiation and the persistence of youth alcohol use. These results were consistent with those of prospective studies from other countries indicating that exposure to alcohol advertising, marketing, and portrayals was associated with the initiation and progression of youth alcohol consumption (Anderson et al., 2009; Collins et al., 2007; Dal Cin et al., 2009; Gordon et al., 2010; Sargent et al., 2006; Smith & Foxcroft, 2009).

Taiwan adolescents, as with American (Center on Alcohol Marketing & Youth, 2012), Australian (Jones & Magee, 2011; Winter, Donovan, & Fielder, 2008), and UK youth (Atkinson et al., 2011), are increasingly exposed to a high level of alcohol advertising, marketing, and portrayals. The present study showed adolescents average a few weekly exposures to alcohol ads on TV and a few monthly exposures to alcohol ads in magazines, outdoor billboards, and alcohol drinking portrayals in film and TV. These results may be due to an increase in alcohol advertising and portrayals on TV, more alcohol outdoor billboards and alcohol promotional campaigns in Taiwan. In addition, an increasing number of convenience stores were opened (Taiwan Fair Trade Commission, 2012) and displaying alcoholic beverage posters and promotional messages in Taiwan. For example, one study in Taiwan found that a greater availability of convenience stores near schools was associated with youth alcohol use (Wang et al., 2013), while another study in the United States also found that exposure to outdoor alcohol advertising around schools was associated with subsequent youth alcohol use intentions (Pasch, Komro, Perry, Hearst, & Farbakhsh, 2007).

Although alcohol ads are banned on TV before 9 pm in Taiwan, this study found that adolescents remain exposed to many alcohol commercials and alcohol drinking messages through TV, magazines, outdoor billboards, and Internet venues. The present study found that media alcohol exposure was significantly associated with the initiation of, and persistence in, the drinking of alcohol in Taiwan. The World Health Organization adopted the first Global Strategy to Reduce Alcohol-Related Harm in 2010 and suggested that countries implement alcohol advertising bans in order to reduce alcohol-related harm (World Health Organization, 2010). The Taiwan government should restrict alcohol advertisements across a range of media, including on the Internet, and in a variety of marketing practices to protect children and adolescents from

media alcohol influence. Moreover, experts advocate a total ban on alcohol advertising to prevent underage and harmful drinking (Parry, Burnhams, & London, 2012). A study in the United States found that a complete ban on alcohol advertising would result in a 16.4% decrease in alcohol-related life-years lost, while a partial advertising ban would result in a 4% reduction in alcohol-related life-years lost (Hollingworth et al., 2006). A multi-national study also indicated that more comprehensive and stringent alcohol control policies to restrict availability and marketing were associated with a lower prevalence and frequency of adolescent alcohol consumption (Paschall, Grube, & Kypri, 2009).

We found that the Internet was the most heavily used media among adolescents, and that youth are exposed to online alcohol messages. The sale of alcohol through the Internet was banned in Taiwan. However, studies found that alcohol companies have increased their use of social networking sites such as Facebook, video sharing sites and interactive games in order to promote alcohol use among youth (Griffiths & Casswell, 2010; Mooney, 2011). Other studies have indicated that problem Internet use was associated with adolescent smoking, drinking, and drug use (Frangos, Frangos, & Sotiropoulos, 2011; Ko et al., 2008). The Taiwan government should monitor and regulate alcohol, tobacco, and other illicit drug use messages and Internet sales to reduce adolescent alcohol online exposure and purchasing. Studies have suggested that alcohol policies should limit media alcohol exposure to prevent youth alcohol use (Chung et al., 2010; Collins et al., 2007; Ellickson, Collins, Hambarsoomians, & McCaffrey, 2005; Stoolmiller et al., 2012)

This study supports the social learning theory and the reasoned action theory that found social influence variables (e.g. media, peer and parent), drinking norms, attitudes, and alcohol refusal efficacy could be used to predict youth alcohol drinking. Other studies also found peer alcohol use predicted the onset of the use of alcohol by youth (Mundt, 2011; Trucco, Colder, & Wieczorek, 2011), while alcohol refusal self-efficacy mediated drinking behaviors (Connor et al., 2011; Jang, Rimal, & Cho, 2013). Parent and peer norms were also related to youth alcohol use (Keyes et al., 2012; Song, Smiler, Wagoner, & Wolfson, 2012). Other studies have indicated that parental discussion affected youth drinking behavior indirectly (Austin, Pinkleton, & Fujioka, 2000; Williams, Kittinger, Eller, & Nigg, 2010). Although parents and peers play a critical role in both the initiation and the persistence of youthful drinking, the present study has shown that after controlling for gender, parent and peer factors, media alcohol exposure remains a significant factor influencing the youthful drinking of alcohol.

Moreover, this study found that students who perceived higher levels of media influence, positive alcohol expectancies, and had lower levels of alcohol media resistance efficacy were more likely to initiate drinking alcohol and persist in drinking. A prospective study also found that media resistance skills negatively predicted youth alcohol use (Epstein & Botvin, 2008). Experts recommend the implementation of media literacy education programs to reduce adolescent substance use (Bergsma & Carney, 2008; Office of National Drug Control Policy, 2001). One study also indicated that alcohol media literacy programs are effective in reducing youthful intentions to use alcohol (Kupersmidt, Scull, & Benson, 2012).

Limitations

This research had some limitations. First, the study design and results could not demonstrate causality. A plausible interpretation of the results may be that young people who already drink or are interested in, or inclined towards, the drinking of alcohol are in fact more likely to notice and be aware of alcohol advertising. Second, self-reporting of media exposure can be biased. Many other factors are likely to have an impact upon the exposure of young people to alcohol advertising and on the degree to which they are conscious of their exposure. Third, a social desirability bias may have influenced the truthfulness of adolescents' reports of alcohol use. However, confidentiality was emphasized, and trained investigators collected the questionnaires immediately. Fourth, approximately one-fifth of parents and students refused to participate in this study; hence, potential biases from selection and refusal to participate must be considered. Finally, one-fifth of the students dropped out of the follow-up survey, because students had dropped out of school, transferred to other schools, refused to participate, or were absent on the survey day. At the baseline (10th grade) survey, the percentage of alcohol drinking and media alcohol exposure among the dropouts was higher than that among the students who completed the follow-up survey. This result indicated that the prevalence of the initiation and persistence of alcohol drinking might be underestimated. Students who drop out of school often have higher risk behaviors and need extra intervention. Despite these limitations, the present study adds to the limited amount of longitudinal studies and addresses how media alcohol exposure affects the initiation and persistence of adolescent alcohol use.

Conclusion

In conclusion, the multivariable analysis results indicated that after controlling for gender, parent and peer factors, greater media alcohol exposure in grade 10 was significantly associated with youth alcohol drinking initiation by grade 11. Similarly, students with higher media alcohol exposure in grade 10 and an increase in media alcohol exposure from grades 10 to 11 were more likely to continue to drink alcohol in grade 11.

Acknowledgements

We acknowledge two anonymous reviewers for their helpful comments and suggestions. This work was supported by a research grant from the Taiwan National Science Council (NSC 99-2511-S-003-029-MY2). Many thanks go to the participant schools and students.

Conflict of interest

None.

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