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Adolescent Alcohol Use in Japan, 1996

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We conducted the 1st nationwide survey on the use of alcohol by Japanese high school students. The survey design was a cross-sectional sampling survey. The targets of the survey were junior and senior high schools throughout Japan. Sample schools were selected by stratified cluster sampling. Self-administered anonymous questionnaires were sent to sample schools for all students to fill out. Among sampled schools, 65.6% and 67.0% of junior high schools and senior high schools responded, respectively. A total of 117,325 students responded and 115,814 questionnaires were subjected to analysis. The current drinking rate was defined as the percentage of students who had drank alcohol at least 1 day within the 30 day period before answering the questionnaire, starting at 26.0% for boys and 22.2% for girls in the 1st grade of junior high and increasing to 54.9% for boys and 43.4% for girls in the 3rd grade of senior high school. The experience rate of alcohol drinking on ceremonial occasions was much higher. The experience rates of drinking with peers, at parties, in bars and drinking alone increased with age. The cumulative experience rate of drinking with peers was dramatically increased in senior high school students. The most popular alcohol beverage was beer among boys, and sweet fruit-flavored liquor among girls. The most prevalent sources of alcohol for student drinkers were convenience stores, bars, liquor stores and vending machines. The results showed that adolescent drinking in Japan is quite widespread; this suggests that education toward the prevention of drinking should start in primary school. Adults around junior and senior high school students should take adolescent drinking seriously.

Key words: adolescent behavior; alcohol drinking; drinking behavior; Japan

Adolescent drinking is associated with a variety of problems, such as traffic accidents and delinquency and not just alcohol-related health problems; it has become a major social issue. Moreover, the younger the age at which drinking behavior begins, the greater these problems become (Suzuki, 1995), and thus it is important to begin alcohol education at an early age. In Western countries, adolescent drinking has been investigated on a nationwide scale (Kann et al., 1998). Moreover, many of the surveys have been periodically conducted, and by gathering data on changes over time they have provided important information for controlling of adolescent drinking. In Japan, many minors are thought to

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Abbreviation: CI, confidence interval

already be drinking despite the fact that there is an "Act to prohibit minors from alcohol drinking." However, no surveys representative of the entire country have ever been conducted on the drinking of alcohol by young people, although several surveys targeting regions of the country and schools have been published (Kawabata, 1991; Suzuki, 1995; Matsushita et al., 1996). We therefore planned a survey on the drinking behavior of youth by a representative sampling method. As a result, the actual state of alcohol use by junior and senior high school students in Japan and related factors were revealed. This basic information can be applied to measures for the prevention and control of adolescent drinking.

Subjects and Methods

Subjects

The survey design was a cross-sectional sampling survey. The targets of the survey were students belonging to junior and senior high schools throughout Japan. The survey was conducted by sampling 122 of the 11,274 junior high schools (selection rate: 1.1%) and 109 of the 5501 senior high schools (selection rate: 2.0%) registered in the 1996 National School Directory. The survey period was from December 1996 to the end of January 1997.

Sampling

The sampling method used was a stratified, single-stage cluster sampling. In order to avoid sampling bias toward any regional blocks, stratified sampling was performed with regional blocks as the strata. Because it was foreseen that there would be a greater drinking rate variance among the senior high schools, the breaks between the regional blocks, and the selection rate were made larger in order to make the confidence interval (CI) of drinking rate smaller. As a result, the junior high schools were selected by creating 12 strata, and the senior high schools, by creating 6 strata. All of the students in the schools that were sampled were used as subjects of the survey. Accordingly, the selection method was adopted in which the schools were regarded as a single cluster.

The number of samples was calculated by using the variance of smoking rates according to school and survey response rate obtained in a nationwide survey on junior and senior high school smoking behavior conducted in 1990 (Osaki and Minowa, 1996). The calculations were made by assuming that the variance of drinking rates among the schools was similar to those of the smoking rates. Since the estimated 95% CI of the drinking rates in junior high schools throughout the country was ± 0.5%, and the estimated 95% CI for the drinking rates of each regional block was ± 2%, 122 schools had to be selected (Matsui, 1989). Since the variance of smoking rates according to school was much larger for senior high schools than for junior high schools, the estimated 95% CI for the drinking rates in senior high schools in the country as a whole was ± 1.5% and the 95% CI for drinking rates according to regional block was ± 3%, and thus 109 were needed (Matsui, 1989). The selection numbers were assigned according to the numbers of students in each regional block. The target schools in each regional block were selected according to the number of students in each school.

Questionnaire

The content of the survey was decided by referring to the content of surveys on the drinking behavior of minors that had been conducted in Japan and in various other countries. In order to be able to compare the drinking frequency and age at the time of the 1st drink, the same criteria were established as in surveys in other countries, including the United States. Because characteristics such as occasions for drinking, drinking settings, types of alcoholic beverages, sources of alcoholic beverages, alcohol-related problems, etc., vary from country to country, minor adjustments to the content of the survey were made by referring to previous surveys that had been conducted in Japan.

Survey procedure

Letters requesting cooperation in conducting the survey were addressed to the principals of the schools that had been selected. The survey was carried out in the classrooms, and the forms were distributed and collected by the homeroom teacher. After anonymously filling out their own forms, the students placed them in a sealed envelope. The survey instruction manual requested that the teacher not walk around the room or look at the survey forms while administering the survey. The teacher then collected the envelopes and mailed them back to the National Institute of Public Health without breaking the seal of the individual envelopes.

Data analysis

The data were analyzed by using SAS for Windows version 8.1 Software (SAS Institute Inc., Cary, NC). The prevalence of the items surveyed was calculated according to the selection method used in this survey. The percentage of persons who replied to the individual questions was calculated in each stratum. The values obtained by each stratum were added to obtain percentages of the whole by multiplying the weight of each stratum. The weights were the values obtained by placing the total number of students in each stratum in the numerator and the total number of students in the country in the denominator.

Results

Response rates

Replies were obtained from 80 of the 122 junior high schools (school response rate: 65.6%) and 73 of the 109 senior high schools (school response rate: 67.0%; combined junior and senior high school response rate: 66.2%). A total of 117,325 envelopes were collected. The student response rate as a proportion of enrolled students in sampled schools was 99.3% in the junior high schools, 90.8% in the senior high schools and 93.8% as a whole. Accordingly, the overall response rate was 64.1% in the junior high schools, 62.5% in the senior high schools and 63.0% as a whole. After excluding 2 forms because the sex or grade was unknown, and 1419 forms because of inconsistencies in the forms (for example, a questionnaire which indicated “non-drinker” in one question whereas “daily drinker” was indicated in another question), a total of 115,814 questionnaires were adopted for analyses.

Drinking prevalence

We classified alcohol drinking status among high school students using the information about the number of drinking days during the 30 days preceding the day of the survey. The prevalence rates of both boys and girls who answered “1 day or more” (current drinkers) increased with school grade. The prevalence of subjects who drank “10 days or more”, 1.9% among 1st-grade junior high boy students (7th graders in the United States), rose to 7.0% among 3rd-grade senior high boys (12th graders in the United States). The rate was 1.3% among 1st-grade junior high girl students, and while the increase was only slight, it rose to 2.5% among 3rd-grade senior high girls (Table 1). Few subjects drank every day, and there were no clear trends. Large changes were observed between the 3rd-grade junior and 1st-grade senior high school students. The prevalence of alcohol drinking among boys tended to be higher than among girls.

The prevalence of boys who drank once or more a week was 4.4% in the 1st grade of junior high school, and rose to 16.8% by the 3rd grade of senior high school. Among girls, it was 3.1% in the 1st grade of junior high school, and rose to 7.0% by the 3rd grade of senior high school.

Drinking occasions

When we calculated the experienced rate by drinking occasions, ceremonial occasions (festivals, weddings, funerals, etc.) were the most common occasions for both boys and girls: 1st-grade junior

Table 1. Drinking prevalence among junior and senior high school students, Japan, 1996

Gender	High school	Grade	Number of subjects	Experience rate	Drinker classification		
					Current	Weekly	Daily
Boy	Junior	1st	7,211	71.5	26.0	4.4	0.5
		2nd	7,152	74.9	30.4	6.7	0.5
		3rd	7,108	77.5	32.1	8.1	0.8
	Senior	1st	12,079	84.4	43.9	10.7	0.5
		2nd	12,645	88.2	52.5	14.1	0.7
		3rd	10,921	89.2	54.9	16.8	1.2
Girl	Junior	1st	7,158	70.4	22.2	3.2	0.4
		2nd	6,966	72.8	24.6	4.0	0.4
		3rd	7,203	75.9	25.4	4.4	0.4
	Senior	1st	12,617	83.7	34.9	5.4	0.5
		2nd	12,771	87.5	43.3	6.6	0.2
		3rd	11,983	89.2	43.4	7.0	0.3

Experience rate: experienced any drinking occasion.
Current drinkers: drank alcohol ≥ 1 of the 30 days preceding the survey.
Weekly drinkers: (every week end) + (several times a week) + (daily).
Daily drinker: drank every day of the 30 days preceding the survey.

high boys 54.0%, girls 52.3%; 3rd-grade senior high boys 61.3%, girls 61.1%. The experience rate for drinking with the family was also high: 1st-grade junior high boys 35.6%, girls 37.1%; 3rd-grade senior high boys 46.3%, girls 47.6%. Although the experience rates did not rise very much as the grade level increased, the percentages of those who answered that they drank "during class meetings, at the close of events or at parties" (1st-grade junior high boys 3.5%, girls 2.6%; 3rd-grade senior high boys 45.2%, girls 40.9%), "with peers at taverns, karaoke rooms or bars" (1st-grade junior high boys 4.0%, girls 3.2%; 3rd-grade senior high boys 45.4%, girls 40.6%) or "with peers in someone's room" (1st-grade junior high boys 4.9%, girls 5.2%; 3rd-grade senior high boys 56.3%, girls 51.3%) increased with grade. The differences between boys and girls in experience rates according to drinking occasions were small. The percentages of subjects who had drunk "on ceremonial occasions" and "with my family at mealtime" were relatively high, even among those whose drinking frequency was low, but the percentages of those who had drunk "during class meetings, at the close of events or at parties," "with peers at taverns, etc.," "with peers in someone's room" or "alone" rose as the drinking frequency increased.

Age at the time of the 1st drink

The percentages of both boys and girls in their 1st grade of junior high school who replied that they had taken their 1st drink at 9 to 10 years of age were the highest, and in the 3rd grade of senior high school, the percentages who replied that it was at 15–16 years of age were the highest (Table 2).

In this study we proposed drinking with peers as one of the starting points that leads to problem drinking, and we asked when they started drinking with peers. The highest percentages of the 1st-grade junior high students, both boys and girls, replied 11 to 12 years of age, whereas the most common reply of the 3rd-grade senior high students was 15 to 16 years (Table 2). As the drinking frequency increased, the percentage of those who had their 1st drink with peers at 8 years of age or less increased.

Type of alcohol consumed

Among the 1st-grade boys of junior high school, 58.0% of drinkers were found to prefer beer, and the percentage increased with grade, reaching 77.5% among the 3rd-grade boys of senior high school. Among boys, about 50% of the drinkers at all grade levels drank sweet, fruit-flavored alcoholic

Table 2. Cumulative proportion of the 1st experience of drinking, and trying drinking with peers, Japanese high school students, 1996

	Gender	High school	Grade	Number of subjects	Age (year) ≤ 8	9–10	11–12	13–14	15–16	≥ 17
Age at the 1st drinking										
	Boy	Junior	1st	7,211	24.3	50.9	69.3	71.5		
			2nd	7,152	22.5	43.5	66.9	74.9		
			3rd	7,108	22.9	38.6	60.0	75.6	77.5	
		Senior	1st	12,079	19.0	31.4	51.5	75.9	84.4	
			2nd	12,645	18.7	29.7	46.1	69.8	87.4	88.2
			3rd	10,921	17.9	26.7	40.3	61.8	85.3	89.2
	Girl	Junior	1st	7,158	23.0	48.1	69.0	70.4		
			2nd	6,966	21.5	41.6	65.0	72.8		
			3rd	7,203	21.2	35.9	57.2	74.4	75.9	
		Senior	1st	12,617	18.4	31.6	50.7	74.2	83.7	
			2nd	12,771	17.4	28.7	44.6	66.4	86.6	87.5
			3rd	11,983	16.8	25.1	37.7	57.4	83.6	89.2
Age at trying drinking with peers										
	Boy	Junior	1st	7,211	3.3	8.4	19.0	21.9		
			2nd	7,152	2.3	5.5	16.9	28.7		
			3rd	7,108	1.9	4.1	12.0	34.7	39.6	
		Senior	1st	12,079	1.0	2.3	8.7	39.0	61.3	
			2nd	12,645	1.1	1.8	6.4	30.7	70.8	72.9
			3rd	10,921	1.1	1.7	5.5	24.5	68.2	78.6
	Girl	Junior	1st	7,158	2.6	6.4	15.3	16.9		
			2nd	6,966	1.5	4.1	13.3	23.2		
			3rd	7,203	1.2	2.8	10.2	29.0	32.6	
		Senior	1st	12,617	0.8	1.6	7.7	31.3	52.4	
			2nd	12,771	0.5	1.2	5.8	24.6	64.2	67.0
			3rd	11,983	0.6	0.9	4 .1	18.7	61.5	75.9

beverages (Table 3). This was followed by *sake* (Japanese wine), *shochu* (cheap spirit) and wine (Table 3). The percentage of boys who drank high-proof, strong alcoholic beverages, i.e., whiskey, brandy and vodka, rose as the grade level increased. Among girls, more than 60 to 70% at all grade levels drank sweet, fruit-flavored alcoholic beverages. They were followed by beer, *shochu* and wine (Table 3).

Beer and sweet, fruit-flavored alcoholic beverages were the most often consumed even by those with a relatively low drinking frequency. As the drinking frequency increased, the percentages of those who consumed strong alcoholic beverages and *shochu* increased.

Usual sources of alcoholic beverages

Among the 1st-grade junior high students, the largest percentages of both boys and girls consuming alcoholic beverages found them at home. This trend hardly increased as the grade increased: 1st-grade junior high boy students 66.5%, girl students 74.9%; 3rd-grade senior high boys 52.9%, girls 53.1%. The next most common sources were "purchase from convenience stores or supermarkets" (1st-grade junior high boys 9.4%, girls 11.9%; 3rd-grade senior high boys 61.5%, girls 59.8%), "purchase at liquor stores" (1st-grade junior high boys 5.6%, girls 5.8%; 3rd-grade senior high boys 36.7%, girls 28.8%), "drinking at bars, etc." (1st-grade junior high boys 4.7%, girls 4.3%; 3rd-grade senior high

Table 3. Type of alcohol consumed by students classified by sex and grade

Gender	High school	Grade	Number of subjects	Beer	*Sake* (Japanese wine)	Wine	*Shochu* (cheap spirit)	Sweet, fruit-flavored liquor*	Strong liquor†
Boy	Junior	1st	4,565	58.0	26.2	21.9	14.6	49.9	8.7
		2nd	4,709	59.1	23.7	22.0	14.3	51.8	10.6
		3rd	4,930	62.1	25.2	22.4	17.1	51.6	11.4
	senior	1st	9,279	68.0	23.1	20.0	20.1	53.8	14.4
		2nd	10,477	73.7	22.8	18.4	24.8	49.5	17.3
		3rd	9,308	77.5	25.2	18.3	29.3	42.3	20.9
Girl	Junior	1st	4,174	46.2	18.8	22.2	14.9	67.5	6.5
		2nd	4,270	45.6	18.7	24.6	17.3	68.9	7.7
		3rd	4,664	44.0	16.6	23.9	17.0	72.4	8.1
	Senior	1st	9,299	44.9	14.3	20.6	19.3	77.3	7.1
		2nd	10,245	46.9	12.6	19.9	26.7	77.1	7.9
		3rd	10,077	49.0	13.1	19.7	33.8	75.7	8.6

Percentages add up to more than 100%, as some students mentioned more than 1 alcohol type.
* Liqueurs.
† Whiskey, brandy and vodka.

boys 40.6%, girls 38.9%), "purchase from vending machines" (1st-grade junior high boys 6.1%, girls 5.0%; 3rd-grade senior high boys 35.9%, girls 21.1%): in every instance the percentages increased with grade. Small gender differences among these percentages were observed. Even when the drinking frequency was low, the most common source was alcoholic beverages that were at home. Among senior high school students, convenience stores were commonly used as a source even by those with a low drinking frequency. Vending machines, liquor stores and bars were sources that were used frequently when the drinking frequency became high.

Alcohol-related problems

The most common experiences with alcohol-related problem were "vomiting," "blacking out" and "scolded by parents" (Table 4). They all increased as school grade increased. The percentages of "vomiting" were higher among boys, but there was little difference between boys and girls in "blacking out" and "being scolded by parents." Among the 3rd-grade senior high boy drinkers, 37.9% were found to have already experienced "vomiting" and 20.4% had already experienced "blacking out." We found that the experiment rates with alcohol-related problems increased for every item as the frequency of drinking rose. The percentages of those who were "scolded by parents" did not rise very much as the frequency of drinking increased, but "fighting" and "trouble with police" were much higher in the group with the highest drinking frequency.

Discussion

This survey is the 1st nationwide survey on drinking behavior of high school students in Japan. A sampling method that would yield a sample that would be representative of the entire country was adopted, and the response rate was almost on the same level as in nationwide surveys in the United States (Kann et al., 1995, 1996, 1998). In addition, because a method that thoroughly ensured the anonymity of the respondents' replies was adopted in the survey procedure, the results are believed to more accurately reflect the actual drinking situation of high school students in Japan.

The drinking rates observed in this survey were lower than in the results of previous surveys in Japan. The "current drinking rates" in this survey

Table 4. Experience rates of alcohol-related problems, Japanese high school students, 1996

Gender	High school	Grade	Number of subjects	Vomiting	Fighting	Blacking out	Trouble with police	Scolded by parents
Boy	Junior	1st	7,211	6.3	1.6	5.1	1.2	6.6
		2nd	7,152	6.5	1.9	6.0	0.8	6.4
		3rd	7,108	8.5	2.4	9.2	1.4	5.8
	Senior	1st	12,079	14.8	3.5	13.0	1.2	7.3
		2nd	12,645	23.8	4.0	16.5	1.8	7.1
		3rd	10,921	33.9	4.9	18.2	2.3	6.9
Girl	Junior	1st	7,158	2.9	0.6	3.4	0.3	3.5
		2nd	6,966	3.1	0.9	5.1	0.6	4.6
		3rd	7,203	4.3	1.1	5.3	0.6	3.9
	Senior	1st	12,617	7.3	1.1	10.0	0.6	4.5
		2nd	12,771	12.8	1.1	12.9	0.5	4.8
		3rd	11,983	18.9	1.4	15.5	0.6	5.4

were higher for both the 1st- and 2nd-grade boys and girls of junior high schools than in the 1989 survey (Kawabata et al., 1991), and they were lower for the other grades. The once-or-more-a-week drinker rates (weekly drinking rates) among senior high school boys were slightly lower than in previous surveys, and for the girls they were in the middle of the results of previous studies (Tani et al., 1978; Ikegami et al., 1983; Ohmoto et al., 1986a, 1986b; Suzuki et al., 1991, 1993; Toyama et al., 1995; Matsushita et al., 1996). The reason why the drinker rates in this survey were relatively low may be because the samples in earlier surveys were biased because the target schools were selected arbitrarily or because schools in which student drinking had become a problem were sampled.

The drinking rates observed in this survey were low when compared with the results of surveys in European countries, and were almost on the same level as in the United States. The drinking rate in the United States occupies a median position among the rates in Western countries (Hiebell et al., 1997). The weekly drinking rate in Japan corresponds to the European countries that have low weekly drinking rates (King et al., 1996). Our survey yielded lower current drinking rates for both boys and girls than in the Center for Disease Control Youth Risk Behavior Survey, which has yielded the highest current drinking rates among the surveys conducted in the United States (Kann et al., 1995, 1996, 1998), but the differences tend to shrink as the grade level increases. The drinking experience rates among boys and girls were both higher in our survey, but both the weekly drinking rates (May, 1992; King et al., 1996) and the current drinking rates (Rahkonen and Ahlstrom, 1989) tended to be higher in Europe than in Japan. Thus, it can be concluded that the drinking rates among junior and senior high school students in Japan has already reached the median position of Western countries, and that the differences from drinking rates between Japan and Western countries become smaller as the grade level increases.

Birth cohort analysis has revealed that the drinking experience of youth in the United States is occurring at younger ages (Johnson, 1998). We observed a phenomenon in which the percentage of those whose first experience was at a young age increased as the school grade became lower. Since it may be caused by the recall bias, it will be necessary to reveal this phenomenon by carrying out periodical nationwide surveys.

However, even when the results of a cross-sectional nationwide survey in the United States were compared with the age of the 1st drinking experience in our survey, the junior and senior high school students in Japan were found to have experienced drinking at a younger age (Warren et al., 1997). There was a high rate of drinking experience among high school students on ceremonial occa-

sions in Japan (Wada et al, 1998), and almost all of them had some experience before they entered junior high school. We can conclude then that drinking alone and drinking alcoholic beverages obtained by the students themselves are important starting points. The rate of drinking experience associated with these opportunities rose as age increased, especially after entering high school. And there were only small number of weekly drinkers in the 1st-grade junior high students. Thus it is important to emphasize alcohol education in early junior high school.

In earlier surveys, beer was the most common alcoholic beverage among both sexes, but in our survey girls reported drinking sweet, fruit-flavored alcoholic beverages, many different kinds of which have recently come onto the market. Young people in other countries have also been reported to prefer alcoholic beverages with low alcohol concentrations (Rio et al., 1995). The popularity of sweet alcoholic beverages among girls in Japan may be responsible for lowering their resistance to start drinking alcoholic beverages, and it is feared that drinking may become even more widespread among young women in the future.

Analysis of the usual sources of alcoholic beverages showed that as drinking behavior became more established, the percentages of subjects who "purchase from some stores" and who "drink at bars, etc." increased. This contrasts with the fact that the major source of cigarettes by adolescent smokers is vending machines (Osaki and Minowa, 1996). A considerable number of subjects obtained alcoholic beverages in over-the-counter sales settings and that minors were drinking at bars. This suggests that the adults who are selling alcoholic beverages need to be more concerned about adolescent drinking.

Alcohol-related youth problems have been monitored in New York, but it is difficult to make comparisons, because a different definition was used (Barnes et al., 1997). However, 47% of boys and 32% of girls in their 3rd grade of senior high school in Japan had already experienced alcohol-related problems. In spite of this, not many of them had been reprimanded by their parents, and it is suspected that their parents were unconcerned about their children's drinking.

The above results show that adolescent drinking in Japan is quite widespread even among 1st graders of junior high schools, and they suggest that education to prevent drinking should start in primary school. The adults around them should take adolescent drinking seriously.

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