Transition From Alcohol to Other Drugs Among Adolescents in Taiwan: The First Drinking Context Matters*

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ABSTRACT. Objective: This study examined the extent to which youthful alcohol consumption and the initiation of tobacco, betel nut, and other illegal drugs may differ by their first drinking context in Taiwan—a society with social norms that are more tolerant of underage drinking. **Method:** In 2004, in a nationally representative sample of 11,943 school-attending youth ages 15-18, information pertaining to sociodemographic characteristics, problem behaviors, lifetime experiences of alcohol, tobacco, betel nut, and illegal drugs, as well as psychoactive, drug-specific age of initiation, context at first use, average frequency, and recency of use, was assessed by anonymous questionnaires. **Results:** Youth who had their first alcoholic beverages in enter- tainment settings or at friends' houses were more likely to become fre- quent drinkers. After adjustment for socioeconomic background and problem behaviors, having had the first drink in entertainment settings was associated with a faster progression into the initiation of illegal drugs (hazard ratio [HR] = 2.5, 95% confidence interval [CI]: 1.5-4.0) and betel nut (HR = 1.5, 95% CI: 1.1-2.1). **Conclusions:** Youthful drinking pattern and transition from alcohol to betel nut and illegal drugs may vary modestly by the first drinking context. This context may be recog- nized as a proxy variable to identify youth at a higher risk for alcohol and other drug problems and to devise context-based educational or pre- vention programs. (*J. Stud. Alcohol Drugs* **69:** 378-387, 2008)

A LCOHOL USE AND RELATED PROBLEMS in ado- lescence continue to cause public health concern in many industrialized countries (Bonnie and O'Connell, 2004; O'Malley et al., 1998). A number of studies have shown that early-onset alcohol initiation is adverse not only in relation to severe alcohol clinical problems but also is as- sociated with increased risk-taking or health-comprising be- haviors, such as driving under the influence, unprotected sexual behaviors, and violent behaviors (Bonnie and O'Connell, 2004; Shore and Spicer, 2004; So et al., 2005). Moreover, epidemiological evidence from the United States, France, and other parts of the world indicates that the en- gagement of alcoholic beverage and tobacco, so-called gate- way drugs, may significantly elevate one's subsequent risks of exposure opportunity and actual use of illegal drugs (Adler and Kandel, 1981; Golub and Johnson, 1994; Kandel et al., 1992; Wagner and Anthony, 2002).

One of the most important aspects of underage drug ex- periences is that initiation, consumption amount, or prob- lems are largely context dependent, which is particularly true for alcohol drinking (Kairouz et al., 2002; Knibbe, 1998; Orcutt, 1975). For example, undergraduate students were consistently found to drink more in bars and group settings, and heavy episodic drinking tends to occur while youth socialize with friends or at parties (Clapp et al., 2000; Demers et al., 2002; Harford et al., 1983; Rossow, 1996). Some researchers have extended this line of research by focusing on the context of first drink, given that younger age of initiation is a stronger predictor of subsequent prob- lem drinking (Bonnie and O'Connell, 2004). On the basis of community-dwelling youth prospectively followed up from adolescence to young adulthood, Warner and White (2003) found that the risk of problem drinking was most salient for the subgroup of youth characterized by

early-onset alcohol initiation in the context outside family gatherings. Despite this body of work, current evidence characterizing the effects of drinking context or situation is mainly derived from Western populations (Demers et al., 2002; Harford et al., 1983; Knibbe, 1998). Few studies have examined such links in countries or societies with different norms, regulations, and enforcement practice toward underage drinking.

Alcoholic beverages have been an integral part of Chinese culture for millennia (Cochrane et al., 2003; Hao et al., 2005; Yang, 2002). In addition to its significant roles in traditional medicine and food preparation, alcohol has been considered as one of the indispensable elements in promoting cheerfulness or facilitating interactions at family reunions, weddings, birthday parties, and business activities. Although, by law, minors are not allowed to drink or purchase alcoholic beverages, youth access to alcoholic products is utterly effortless. However, Taiwan has witnessed several remarkable transformations regarding alcohol, tobacco, betel nut, and other illegal drug problems. One transformation involves an increase of alcohol and tobacco availability to youth and a decline in the initiation age of tobacco and betel nut use as a consequence, in part, of the trade liberalization and lowered custom tariffs on imported tobacco and alcoholic beverages (Lin et al., 2003; Wen et al., 2005a,b). Another transformation involves the upsurge in availability and diversity of illegal drugs, particularly methamphetamines, Ecstasy, and heroin (Chiang et al., 2006; Chou et al., 2006; Yen et al., 2007).

In a culture in which most drinkers have had their first drinks as early as in childhood, alcohol initiation per se may not be a pivotal factor in predicting subsequent drug experiences. With an intention to identify possible heterogeneity among alcohol-experienced youth, this research hypothesized that first drinking context would help to predict youthful differential progression to the initiation of other psychoactive drug involvement. Building on a recently conducted school survey with nationally representative youth samples in Taiwan, the aims of the present study are (1) to examine the extent to which youth frequency of alcohol consumption may differ by first drinking context and (2) to probe possible first drinking context-related differences in progression from alcohol into tobacco, betel nut, and other illegal drugs among youth ages 15-18.

Method

Study sample

Data for this study are generated from the 2004 National Survey of Illegal Drug Use among Adolescents (NSIDA) in Taiwan. The NSIDA is a cross-sectional survey of behavioral and psychological problems, drug experiences, and life events of school-attending youth ages 12-18. In brief, during the 2004-2005 academic year, the NSIDA team drew nationally representative samples from schools via multistage sampling procedures. A sampling strategy was developed to cover middle school and two types of high schools (i.e., senior high and vocational/technical high schools) in seven living regions of Taiwan, defined by geographic characteristics, urbanicity level, and population composition (Chen et al., 2006). Considering a relatively lower prevalence of illegal drug experiences in middle school ages in Taiwan, the present study focuses primarily on youth (ages 15-18) attending senior high and vocational/technical high schools. On the basis of aggregate lists obtained from the Ministry of Education, a total of 88 high schools were selected. In the case in which the school directors of two vocational high schools were unwilling to allow participation of their schools, a replacement school of the same type was selected from the same living region. Within each high school, two classes were randomly selected from Grades 10 and 12. All the students in the sampled classes were eligible to participate in the survey. The participation rate was 98.8% at the high-school level, 98.2% at the 10th-grade level, 79.2% at the 12th-grade level, and 90.1% at the individual level.

A total of 12,791 high school-attending youth respondents completed anonymous questionnaires for the NSIDA. To focus on high school-age adolescent drug experiences, the present study excluded the following: (1) 9 respondents who reported using a fake drug; (2) 77 respondents whose responses were missing in all drug items; and (3) 762 respondents whose questionnaires indicated an age younger than 12 or older than 18, resulting in the final analytic sample of 11,943 respondents.

Data collection

Data collection was primarily conducted during regular class time, and one or two research assistants were present to promote trust and to ensure confidentiality. For high school-age youth, survey assessments were completed by paper-and-pencil self-administration, with a mean duration of approximately 20-30 minutes. For each potential participant, a fixed sequence of standardized preworded and precoded survey questions was designed to obtain information regarding his/her sociodemographic background, problem behaviors, drug-associated experiences, life events, and internalizing/externalizing behaviors. As the assessment was completed, each participant received stationery incentives from the NSIDA team equal to no more than 20 New Taiwan Dollars (1 United States Dollar $\cong$ 30 New Taiwan Dollars). The study was reviewed and approved by the institutional review board of the College of Public Health at the National Taiwan University.

Definition of study variables

The NSIDA assessed lifetime psychoactive drug experiences for alcohol, tobacco, betel nut, and nine other types of psychoactive substances, including Ecstasy (i.e., 3,4-methylenedioxymethamphetamine [MDMA]), glue, methamphetamine, ketamine, flunitrazepam (also known as FM2), marijuana, heroin or morphine, phencyclidine (PCP), and gamma-hydroxybutyrate (GHB). For convenience, these nine types of psychoactive substances were denoted as illegal drugs in this study. Betel nut is one of the most commonly consumed psychoactive drugs in South and Pacific Asian countries (Changrani and Gany, 2005; Chu, 2001). Given that marijuana is not widely available in Taiwan and the majority of illegal drug users have chewed betel nut earlier in their lives, it has been hypothesized that—in the stage theory—betel nut has played a role similar to marijuana (Kandel, 1975; Wen et al., 2005b). Those individuals who reported having used particular psychoactive drugs at least once were subsequently asked information regarding drug-specific age at first use, context at first use, average frequency of consumption, and recency of use. For illegal drugs, we coded the initiation age as one's earliest age to start any of nine illegal drugs. According to the self-reported context of first alcohol use, alcohol-experienced youth were further regrouped into four main categories defined by (1) family ($n = 2,069$), (2) friends' houses ($n = 684$), (3) entertainment places (e.g., pubs, karaoke lounges; $n = 992$), and (4) other settings (e.g., schools, parks; $n = 1,139$). *Frequent alcohol drinker* was determined if one's alcohol was consumed at one or more occasions per month. Having started alcohol use before age 12 was defined as early onset. *Recent alcohol use* was defined as having had alcoholic beverages at least once in the preceding 30 days before the assessment.

Other variables potentially confounding the associations linking alcohol drinking context with tobacco, betel nut, and illegal drug initiation included sociodemographics (e.g., gender, family structure, and weekly allowance), living with family, and problem behaviors. In Taiwan, high school-age adolescents may move out of the home to attend schools that are beyond commuting distance from their homes. In this particular scenario, youth often live in school dorms or rental housing with either same-school students or friends. In this analysis, *not living with family* served as a proxy measure for lower levels of parental supervision. In addition, because the present study was intended to distinguish the initiation time of problem behaviors and substance use, only those behavioral items with information of onset age were included (e.g., truancy and running away from home). A more detailed assessment of youth emotional or behavioral problems using the Youth Self-Report (Achenbach, 1995; Chen et al., 2008) was not included for analysis. Features of problem behaviors in adolescence assessed in this study covered lifetime experiences of truancy and running away from home, age at first occurrence, and cumulative frequency.

Data analysis

Because of the multistage probability sampling procedures used in the NSIDA, standard survey analysis procedures were first used to compare the distribution of sociodemographic characteristics and lifetime drug experiences for four subgroups, defined by the context of first alcoholic beverage with that of the alcohol naive. Odds ratios and 95% confidence intervals (CIs) were derived by taking into consideration the sampling weights (e.g., to compensate for variation in sample selection probability) and the complex sampling design via the Taylor series method (Lee and Forthofer, 2005). Multivariate multinomial logistic regression models were used to estimate the association linking early-onset problem and alcohol-using pattern with the first drinking context and with the statistical adjustment for an array of sociodemographic characteristics.

Kaplan-Meier analyses were performed to estimate the cumulative hazard of drug initiation yearly from the age of starting alcohol use by the first drinking context. Lifetime estimates of alcohol use among cigarette smoking-, betel nut-, and illegal drug-experienced youth were 77%, 88%, and 89%, respectively. In nearly 60%, 77%, and 93% of the cases, alcohol had been used either in the same year or before first use of tobacco, betel nut, and illegal drugs, respectively. To assess whether the instantaneous risk of starting use of tobacco, betel nut, and illegal drugs varies by the first drinking context, the semiparametric Cox proportional hazards model was implemented to estimate context-associated hazard ratios (HRs) and 95% CIs. The first model examined the effect of first drinking context, with adjustment for gender, family, weekly allowance, and covariates of time-varying characteristics (i.e., age of first truancy, age when first running away from home), and variables that can be potentially influenced by alcohol involvement (e.g., vocational school attendance). To consider developmental, stage-associated variation in the risk of psychoactive drug initiation, analyses were repeated for the subsample defined by alcohol onset later than age 12; results were denoted as Model 2 ($n = 3,540$). All statistical analyses were conducted with STATA, Version 8.0 (StataCorp LP, College Station, TX).

Results

Distribution of sociodemographic background and drug experiences among school-attending youth stratified by alcohol experiences is shown in Table 1. More than 40% of youth had tried alcohol at least once in their lifetimes ($n = 4,884$), and most first drinks took place at home (42.4%)

TABLE 1. Selected characteristics by the first drinking context, the 2004 National Survey of Illegal Drug Use among adolescents in Taiwan

| Variables[a,b] | Alcohol-naive (n = 6,974) n (%wt) | Alcohol users (n = 4,884) | | | | | | | |
		Home (n = 2,069) n (%wt)	OR	Friend's home (n = 684) n (%wt)	OR	Entertainment settings (n = 992) n (%wt)	OR	Other settings (n = 1,139) n (%wt)	OR
Gender									
Female	3,541 (48.0)	861 (40.3)	1.00	247 (33.9)	1.00	463 (45.1)	1.00	491 (40.2)	1.00
Male	3,431 (52.0)	1,208 (59.7)	1.37 (1.1-1.7)†	437 (66.1)	1.80 (1.3-2.4)‡	529 (54.9)	1.13 (0.8-1.6)	648 (59.8)	1.37 (1.1-1.7)†
School type									
Senior high	3,800 (54.1)	1,182 (57.9)	1.00	292 (44.6)	1.00	358 (41.2)	1.00	648 (59.7)	1.00
Vocation/technical	3,174 (45.9)	887 (42.1)	0.86 (0.7-1.1)	392 (55.4)	1.47 (1.1-2.0)*	634 (58.8)	1.69 (1.0-3.0)	491 (40.3)	0.80 (0.6-1.0)
Family structure									
Two parents	6,107 (88.1)	1,798 (86.1)	1.00	575 (83.5)	1.00	790 (80.0)	1.00	977 (86.7)	1.00
Single parent	752 (10.1)	232 (11.8)	1.19 (0.9-1.6)	94 (14.7)	1.53 (1.1-2.2)*	177 (15.9)	1.73 (1.3-2.2)‡	150 (11.3)	1.13 (0.9-1.5)
Weekly allowance[c]									
0-500	4,254 (56.9)	1,046 (46.5)	1.00	298 (43.0)	1.00	385 (34.0)	1.00	583 (50.1)	1.00
501-1,500	2,110 (31.5)	778 (41.1)	1.59 (1.4-1.9)‡	296 (43.9)	1.84 (1.5-2.3)‡	462 (46.4)	2.47 (2.0-3.1)‡	432 (36.9)	1.33 (1.0-1.7)*
1,501 or above	296 (4.1)	144 (8.0)	2.36 (1.3-4.2)†	51 (8.5)	2.71 (1.7-4.3)‡	87 (14.3)	5.79 (2.4-13.7)‡	74 (6.7)	1.85 (1.3-2.7)†
Living with family									
Yes	6,750 (96.7)	1,969 (95.0)	1.00	645 (94.9)	1.00	952 (96.3)	1.00	1,095 (95.3)	1.00
No	140 (2.0)	76 (3.5)	1.81 (1.3-2.6)‡	32 (4.1)	2.14 (1.2-3.8)†	26 (2.7)	1.37 (0.8-2.4)	37 (3.0)	1.57 (1.1-2.2)†
Lifetime tobacco use									
No	6,305 (91.0)	1,222 (58.9)	1.00	283 (40.7)	1.00	422 (42.8)	1.00	641 (57.0)	1.00
Yes	669 (9.0)	826 (40.3)	6.91 (5.7-8.4)‡	397 (58.8)	14.6 (12.2-17.5)‡	561 (56.6)	13.4 (11.3-15.9)‡	490 (41.9)	7.44 (6.1-9.0)‡
Lifetime betel nut use									
No	6,873 (98.7)	1,780 (87.1)	1.00	537 (77.2)	1.00	804 (79.9)	1.00	980 (84.8)	1.00
Yes	95 (1.2)	252 (11.1)	10.6 (7.2-15.5)‡	131 (20.2)	21.8 (15.2-31.4)‡	172 (19.0)	19.8 (13.7-28.7)‡	143 (13.3)	13.0 (8.7-19.5)‡
Lifetime illegal drugs[d]									
No	6,895 (96.0)	1,958 (95.2)	1.00	623 (88.8)	1.00	873 (85.7)	1.00	1,077 (93.6)	1.00
Yes	25 (0.5)	52 (2.1)	4.43 (2.3-8.4)‡	39 (7.1)	15.8 (8.5-29.2)‡	98 (12.4)	28.7 (13.7-60.4)‡	39 (3.9)	8.16 (4.2-16.0)‡

[a]The columns do not add up to 100% because of missing data; [b]estimated percentage and odds ratios are derived based on complex survey analyses (weighted data with Taylor series linearization); [c]NTD: New Taiwan Dollar, 1 USD = 30 NTD; [d]include Ecstasy (i.e., MDMA), glue, methamphetamine, ketamine, flunitrazepam (so-called FM2), marijuana, heroin or morphine, LSD, and gamma hydroxybutyrate (GHB).
*p < .05; †p < .01; ‡p < .001.

and in entertainment settings (20.3%). Compared with their alcohol-naive peers, alcohol-experienced youth were more likely to be male, attend vocational/technical schools, come from a single-parent household, have more weekly disposable allowance, and not reside currently with their families. Notably, an estimated 2%-13% of alcohol-experienced youth had started use of illegal drugs, which was nearly 4-fold to 29-fold greater likelihood than their alcohol-naive counterparts.

Results of multivariate complex survey analyses showed that alcohol-experienced youth in the four subgroups endorsed similar occurrence of early-onset problem behaviors, such as running away from home and truancy at primary school ages (Table 2). However, alcohol-drinking pattern differed substantially by the first drinking context. For example, when compared with youth who had their drinks at family occasions, youth who had their first drinks in entertainment settings and at friends' houses tended to start alcohol use at ages later than 12. Moreover, an estimated two-fold to six-fold risk of higher frequency of alcohol consumption was found associated with having first drinks in situations other than at family occasions (e.g., entertainment settings for monthly drinking; adjusted odds ratio = 6.09, 95% CI = 4.8-7.7, $p < .001$).

Figure 1 shows the estimated cumulative hazard of tobacco, betel nut, and illegal drug initiation by the context of first alcohol drinking. In general, youth who had their first alcoholic beverage on occasions such as entertainment settings or at friends' houses were more likely to start use of betel nut and illegal drugs than those in family occasions. However, the observed first drinking context-related risk of drug initiation seems different across drug category (Table 3). Crude HR estimates indicate that youth who had their first alcoholic drink in entertainment settings were at twofold risk to start betel nut chewing and at fivefold risk to start use of illegal drugs, as compared with those whose first drink occurred at family occasions. When all covariates were included in Model 1, the contextual differences in the hazard of tobacco initiation were no longer statistically significant. Nevertheless, despite further attenuation, the HRs for betel nut and illegal drugs remained significant for the situations such as entertainment settings (adjusted HR [aHR] for betel nut = 1.45, 95% CI: 1.1-2.0; aHR for illegal drugs = 2.70, 95% CI: 1.8-4.1) and friends' houses (aHR for illegal drugs = 1.73, 95% CI: 1.1-2.8). Similar HR estimates were obtained as we repeated the analyses exclusively for youth taking their first drink later than age 12 (Model 2 in Table 3).

TABLE 2. Estimated associations between first drinking context with early-onset problem behaviors and alcohol experiences in the 2004 National Survey of Illegal Drug Use among adolescents in Taiwan

	Alcohol naive ($n = 6,974$)	Alcohol users ($n = 4,884$)						
		Home ($n = 2,069$)	Friend's house ($n = 684$)		Entertainment settings ($n = 992$)		Other settings ($n = 1,139$)	
Variables[a,b,c]	n (%wt)	n (%wt)	n (%wt)	AOR	n (%wt)	AOR	n (%wt)	AOR
Early-onset truancy[d]								
No	6,691 (96.2)	1,898 (91.9)	634 (93.6)	1.00	899 (88.4)	1.00	1,044 (91.2)	1.00
Yes	234 (3.3)	162 (7.5)	50 (6.4)	0.75 (0.5-1.2)	90 (10.7)	1.49 (0.8-2.6)	88 (8.3)	1.10 (0.6-2.0)
Early-onset runaway[d]								
No	6,808 (97.6)	1,992 (96.4)	654 (95.3)	1.00	957 (97.5)	1.00	1,095 (95.8)	1.00
Yes	74 (1.0)	52 (2.2)	22 (3.4)	1.23 (0.7-2.1)	25 (1.8)	0.57 (0.3-1.1)	30 (1.8)	1.10 (0.6-2.0)
Early-onset tobacco use[d]								
No	6,828 (98.1)	1,873 (91.2)	628 (91.6)	1.00	912 (94.0)	1.00	1,034 (92.8)	1.00
Yes	146 (1.9)	196 (8.8)	56 (8.4)	0.88 (0.6-1.4)	80 (6.0)	0.65 (0.4-1.0)*	105 (7.2)	0.78 (0.6-1.0)
Early-onset betel nut use[d]								
No	5,953 (99.7)	2,007 (97.8)	670 (98.6)	1.00	974 (98.7)	1.00	1,115 (98.7)	1.00
Yes	21 (0.3)	62 (2.2)	14 (1.4)	0.61 (0.3-1.4)	18 (1.3)	0.59 (0.3-1.3)	24 (1.3)	0.57 (0.3-1.0)*
Age at first alcohol use								
12 years or above	NA	1,529 (72.0)	611 (92.1)	1.00	925 (94.8)	1.00	912 (80.4)	1.00
<12 years	NA	450 (23.8)	55 (6.3)	0.22 (0.1-0.3)‡	51 (3.8)	0.14 (0.1-0.3)‡	150 (12.0)	0.62 (0.5-0.8)†
Avg. frequency of alcohol use								
Less than once per month	NA	1,541 (74.9)	350 (51.1)	1.00	366 (33.2)	1.00	754 (67.7)	1.00
Once per month or above		528 (25.1)	334 (49.0)	3.01 (2.4-3.8)‡	626 (66.8)	6.09 (4.8-7.7)‡	385 (32.4)	1.46 (1.2-1.8)‡
Recent alcohol use[e]								
No	NA	1,427 (71.2)	449 (63.9)	1.00	656 (64.8)	1.00	844 (77.1)	1.00
Yes		642 (28.8)	235 (36.1)	1.30 (1.0-1.8)	336 (35.2)	1.26 (1.0-1.6)	295 (22.9)	0.74 (0.6-1.0)*

Notes: AOR = adjusted odds ratio; NA = not applicable; avg. = average. [a]The columns do not add up to 100% because of missing data; [b]estimated percentage and odds ratios are derived based on complex survey analyses (weighted data with Taylor series linearization); [c]adjusted for age, male gender, school type, family structure, and weekly allowance; [d]occurred at the ages of primary-school (<12); [e]used alcohol at least once in the preceding 30 days of assessment.
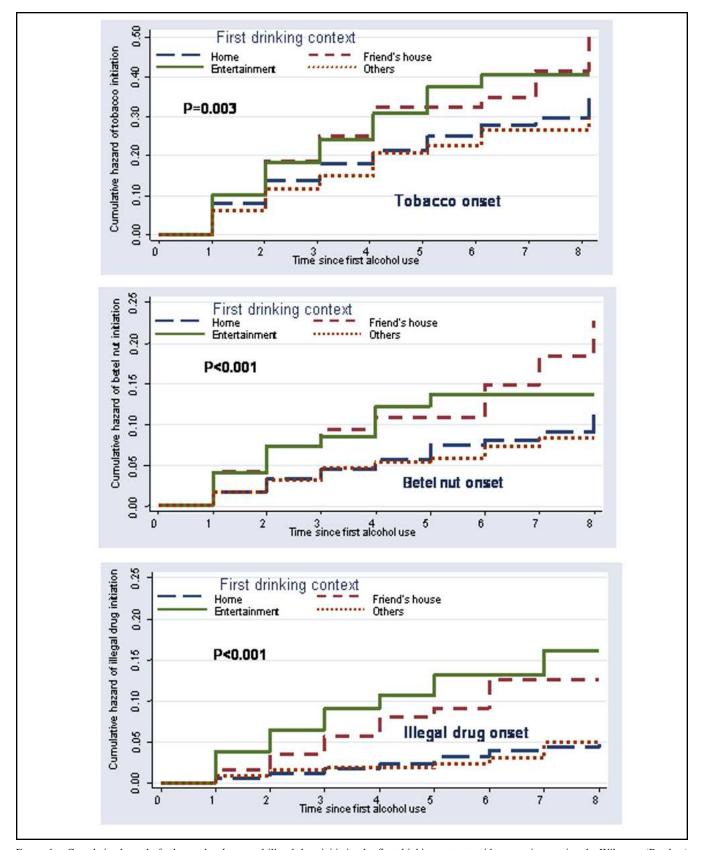*$p < .05$; †$p < .01$; ‡$p < .001$.

FIGURE 1. Cumulative hazard of tobacco, betel nut, and illegal drug initiation by first drinking context, with comparisons using the Wilcoxon (Breslow) test

TABLE 3.   Estimated hazard ratios (HRs) linking first drinking context to first use of tobacco, betel nut, and illegal drug, the 2004 National Survey of Illegal Drug Use among adolescents in Taiwan

Variables[a]	Tobacco HR (95% CI)	Betel nut HR (95% CI)	Illegal drug HR (95% CI)
Crude			
Friend's house[b]	1.44 (1.13-1.84)[†]	1.99 (1.40-2.84)[‡]	3.11 (2.02-4.79)[‡]
Entertainment settings[b]	1.42 (1.09-1.83)[†]	1.98 (1.43-2.74)[‡]	5.21 (3.51-7.74)[‡]
Other settings[b]	0.85 (0.68-1.06)	0.90 (0.62-1.30)	1.09 (0.63-1.86)
Male gender	1.78 (1.45-2.18)[‡]	5.69 (3.16-8.97)[‡]	1.73 (1.08-2.77)[*]
Single-parent family	1.43 (1.11-1.84)[†]	1.13 (0.75-1.69)	1.68 (1.12-2.53)[†]
Weekly allowance of 501-1,500	1.35 (1.14-1.59)[‡]	1.88 (1.40-2.53)[‡]	2.30 (1.64-3.22)[‡]
Weekly allowance of 1,501 or above	1.49 (1.11-2.01)[†]	2.11 (1.38-3.23)[‡]	2.72 (1.68-4.41)[‡]
Not living with family	1.95 (1.41-2.70)[‡]	1.04 (0.50-2.19)	1.41 (0.63-3.15)
Vocational school attendance	1.89 (1.56-2.29)[‡]	2.99 (2.08-4.29)[‡]	3.00 (1.89-4.77)[‡]
Runaway[c]	2.99 (2.41-3.71)[‡]	2.86 (2.05-3.98)[‡]	6.95 (5.03-9.61)[‡]
Truancy[c]	2.21 (1.86-2.63)[‡]	2.48 (1.90-3.24)[‡]	10.10 (6.37-16.10)[‡]
Model 1[b,d]			
Friend's house	1.12 (0.86-1.45)	1.34 (0.97-1.86)	1.73 (1.07-2.78)[*]
Entertainment settings	1.07 (0.82-1.40)	1.45 (1.08-1.95)[‡]	2.70 (1.77-4.14)[‡]
Other settings	0.86 (0.69-1.07)	0.93 (0.65-1.33)	1.03 (0.59-1.79)
Model 2[b,d,e]			
Friend's house	1.08 (0.79-1.49)	1.48 (1.02-2.14)[*]	1.52 (0.88-2.63)
Entertainment settings	0.96 (0.70-1.33)	1.50 (1.08-2.07)[†]	2.47 (1.52-4.00)[‡]
Other settings	0.76 (0.55-1.03)	0.77 (0.49-1.21)	0.92 (0.47-1.82)

Notes: CI = confidence interval. [a]Estimates were obtained from Cox proportional regression model taking school as clustering effects into account and with robust method of calculating the variance-covariance matrix; [b]reference group: having the first drink at home; [c]time-varying variables; [d]adjusted for listed covariates; [e]adjusted for covariates in Model 1 in the subsample with alcohol initiation at age 12 years or above.
*$p < .05$; †$p < .01$; ‡$p < .001$.

To probe possible gender-related differences in the risk of drug progression, we performed subsidiary analyses to compare gender-specific estimates of HRs. Taking illegal drug initiation as an example, for both genders, risk estimates linking family factors (e.g., single-parent family, living with family, allowance) were generally similar, and the first drinking situation-associated hazard risks were almost identical. Extra efforts were also made to introduce the product terms between gender and three family factors. No significant gender-associated moderational effects were found (data not shown).

In addition, to check the covariance patterns, a series of covariance matrix was estimated for each pair of confounding variables. In brief, the correlation ranged from .0018 (i.e., not living with family with type of high school) to .203 (i.e., early-onset tobacco use with early-onset betel nut use), with the corresponding covariance estimated from .000146 to .0047. These subsidiary analyses suggested that most of the correlation estimates for pairs of ancillary variables were statistically significant, in terms of *p* values less than .05. However, patterns of correlation and covariance indicated that the concern for multicollinearity should not pose a strong threat to the present analyses.

Discussion

In the cultural context that underage accessibility to alcoholic beverage is exceptionally easy, we have identified first drinking context-related differences in the progression from alcohol to betel nut and illegal drugs. On the basis of nationally representative high school students, our results show that more than 40% of the students had tried alcohol at least once in their lifetimes by age 15. Youth who had their first drinks at social gatherings (i.e., entertainment settings and friends' houses) seem to consume alcohol more frequently in late adolescence. In addition, regardless of gender, family structure, weekly allowance, living status with family, type of school attendance, and prior experiences of running away from home and truancy, having their first alcoholic beverage in entertainment settings (e.g., pub, karaoke lounges) was significantly associated with a faster onset of betel nut and illegal drugs.

Some potential limitations of this study should also be considered. The first limitation involves the specification of the survey population in relation to school-attending youth. As a result, these are limits when generalizing the present findings to non-school-based recruited samples, albeit the effort has been made to take truancy experiences into account by statistical adjustment. It is very likely that the observed estimates of HRs in this study may be lower than values derived from nonschool-attending individuals, given that the experiences of betel nut and illegal drug were more prevalent among dropouts and nonattendants (Chou et al., 2006; Gfroerer et al., 1997; Greene et al., 1997; Swaim et al., 1997). The second limitation in this study can be traced to its cross-sectional and nonexperimental

design, which creates opportunities for errors in specification of temporal sequences (e.g., recall bias for initiation age or first drinking context). Prospective studies with frequent assessments may help overcome this limitation, and special efforts may also be needed to collect temporal order and time lag because two or more drugs have been experienced at the same reported age. Finally, because of the cultural, geographic, and societal differences, it might not be appropriate to generalize the observed association to other places with profiles of drug availability, drug diversity, and drug norms different from those of Taiwan.

Notwithstanding limitations such as these, the findings derived from this school survey with the nationally representative sample have offered new evidence on the factors accounting for a differential drug progression process from alcohol to other psychoactive drugs (i.e., betel nut and illegal drugs). Prior research suggests that there are particular progression patterns and sequences of drug involvement among adolescents that are heterogeneous across racial/ethnic group, birth cohort, gender, socioeconomic status, and age at first drug use (Golub and Johnson, 2001; Guerra et al., 2000; Novins et al., 2001). However, very few studies have explored possible roles of the first drinking context in the link between alcohol and subsequent illegal drug use. In addition, the large sample size of youth in mid-adolescence allows us to identify drinking context-related heterogeneity in higher frequency of alcohol consumption and faster progression of drug experiences in society, wherein the prevalence of illegal drug use is relatively uncommon compared with the ones in other Western countries.

Within the cultural context wherein social norms are more tolerant, if not encouraging, of underage drinking, these results can be interpreted in one of several ways. First, the observed elevated risks of advanced alcohol involvement and earlier initiation of betel nut and illegal drugs among youth having their first drink in the contexts such as entertainment settings may be the result of mixed and reciprocal processes of differential drug availabilities, rising opportunities owing to social contagion, and differential association (Fergusson et al., 2006; Osgood et al., 1996; Weitzman et al., 2005). For example, for social contexts such as night clubs or karaoke lounges, accessibility to certain illegal drugs seems relatively easier compared with one's own home. It may be expected that adolescents who had their first drink in entertainment settings may spend a great amount of time within these environments, and, consequently, they have a greater chance of being exposed to drug-using adults and peers or even being offered drugs (Chen et al., 2004; Wagner and Anthony, 2002).

Another perspective that may account for this observed excess risk of illegal drug involvement associated with the first drink in socializing gatherings (e.g., friends' houses and entertainment settings) may be supported by the work of Orcutt (1975), suggesting that young adults' definitions for deviance (e.g., alcohol and marijuana use) were a context-dependent phenomenon. In keeping with this point of view, one's involvement with alcohol, tobacco, or marijuana seem much more acceptable if an individual was in the context of socio-emotional functions (e.g., social gathering) and social motivations (e.g., when the context demands mutual social participation in drug-related activities). Thus, youth who had their first drink in entertainment settings or at friends' houses might be inclined to the idea that psychoactive drug-using behaviors are acceptable or ordinary in situations with socio-emotional or socio-motivational functions. However, we cannot rule out that the observed differential risks in high-frequency alcohol consumption and the involvement of illegal drugs and betel nut may be, in part, the result of other unmeasured variables, such as parental monitoring/supervision, deviant peer affiliation, personality, or school neighborhood (Chilcoat and Anthony, 1996; Maes and Lievens, 2003). For example, it is possible that youth who had first drinks at places such as friends' houses or entertainment settings were more likely to be those having lower levels of parental monitoring/supervision, compared with their counterparts who had alcoholic beverages at family functions.

Our findings may also lend some empirical evidence to a broader range of health policies in Taiwan, such as improved implementation of minor protection law governing underage access to alcoholic beverages or alcohol use in public places (Aguirre-Molina and Gorman, 1996; Wagenaar and Perry, 1994). Given that alcohol initiation in entertainment settings may be associated with a more rapid progression into the involvement of betel nut and illegal drugs, public health practices or prevention programs should give more emphasis to context or environmental settings associated with adolescent psychoactive drug use, including efforts to limit access and availability, expand alcohol- or tobacco-free entertainment settings, or encourage responsive entertainment/beverage services (Aguirre-Molina and Gorman, 1996; Wagenaar and Perry, 1994; Weitzman et al., 2005). Finally, in the case that alcohol-experienced youth were uniformly more likely to experience other psychoactive drugs than their alcohol-naive counterparts, public health strategies are needed to target parents or families to address the issues such as minimal drinking age and harmful effects of underage drinking.

Acknowledgments

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