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Original Article

Effects of Alcohol-related Health Education on Alcohol and Drinking Behavior Awareness among Japanese Junior College Students: A Randomized Controlled Trial

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We conducted a randomized controlled trial involving Japanese junior college students aimed at investigating the effects of a single session of alcohol health education concerning the effects of alcohol, alcohol-related health problems, and drinking behavior. Students were randomly assigned to an intervention (n = 38) or a control group (n = 33). The intervention group attended a 90-minute alcohol health education session that included demonstration of an ethanol patch test, watching videos, and a lecture by an ex-alcoholic. The control group received health education regarding smoking. The students' knowledge regarding alcohol, their drinking behavior, and problem drinking (CAGE) were measured by a self-administered questionnaire at the baseline and at a two-month follow-up. A repeated measures of analysis of variance (ANOVA) of those who completed the follow-up indicated the education sessions' significant intervention (group × time) effect on the scores related to knowledge of alcohol-related health problems ($p = 0.035$), with a greater increase in the scores of the intervention group at the follow-up. No significant intervention effect was observed regarding drinking behavior or problem drinking as measured by CAGE ($p > 0.05$). Alcohol-related education can be considered an effective way to increase awareness of alcohol-related health problems, but less effective for changing drinking the behavior of Japanese junior college students.

Key words: intervention study, problem drinking, alcohol-related health problems, adolescents, Japan

An increasing trend toward underage alcohol use among adolescents, particularly that of high-risk drinking behaviors, has been recently recognized [1]. Up to 80% of college students have been reported to drink alcohol, with 25% to 50% being heavy episodic drinkers in the U.S. [2]. Also in the U.S., one quarter to one-third of high school students have been found to consume alcohol to a harmful degree (*i.e.*, 5 or more drinks in the past 2 weeks) [3]. The WHO Health Behavior in School-aged Children

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Survey [4] and the U. S. Centers for Disease Control (CDC) Youth Risk Behavior Surveillance [5] have shown that alcohol consumption by youths is common in Europe and America, and that alcohol abuse among adolescents is a major public health problem.

Unhealthy habits that affect physical [6, 7] and mental health and well-being [8, 9] usually start during adolescence. Alcohol misuse and abuse among adolescents are associated with decreased academic performance, higher rates of accidents and injuries, interpersonal problems, risky sexual behavior, tobacco and other substance use, and a variety of mental health disorders [10, 11]. Not only is the use of alcohol associated with these problems, but also frequent and high-dose consumption of alcohol is associated with a greater alcohol problem rate and a higher risk of developing early alcohol dependence [12, 13]. Research over the past 2 decades has put much effort into developing an effective education intervention program regarding alcohol use in college students [14–16].

In Japan, accoding to the 1996 national representative survey, 5% of junior high school students and 10% of senior high school students drank one or more times per week [17]. Sixty percent of junior high school students and 70% of senior high school students reported having drinking experiences [17]. A more recent survey indicated that the drinking rate increased for female students between 1996 and 2000 [18]. Although these figures were lower than those in the U.S. and Europe [4, 5], they still indicate that underage drinking is an important public health problem in Japan as well.

According to randomized controlled trials, a wide range of alcohol health education programs, such as brief interventions and motivational interventions, have been developed and have been shown to be effective in reducing alcohol consumption and drinking-related problems among adults [19, 20]. On the other hand, fewer studies have been performed regarding the effects of alcohol education among adolescents. Sixteen studies including 3 randomized controlled trials have been carried out on the effects of alcohol education class, small group sessions, and workshops on improving the knowledge and attitudes regarding alcohol and reducing the alcohol consumption among college students with alcohol abuse, although most of these studies had a small sample size and no control group, and only 3 were randomized controlled trials [21]. Family involvement, peer pressure encouraging drinking, and the mental and physical characteristics of participants have been suggested as important factors in designing an effective educational program for adolescents [22]. Some interventions have used new approaches, *e.g.,* a lecture by those who had recovered from alcohol dependence (*i.e.,* ex-alcoholics) [23] and a computer-based, CD-ROM interactive program [24] as useful tools in increasing alcohol awareness.

Alcohol health education has also been introduced to school curriculums in Japan, adopting programs which have been applied to high schools in the U.S. In a previous study from Japan [25], a physician and a clinical psychologist provided an education program consisting of a lecture and role-playing exercises for high school students. Knowledge of alcohol use improved after the students has participated in this program [25]. Another education program in Japan used an ethanol patch test to provide an opportunity for participating students to find out their genetic background with respect to alcohol tolerance, *i.e.,* the amount of acetaldehyde dehydrogenase (ALDH) II [26]. The program was also shown to be effective in improving knowledge of the adverse effects of alcohol [26]. However, these studies included a simple before-after comparison without a control group. To our knowledge, no randomized controlled trial has been carried out that has examined the effects of an alcohol health education program regarding the knowledge of alcohol and drinking behavior among underage students.

We developed a single-session 90-min alcohol health education program for adolescents, based on similar alcohol education programs used in previous studies, including a didactic lecture via a standardized video, a test for ALDH II [26], a lecture by ex-alcoholics [23], and the distribution of a booklet on alcohol and health. The purpose of the study was therefore to evaluate the effects of this alcohol health education program on junior college students' awareness of alcohol's effects and alcohol-related health problems, and drinking behavior and its associated problems, using a randomized controlled study design.

Materials and Methods

Subjects. All students (n = 105) in the first and second grades of a junior college in Okayama prefecture, excluding 2 students who were on long sick leave, were randomly assigned to either an intervention (n = 52) or control group (n = 53) before the study. This junior college was selected as a study site because of the cooperation of the college faculty, particularly on the part of those who were responsible for a health education class, the granting of permission for the study on the part of the dean of the junior college, and because almost all the college's students are under 20, although the number of male students was expected to be small. The students' majors were social work and welfare studies. The randomization was made within each grade and based on computer-generated random numbers. The students were invited to attend a health education class in November 2005 and to participate in the study. Thirteen students (3 and 10 in the intervention and control groups, respectively) did not attend the class. One student in the control group did not agree to participate. The remaining 92 students (49 and 43 in the intervention and control groups, respectively) were asked to complete a baseline questionnaire on their knowledge of alcohol and drinking behavior. After completing the questionnaire, the intervention group attended a health education session on alcohol, and the control group attended a session on smoking. The student who did not consent to this study was asked to attend the class on smoking. Two months later, in January 2006, the intervention group and control group students were asked to attend a follow-up class in which they were asked to complete a follow-up questionnaire including the same questions/scales as in the baseline questionnaire. This relatively shorter follow-up period was a result of a fact that the present study was planned using a half-semester health education class from October 2003 to February 2004; the class curriculum limited the study schedule. Two of the intervention group students and 3 of the control group students could not be matched to the baseline questionnaire because they did not give their unique ID on the questionnaire. In addition, 5 students in the intervention group and 5 students in the control group had at least one missing response in the follow-up questionnaire. Data from 42 and 35 students (81% and 66% of the initial subjects, or 86% and 81% of the baseline respondents, respectively) in the intervention and control groups, respectively, who completed the follow-up survey were analyzed. Because there were only a few male participants (4 in the intervention and 2 in the control group), we limited further analyses to only females (38 in the intervention and 33 in the control group). The ages most students ranged from 18 to 20;3 of them were older than 20 (22, 23, and 24 years old). Mean ages (standard deviation) for the intervention and control groups were 19.2 (1.0) and 19.4 (1.0), respectively.

Procedure. The outline of the study was explained to all participating students, and written informed consent was obtained. For those who were under age 20, written informed consent was also obtained from their parents before the study. The students filled in the baseline questionnaire before the intervention. The control group was then asked to move to another classroom. Each group attended a 90-min health education class. Students in the intervention group were provided a health education class on alcohol and health. Previous studies have reported that a single 90-min session on alcohol health education is useful for improving knowledge regarding alcohol use among adolescents in Japan [25, 26], one session of which also used a test for ALDH II [26] to attract participants' attentions. A lecture by ex-alcoholics may be additionally effective to change drinking behavior among adolescents, as previously reported outside Japan [23]. Thus the alcohol health education program used here was developed, to include these features. First, the participants were told about the ethanol patch test, and were then asked to apply it to themselves. They watched a 23-minute video on alcohol and health specially selected by the Japan Ministry of Education, Science and Culture. After watching the video, they learned their patch test results regarding their own ALDH II activity. A male volunteer who had recovered from alcohol dependence (an ex-alcoholic) gave a speech to the students on his experience with alcohol and its related problems. Finally, a booklet on alcohol and health was distributed to the students. The control group, on the other hand, was provided a health education class on smoking and health. In this class, a professor at the junior college in charge of health education gave a slide lecture on smoking, *e.g.,* the toxic substances contained in

cigarettes, the relationship between smoking and disease, and the health effects of starting to smoke at a younger age.

At the 2-month follow-up, the students filled out the follow-up questionnaire survey. After the post-test survey, the intervention and control groups were provided health education classes on cigarette smoking and alcohol, respectively.

The design and procedure of the study were reviewed and approved by the Ethics Committee on Epidemiologic Research of the Okayama University Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences in September 2005.

Questionnaire. Knowledge of the effects of alcohol and alcohol-related health problems, and drinking behavior and problem drinking were assessed in the baseline and follow-up questionnaires. The scales and questions used in the baseline and follow-up questionnaires were adopted from those used in the National Survey Concerning Underage Smoking and Alcohol Drinking Behavior conducted in 1990–1996, 2000, and 2004 in Japan [27, 28], which have also been used extensively in other countries. We could not include other questions/scales which might be more relevant to drinking behavior among adolescents, because the Ethics Committee expressed their strong concern about asking questions other than those previously used in national surveys in Japan among adolescents under 20, who are not legally allowed to drink.

Drinking behaviors. The quantity-frequency scale (QF-scale) was used to estimate the quantity and frequency of drinking [27, 28]. Students were asked how often they drank alcoholic beverages per week, and how much they usually consumed on each occasion. Frequency was rated as a 4-point response: never, once or twice a year, once or twice a month, or once or twice a week or more. The quantity per occasion was classified into 6 categories (never, just a small quantity, 1 drink, 2 drinks, 3–5 drinks, 6 or more drinks), where 1 drink was defined as a 350 ml can of beer, a half "go" (90 ml) of Japanese *sake*, a glass of wine, or an equivalent amount of alcohol (*i.e.,* 9 mg of pure ethanol).

Awareness of the effects of alcohol and alcohol-related health problems. The degree of awareness of the psychopharmacological effects of alcohol was assessed by a 5-item scale with a 2-point response option (yes or no), including items such as "slow drinking with food prevents one from becoming badly drunk (true)" and "there are no individual differences in the optimum dose of alcohol consumption (false)" [27, 28]. In addition to each dichotomous response, the total score was used as a measure of knowledge regarding the effects of alcohol consumption (Cronbach's alpha, 0.349). The degree of knowledge of alcohol-related health problems was assessed by an 8-item scale with a 2-point response option (yes or no), including items such as "alcohol may cause liver disease" (true), "alcohol may cause acute intoxication" (true), and "alcohol may cause lung cancer" (false) [24, 25]. The total score was used as a measure of the awareness of alcohol-related health problems (Cronbach's alpha, 0.468).

Problem drinking. CAGE (an acronym for the English words: attempts to Cut back on drinking, being Annoyed at criticisms about drinking, feeling Guilty about drinking, and using alcohol as an Eye opener) is a 4-item scale designed as a screening instrument for problem drinking that includes items inquiring about an unsuccessful attempt to cut down on drinking, being annoyed by criticism from others about one's drinking, feeling guilty about drinking, and using alcohol as an eye opener [29]. CAGE has been translated into Japanese [30] and tested for its acceptable levels of reliability and validity [31]. Each CAGE item was scored as yes = 1 and no = 0. The total CAGE score (0–4) was used as an index of problem drinking. We imputed a CAGE score of 0 for 1 and 2 respondents in the intervention and control groups, respectively, who had missing response on the CAGE but were found to have lower frequency of drinking (none or less than 2–3 times per year). We also classified students into 3 categories based on their CAGE scores: A normal group (CAGE score of 0), a sub-threshold group (CAGE score of 1), and a problem drinking group (CAGE score of 2 +).

Demographic variables. The background variables, including sex and age, were assessed in the baseline questionnaire. The school grade was used for stratification in the randomization.

Statistical analyses. The average scores for awareness of the effects of alcohol, awareness of alcohol-related health problems, and for CAGE at baseline and follow-up were compared between the intervention and control groups. An intervention (group × time) effect was tested by using a 2-way

analysis of variance (ANOVA) with repeated measures.

Distributions of CAGE category and drinking frequency and quantity measured at baseline and follow-up were also compared between the 2 groups. For these discrete variables, multiple logistic regression analysis with ordinal response (the "ordered logit model") was employed to test a significant intervention effect of the group (intervention vs. control) on each variable, controlling for its baseline value. The ordered logit model [32], also known as the cumulative logit model, estimates the effects of independent variables (X_k) on the log odds of having lower (*e.g.,* normal group by CAGE as $Y = 1$) rather than higher categories (*e.g.,* subthreshold and problem drinkers by CAGE, as $Y = 2$ and 3, respectively) regarding the dependent variable, according to the following equation:

$$1n\left(\frac{p(Y \le j)}{p(Y > j)}\right) = \alpha j - \sum_{k=1}^{K} \beta_k X_k \quad for\ j = 1\ to\ J-1$$

In this equation, α_j are intercepts indicating the log odds of lower rather than higher score categories when all independent variables equal zero. The independent variables (X_k) included the corresponding baseline variable (with number of categories-1 of dummy variables) and an intervention factor (1 for the intervention group and 0 for the control group). We used p value for the effect of the intervention factor as the intervention effect's level of significance. All statistical analyses were conducted using SPSS Windows 14.0J (ANOVA and PLUM procedures).

Results

The score of the awareness of alcohol-related health problems significantly increased at follow-up in the intervention group compared to the control group (Table 1, $p = 0.035$). This was particularly the case for the item "drinking makes the brain shrink" ($p < 0.001$). A marginally significant intervention effect was observed in the CAGE scores, with a greater increase in the score at post-intervention compared with pre-intervention in the intervention group ($p = 0.065$). No significant intervention effect (or a significant difference in changes of the score between the groups) was noted regarding the scores regarding knowledge of the effects of alcohol.

A marginally significant intervention effect was observed for the CAGE category in the female sample ($p = 0.079$). Participants in the intervention group more than those in the control group were more likely to be in the sub-threshold group at the follow-up (Table 2). No significant intervention effect was observed for drinking frequency or drinking quantity per occasion in the female sample.

Discussion

The present randomized controlled trial involving junior college students in Japan showed that scores regarding the awareness of alcohol-related health problems increased in the intervention group at the follow-up 2 months after receiving a health education class on alcohol use, with a significant intervention effect. However, no significant intervention effect was observed regarding the knowledge of the effects of alcohol or drinking behaviors and problems. These results were consistent with the findings of previous studies [25, 33–35] in which a single-session alcohol health education class increased awareness regarding alcohol but did not change drinking behavior and problems among adolescents, despite the additional inclusion of a lecture by an ex-alcoholic and the use of a patch test for ALDH II as part of the program. Among items regarding knowledge of the association between alcohol and health, one particular item for which a significant intervention effect was indicated was that on alcohol's effects on brain shrinkage. The standard video used in the present study placed some emphasis on this topic. Also, a lecture by the ex-alcoholic covered this topic to some extent. Thus the change regarding this particular item in the intervention group seems relevant to the content of the alcohol health education program.

Previous studies have reported that using an ethanol patch test in an alcohol health education class was useful in the prevention of accidents caused by acute alcohol intoxication among adolescents in Japan [36]. It has also been reported that by using an ethanol patch test, participants often showed their intention to stop drinking alcohol, particularly those Japanese adolescents who had positive test results [37]. This approach may be effective particularly among Japanese, because a high proportion (about half) of Japanese lack ALDH II [38]. Also among the present

Table 1 The effects of alcohol health education on knowledge of alcohol's effects and its influence on health among female junior college students in Japan: A rondomized controlled trial

	Intervention group (n = 38)					Control group (n = 33)					Intervention effect (p value)*
	Pre-intervention		Post intervention		Change†	Pre-intervention		Post intervention		Change†	
	% true‡	Mean (SD)	% true‡	Mean (SD)	Mean (SD)	% true‡	Mean (SD)	% true‡	Mean (SD)	Mean (SD)	
Knowledge of alcohol effects:											
I think drinking a moderate quantity of alcohol is good for one's health.	66%		58%			91%		79%			0.344
There is no individual difference in moderate quantity (reverse scored)	3%		8%			0%		0%			1.000
The risk of getting acute alcohol poisoning is higher when drinking large quantities in a short period of time.	82%		84%			85%		79%			0.536
You can avoid getting drunk by drinking slowly while eating.	58%		58%			70%		33%			0.160
It takes about 3 h for the body of healthy person weighing 60 kg to process 1 large bottle of beer (633 ml).	13%		21%			3%		18%			0.882
Total score		2.08 (0.82)		2.29 (1.06)	0.21 (1.21)		2.12 (0.70)		2.45 (0.97)	0.33 (0.96)	0.391
Knowledge of the influence of alcohol on health:											
Drinking causes lung cancer (reverse scored)	5%		8%			3%		3%			0.796
Drinking causes acute alcohol poisoning.	97%		100%			94%		94%			0.998
Drinking negatively affects the liver.	89%		89%			88%		94%			0.714
Drinking increases traffic accidents.	61%		66%			61%		61%			0.642
Drinking affects an unborn fetus.	50%		71%			55%		61%			0.245
Drinking causes the flu (reverse scored)	3%		3%			3%		0%			0.998
Drinking causes alcohol dependence	95%		100%			94%		97%			0.998
Drinking causes the brain shrink	26%		68%			21%		24%			< 0.001
Total score		6.08 (1.05)		6.87 (1.17)	0.79 (1.42)		6.12 (1.08)		6.21 (1.11)	0.09 (1.31)	0.035
CAGE (score)		0.37 (0.68)		0.53 (0.69)	0.16 (0.80)		0.45 (0.75)		0.30 (0.59)	−0.15 (0.71)	0.089

† Change in a score was caluculated by subtracting the pre-intervention score from the post-intervention one.

‡ A proportion (%) of respondents who answered that each statement was "true" was shown. Some of the item scores were reversed in calculating a total score.

* Significance of an intervention effect was tested by repeated analysis of variance for a continous variable and by multiple logistic regression for a frequency variable.

Table 2 Effects of alcohol health education on problem drinking (CAGE category), drinking frequency, and quantities per drinking occasion among female junior college students in Japan: A randomized controlled trial

	Intevention group (N = 38)				Control group (N = 33)				Intervention effect* (*p* value)
	Baseline		Two-month follow-up		Baseline		Two-month follow-up		
	n	%	n	%	n	%	n	%	
CAGE category (score range)									
Normal group (0)	27	71.1	21	55.3	21	63.6	23	69.7	0.079
Subthreshold group (1)	7	18.4	13	34.2	6	18.2	8	24.2	
Problem drinkers (2 +)	4	10.5	4	10.5	6	18.2	2	6.1	
Drinking frequency									
Never	10	26.3	7	18.4	10	30.3	8	24.2	0.852
Once or twice a year	5	13.2	25	65.8	5	15.2	24	72.7	
Once or twice a month	19	50.0	3	7.9	17	51.5	0	0.0	
Once or twice a week	4	10.5	3	7.9	1	3.0	1	3.0	
Drinking quantities per occasion**									
Never	9	23.7	5	13.2	9	27.3	5	15.2	0.501
Just small quantity	6	15.8	5	13.2	1	3.0	2	6.1	
1 drink	6	15.8	7	18.4	6	18.2	3	9.1	
2 drinks	5	13.2	6	15.8	5	15.2	10	30.3	
3–5 drinks	9	23.7	10	26.3	12	36.4	10	30.3	
6 or more drinks	3	7.9	5	13.2	0	0.0	3	9.1	

*An intervention effect was tested by using multiple logistic regression with ordinal responses controlling for status at baseline.
**One drink is almost equivalent to 9 mg of ethanol.

sample of students, the ethanol patch test also seemed effective in increasing participants' recognition of their own genetic background for acetaldehyde metabolism, *i.e.,* heterogeneity of alcohol tolerance, possibly resulting in an increased awareness of the health effects of alcohol. However, the use of the ethanol patch test seems not fully effective in changing drinking behaviors in the present sample. This may be attributable to a low prevalence of drinkers in the sample, because it is natural that students do not see their genetic susceptibility as important when they do not drink. In a future study, we could consider a technique to link such a genetic susceptibility with alcohol-related health among non- or less-frequent adolescent drinkers. A standard video emphasizing the effects of heavy alcohol drinking on a wide range of chronic diseases, including alcohol abuse/dependence and acute intoxication, has often been used in school-based alcohol education classes. This seems not fully effective in changing the drinking behaviors of Japanese adolescents.

In the present study, a lecture by an ex-alcoholic focused on his struggle with alcohol dependence, particularly with respect to the symptoms of alcohol dependence and his path to recovery from alcoholism. These features of the health education program have been reported to enhance students' knowledge of alcohol-related health problems, particularly that regarding alcohol dependence, and to change students' drinking behavior as well [23]. Nevertheless, we failed to find a significant intervention effect of the education program on changes in the drinking behavior of our sample of adolescents. The chronic health effects of alcohol usually occur as a result of many years of heavy drinking. Alcohol dependence also has a long-term natural course. Most students who participated in this study, however, were under 20 years of age, and most of them were non-drinkers or only occasional drinkers. Thus, knowledge of the association between habitual drinking and chronic diseases may not be associated with their current motivation to change their drinking habits. This lack of a significant intervention effect may also be attributable to the fact that the ex-alcoholic was a man and our sample was composed of females. The female students may have thought that the ex-alcoholic's story was irrelevant to

their ordinary life. The effect of a lecture by an ex-alcoholic as a part of an alcohol health education program for adolescents should be re-examined in a study that includes male samples and more interaction between the ex-alcoholic and the program's participants.

In addition, a recommendation to change one's drinking behavior was not included in the ex-alcoholic's presentation or in the video lecture, except concerning the habit of "Ikki" drinking (a binge drinking in one go) which was included in the video. If more focus on actual types of drinking behavior among younger people, such as binge drinking (the quick consumption of large amounts of alcohol, or "Ikki-nomi" in Japanese) and acute alcohol intoxication, was included in health education programs, then participants might be more likely to change their drinking behavior. In addition, many participating students in our study were under 20 years of age, and thus it is still illegal for them to drink alcohol. This aspect of drinking was not emphasized in the health education program, as the focus was rather on how to increase student awareness and change drinking behavior in order to reduce future risk of alcohol-related health problems. Future programs should include more focus on this type of message and information, and their effects should be investigated.

Problem drinking as measured by the CAGE score increased in the intervention group at the 2-month follow-up, which was an unexpected finding. A proportion of the CAGE sub-threshold group increased at follow-up in the intervention group. The increased CAGE score is probably not attributable to an increase in the frequency or quantity of alcohol drinking, since drinking behavior did not change during the follow-up in the intervention group. A possible explanation for this is that the students who received the alcohol health education may become more aware of their drinking problems and also more open to recognizing these problems in themselves.

Limitations of this study include the limited features of our alcohol health education program, some of which we have already mentioned. Some previous intervention studies with the aim of reducing alcohol-related problems focused on skills to reduce or overcome peer pressure to drink, including fostering improved communication skills [39–41]. These programs often included a role- playing section to learn how to better say "no" to peer pressure, with some programs even including simulation experiences presented using computer software [23]. Our program did not include these kinds of skill training, which may be important for controlling the drinking behavior of adolescents. Furthermore, students mainly participated passively, sitting and listening to the video and speech given by the ex-alcoholic, with the exception of the part where they applied the ethanol patch test. Skill training to deal with peer pressure and more interactive techniques should therefore be included in future alcohol health education programs.

Another limitation of the present study was the fact that the sample size was small. We may have failed to detect an important educational effect. The analyses included only females, since there were only a few male students; the results may be different if we conducted the same study among male students. The completion rate was lower for the control group (66% of the initial subjects), which may result in under- or over-estimation of the intervention effect. Moreover, since we randomized students within each grade in one school, the information given by the program may have leaked from the intervention group to the control group, which might have diluted the true effects of the intervention. The internal consistency reliability coefficients for the 2 knowledge scores were low to moderate, which again may lead to underestimation of the actual effects. We did not use a measure of the frequency of binge drinking in this study, which is one often used in intervention studies among adolescents. It is also possible that the CAGE is not a suitable measure of drinking problems among adolescents, although we could not find any alternative scale designed for adolescents. Furthermore, cultural and seasonal events may have affected the drinking behavior of the participating students, as the follow-up period included the end of the year and New Year's holidays, for which the Japanese typically have many occasions to drink.

In conclusion, the present study is preliminary, providing basic data with which to develop a more effective intervention program of alcohol health education aimed at preventing young people from abusing alcohol and thus avoiding its related problems. As mentioned above, improved knowledge of alcohol-related health problems was seen to dissuade the subjects from abusing alcohol. This may be because the

sample was limited to female students in social work and welfare studies and the prevalence of problem drinkers was very low. A future intervention study should compare people in the normal group to other groups with a larger number of male and female participants. It is expected that the enrollment of a larger number of participants would allow us to investigate which aspects of an alcohol health education program should be targeted to a particular type of drinking behavior. The development of a more effective alcohol health education program and a questionnaire to more accurately measure intervention effects are needed.

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