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Study of binge drinking among Japanese college students

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Chapter 1
Background and Literature Review

1 The situation about alcohol in Japan

In Japan, alcohol beverages enrich our lives and are also deeply rooted in our traditions and culture (Ministry of Health, Labour and Welfare, 2013). Shimizu (2003) stated that one aspect of drinking culture for Japanese people is generosity, “kanyosei”. Because of the thinking that alcohol is the best medicine, “hyakuyakunotyo”, evening drinking (“banshaku”), which can be considered an addictive behavior, has been accepted as having high utility value. Also, although the person who can drink a lot is regarded as a hero, the person who cannot drink has been called “geko,” which means someone in a low social position. On the other hand, alcohol can act a glue or lubricant for social relationships. Although the Minor Drinking Prohibition Act was enacted in 1922, many minors start drinking without waiting to turn 20 years old, because they recognize alcohol as a symbol of adulthood (Oida et al., 2012). This situation may affect social pressures that encourage a person to drink more.

In regards of alcohol consumption among Japanese people, the percentage of “those who drink alcohol at least one day a month” was 63.7% in men and 33.2% in women respectively in 2012 and these number remained unchanged from fiscal 2003 according to the National Health and Nutrition Survey in 2012 (Ministry of Health, Labour and Welfare,2012a).

The National Health Promotion Movement in the twenty first century (Health Japan 21 [second term]) (Ministry of Health, Labour and Welfare ,2012b) targets to individuals who consume 40g or more (for men) or 20g or more (for women) of pure alcohol per day drink, because that drinking pattern increase the risk of lifestyle-related disease. According to the National Health and Nutrition Survey in 2017, the percentage of those individuals was 14.7% in men and 8.6% in women and the percentage rose

statistically significantly among women. Also, by age group, 40s is the highest in both sex and the percentage was 21.4% in men and 15.2% in women (Ministry of Health, Labour and Welfare,2017) (Figure 1).Furthermore, according to survey conducted in 2013（Osaki et al., 2016) revealed that the number of individuals whose score of AUDIT(Alcohol Use Disorders Identification Test)(Babor, Higgins-Biddle, Saunders, & Monteiro, 2001)was 15 or more is suspected of being alcohol dependence was 2.92million (2.56 million for men and 0.36 million for women). Also, it was reported there were 1.07million (0.94 million for men and 0.13million for women) individuals who diagnosed as alcohol dependence.

2 Harmful use of alcohol and strategies in worldwide and Japan

In 2012, an estimated 3.3 million deaths were caused by alcohol-related problems, accounting for 5.9% of all deaths (World Health Organization 2014). WHO (2010) adopted recommendation “Global strategy to reduce harmful use of alcohol”, because alcohol misuse is one of maximum risk factor which can damage not only personal life but also their family and society. The recommendation lists 10 target areas, which should be seen as supportive and complementary to each other. These 10 areas are:

(a) leadership, awareness and commitment

(b) health services’ response

(c) community action

(d) drink-driving policies and countermeasures

(e) availability of alcohol

(f) marketing of alcoholic beverages

(g) pricing policies

(h) reducing the negative consequences of drinking and alcohol intoxication

(i) reducing the public health impact of illicit alcohol and informally produced alcohol 1

(j) monitoring and surveillance.

Each country is required to engage in harm reduction strategies depending on national, religious and cultural contexts, national public health priorities, and available resources, and in accordance with constitutional principles and international legal obligations and to report about the progress of those action periodically.

Following this recommendation, Japan established in2013 and enforced in 2014 “Basic Act on Measures Against Alcohol-related Health Harm”. The aim of this act is to contribute toward realizing a society where we can live safely as well as protect our health with preventing alcohol-related health harm from occurring, progressing and relapsing and preparing fully support for persons experiencing alcohol-related health harm (Ministry of Health, Labour and Welfare, 2013). In 2015, Basic Plan for Promotion of Measures against Alcohol-related Harm” was formulate. Key Issues of this plan are following, 1. Implementation of Thorough Measures to Spread Correct Knowledge about Risks Associated with Alcohol Consumption, and Prevention of Occurrence of Alcohol-related Harm in the Future, 2. Development of a Support System That Prevents Alcohol-related Harm and Ensures Seamless Processes from Consultation to Medical Treatment and Support for Recovery (Ministry of Health, Labour and Welfare,2015). In the first issue, that target group are minors, expectant and nursing mothers, and youngsters and measures to be taken are mentioned respectively.

Regarding young generation, it is mentioned that they are not sure their tolerance to alcohol and there are exposed the risk of acute alcohol intoxication, so need

provision of accurate and useful information on alcohol.

3 The framework and terminology for alcohol related problem

I show conceptual causal model of alcohol consumption and health outcomes of WHO in Figure 2(WHO, 2014). Also, the spectrum of alcohol use which captures alcohol problem step by step is shown in Figure 3 (Saitz, 2005). Health problems caused by alcohol excessive drinking extensive from chronic one to acute one. It is important that to categorize each drinking pattern to hazardous drinking, harmful drinking and alcohol dependence to explore adequate intervention considering private and social factors on drinking behavior.

I show definition of problematic drinking pattern such as hazardous drinking, harmful drinking and alcohol dependence (Table1). We can separate definition of terminology on alcohol use disorder into International Classification of Diseases (ICD) (WHO, 1992) and Diagnostic and Statistical Manual of Psychiatric Disorders (DSM) (American Psychiatric Association [APA],2014). According to “The Alcohol Use Disorders Identification Test”, hazardous drinking is alcohol use disorder which may cause hazardous consequences on drinkers and this is not included in ICD-10. Harmful use is recognized as drinking pattern which has already cause some damage by alcohol drinking which include not only physical problem such as liver disease but also mental problem like depression. Alcohol dependence present symptoms such as “Craving or feeling of compulsion to use the alcohol” “Impairment of the ability to control use of alcohol” “Difficulties in voiding initial use, difficulties in discontinuing se, difficulties in controlling the level of use” “Withdrawal state, or use of the substance to mitigate or avoid withdrawal symptoms, and subjective awareness of the efficacy of this behavior”

“Presence of tolerance to the alcohol’s effects” “Progressive neglect of pleasures, behaviors or interests in favor of using alcohol” “Persistent use of alcohol despite evident presence of harmful consequences(Babor, Higgins-Biddle, Saunders & Monteiro, 2001).

4 Standard drinking definition and guideline of safety drinking

Although we use “one unit” as drinking size, we have to know that “standard drink” is used globally. One unit of Japan is 20g pure ethanol and the model of standard drink size is 10g pure, but variation is wide. For example, one standard drink is 14g in United States, 8g in England and 20g in Australia of pure ethanol respectively. Also, the guideline of “law-risk alcohol consumption” is different at each country, the limitation for low-risk drinking is less than 40g pure ethanol per day for men and 20g per day for women in Japan. I show the governmental standard drink and low-risk drinking guideline in grams of pure ethanol (Dawson, 2011; Kalinowski & Humphreys, 2016; Room & Rehm, 2012). The details of this guideline in Table 2.

5 HED (Heavy Episodic Drinking) and Binge Drinking

HED (Heavy Episodic Drinking and binge drinking are hazardous drinking pattern. HED is defined as the consumption of 60g or more in one drinking occasion (WHO,2014) and this does not consider the duration time for drinking. On the other hand, concerning binge drinking, its definition varies across studies, but commonly consists of the consumption of five or more drinks (for men) or four or more drinks (for women) over a period of about 2 hours (National Institute of Alcohol Abuse and Alcoholism (NIAAA), 2004). As I mentioned, the definition of standard drinking is different at each country, binge drinking is defined as consumption of 70g or more pure ethanol for men

and 56g or more pure ethanol in 2-hour period in United State. Although there are some previous articles which investigated which is more sensitive to risk between HED and binge drinking (Fillmore & Jude, 2011; Jackson, 2008; S,Kim, J,Kim, Pack & Sung ,2016; Rolland et,al., 2017), each drinking pattern is hazardous because these tend to lead to various problems caused by high alcohol concentration in the blood. As I mentioned, "Basic Act on Measures against Alcohol-related Harm" was put in forced in July of 2014 in Japan. Although this act mentioned on promoting measures against Alcohol-related Harm in a comprehensive and systematic manner and present index for dinking such as HED, it does not refer to counter measures for binge drinking.

6 The status of binge drinking among college students

Centers for Disease Control and Prevention (CDC) (2014) reported that binge drinking is most common among younger adults aged 18–34 years in "Fact Sheets" (CDC,2014). In addition to this report, it was revealed that binge drinking prevalence (28.2%) and intensity (9.3 drinks) were highest among persons aged 18–24 years (CDC, 2012). Among young people, 40.1 percent were binge drinkers among full-time college students and the rate was 35.0 percent among those not enrolled full time in college in 2012 (U.S. Department of Health & Human Services (HHS), 2013) (Figure 4). These results indicated that college students are belonging to group for risky drinking such as binge drinking. In the study of France, it tried to investigate binge drinking classifying as follows: twice a month as frequent, once a month or less as occasional, and total abstinence as never. The ratio of each category was respectively 13.8%, 51.3% and 34.9% and which means that more 60% of college students engage in binge drinking once or more a month (Tavolacci, Boerg, Richard, Meyrignac, Dechelotte & Ladner, 2016). In

Belgium, the average number of times of binge drinking per month were 4.0～4.6 times for men and 1.9～2.5timens for women(Lorant &Nicaise, 2014). Another article which investigated binge drinking among Italian college students revealed that the prevalence of binge drinking in the last two weeks was 33.9% for mens and 41.8% for women, significantly higher for women than men (Bartoli, Carretta, Crocamo, Schivalocchi, Brambilla, Clerici & Carrà, 2014). Regarding Asian college students, 37.4% of men and 11.6% of women have experienced binge drinking once or more a month and 65.7% and 56.4% a year respectively (Ji,Hu & Song, 2012). Also, the research targeted for Korean college students it was revealed that the ratio of experience of binge drinking a month was 82.2% and about 10% of them engaged in binge drinking every day (Hong et al., 2017).

Many of Japanese previous article focused on usual drinking pattern (Asano, Dohi, Kazuma, Oyabu, Nakayama & Matsunami, 2006; Kasamaki, 2012; Takase & Kawai, 2010). Although there are several articles to study risk of drinking alcohol, it tried to explore the factors related on risk for alcohol dependence using AUDIT (Watanabe et al., 2014) and it was not specialized for binge drinking. The article which focused on binge drinking among Japanese college students and conducted investigation targeted on three colleges located in Mie prefecture (Yoshimoto et al., 2017). It reported that 56.7% of men and 47.9%of women engaged in binge drinking once or more in last year.

In Japan, alcohol consumption by young people aged 20 to 29 has gradually increased since 1984(Higuchi, Suzuki, Matsushita & Osaki, 2004), and HED and binge drinking have been observed, especially in young people (Osaki et al., 2016). In fact, the number of people in their 20's transported to emergency room for acute alcohol intoxication was the highest (Tokyo Fire Department, 2017) (Figure 5), it was suggested

that they might engage in drinking pattern such as binge drinking. Also, it was reported that many college students used Izakaya (Japanese bar) (Kitada, 2011) and many Izakaya provide 2-hour “nomihodai” service, there is possibility of raise the ratio of binge drinking among college students.

7 Binge drinking and alcohol-related consequences among college students

Binge drinking has serious risks including unintentional injuries, violence, sexually transmitted disease, unintended pregnancy, chronic disease such as high blood pressure and alcohol dependence (CDC, 2014; Correia, Murphy & Barnett, 2012, Chapter 6). The prevalence of alcohol dependence was 10.2% among binge drinking, and 1.3% among non-binge drinking and appositive relationship was found between alcohol dependence and frequency of binge drinking (Esser, Hedden, Kanny, Brewer, Gfroerer, & Naimi, 2014). Also, previous article revealed that binge drinking during adolescence was associated with binge drinking at 30 to 31 for both men and women (McCarty, 2004) and other article reported that binge drinking at age 23 increased the odds ratio of binge drinking at 42 years: odds ratio(OR) 2.10(95% CI 1.85, 2.39) for men; OR 1.56(95% CI 1.29, 1.89) for women (Jefferis, Power & Manor, 2005). These results indicated that binge drinking has chronic effect on our health. In addition to these risks, binge drinking has a relatively higher risk of poor academic performance (Meda et al, 2017; Patte, Qian & Leatherdale, 2017) and we should be concerned about that drinking pattern among college students bearing future of Japan.

Regarding binge drinking, the prevalence of binge drinking among college students was 56.8% for men and 47.8% for women and binge drinkers experience significantly more alcohol-related injuries (odds ratio (OR), 25.6; 95% confidence ratio

(CI), 8.05–81.4) (Yoshimoto et al., 2017). One study investigating alcohol-related consequences clarified following consequences, headache, vomiting, memory loss, being late or absent for classes due to hangovers, use of violent language, and violence (Masaki, 2007). Other articles describe college student experimented following alcohol effects, feeling down, becoming cheerful, generous, or sleepy, while some participants reported no changes after drinking (Mori, Kimura & Kawai, 2012).

8 The reasons for drinking or alcohol expectancy and "nomihodai" use among college students

In foreign countries, reason for drinking or alcohol expectancy related to binge drinking were investigated using sub scale such as RFD (Reason for drinking scale) (Cronin, 1997), DMQ-R (Drinking Motives Questionnaire Revised)(Cooper, 1994), CEOA (Comprehensive Effect of Alcohol)(Fromme, Stroot & Kaplan, 1993), Alcohol Expectancies (Ham & Hope, 2003).The study using DMQ-R reported that binge drinking was associated with enhancement, social order, coping motives(Lannoy, Billieux, Poncin & Maurage, 2017) and other article showed that extreme drinker use alcohol with social, enhancement and coping motivation(White, Anderson, Ray & Mun, 2016). Also, social motivations for drinking the most frequently endorsed and followed by enhancement and coping motives with alcohol use among older adults (Gilson, Bryant, Bei, Komiti, Jackson & Judd, 2013). These result indicated that there is not big difference between college students and older adults on drinking motives.

In Japan, the reasons for drinking among college students were "to enjoy conversation with their friends", "to forget something bad", "become accustomed to do so" and "I like alcohol", "cannot sleep without alcohol" (Takase et al., 2010). Other article

reported that they drink alcohol with following expectation; changing mood, socializing, favorite taste, wanting to become drunk and appetizing. (Mizuno, Otuka & Hashimoto, 2003). Also, among women their motivations for drinking were becoming happy, reliving tress, and feeling that they became grown up (Fujioka & Ono, 2013). These drinking motives or expectancies were for just drinking but not limited to binge drinking.

9 The prevalence of "nomihodai" service use and the influence of that on drinking behavior

In Japan, there is a unique and common system, "nomihodai", which enables the customer to drink various kinds of drinks within two to three hours at a fixed price. There is report on the prevalence of "nomihodai" use among adults who took periodical health check, 18.9% of men and 16.1% of women answered they use "nomihodai" frequently in Japan (Nagamoto, Tanaka, Ueno, Adachi & Yamagami, 2012). A previous study reported that "all-you-can-drink" services increase the risk of binge drinking 2.44-fold (Carlini, Andreoni, Martins, Benjamin, Sanudo & Sanchez, 2014) and that a set price for unlimited drinking is associated with HED among college students (Wechsler, Kuo, Lee, & Dowdall, 2000). Also, a significant relationship has been reported between "all-you-can-drink" and blood alcohol concentration (BAC) (Thombs et al., 2009). These results were all obtained from college students, which imply that college students tend to consume excessive amounts of alcohol (resulting in high BAC) under circumstances like "nomihodai". Policies that restrict "flat rate for unlimited drinking," which is synonymous for "all-you-can-drink," can decrease harmful drinking (WHO, 2010). Recently, "all-you-can-drink" offers were outlawed in countries such as Northern Ireland and England, which instituted fines for establishments with "all-you-can-drink" offers (Anonymous, 2012; Wise,2010). On the other hand, the proportion of izakaya

(Japanese bar) establishments that provide “all-you-can-drink” services are approximately 34% of all alcohol-serving establishments, as determined by searching the Taberogu website, which is used as a restaurant guide all over Japan. This indicates that “nomihodai” has become common among Japanese people. Also, izakaya establishments are the most popular place for drinking among college students (Kitada, 2011). Although it is easy to imagine that college students use this service as a matter of course, no previous study has examined the influence of “nomihodai” on alcohol consumption among Japanese college students.

9 Preventive interventions aimed at binge drinking among college students

Outside of Japan, a lot of preventive intervention of binge drinking are practiced. For example, NIAAA developed “College AMI (Alcohol Intervention Matrix) guide which is not specialized for binge drinking” but rated nearly 60 interventions on their relative effectiveness, costs, barriers to implementation, and amount and quality of research, among other variables (NIAAA, 2015). This guide introduces strategies from individual-level to environmental-level and effectiveness, cost, barriers and research amount of each strategy. There is a book which is guide to assessment, intervention and prevention for college student alcohol abuse (Correria et al., 2012). Also, one article which is a systematic review of interventions aimed at reducing binge drinking among college students is reported that most of interventions were based on brief motivational intervention(BMI) (Bridges & Sharma, 2015). BMI combines a brief intervention with interviewing (NIAAA, 2015; Correria et al., 2012). Motivational interviewing (MI) is a counseling approach developed by clinical psychologists William R. Miller and Stephen Rollnick. It is a directive, client-centered counseling style for eliciting behavior change

by helping clients to explore and resolve ambivalence (Miller & Rollnick, 2012). BMI emphasizes personal responsibility and self-efficacy of participants, offering them personalized feedback on their alcohol use, risk, expectancies, perception of social norms, and options for reducing problems and consequences (NIAAA, 2015). Several studies which used BMI strategies revealed the effectiveness of this intervention on alcohol misuse including binge drinking among college students in various countries (Bingham, Barretto, Walton, Bryant, Shope & Raghunathan, 2010; Borsari et al., 2012; Doumas, Kane, Navarro & Roman, 2011; Murphy, Dennhardt, Skidmore, Martens & McDevitt-Murphy, 2010; Neighbors et al., 2012; Terlecki, Buckner, Larimer & Copeland, 2015; Wood, Fairlie, Fernandez, Borsari, Capone, Laforge & Carmona-Barros, 2010). Bingham et al., (2010) identified that high risk men college students who were provided BMI reported less frequent binge drinking (3.68) compared to controls (4.61). One of BMI is BASICS (Brief Alcohol Screening and Intervention for College Students) (Dimeff, 1999) and there was a significant treatment effect on heavy episodic drinking among participants in BASICS, reporting their amount of follow-up drinking was significantly lower than that of assessment only participants (Murphy et al., 2010). Also, Terlecki et al., (2015) clarified BASICS significantly decreased weekly drinking, typical drinking, and peak drinks among intervention group compared to the control group.

In Japan, there are several studies concerning on strategies for alcohol use and related problems among college students. One is about alcohol education which aims to change student's awareness of alcohol drinking during class of liberal arts (Shimauchi, Tachikawa & Nagata, 2016). This study just introduced their efforts to practice alcohol education for college students, so they did not assess the effectiveness of that education. Another Japanese study is alcohol education for college students targeting to medical

students (Yoshimoto, Murakami & Takemura, 2013). In this article, researchers indicated that alcohol education for college students not only targeted to medical student but also whole school student was important in future. These two researches were comprehensive alcohol education for college students and not focusing on binge drinking among college students.

Chapter 2
Aims

The aims of this study was to explore prevalence and correlates of binge drinking and develop preventive education program targeted to binge drinking among college students in Japan and assess the effectiveness of that program.

These results will be possible to provide information for establishing preventive education program for binge drinking among Japanese college students and verifying the effectiveness of that program will be possible to provide a clue for exploring more effective intervention measure to do safety drinking of college students.

Consists of my study is shown in Figure 6.

Chapter 3
Operational Definition

In this study, I defined “binge drinker” and “non-binge drinker” like following,

1) In study 1-1 and 1-2

· Binge drinker: The student who have experience once or more of binge drinking in the past year.

· Non-binge drinker: Other students

2) In study 2(Web survey) and study 3(observational study)

· Binge drinker: The student who have experience once or more of binge drinking in the past month

· Non-binge drinker: Other students

The reasons are following,

1) Study 1: I defined following previous study.
2) Study 2 (Web survey): I defined that because subjects have drinking habit and shorter feedback period make them possible to answer more accurately.
3) Study 3 (Intervention research): I defined that because I evaluate the change of drinking pattern after one month.

Chapter 4

Study 1

Prevalence and Correlates of Binge Drinking among College Students in Japan: Cross-sectional study

Study 1-1

Prevalence of binge drinking and association with alcohol-related consequences and reason for drinking: a cross-sectional study of college students in the Kanto region of Japan

1 Aims

The purpose of this study is to clarify the prevalence of binge drinking and its correlates, alcohol-related consequences and reason for drinking.

2 Methods

2－1　Study design and data collection

Our cross-sectional study conducted by self-administered questionnaire. The duration period was from December 2016 to March 2017. In this study, we adopted the following procedure to ensure the representativeness of our sample. Announcement on FY2016 School Basic Survey (Ministry of Education, Culture, Sports, Science and Technology-Japan 2016), the number of college or university students was 2,873,624 in 2016. To collect samples from various backgrounds, we determined that the target number for each department of a college was 30. Subjects were selected from each of seven prefectures, including Tokyo (Kanto). In Japan, there are three main types of institutions: national, public, and private. According to a basic survey of schools performed in 2016 as mentioned above, the relative proportions of each type of institution were as follows: national institute, 21.1%; public institute, 5.2%; and private institute, 73.5% (Ministry of Education, Culture, Sports, Science and Technology, 2016). We selected departments of college to send request letter for study cooperation based on this ratio while referring to the university ranking list. We mailed the dean of each department to request understanding of and cooperation with our study. This mailing included a document that explained the research outline, including the objectives, procedures, and ethical consideration of this research, along with a consent form and reply envelope. Also, we requested the dean to notify me of the name and address of the person responsible for

maintaining contact and distributing questionnaires. Until it reaches target number, I sent our requests letter to 160 deans of faculties in Kanto area. The Kanto region, locates in the eastern part of Japan, which consists of Tokyo metropolitan and Ibaraki, Tochigi, Gunma, Saitama, Chiba and Kanagawa Prefecture. Also, various types of private and public educational institutions spanning a wide range of disciplines are there. Those locations cover from urban to rural areas with various fields. Ultimately, 35 departments of 31 colleges agreed to participate. A total of 1,030 questionnaires were delivered through person in charge of each college. Taking minimum drinking age into account, undergraduate and graduate students above the age of 20 years were sampled in this study.

2－2 Measures

Our questionnaire included questions about: 1) demographic data (gender and age); 2) frequency of drinking alcohol; 3) frequency of binge drinking in the past year, as evaluated by the following question: “During the last 12 months, how often did you have five or more drinks (for men) or four or more drinks (for women) containing any kind of alcohol within a 2-hour period?”.; 4) alcohol-related consequences, as evaluated by the question “What kind of consequences did you experience after drinking?” . This question consisted of 11 possible responses: “I became happy,” “I felt stress relief,” “I became excited,” “I became sleepy,” “My mood worsened,” “I became generous,” “I became rude,” “I got injured from an accident,” “I had a hangover (headache, nausea, vomiting, etc.),” “I didn’t experience any changes,” and “other consequences.”

To select question items of alcohol-related consequences, we referred to several previous articles from inside to outside Japan that investigated alcohol-related consequences that college students experienced after binge drinking or ordinary drinking

(CDC, 2014; Correia et al.,2012; Masaki, 2007; Mori et al., 2012; Mizuno et al.,2003) as well as the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ) (Kahler, Strong & Read, 2005). Also, I tried to take Japanese social and cultural background into account to list up these question items more suitable for Japanese college student. In addition, I consulted an expert in alcohol research to assure the validity and credibility of this survey. Multiple answers were allowed to answer this question.

As for the reasons for drinking, as evaluated by the question "What is the reason of your drinking?" (This question used a multi-answer design). The 12 possible responses to the question were "to feel happy or be in a good mood," "to be relaxed," "to facilitate interpersonal relationships," "to increase appetite," "to forget something bad," "to get high," "to impress others," "to sleep well," "to live up to expectations," "to relieve stress," "because I was forced to drink," and "other reasons." To select choice of the reasons for drinking, we performed a literature review of studies that used the RFD (Reasons for Drinking scale) (Cronin, 1997), DMQ-R (Drinking Motives Questionnaire Revised) (Cooper, 1994), CEOA (Comprehensive Effect of Alcohol) (Fromme et al. 1993), and Alcohol Expectancies (Ham et al., 2003) scales. To make it suitable for Japanese college students, I also referred to Japanese literature which investigated about the reasons for drinking among Japanese college students (Fujioka et al., 2013; Kitada, 2011; Masaki 2007; Mizuno et al., 2003; Sakurai, 1997). Demographic data (sex, age and club activity) was also collected. With supervising by experts of this field, Cronbach's alpha was used to measure the reliability of the scale.

2－3 Data Analysis

After confirming the distribution of age, frequency of drinking, amount of

drinking during each occasion, and frequency of binge drinking, the chi-squared test and the Mann-Whitney U-test were used to examine differences between binge drinker and non-binge drinker. Logistic regression was conducted to assess the association between binge drinker and alcohol-related consequences or reason for drinking. The level of statistical significance was set at $p<0.05$. All statistical analyses were performed using IBM SPSS statistics 25.

3 Ethical considerations

To obtain informed consent from participants, I enclosed a document that explained the purpose, methods, and ethical considerations of research. Returning the questionnaire was deemed to have consented to participate in our study. This research was approved by the ethics committee of the National Defense Medical College (Approval number 2567).

4 Results

During the study period, 594 out of 1,030 students who received the questionnaire responded (57.7% response rate). After 31 were excluded due to missing data, the remaining 563 were included in the analysis. A flow chart is shown in Figure 7.

4－1 The characteristics of study participants

These results are shown in Table 3.

The subjects included 383 binge drinkers and 181 non-binge drinkers. Binge drinkers and non-binge drinkers were significantly different in terms of frequency of drinking in a week (1.5 ± 1.6 vs. 0.6 ± 1.1 days, respectively) and amount of drinking (66.2 ± 41.4 vs. 26.2 ± 18.0 g/day, respectively).

4－2 Associations between binge drinker and alcohol-related consequences

These results are shown in Table 4.

Among men, binge drinker was associated with alcohol-related consequences such as “I felt stress relief” (odds ratio 2.94[1.39–6.22]), “I had a hangover (headache, nausea, vomiting, etc.)” (odds ratio 2.88[1.29–6.44]), and “other consequences” (odds ratio 0.10[0.12–0.89]). On the other hand, among women, binge drinker was associated with “I became happy” (odds ratio 4.89[2.31–10.37]), “I felt stress relief” (odds ratio 2.53[1.26–5.08]), “I had a hangover (headache, nausea, vomiting, etc.)” (odds ratio 2.64[1.23–5.65]), and “I didn’t experience any changes” (odds ratio 4.49[1.85–10.92]).

4－3 Reasons for drinking related to binge drinking

These results are shown in Table 5.

Among men, the statistically significant reasons for binge drinking associated binge drinker were “to feel happy or be in a good mood” (OR 2.06 [CI 1.00-4.23]), and “to relieve stress” (OR 4.62 [CI 1.68-12.68]). Among women, on the other hand, the reasons correlated with binge drinker were “to feel happy or be in a good mood” (OR 2.48 [CI 1.10-5.55]), “to facilitate interpersonal relationships” (OR 2.84 [CI 1.40 – 5.77]), “to forget something bad” (OR 3.59 [CI 1.05 – 12.25]), and “to relieve stress” (OR 2.77 [CI 1.28 – 6.00]).

5 Discussion

5－1 The prevalence of binge drinking among college students in Japan.

This study revealed that 74.9% of men and 59.6% of women engaged in binge drinking during the past year. These results indicated that many Japanese college

students have experience of binge drinking. In a previous study which used same definition of binge drinking, it was reported that 56.8% of men and 47.8% of women were binge drinkers (Yoshimoto et al., 2017). The proportion of binge drinkers in our study was slightly higher. Same trends were confirmed on frequency of drinking and amount of drinking, in the previously mentioned study, frequency of drinking. I assume that the study participants differed in background. In the previous study, the authors recruited students through an annual health examination in three college located same area. Whereas in our study, questionnaires were returned from students voluntarily and so it was assumed that students who returned the questionnaire might be more interested in drinking or alcohol than previous study participants. In the United States, the prevalence of binge drinking in the past month was 40.1% among college students aged 18–22 years (HHS), 2012). Although I cannot compare these results directly because of differences in the duration of the feedback period, it is serious problem that majority of college students experiences binge drinking in the past year.

5－2 Regarding alcohol-related consequences associated with binge drinking among all students

Alcohol-related consequences associated with binge drinking among mens were “I felt stress relief,” “I had a hangover (headache, nausea, vomiting, etc.),” and “other consequences.” Among women, “I became happy,” “I felt stress relief,” “I had a hangover (headache, nausea, vomiting, etc.)” and “I didn’t experience any changes” Binge drinkers had a history of significantly more hangover. Previous research reported that almost half of college students experiences hangover such headache or vomiting (Masaki, 2007; Mori et al., 2012).

As for hangovers, in another previous Japanese study, 17% of students were

late and 15% were absent from classes due to hangovers (Masaki, 2007). This was alcohol-related consequences after ordinary drinking, I should be careful to compare between their results and my ones. Also, binge drinkers reported that they had experience of becoming happier (odds ratio 2.72[1.66-4.45]) or felt their stress relieved more often (odds ratio 2.65[1.62-4.34]) than non-binge drinkers. Previous research revealed that half of Japanese college students had experiences becoming cheerful (Mizuno et al., 2003). In previous foreign article, 47.5% of men and 56.2% of women experienced positive change such as “great fun/socializing” after drinking. Also, HED (Heavy episodic drinking) associated with positive alcohol-related consequence such as becoming fan or social. These results indicated that many college students in Japan and abroad experienced positive consequences after drinking. Concerning stress relief, although our research revealed 33.7% of Japanese student felt they relieved their stress by drinking alcohol, only 5.9% of men and 1.5% of women reported they relieved stress after drinking in United State (Park, 2004). This result indicated that Japanese students seem to feel befits on relieving stress by drinking alcohol more American college students.

From these results, it is suggested that college students have an ambivalent relationship with alcohol, in which they felt that they could relieve their stress momentarily by drinking while recognizing alcohol-related negative consequences. This ambivalence relationship is common among alcohol dependent patients and there is possibility some students start to become alcohol dependence. Although they engage in risky drinking like binge drinking, they may have inaccurate thought that it is easy to quit risky drinking behavior such as binge drinking when they want to do. Taking into this possibility, it is important to inform them contradiction that binge drinking make them happy while deteriorating their health or QOL and alcohol drinking could be maladaptive

behavior to resolve stress. It is important to make them recognize the risk of falling into alcohol dependence against their optimistic thinking that they can change their drinking behavior as they like. Also, it may be useful to notify them to explore more effective coping skills. I think that motivational interviewing (Miller et al., 2012) can be effective measure to tackle problems that is ambivalent and difficult to change behavior. Several studies of foreign country presented evidence of motivational interviewing for alcohol misuse among young people including college students (Bingham et al.,2010; Borsari et al.,2012; Doumas et al.,2011; Murphy et al.,2010; Neighbors et al.,2012; Terlecki et al., 2015; Wood et al., 2010). It is important to support college students who engage in hazardous drinking such as binge drinking to find out their own relationship with alcohol in future with using motivational interviewing.

5－3 the association between binge drinking and the reasons for drinking among college students in Japan

To our knowledge, this is the first study to explore the association between binge drinking and the reasons for drinking among college students in Japan. I identified four reasons for underlying binge drinking: “to feel happy or be in a good mood,” “to facilitate interpersonal relationships,” “to forget something bad,” and “to relieve stress”. I discuss the relationship between binge drinking and these reasons, i.e., alcohol expectancies and motives for drinking. Men tended to engage in binge drinking when they feel to become happy or be in a good mood or release stress. In addition to these reasons, women tented to engaged in binge drinking in order to facilitate interpersonal relationships or forget something bad.

Now, I discuss these results from the point of view of motivation theory. Motivation theory asserts that motives or reasons for drinking are the final common

pathway to alcohol use and abuse (Cooper, 1994). Cooper developed and validated a four-factor model of motivation for alcohol use: “social,” “coping,” enhancement,” and “conformity.” Also, I consider the reasons for drinking associated with binge drinking and shared by both men and women. Japanese college students experience the following stressors: troubles at a part-time job or club activity; personal relationships with friends, lovers, and family members; studies (e.g., homework); future path; and job hunting (Japan Student Service Organization, 2018). Previous research revealed that students with higher stress tend to engage in more binge drinking (Chen & Freeley, 2015). This phenomenon may be understood in terms of coping motives for drinking. In this study, the risk of binge drinking increased 4.6-fold among men who wished to relieve stress relative to those who did not. In such cases, physical activity may decrease perceived stress (Tavolacci et al., 2016). For students who drink with coping motives, it may be better strategies for them to explore alternative coping measures like physical activity, which is of lower-risk than binge drinking.

Another reason for drinking among men and women is “to feel happy or be in a good mood.” Such individuals seemed to drink alcohol with enhancement motives. These motives involve drinking to increase positive affect, and consist of sensation-seeking and enjoyment motives (Ham et al., 2003). In this study, students who drank with enhancement motives tended to engage in binge drinking. Enjoyment expectancy, like “Drinking to get drunk,” is a strong predictor of frequent binge drinking (McCabe, 2002). For students who want to drink to get drunk and therefore be happy, it is essential to provide tips about how to enjoy a party without depending on alcohol.

Next, I discuss the reasons for drinking that were associated with binge drinking only among women. “To forget something bad” is considered a form of coping.

In that sense, we can understand the relationship between this motivation and binge drinking to relieve stress. As mentioned above, in these cases it is important to help the student find another measure that helps them get rid of the undesirable thing that they are hoping to forget.

Another reason for drinking specific for women is “to facilitate interpersonal relationships”; this can be regarded as a social motive. In early adulthood, women tend to feel more ashamed to have interpersonal relationships with others than men of (Yagi, 2009). Moreover, the friendship networks of women were relatively fixed, whereas those of men were comparatively flexible (Nishimura & Nagano, 2009). After entering college, many students must establish new relationship with strangers, both inside and outside of the classroom, and this seems to be more difficult for women. We assume that women use alcohol to reduce their tension or anxiety and facilitate the formation of new relationships. Men, on the other hand, have more self-confidence in interpersonal relationships than women (Nishimura et al., 2009). Therefore, assisting them to promote self-confidence to establish relationships with other students is important. Among students in their 20s, the proportion who have experience with drinking is higher among women than men (Higuchi, 2009), and 58.9% women have experience with “ikki-nomi,” chugging an entire drink without stopping to take a breath, which is considered a risky drinking pattern (Fujioka et al., 2013). The speed of alcohol metabolism is slower in women than mens due to differences in physical build (Maesato & HIcuchi, 2015), so women are more prone to acute alcohol intoxication it is important to educate women to understand their own constitutional characteristics and to drink alcohol moderately without engaging in binge drinking, which raises BAC (blood alcohol concentration) rapidly within a short period. In particular, women who drink alcohol to forget something bad or to facilitate

interpersonal relationships tended to engage in binge drinking, provision of information of the risks of that drinking pattern for them in important in future.

5－4 The limitation of this study

There are three limitations in this study. The first is the accuracy of the amount of alcohol consumption. It might not have been accurately reported by participants. In future studies, we will request students keep alcohol diaries to accurately record the amount and frequency of alcohol consumption. The second is that the questionnaire might not have covered all possible alcohol-related consequences and reason for drinking. I plan to use existing scales like the B-YAACQ and DMQ-R in future research. Finally, I cannot determine causal relationship between binge drinking and alcohol-related consequences due to the cross sectional nature of this study. Outside of Japan, several studies have investigated that association between binge drinking and alcohol-related consequences and reason for drinking.

Despites of these limitation as I mentioned above, I think this study is novelty meaningful because this is the first study to clarify the prevalence of binge drinking, and the association between binge drinking and alcohol-related consequences and reason for drinking in Japan.

Study 1-2

The use of all-you-can-drink system, “nomihodai”, is associated with the increased alcohol consumption among college students: a cross-sectional study in Japan

1 Aims

The aim of this study is to identify the prevalence of “nomihodai” use and the influence of that use on the amount of drinking of college students.

2 Methods

2－1 Study design and data collection

Study design and recruit procedure is same as study1－1

2－2 Measures

Questions about demographic data (gender and age) and drinking behavior were same as study 1-1. Regarding “nomihodai” use, I asked "Did you use “nomihodai”? (Yes or No) and the number of drinks consumed when using or not using “nomihodai”.

2－3 Statistical Analysis

In this study, Characteristics of participants were compared between men and women. Furthermore, in both mens and women, t-test was used to compare the average of the two the amount of drinking between “nomihodai” use states and non-use states The Fisher’s exact test was used to examine the significance of the proportion of HED distribution difference between “nomihodai” use states and non-use states.

3 Ethical Consideration

Ethical consideration of this study was same as study1-1.

4 Results

In this study, the data from those 511 students had experienced “nomihodai” use were analyzed. A flow chart is shown in Figure 8.

Characteristics of study participants are provided in Table 6. Subjects included 274 men and 237 women. Significant differences between men and women included frequency of drinking in a week (men: 1.5 ± 1.7 days; women: 1.0 ± 1.3 days), amount of drinking (men: 62.9 ± 43.5 g/day; women: 46.3 ± 32.9 g/day), and occurrence of binge drinking (men: 77.7% vs. women: 63.3%). The amount of drinking was increased 1.8-times (85.9 ± 49.7 g vs. 48.2 ± 29.5 g) among men and 1.7-times (63.7 ± 39.3 g vs. 36.5 ± 26.7 g) among women during “nomihodai” use, compared with non-use states (Figure 9). Furthermore, 109 (39.8%) men and 71 (30.3%) women reported HED only at “nomihodai” states.

5 Discussion

It is revealed that almost all college students had experience with “nomihodai” use, which means “nomihodai” is much prevalent and has become a common habit among Japanese college students. Also, I confirmed there was a significant difference in the amount of alcohol consumption between “nomihodai” use and non-use states and 109 (39.8%) men and 71 (30.3%) women reported HED only at “nomihodai” states. From these results, it is easy to imagine that college students use the service as a matter of course and this environmental factor may contribute to the high ratio of “nomihodai” use among college students. As mentioned above, previous studies reported that a set price for unlimited drinking is associated with HED among college students (Wechsler et al. 2000), and that there is a significant relationship between “all-you-candrink” and BAC (Thombs et al. 2009). Moreover, Thombs et al. (2009) reported that students who do not

take advantage of drink specials (e.g., “all-you-can-drink”) reported consuming more drinks before bar entry than those who did participate in these promotions. Thus, college students who use systems like “all-you-can-drink” may try to make the most of the occasion so that they can thoroughly enjoy drinking. “nomihodai” service does not permit individual use; consequently, students always participate in “nomihodai” in groups. There is possibility that presence of other students may influent on the amount of consumed alcohol of students. One is the “peer drinking norm,” which involves recognition and approval of peers’ drinking behavior like drinking frequency and the amount of alcohol consumed (Borsari & Carey., 2001). If students recognize that other students are drinking more, according to the peer drinking norm, they may feel pressured to do the same. Particularly in occasions of “nomihodai” use, students who did not drink as much were often affected by other students who engaged in heavier drinking and tray to make the most of the service of “nomihodai”. The peer drinking norm can have a positive effect, so it is important to providing information about actual peer drinking behavior to correct their misunderstandings. Another factor is “peer pressure.” Mekonen, Fekadu, Chane, and Bitew, (2017) indicated that peer pressure is an important predictor of problematic drinking among college students. If peer pressure is excessive, there is a risk that students will force other students to drink more. In Japan, the proportion of the students who have experienced being insisted by others to drink has been reported as 42% (Masaki,2007), 57% (Takase et al.,2010), and 47% (Kawai, Ohta, Negishi, Otomaru & Uemura, 2014). These results indicate that about half of all students have experience of compulsion of drinking. Furthermore, Masaki (2007) revealed that 55.0% of students accepted that request completely, and an additional 31% drank a bit more, which means that 86% of students did not refuse the insistence of another student to drink more, at least

to some extent. I think that protective behavior (Martens, Martin, Littlefield, Murphy & Cimini, 2011; Kim & Park, 2015) can decrease risky drinking behavior among students who cannot or do not want to drink it is important. We must support the ability of students to refuse the request to drink and to engage in self-protective behavior.

The limitations of this study were same as study 1－1.

This study has revealed the significant influence of nomihodai on the amount of drinking among college students in Japan. Future efforts should promote preventive education and awareness activities that lead to safer alcohol-related behavior of college students even under the “nomihodai” condition.

Chapter 5

Study 2

The differences of drinking pattern including binge drinking between adults and college students and change of drinking pattern by age through a web survey in Japan.

1. Aims

The purpose of this study was to clarify the differences in drinking patterns, including binge drinking, between college students and adults, and the change in drinking patterns with age, as determined using a web survey in Japan.

2. Methods

2－1 Study design and data collection

A web survey was conducted in March by the Macromill Group, which has 1.2 million members and conducts 25,000 internet studies each year. Participants were recruited from members enrolled in Macromill. One of the essential criteria was drinking alcohol more than once a week. Subjects were adults who graduated from college in the age range from the twenties to forties. I requested that the research company provide a sample that equalized the numbers of people of each age and sex. Ultimately, the total sample consisted of 210 respondents (104 college students, 106 adults), all of whom were included in the analysis.

2－2 Measures

Our questionnaire included questions about: 1) frequency of drinking alcohol; 2) frequency of binge drinking in the past month, as evaluated by the following question: “During the last month, how often did you have five or more drinks (for men) or four or more drinks (for women) containing any kind of alcohol within a 2-hour period?” ;3) the maximum number of drinks in one drinking occasion; 4) thoughts about excessive drinking, such as binge drinking, and the reason for such drinking behavior; 5) opportunities to stop excessive drinking; 6) thoughts about their own drinking pattern; 7)

tolerance of alcohol; 8) “nomihodai” use ("Did you use “nomihodai”? [Yes or No]; the number of drinks consumed when using or not using “nomihodai”; and the reason for increased drinking when using “nomihodai”); 9) PSS (Perceived Stress Scale) is 14-item scale to measure the degree to what kind of daily situations are recognized as stressful and originally developed by Cohen, Kamarck and Mermelstein (1983). This scale has already translated to Japanese and confirmed reliability and validation of Japanese version (Sumi, 2006). I got permission to use Japanese version from Sumi through e-mail. The detail of each item are shown in appendix 2. In addition to these questions, adults were asked about their drinking patterns during their college days and the reason that they quit binge drinking. Demographic data provided by Macromill included gender, age, residential area, marital status, employment status, and household and individual income.

2－3 Data analysis

The t-test was used for normally distributed variables, and the Mann–Whitney U-test was used to compare college student and adults in terms of frequency of drinking, amount of drinking on each occasion, and frequency of binge drinking. Also, the same analysis was used to compare between college days and present status. The level of statistical significance was set at $p<0.05$. All statistical analyses were performed using OBM SPSS statistics 25.

3 Ethical considerations

To obtain informed consent from the participants, I asked the research company to provide explanations of the purpose, methods, and ethical considerations of research. Pushing the ‘submit’ button after answering questions was deemed to represent

informed consent for participation in our study. This research was approved by the ethics committee of the University of Tsukuba (Approval number1361).

4 Results

A total of 104 college students (age, 22.2 ± 2.6 years) and adults in their twenties through forties (age, 35.3 ± 8.1 years) participated in this web study. Characteristics of study participants are provided in Table 7. There were no significant differences between college students and adults in the frequency of drinking per month (college students: 11.2 ± 11.9 days; adults:14.9 ± 10.1 days), frequency of HED in a month (college students: 4.1 ± 7.2/month; adults: 6.0 ± 8.6/month), frequency of binge drinking (college students: 2.8 ± 5.1/month: adults 3.6 ± 5.8/month, or the maximum amount of drinking at one time (7.1 ± 6.1drink; adults 6.6 ± 6.1drink).

Age-specific allocations of binge drinking in men and women are shown in Figure 10 and 11. The ratio of binge drinkers differed among age groups, but not significantly. For women, binge drinking became less frequent with age, whereas the opposite was true for men.

A comparison of drinking patterns between college days and adulthood is shown in Table 8. We observed significant differences between college and the present in frequency of drinking per month (college: 8.9 ± 8.4 /month; current days: 14.9 ± 10.1days), maximum amount of drinking at one time (college: 8.8 ± 8.3 drinks; present: 6.6 ± 6.1 drinks). There was no significant difference between college and the present in the frequency of HED or binge drinking.

Thoughts about excessive drinking, like binge drinking, is shown in Figure 12. There was no statistically significant different between college students and adults,

although college students were more likely than adults to recognize excessive drinking as a risk.

The reasons for excessive drinking, like binge drinking, are shown in Figure 13. The most frequent reasons were “because it can relieve stress,” “there is actually no problem,” and “because it makes me feel happy,” followed by “I can quit anytime I want to” and “because I am young and thoughtless”.

5 Discussion

5－1 Comparing drinking pattern between college students and adults in their twenties through forties

The frequency of drinking was significantly higher in adults than in college students, but there was no significant difference in the frequency of binge drinking, HED, or the maximum amount of drinking on one occasion. By contrast, In the 2014 Fact Sheets (CDC, 2014), the CDC reported that binge drinking is most common among younger adults aged 18–34. Also, in 2012, 40.1% of full-time college students were binge drinkers, vs. 35.0% of those not enrolled full time in college (HHS, 2012). These results indicated that college students are at higher risk of excessive drinking, like binge drinking, compared with other ages. These results indicated that college students belong to a group involve in risky drinking behaviors such as binge drinking. In Japan, HED and binge drinking have been observed, especially in young people, in periodical surveys carried out every 5 years (Osaki et al, 2016). The results of my study differed from those of previous studies.

In regard to the frequency of drinking, it is assumed that adults have more occasion to go to drink with colleagues or business partners and can more easily afford to

go out drinking than college students. Also, my recruitment criterion for this study was drinking at least once per month; such individuals may have similar drinking patterns, so no significant difference was observed between college students and adults. Regarding binge drinking experience as a function of age, the proportion decreased between the twenties and forties among women, but increased among men. This result indicated that the risk of binge drinking can get worse over time among adult men.

5－2 Comparing drinking patterns between college and the present in adults in their twenties through forties who graduated college

Although the frequency of drinking significantly increased in adulthood, the maximum amount of drinking significantly decreased. However, there was no significant difference in frequency of binge drinking or HED between college and the present. It is indicated that risky drinking tends to continue over time. Among college students who participated in this study, although they must have just started drinking, they had a habit of drinking at least once per week. It is important to support them to recognize their drinking behavior as problematic, and to engage in early detection and intervention before their drinking becomes habitual.

5－3 Recognition of excessive drinking like binge drinking

I asked, “How do you think about excessive drinking, like binge drinking”. Although both college students and adults recognize that drinking pattern as a risk, almost of them engage in risky drinking like binge drinking. Additionally, based on their answer to the question, “What are your reasons for binge drinking?”, individuals who engaged in binge drink alcohol with a positive expectation, like becoming happy or releasing stress. They also answered, “there is actually no problem” and “I can quit anytime I want”, which suggests they are optimistic about their drinking behavior. This result illustrates the

difficulty of changing their behavior.

As I mentioned study 1－1, it is assumed that they experienced positive effect like becoming happy or relieving stress. Also, there is possibility that they may take changing own drinking behavior lightly. From these results, it is important to inform them the acute and chronic effect of alcohol on not only physically but also mentally and the difficulty of changing drinking behavior after establishing drinking style.

5－4 Limitations of this study

The first limitation is that it is difficult to accurately assess the amount of alcohol consumption. The same limitation exists in conventional scientific research. In addition, web research has other limitations, like ambiguity of the population, risk of unauthorized answers or existence of professional despondent.

The second limitation is the number of samples. Also. Our sampling criteria was drinking alcohol more than once a week. So, I must be careful about generalizing these results. Future studies should be performed with sufficiently large samples for generalization.

Chapter 6

Study 3

Development of preventive education program for binge drinking and verify the effectiveness

1 Aims

The aims of this study was to develop a preventive education program for binge drinking for college students and verify the program's effectiveness by comparing the frequency of binge drinking and the amount of alcohol consumption during binge drinking.

2 Methods

2－1 Study design

This was an intervention study.

2－2 Participants

Participant flow through the study is presented in Figure14. The number of students that submitted to the screening test was 280. Demographic characteristics were as follows: 35.0% women, average age 21.1(SD=1.56), 89.9% belonging to some club.

2－3 Measures

2－3－1 Alcohol use

To clarify alcohol use of college student, I asked the following questions, 1) frequency of drinking alcohol; 2) frequency of HED (heavy episodic drinking) in the past month, as evaluated by the following question: "During the past month, how often did you have six or more drinks containing any kind of alcohol on one occasion?; 3) frequency of binge drinking in the past month, as evaluated by the following question: "During the past month, how often did you have five or more drinks (for men) or four or more drinks (for women) containing any kind of alcohol within a 2-hour period?"; 4) The maximum amount of drinking during binge drinking; 5) the maximum amount of drinking in the past month; and 6) Normal alcohol consumption.

2－3－2 Tolerance of alcohol

Almost half of Japanese have low or no alcohol tolerance (Higuchi, Matsushita, Murayama, Takagi and Hayashida.,1995; Shimamoto, 2013). Hence, I asked subjects about their tolerance for alcohol in the past and present.

2－3－3 Recognition to own drinking behavior

To understand their social norms concerning drinking behavior, I asked subjects about their recognition of their own drinking behavior compared with their peers.

2－3－4 Readiness to change drinking behavior

To assess the readiness of college students to change their drinking behavior, I asked how and when they changed their behavior.

2－3－5 Drinking motives

The Drinking Motives Questionnaire- Revised (DMQ-R) is a 20-item scale of motives for alcohol consumption (Cooper, 1994). There are four motives: conformity, coping, social, and enhancement. Each motive consists of five questions, and I show the details of each item in Appendix 2. The five-point Likert scale (almost never/never, some of the time, half of the time, most of the time, almost always/always) is used to specify the degree of each motive. I got permission from Cooper to translate into Japanese using back translation and to use this scale.

2－3－6 Alcohol-related consequences

Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ) is a 24-item scale for assessing alcohol-related problems (Kahler et al.,2005). With the permission of Kahler, who developed this scale, the original English version of B-YAACQ was translated into Japanese and used in this study. Using a dichotomous response format, students indicated whether they had experienced each of the 24

consequences during the past month. The details of each item are provided in Appendix 2.

2－3－7 Perceived Stress

PSS (Perceived Stress Scale) is used. The details of this scale are mentioned in Measures of Study 2.

2－3－8 The degree of confidence to refuse the compulsion to drink from others

This scale was used to assess student confidence to refuse the compulsion to drink from senior students, classmates, and junior students.

2－3－9 Demographic date

I asked their sex, age, grade, and club activity, as well as demographic data.

3 Procedure

3－1 Development of educational program to prevent binge drinking

I tried to develop a preventive education program for binge drinking among college students, based on knowledge gained through a cross-sectional study and web survey, referring to interventions for which evidence has been established in foreign countries.

3－1－1 Results of the cross-sectional study and web survey

In my cross-sectional study, I found that 74.9% of men and 59.6% of women engaged in binge drinking during the past year. In addition, students who engaged in binge drinking experienced both positive and negative consequences, like “I became happy,” “I felt stress relief,” and “I had a hangover (headache, nausea, vomiting, etc.)”. The results of web survey revealed that people who engaged in hazardous drinking, such as binge drinking, during their college days tended to continue those drinking patterns. Between

the twenties and forties, the proportion of subjects engaging in binge drinking decreased among women but increased among men.

3－1－2 Review of previous articles and books

In addition to the knowledge obtained from the cross-sectional study, I reviewed previous articles that mentioned interventions focusing on alcohol misuse, including binge drinking (Bingham et al., 2010; Borsari et al., 2012; Doumaset al., 2011; Murphy et al., 2010; Neighbors et al., 2012; Terlecki et al., 2015; Wood et al., 2010), textbook (Correia et al., 2012) and alcohol intervention matrix (NIAAA, 2015) to refer them. Harm reduction, which refers to strategies to decrease drinking and related consequences, has a wide scope, and is not limited to traditional programs which aim to stop drinking. Examples of harm reduction approaches are ASTP (the Alcohol Skills Training Program) (Correia et al., 2012) and BASICS (the Brief Alcohol Screening and Intervention for College Students) (Dimeff, 1999). In ASTP, participants are encouraged to consider what they would like to see happen while drinking. Additionally, using open-ended questions, they are provided with information about the role that expectations play on the social effect of alcohol. Alternatively, in BASICS, students complete an alcohol screening that includes various information about drinking and related behaviors or consequences, to use personalized graphic feedback. After that, students meet with BASICS facilitator who utilizes motivational interviewing strategies.

3－1－3 Development program

In this study, referring to ASTP, I try to incorporate BMI (Brief Motivational Intervention) which is introduced in the aforementioned textbook. A BMI session consists of the following: 1. Orientation; 2. Consumption feedback; 3. BAC (Blood Alcohol Concentration) information; 4. Tolerance; 5. Drinking game; 6. Biphasic curve; 7.

Perceived norm; 8. Alcohol-related consequences; 9. Risky behaviors related to drinking; 10. Harm reduction discussion and goal setting; 11. Tips for safe drinking; and 12. Fun things to do that do not involve drinking. Based on discussion with my supervisor, who has rich experience and knowledge, I revised my program and I performed several pilot studies with the cooperation of other graduate students.

The final version of program consists of a 5-minute introduction, 15-minute screening test, 50-minute lecture, and 10-minute summery and conclusion. Educational lecture included the following components: (a) alcohol metabolism and mechanism of drunkenness; (b) the reason for the difference in alcohol tolerance from person to person; (c) acute and chronic alcohol-related consequences; (d) introduction to binge drinking and the associated risks; (e) group work referring to motivational intervention; (f) summary.

3－2 Recruitment

Participants were recruited through two procedures: a poster asking for cooperation with our study, and asking students who were taking courses in health and sport education to cooperate in the study. Regarding the second method, I asked the professor who was in charge of the introductory course on sports and health promotion to cooperate with my research. I had to get approval from the provost of School of Health and Physical Education of University of Tsukuba, because almost all of the participants belonged to that school. Through these two procedures, 382 students participated in my program, 280 students submitted a screening test, and 95 students volunteered for follow-up screening.

3－3 Flow of Intervention

On the day of the program, I explained about the purpose, methods, and ethical considerations of our study in order to obtain informed consent, and asked the students to submit a screening test. Also, at the end of program, the students who were willing to cooperate with a follow-up study were asked to sign a consent form with their address to send post-screening and submit a pre-screening test before they left class. Also, to obtain consent for follow-up assessment, I asked participants to sign a consent document and inform their contact address to send screening questionnaire and gratuity. Returning the follow-up assessment was regarded as agreement to cooperate with our study.

3－4 Follow-up assessment

Follow-up assessments were collected 1-month post-intervention. I sent follow-up assessments with a gratuity to 95 students who offered their cooperation. Ultimately, 52 students, including 21 binge drinkers, returned my follow-up assessment.

4 Data Analysis

To verify the change drinking pattern between the initial assessment and follow-up assessment, I conducted paired t-tests. Also, an independent t-test was used to compare the difference in drinking pattern, YACCQ, and alcohol knowledge test score between binge drinkers and non–binge drinkers during the initial assessment period.

5 Ethical considerations

Procedure for informed consent is shown on 3－3 Flow of Intervention. This study was approved by the ethics committee of the University of Tsukuba (Approval numbers 1323 and 1341).

6 Results

The comparison of drinking patterns between pre-test and post-test for the 21 students who returned the follow-up screening test were analyzed using the paired t-test. The changes in drinking variables due to intervention are shown in Table 9. The frequency of drinking decreased from 6.19 ± 5.93 to 5.71 ± 6.03, the frequency of HED decreased from 3.52 ± 3.37 to 2.76 ± 3.02, and the number of binge drinking incidents per month decreased from 3.10 ± 3.39 to 2.62 ± 3.07, but there was no significant difference between pre-test and post-test. The amount of drinking during binge drinking and the maximum amount of drinking also decreased slightly, from 9.33 ± 5.31 to 6.76 ± 5.95 and 10.90 ± 7.07 to 9.52 ± 7.11, respectively, but the change was not significant.

Concerning alcohol-related consequences, the YAACQ score was slightly higher post-test than pre-test (2.52 ± 3.06 vs. 2.29 ± 2.35). The score on the alcohol knowledge test increased slightly, from 6.71 ± 0.85 to 6.86 ± 0.10, but the improvement was not significant.

7 Discussion

This study is, to my knowledge, the first trial to examine the effect of an educational program for binge drinking prevention among college students in Japan. Although my educational program decreased the frequency of binge drinking, HED, frequency per month, amount of drinking during binge drinking, and maximum amount of drinking, the effects were not significant. This indicated that it may be difficult to change binge drinking behavior using one-time intervention. It is important to reexamine the contents of education and to conduct interviews to clarify the problems and challenges of my

education program. In this study, I referred to previous articles and the alcohol intervention matrix, which described the contents of intervention focusing on alcohol misuse, including binge drinking. Many of these interventions were based on brief motivational interviewing (BMI). I found in my cross-sectional study that college students experienced not only positive effects of alcohol, but also negative ones after drinking; hence, I adopted motivational intervention into my education program. Although, reductions were confirmed in frequency and amount of drinking including binge drinking, those differences were not significant. This result may be affected by the small number of sample. Regarding recruitment for my study, I initially used a poster to call for participants who had experience of binge drinking at least once per month. However, this did not proceed as expected, and only a few students offered cooperation. Finally, I took the opportunity to present my program at a class on social psychiatry and mental health, and requested cooperation for a follow-up study. One of the reasons for the difficulty of recruiting students who had experience with binge drinking is they did not recognize their own drinking as problematic. Also, the rate of return of follow-up questionnaires was lower among students who had experience with binge drinking than among other students, possibly because the former group of students cannot recognize or face their problem. Yoshimoto et al., (2017) revealed that men excessive weekly drinkers were significantly more likely to perceive that their drinking was not normal, but found no difference in recognition between men and women binge drinkers. Focusing on the amount of drinks during binge drinking, the sample size required for valediction of effect of my program is 88 by calculating under the condition when effect size is 0.5(Cohen,1988) and α err probe is 0.05 in one-sided test. While devising recruitment measure, continuing to collect data is needed to confirm the effectiveness of my education

program. In addition to this effort, it is important to reexamine this education program by interviewing participants of my program to clear impressive contents or points to be improved of my education program and reflect on next program.

Also, regarding the number of session, while previous studies tended to provide their education consist of multiple sessions, my education program consisted of only one session. To obtain sufficient educational effect, I should explore like stepwise approach which consists of provision of information on alcohol and that risks, promote and establishment of understanding among students and decision-making and changing behavior by themselves.

Chapter 7
Comprehensive Discussion

1 Alcohol and Japanese people

Since ancient time, Japanese people have been blessed with alcohol in various local culture and climate and play a great role in religious ceremony or celebrations. Also, alcohol has been recognized as secret thing to connect God and people (Health and Medicine of Alcohol Association, 1996). In these backgrounds, Japanese people tend to be more generous and the person who can drink a lot has been regard as like hero Shimizu (2003). This situation may be affected social tendencies that person had better drink more. In addition to this social background, alcohol beverages are available for purchase 24/7 at convenience store or vending machine and at low prices because of appearance of like quasi-beer throughout Japan. Furthermore, “nomihodai” become common and many restaurants or “Izakaya” (Japanese bar) provide this service. It is assumed that these environmental factor may encourage alcohol consumption of Japanese people.

2 Harmful use of alcohol and strategies in worldwide and Japan

In terms of maintaining health, alcohol has the following effects: (1) drunkenness, (2) organ damage due to chronic effects, (3) dependencies, (4) harm to minors and unborn child through pregnant women (Ministry of Health, Labour and Welfare, 2012). The WHO (2010) adopted the recommendation “Global strategy to reduce harmful use of alcohol”, because alcohol misuse is one of the major risk factors that can damage not only an individual’s life, but also their family and society. According to this recommendation, Japan established in 2013, and enforced in 2014, the “Basic Act on Measures Against Alcohol-related Health Harm”. The aim of this act was to contribute toward a society where we can live safely, as well as protect our health by preventing

alcohol-related health harms from occurring, progressing, and relapsing, and to prepare full support for persons experiencing alcohol-related health harms (Ministry of Health, Labour and Welfare, 2013). In 2015, the “Basic Plan for Promotion of Measures against Alcohol-related Harm” was formulated. This plan took into account the future mental and physical impact on the younger generation. Also, it acknowledges that young people are not sure of their tolerance to alcohol, and are therefore exposed to the risk of acute alcohol intoxication. Therefore, we need to provide young people with accurate and useful information on alcohol. What kind of drinking behavior should be noted in the younger generation? In foreign countries, excessive drinking like binge drinking or Heavy Episodic Drinking (HED) has become a problem. In particular, binge drinking is most common among people 18–24 years old (CDC, 2014) and it causes many adverse events, like acute alcohol poisoning, violence, and injuries after drinking. In 2012, among young people, 40.1% of college students were binge drinkers, and the rate among those not enrolled full-time in college was 35.0% (HHS, 2012). To tackle the alcohol problem among college students, a lot of research has been performed to verify the prevalence and related factors associated with alcohol misuse or problematic drinking, and to investigate the effect of interventions aimed at resolving those problems. Based on the knowledge gained from these studies, many guidebook or textbooks, such as the “College AMI (Alcohol Intervention Matrix) guide (NIAAA, 2015)”, “Guide to assessment, intervention and prevention for college student alcohol abuse” (Correria, 2012), and “Brief Alcohol Screening and Intervention for College Students (BASICS): A Harm Reduction Approach” (Dimeff, 1999)” have been published. On the other hand, what about Japanese university students? College students are in an age of transition from minority to adulthood, and they confront alcohol without understanding their tolerance or the practice of appropriate

drinking. Many students enter college with great anticipation and work hard, not only at their studies, but also at club activities. These clubs provide several occasions for drinking, including the welcome party (“Shinkan-Compa”), summer training camp, wrap-up party (“Uchiage”), and year-end party (“Bonenkai”) I understand their feeling that upon becoming college students, they want to act without restraint (“Hame-wo-hazushitai”). However, the news that college students have died from acute alcohol intoxication after drinking never ceased. The other day, regarding a case of death from alcohol, criminal charges were filed for the first time in Japan against the students who had been there. These fatal accidents can take away the important future from not only dead student but also concerned parties like friends, family members etc.

3 Trial development of preventive educational program for binge drinking among college students

Based on this background, I attempted to develop an educational program that would allow college students to maintain a good relationship with alcohol, without engaging in binge drinking, and remain active in society.

So far, although several kinds of alcohol education are conducted in liberal arts or “Introduction to medicine” classes, they are not specialized for binge drinking. In designing my educational program, I sought to base it on the actual situation, and conducted two cross-sectional surveys. One was an anonymous questionnaire that clarified the prevalence and correlates of binge drinking, and the other was a web survey that compared drinking behavior between college students and adults. I reviewed articles that mentioned intervention strategies conducted previously in other countries. The results obtained from the cross-sectional study were as follows: 1. more than half of

Japanese college students have experience of binge drinking one or more times a year; 2. there is a significant relationship between binge drinking and reasons for drinking such as “stress relief” and “to be happy”; 3. students who engaged in binge drinking have experienced not only negative effects of alcohol, like hangover, but also positive effects, like releasing stress. Including these results in the contents of program, I tried to inform students that binge drinking is a familiar problem associated with acute risks. After designing the original program, I conducted several pilot studies and revised the program based on the advice and comments from participants. Also, I adopted DMQ (Drinking Motives Questionnaire) (Cooper, 1994) and YACCQ (Young Adult Alcohol Consequences Questionnaire) (Kahler et al.,2005) to assess their motivation for drinking and their experience after drinking in a screening test that was administered before and after intervention. Furthermore, I asked about stress perception, drinking norms, readiness for behavioral change, and confidence in refusing to drink more.

4 Recruitment of participants

Although I requested the dean of faculty, a co−op, a student office, and the health center to display a poster calling for research cooperation, only a few students offered to cooperate. These students’ schedules did not match, so I did not proceed with my intervention research. I suspected that one obstacle was the application condition: I was seeking to recruit students who had experience of binge drinking in the past month, which may have seemed as if I were trying to assemble students who had engaged in bad behavior. Also, I assumed that most students did not have awareness of their own drinking patterns, and were not in a state of readiness to change. Therefore, I changed the method of the study sought to recruit students with every type of drinking pattern, including non-

drinker. While continuing recruit using the poster, I offered an education program for students who were taking a course in social psychiatry and mental health, and asked them to participate in my study. Ultimately, 382 students took part in my program, and 21 students who had experience of binge drinking offered to participate in my study. The results of my study are derived from the screening test data from those 21 students.

5 Identified issues thorough this study

The frequency of binge drinking and maximum amount consumed using binge drinking, frequency of HED, and YAACQ and alcohol knowledge test scores changed slightly after the education program, but the changes were not significant change. To explain why I did not obtain a sufficient result, the following points should be considered.

(1) Recruitment

As I mentioned in discussion part of Study 3, the rate of return of the follow-up screening test was lower for students who engaged in binge drinking. It is possible that these students are strongly resistant to facing their problematic drinking behavior, making it difficult to motivate them to change their behavior. Furthermore, the physical and mental effects of binge drinking are difficult to compare to those of alcohol dependence, which cause symptoms like withdrawal. This might make it difficult for students to recognize their drinking pattern as problem. As I mentioned, the idea that it is better to drink than you can't not may make it difficult for individuals to recognize binge drinking as risky behavior. However, the results of review and my cross-sectional study revealed that drinking behaviors like binge drinking do not naturally decreases with age, so we cannot overlook this situation.

(2) Session times

A one-session educational program may not be sufficient to change drinking behavior. In a future study, I will first provide information that helps students know their own alcohol tolerance and understand risk of drinking. Next, I will provide support for them to think about how to handle alcohol and find how to realize that. In order to do that, I will need to consider a multi-session program that makes step-by-step advances possible.

6 Prospects

I now want to address my thoughts on future alcohol education based on psychosocial characteristics, namely, the idea that binge drinking is hard to recognize as risky behavior. For students already engaged in risky drinking like binge drinking, measures must be taken to change their drinking behavior. In foreign countries, SBIRT (Screening, Brief Intervention, Referral to Treatment) has been conducted actively (Bridges et al., 2015). SBIRT is aimed at students who drink alcohol heavily and have experienced or are at risk for alcohol-related problems such as poor class attendance, missed assignments, accidents, etc. It is also designed to help students make better alcohol-use decisions (HHS, 2005). This intervention has come to be used at general medical institutions, and we need to think about how to adopt SBIRT for Japanese college students. I think that one of good way to reduce harm for college students would be to carry out alcohol screening tests as part of periodic health examinations, in order to identify students engage in problematic drinking behaviors like binge drinking, and then to provide the necessary support for problem drinkers. Recently, the Japanese National University Council of Health Administration Facilities formulated the “Guideline for standardization of health examination and health related information in college,” which

included alcohol-related matters. I expect that efforts to treat alcohol problems among Japanese college students will be triggered by this opportunity. The measures that we described above are for secondary prevention. However, for people who already engage in problematic drinking, it is difficult to change their behavior through this intervention. In the future, it will be important to first explore preventative measures, such as alcohol education for freshmen, before they start drinking.

Chapter 8
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Chapter 9
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Chapter 10

Table and Figure

Table 1 *Definition of Hazardous use, Harmful use, Alcohol dependence*

Term	ICD Definition	DSM Definition
Alcohol dependence	**Behavioral, cognitive, and physiological phenomena that may develop after repeated alcohol use（ICD-10）**	**Substance use disorder（DSM-5）**
Harmful use	**Results in consequences to physical and mental health（ICD-10）**	
Hazardous use	**Increases the risk of harmful consequences for user or others（WHO）**	

Table2 *Governmental standard drink definition and low-risk consumption guidelines in grams of pure ethanol*

country	standard drink(g)	guidelines			
		women		men	
		(g)/day	(g)/week	(g)/day	(g)/week
Australia	10	20		20	
Austria	20	16	112	24	168
Bosnia and Herzegovina	10	10		20	
Bulgaria	13				
Canada	～13.6	～27	～136	～40.7	～204
Chili	14	42	98	56	196
China	10			50	100
Croatia	10	10		20	
Denmark	12		84		168
Estonia	10	20		40	
Fiji	10	20	100	30	150
France	10	20	140	30	210
Germany	12	12		24	
Grenada	～14	～14		～14	
Iceland	8		112		168
India	10	10		20	
Ireland	10		110		170
Italy	12	20		36	
Japan	**10**	**20**		**40**	

Table 3 *Characteristics of Partiipants*

Variable	Total(n=563)	Binge drinker (n=382)	Non- Binge (n=181)	*p*
Age (years), mean±SD	21.7±1.9	21.6±1.1	21.7±2.8	0.413[a]
Frequency of drinking in a week, mean ± SD	1.2±1.5	1.5±1.6	0.6±1.1	<0.001[a]
Amount of drinking(g/day) mean ± SD	53.4 ± 40.2	66.2 ± 41.4	26.2 ± 18.0	<0.001[a]
AUDIT mean ± SD	6.4 ± 5.1	8.1 ± 5.0	2.9 ± 2.9	<0.001[a]
Sex				
Men	303	227(59.4)	76 (41.9)	<0.001[b]
Women	260	155 (40.6)	105 (58.1)	
Club Activity				
participant	229	251(65.7)	79 (43.6)	<0.001[b]
non-participant	330	129 (34.3)	100 (56.4)	

[a]:Independent t-test (binge vs non-binge)

[b]: Chi-squared test (binge drinker vs non-binge drinker)

Table 4 *Alcohol-related consequences associated with binge drinking*

Variables	Men (n=303)				Women (n=260)			
	Odds Ratio	95% Confidence Interval		*p*	Odds Ratio	95% Confidence Interval		*p*
I became happy	1.5	0.71	3.2	0.29	**4.89**	2.31	10.37	**0.00**
I felt stress relief	**2.94**	1.39	6.22	**0.01**	**2.53**	1.26	5.08	**0.01**
I became excited	1.38	0.58	3.26	0.47	2.56	0.91	7.18	0.08
I became sleepy	0.99	0.54	1.82	0.98	1.27	0.71	2.28	0.42
My mood worsened	0.54	0.17	1.75	0.30	2.86	0.56	14.63	0.21
I became generous	1.19	0.52	2.68	0.68	0.75	0.26	2.15	0.59
I became rude	0.61	0.11	3.28	0.57	0.59	0.06	5.66	0.65
I got injured from an accident	0.89	0.18	4.48	0.89	0.47	0.08	2.89	0.42
I had a hangover (headache,	**2.88**	1.29	6.44	**0.01**	**2.64**	1.23	5.65	**0.01**
I didn’t experience any changes	0.49	0.02	1.20	0.12	**4.49**	1.85	10.92	**0.00**
Other consequences	**0.10**	0.12	0.89	**0.04**	0.74	0.18	3.05	0.68

Adjusted for age

Values in bold and underline indicate significant associations between binge drinking and alcohol-related consequences

Table 5 *Reason for drinking associated with binge drinking*

Variables	Men (n=303)				Women (n=260)			
	Odds Ratio	95% Confidence Interval		*p*	Odds Ratio	95% Confidence Interval		*p*
"To feel happy or be in a good mood"	**2.06**	1.00	4.23	**0.049**	**2.48**	1.1	5.55	**0.03**
"To be relaxed"	1.21	0.52	2.82	0.64	1.11	0.4	3.05	0.83
"To facilitate interpersonal relationships"	1.31	0.70	2.46	0.39	**2.84**	1.4	5.77	**0.00**
"To increase appetite"	2.65	0.54	13.02	0.23	1.13	0.26	4.78	0.86
"To forget something bad"	1.94	0.69	5.47	0.2	**3.59**	1.05	12.25	**0.04**
"To get high"	1.93	0.91	4.11	0.08	1.5	0.7	3.21	0.29
"To impress others as cool"	2.07	0.22	19.35	0.52	-	-	-	-
"To sleep well"	1.26	0.47	3.34	0.63	1.57	0.62	4.00	0.34
"To live up to expectations"	0.75	0.06	10.08	0.83	3.96	0.26	60.82	0.32
"To relieve stress"	**4.62**	1.68	12.68	**0.00**	**2.77**	1.28	6.00	**0.01**
"To be forced to drink"	1.08	0.31	3.79	0.9	0.21	0.04	1.08	0.06
"Other reasons"	0.77	0.27	2.22	0.63	2.53	0.92	6.95	0.07

Adjusted for age

Values in bold and underline indicate significant associations between binge drinking and reason for drinking

Table 6 Characteristics of participants

Variables	Total (n = 511)	Men (n = 274)	Women (n = 237)	*P*
Age (years), mean ± SD	21.7 ± 1.9	21.8 ± 1.3	21.6 ± 2.5	0.254[a]
Frequency of drinking in a week, mean ± SD	1.2 ± 1.5	1.5 ± 1.7	1.0 ± 1.3	<0.001[a]
Amount of drinking mean ± SD	55.2 ± 39.8	62.9 ± 43.5	46.3 ± 32.9	<0.001[a]
Binge drinking				
Yes	363 (71.0)	213 (77.7)	150 (63.3)	<0.001[b]
No	148 (29.0)	61 (22.3)	87 (36.7)	

[a]:Independent t-test (Men vs Women)
[b]: Chi-squared test (Men vs Women)

Table 7 *Comparison of drinking pattern between college students and Adults*

Variable		College students (n = 104)	Adults (n = 106)	*P*
Age (years), mean±SD		22.2 ± 2.6	35.3 ± 8.1	<0.001[d]
Sex	Men	52(49.5)	53(50.5)	1.000[c]
	Women	52(49.5)	53(50.5)	
Frequency of drinking in one month				
mean ± SD		11.2 ± 11.9	14.9 ± 10.1	0.017[d]
Frequency of HED[a] in one month,				
mean ± SD		4.1 ± 7.2	6.0 ± 8.6	0.085[d]
Frequency of binge drinking[b] in one month				
mean ± SD		2.8 ± 5.1	3.6 ± 5.8	0.283[d]
Maximum amount of drinking in one time				
mean ± SD		7.1 ± 6.1	6.6 ± 6.1	0.540[d]

[a]: HED(heavy episodic drinking) of >60 g in one occasion
[b]: Binge drinking: of 50g or more for men and 40g or more for women in 2-hour drinking
[c]: Chi-squared test (College students vs Adults)
[d]:Independent t-test (College students vs Adults)

Table 8 *Comparison of drinking pattern between college days' and Adults*

Variable	College Days' (n = 106)	Current Days' (n = 106)	*P*
Frequency of drinking in one month,			
mean ± SD	8.9 ± 8.4	14.9 ± 10.1	<0.001[a]
Frequency of HED in one month,			
mean ± SD(n=79)	6.4 ± 7.2	7.0 ± 9.0	0.515[a]
Frequency of binge drinking in one month,			
mean ± SD(n=66)	5.7 ± 5.9	5.2 ± 6.6	0.588[a]
Maximum amount of drinking in one time,			
mean ± SD	8.8 ± 8.3	6.6 ± 6.1	<0.001[a]

a: Paired t-test (college days vs Currently)

Table 9 *Change of drinking pattern from pre to post of intervention*

Variable	pre(n=21)	post(n=21)	*P*
Frequency of drinking in a month,			
mean ± SD	6.19 ± 5.93	5.71 ± 6.03	.248[b]
Frequency of HED[a] in a month,			
mean ± SD	3.52 ± 3.37	2.76 ± 3.02	.130[b]
Frequency of binge drinking in a month,			
mean ± SD	3.10 ± 3.39	2.62 ± 3.07	.314[b]
Amount of drinking during binge drinking			
mean ± SD	9.33 ± 5.31	6.76 ± 5.95	.058[b]
Maximum amount of drinking(drink/day)			
mean ± SD	10.90 ± 7.07	9.52 ± 7.11	.766[b]
Normal amount of drinking(drink/day)			
mean ± SD	4.81 ± 2.23	5.00 ± 3.42	.789[b]
YAACQ (Young Aduld Alcohol Consequences Questionnaire)			
mean ± SD	2.29 ± 2.35	2.52 ± 3.06	.596[b]
Knowledge about alcohol			
mean ± SD	6.71 ± 0.85	6.86 ± 0.10	.561[b]

a: the case as pure alcohol intake of 60g more in one occasion

b: Paired t-test (pre vs post)

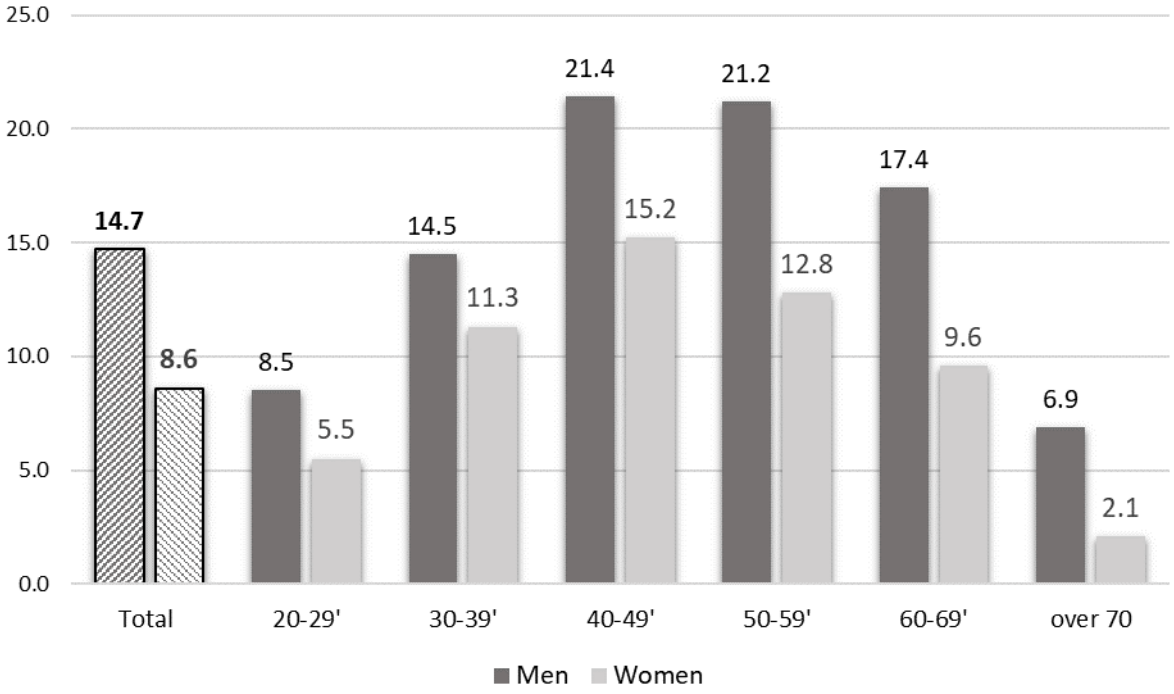

Figure1　The ration of individuals who who drink alcohol to the extent that the risk of lifestyle-related diseases* in 2017.

* Individuals who consume 40g or more (for men) or 20g or more (for women) of pure alcohol per day

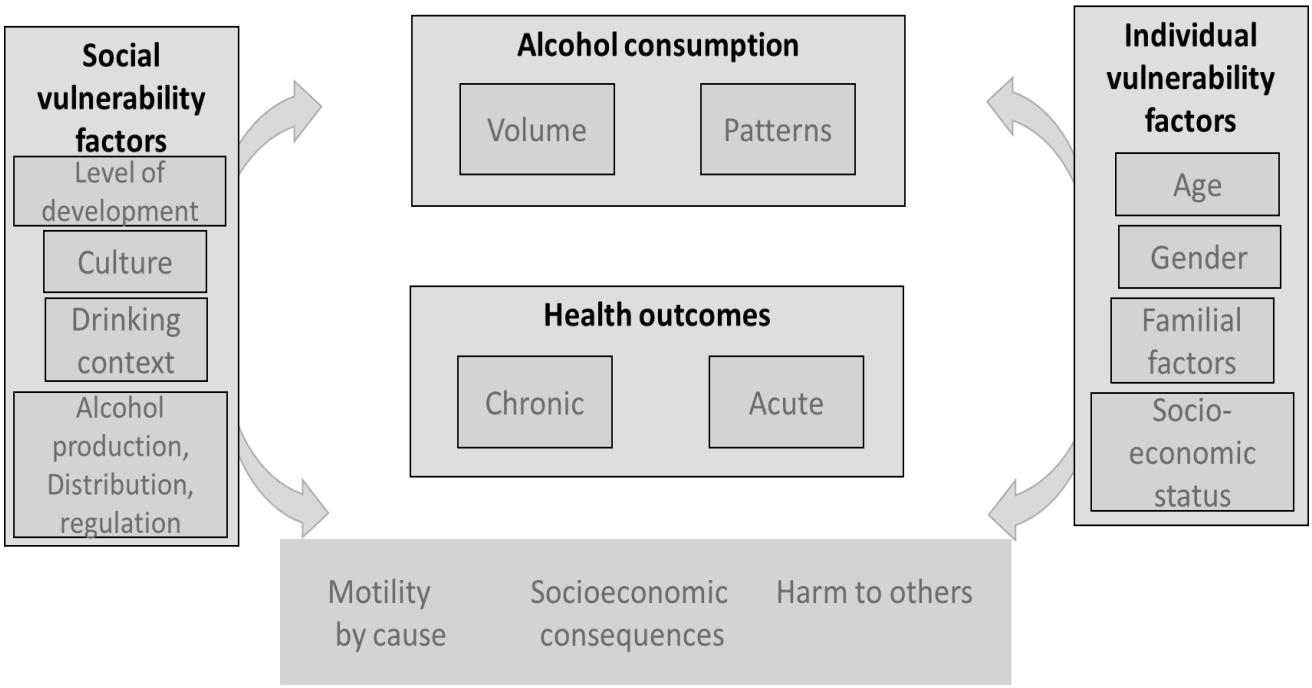

Figure2 Framework to alcohol-attributable harm

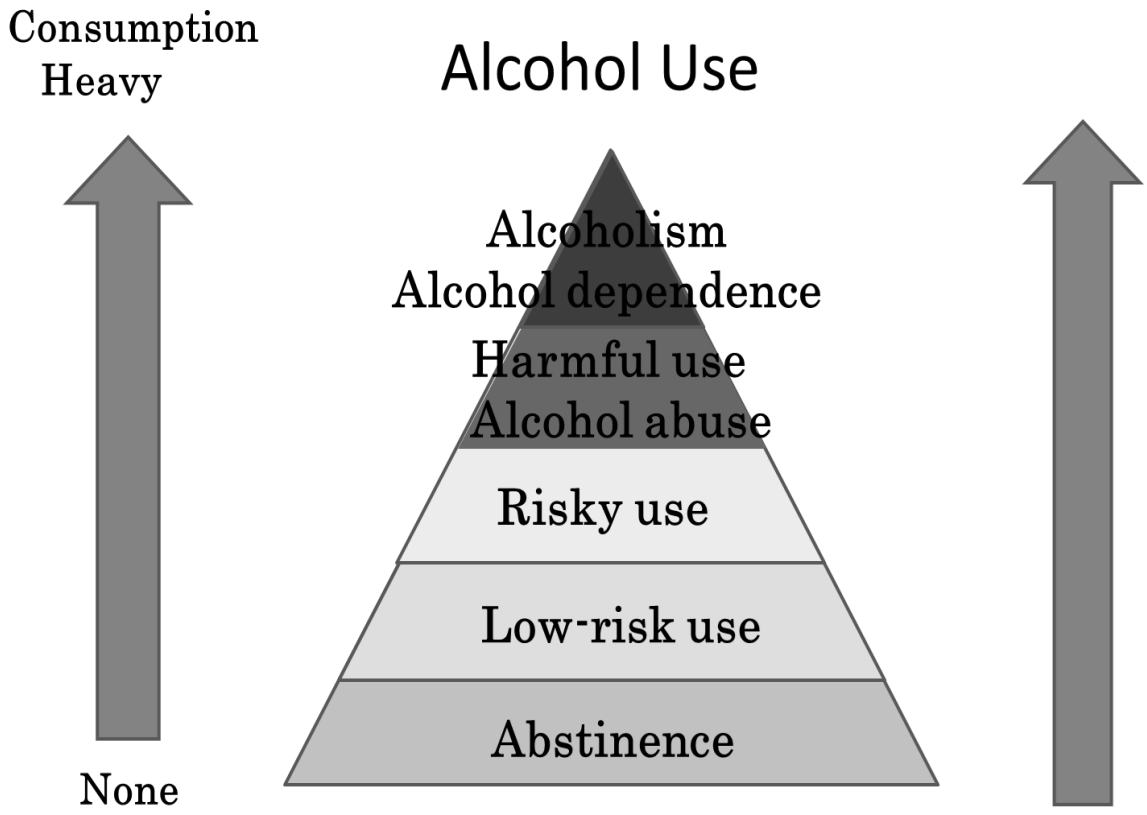

Figure 3 The Spectrum of Alcohol Use

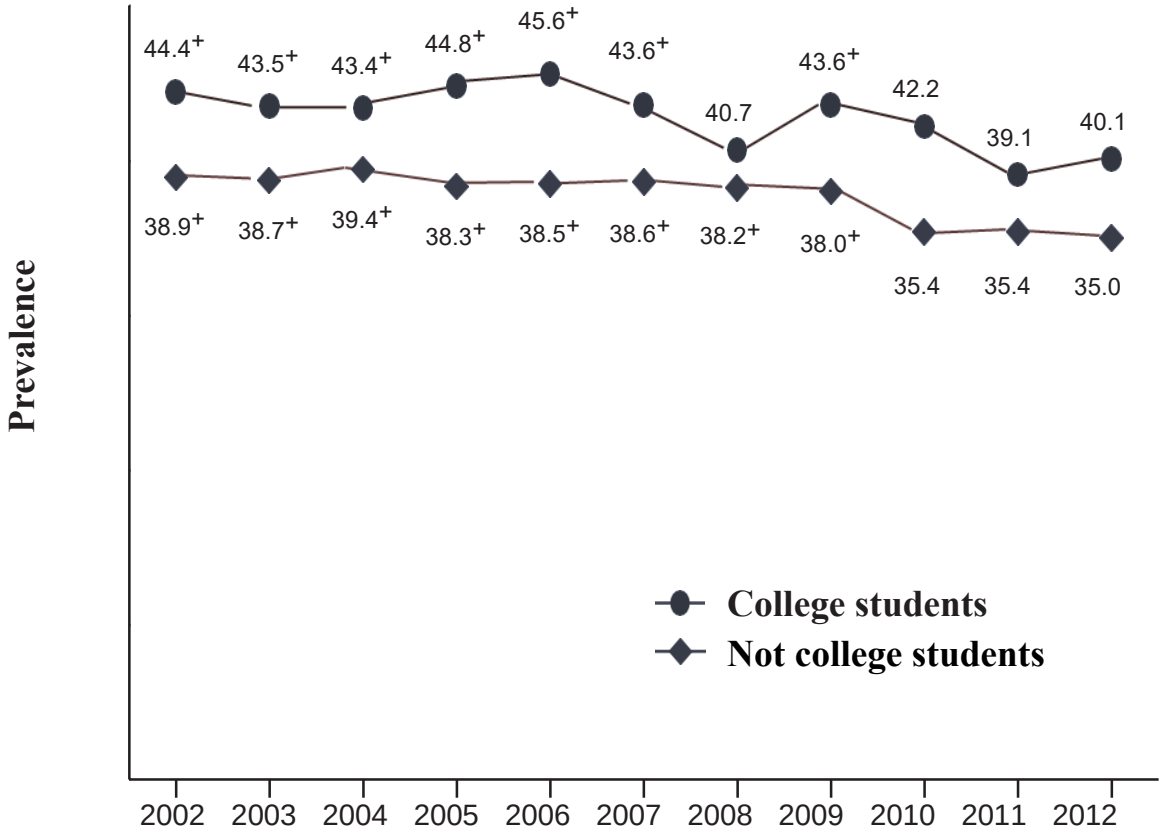

Figure 4 The prevalence of binge drinking in a past month among College students and 18～22age young adults

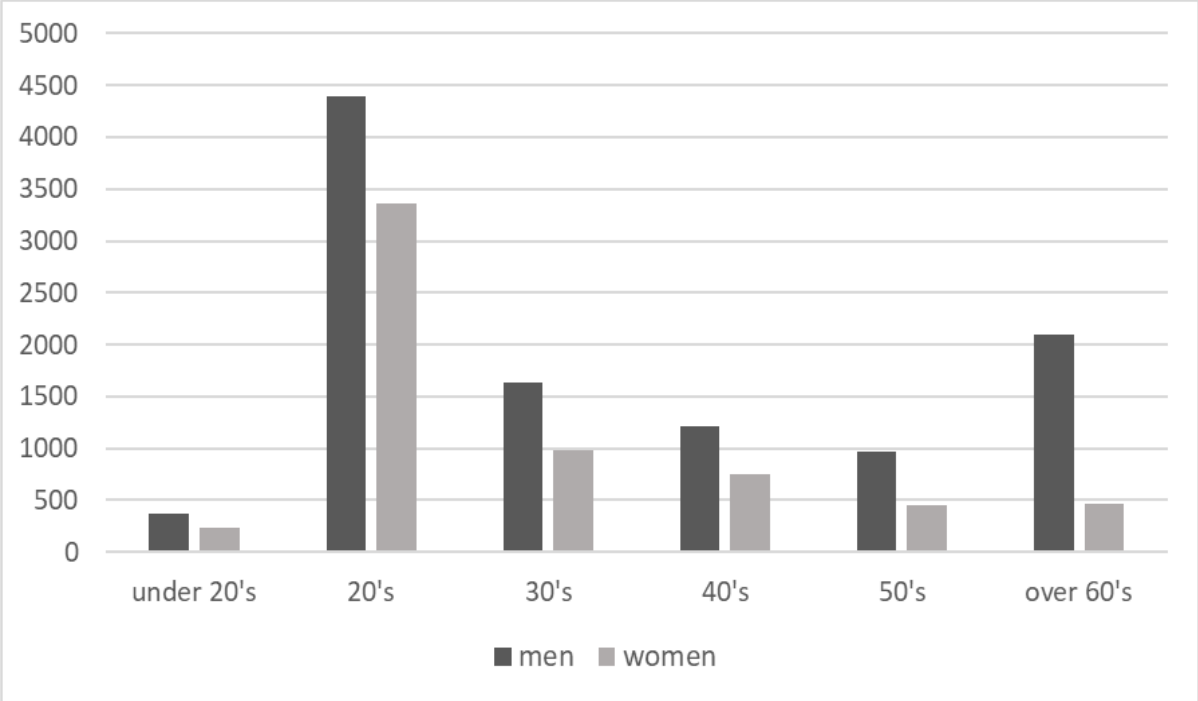

Figure 5 The number of patients to hospital by ambulance
(Tokyo Fire Department, 2018)

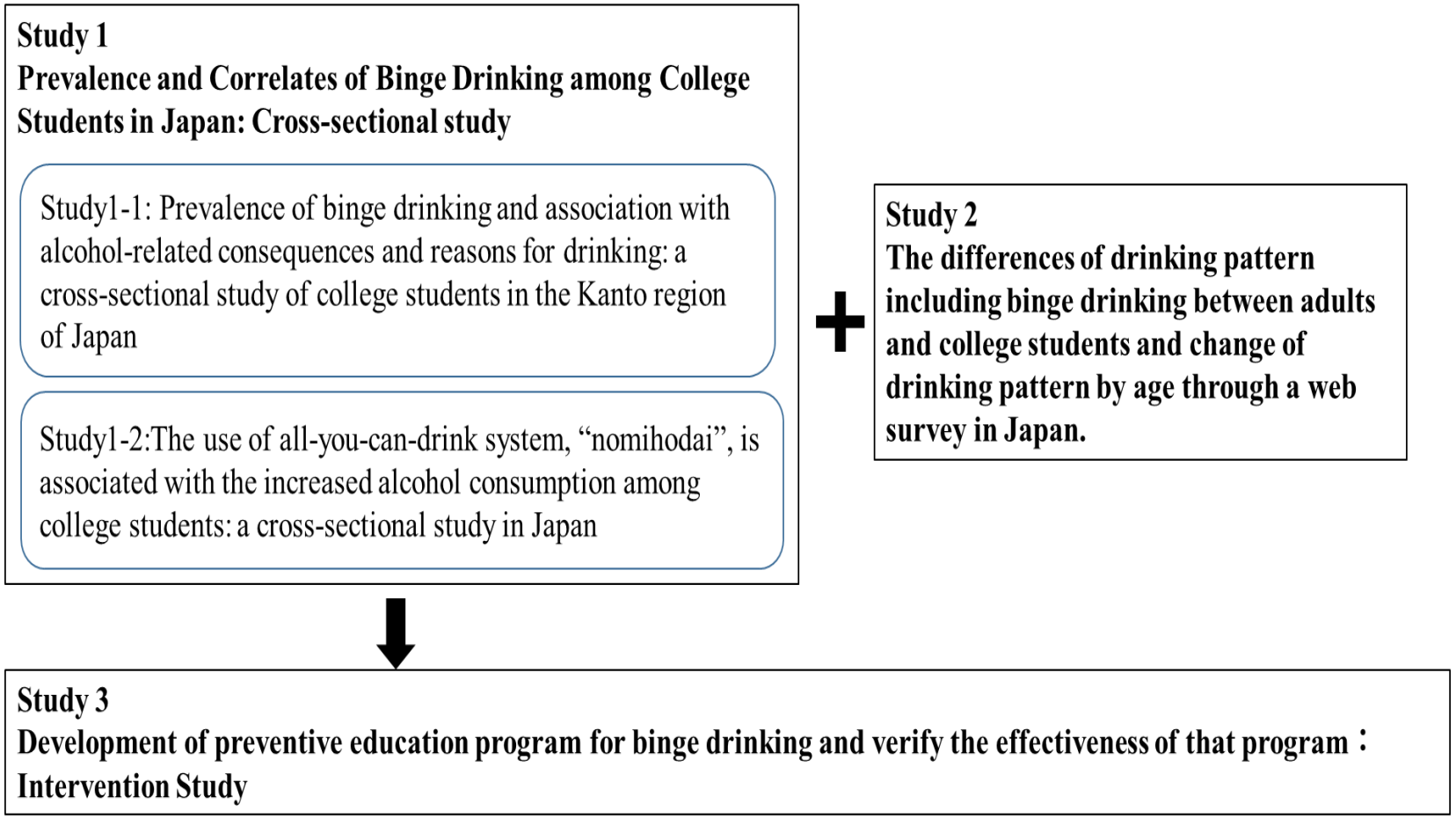

Figure 6 Consists of my study

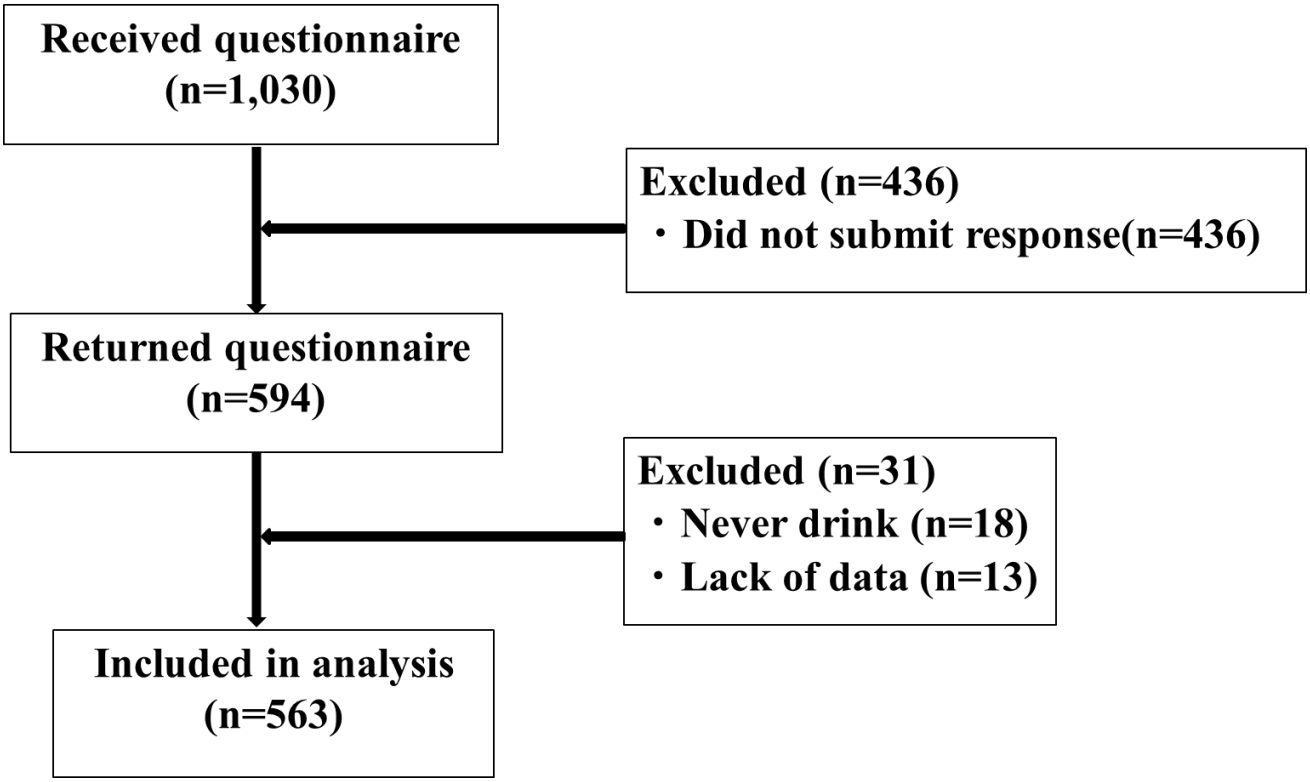

Figure 7 Flow chart of subject selection for study 1－1

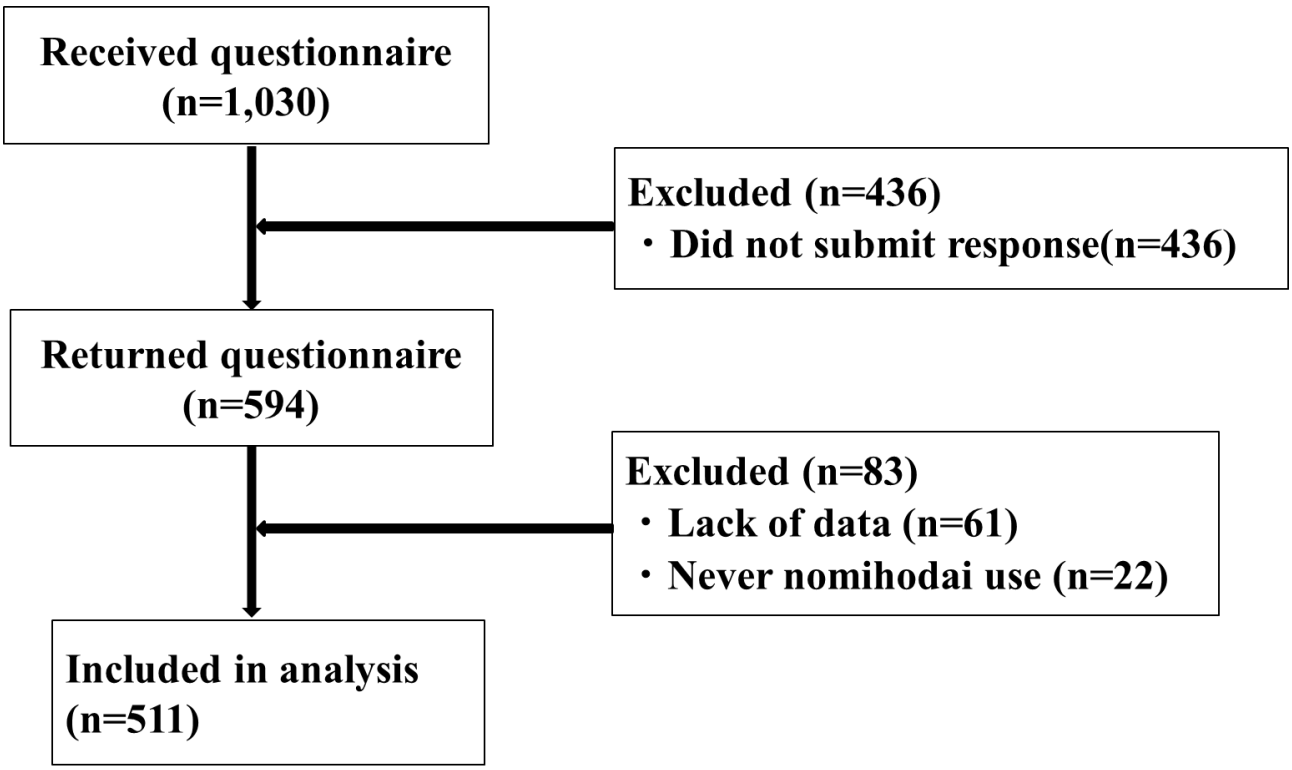

Figure 8 Flow chart of subject selection for study1－2

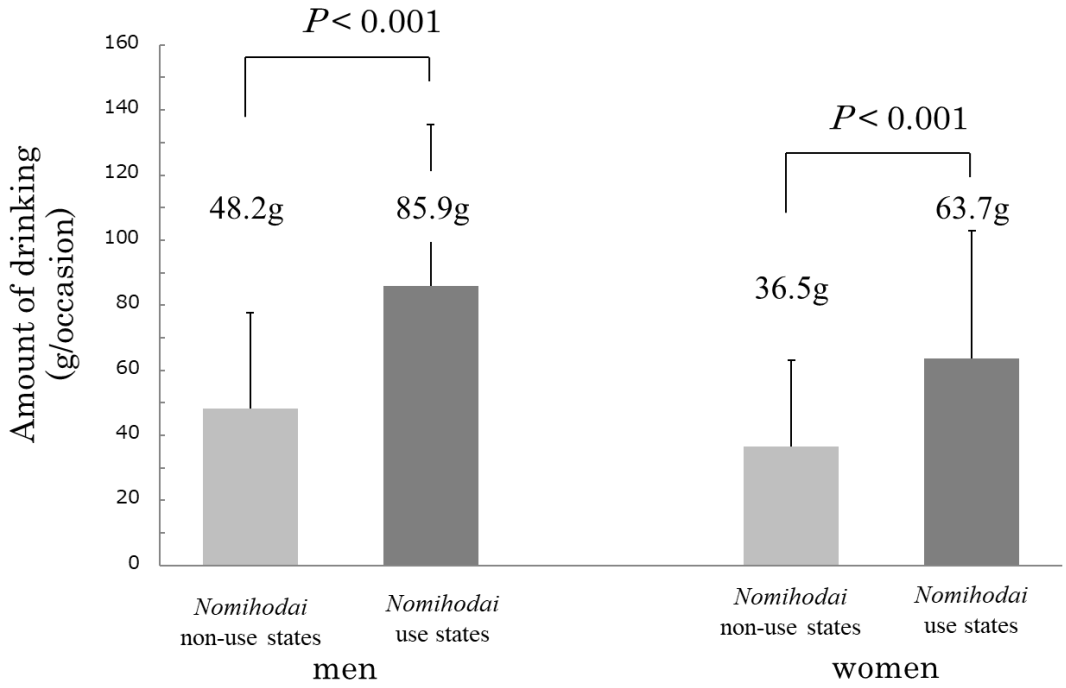

Figure 9 Comparison of the mount of drinking during *nomihodai* use vs non-use states

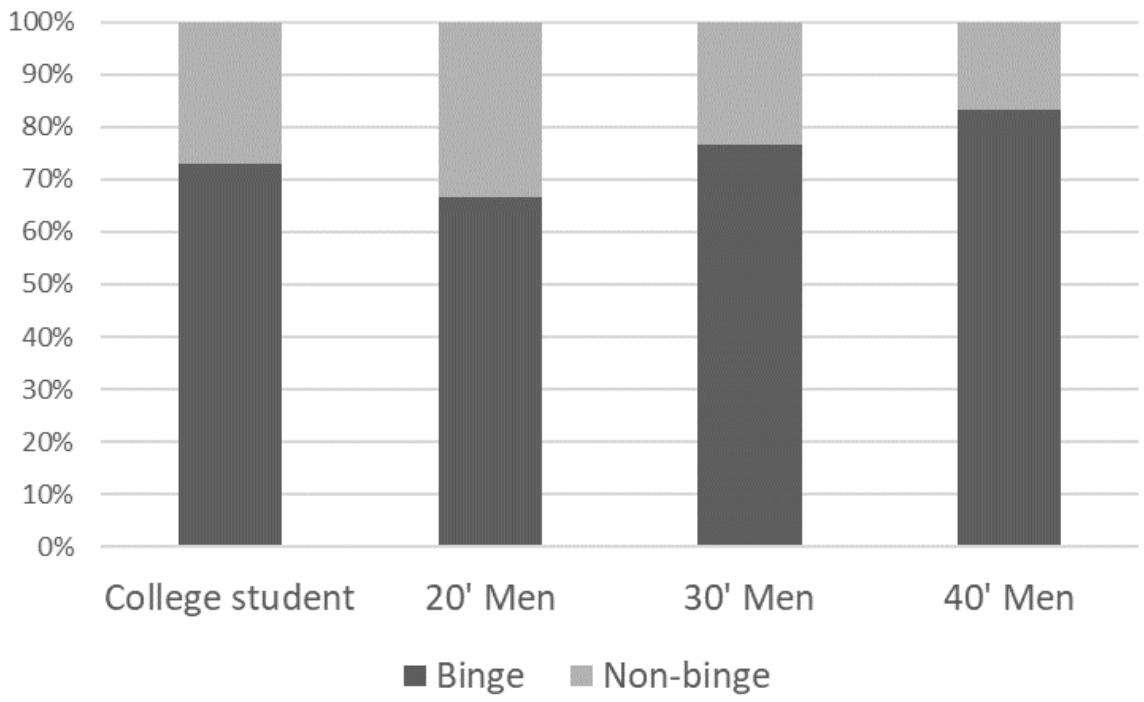

Figure 10 Age-specific allocation of binge drinking (Men)

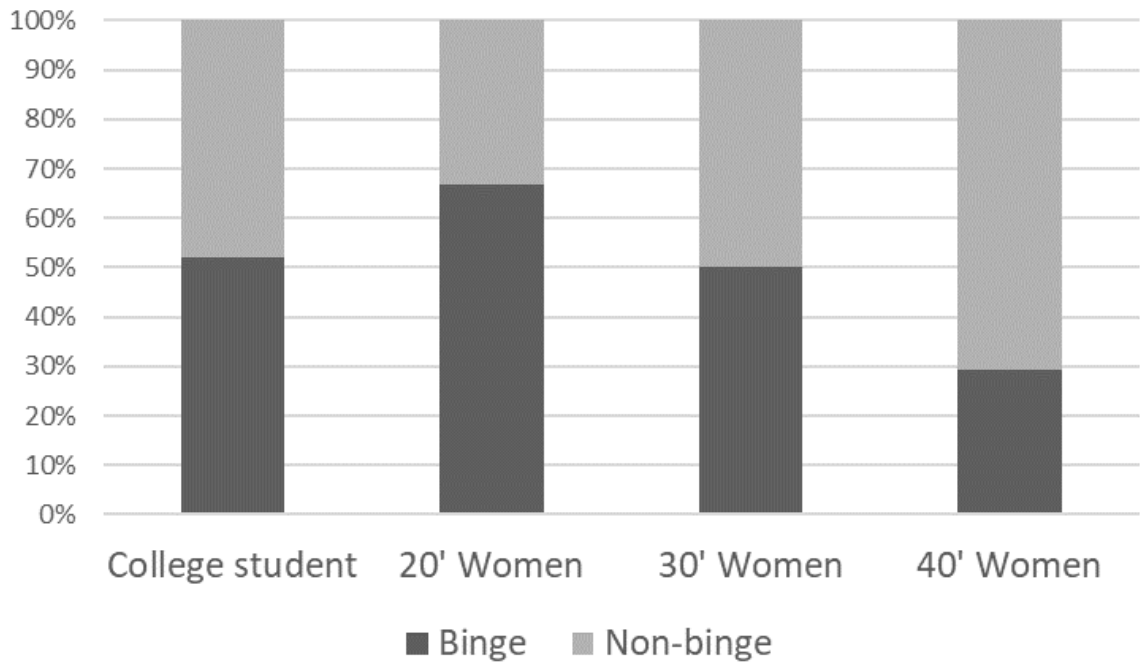

Figure 11 Age-specific allocation of binge drinking (Women)

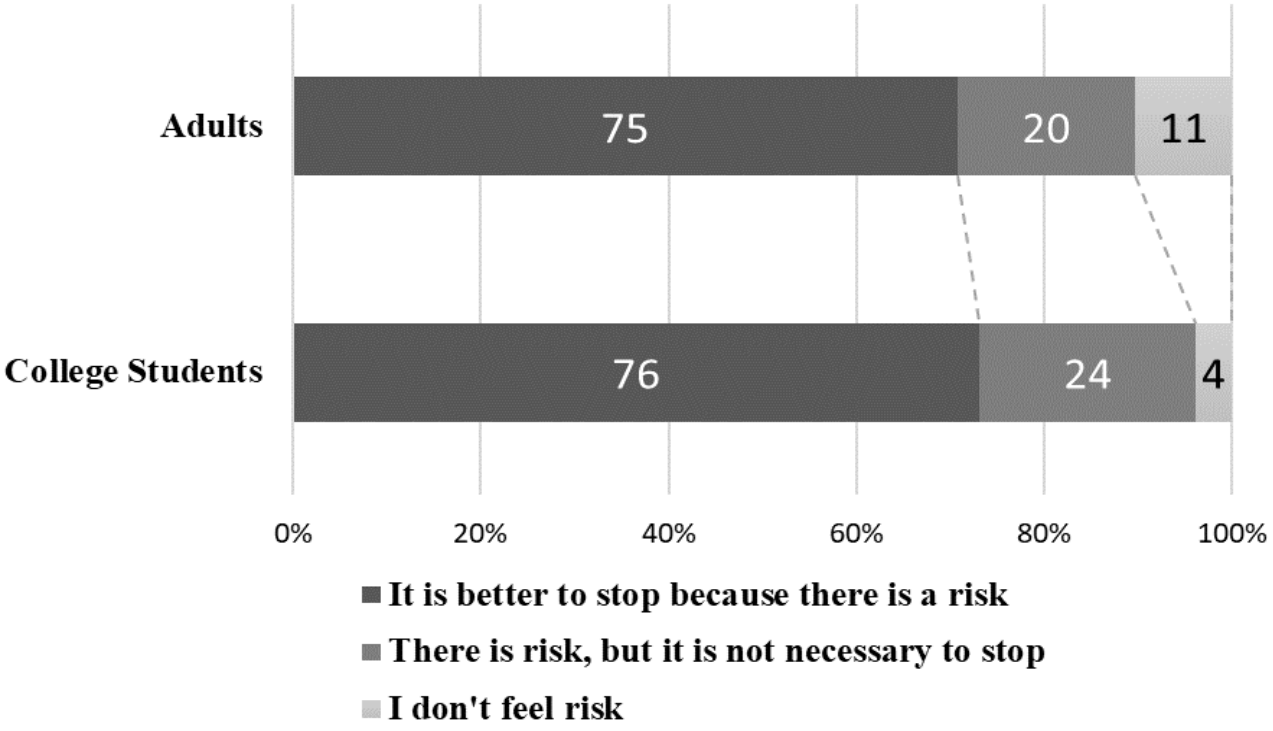

Figure 12 Thought about excessive drinking like binge drinking

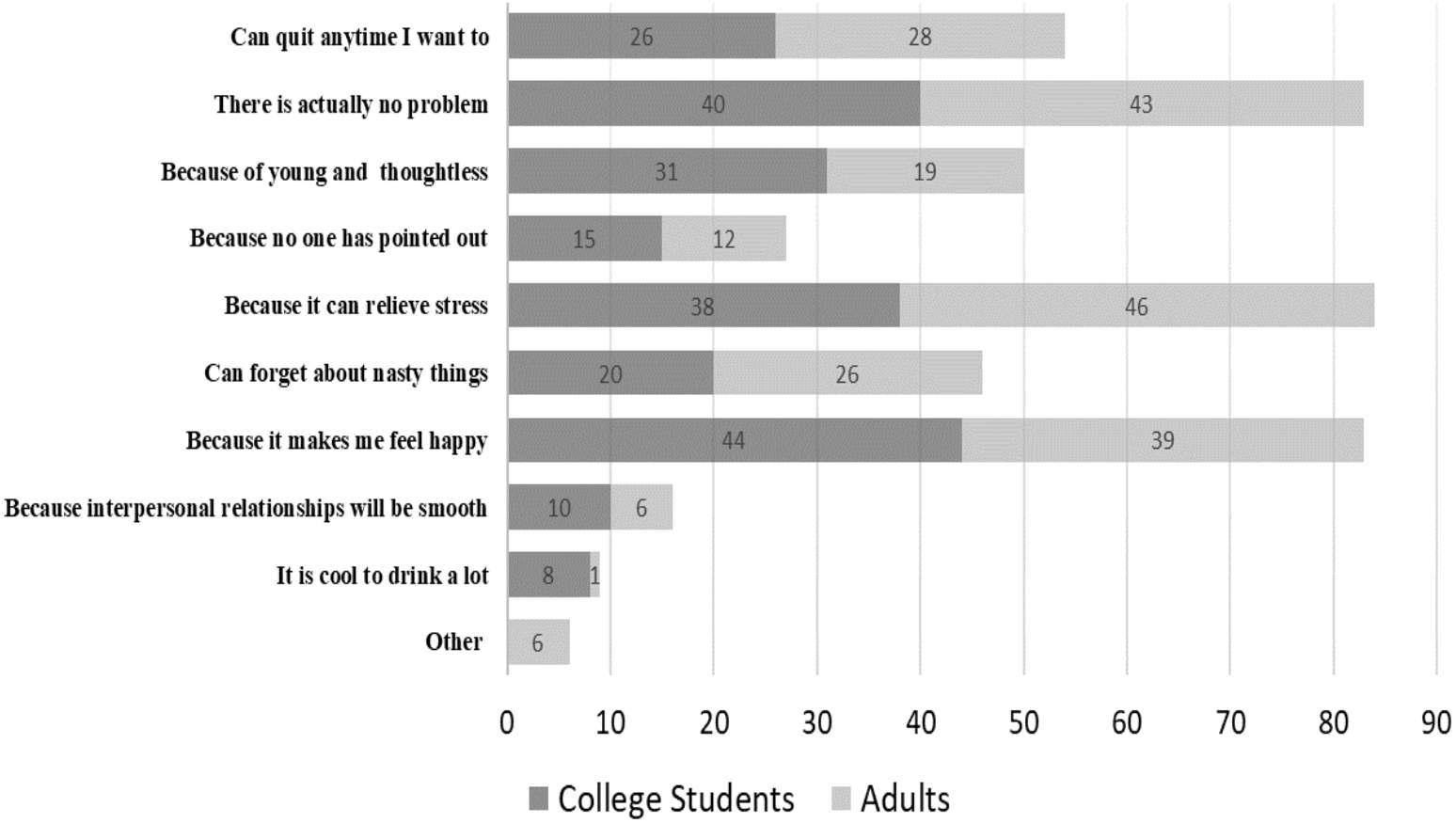

Figure13 Reason for excessive drinking like binge drinking

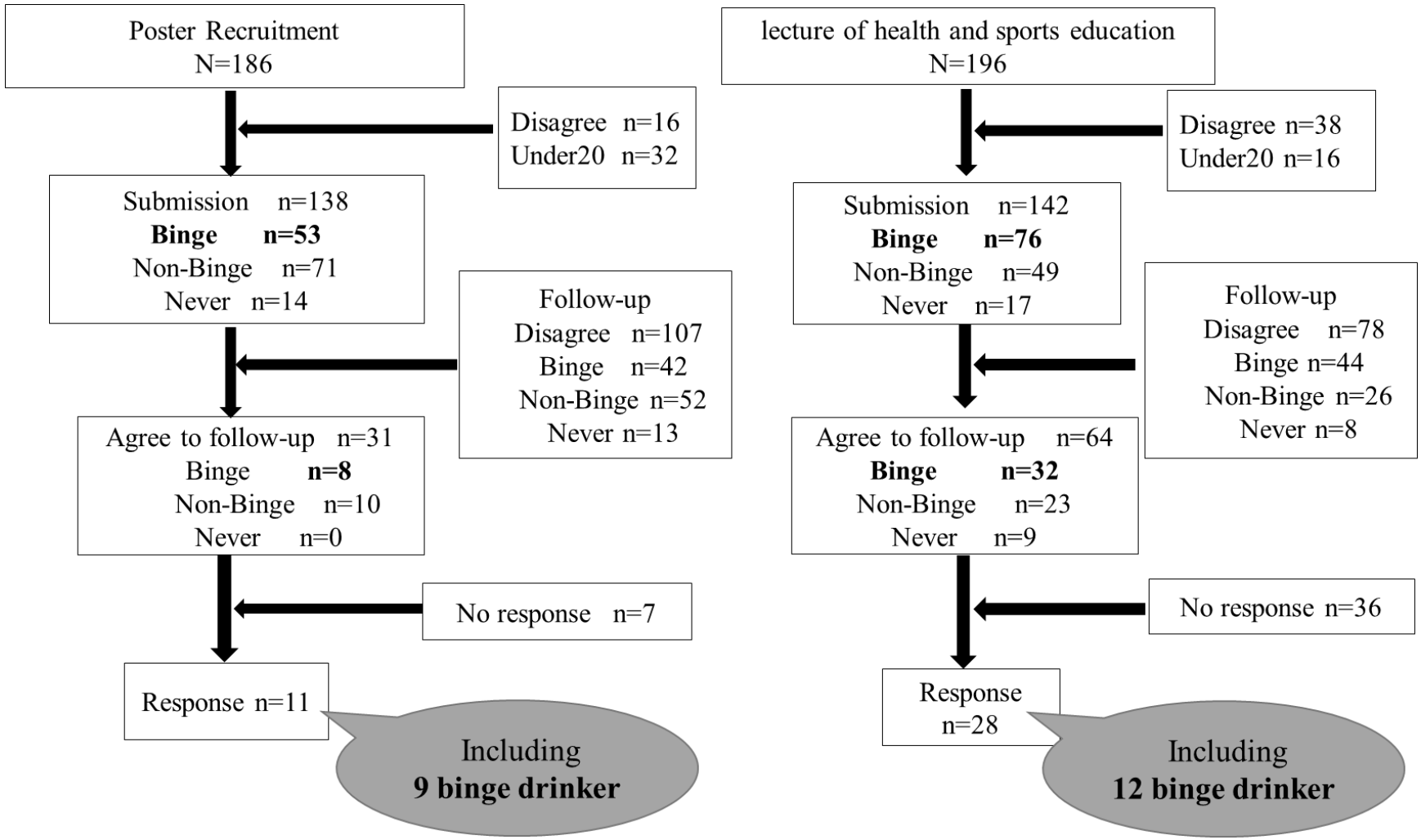

Figure14 Participants recruit flow

Appendix

飲酒に関わる調査への協力のお願い ＜大学生版＞

近年、日本において飲酒に関する全国調査などが徐々に行われるようになってきておりますが、日本での大学生の飲酒状況については正確に把握されていません。

本調査はわが国の大学生における飲酒状況の実態の把握を正確に行い、基礎資料を得るための調査です。匿名調査で個人情報は保護されていますので、正直にお答え頂ければと思います。回答によって法で罰せられたり、成績・進路・実習上の不利益が生じる事などは一切生じません。また、調査を拒否しても不利益はありません。調査は回答を以てあなたの同意を得たものとします。

調査の趣旨をご理解いただき、ご協力をよろしくお願いいたします。

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解　答　例

● 選択肢が番号、はい・いいえの質問の場合・・・

０　ない　　１　１カ月に１度未満　　２　１カ月に１度　　３　１週に１度
④　毎日あるいはほとんど毎日

→ **回答する「番号、はい、いいえ」に○をつけてください。**

● 選択肢が、回数や数を聞かれている質問の場合・・・

問　2時間以内に飲んだ飲酒量の最高記録はどれくらいですか。

○ おおよそ　10　ドリンク → **「整数」を「１つのみ」記入ください。**
回答はおおよその数値で結構です。

× おおよそ　5.25　ドリンク → **最も近い「整数」を記載ください（この場合 5）**

× おおよそ　5～6　ドリンク → **数字は１つのみ記載してください（この場合 5 か 6）**

(注) 回答中に出てくる「ドリンク」の目安は、以下の通りです (酒類、量によって数字が変わります)。

換　算　表

酒類	日本酒	ビール	焼酎	チューハイ	カクテル類	梅酒	ウィスキー	ウィスキー
アルコール濃度	15%	5%	25%	7%	5%	12%	43%	12%
飲酒量	1合 (180ml)	缶1本 中ジョッキー1杯 (500ml)	コップ半分 (100ml)	缶1本 (350ml)	缶1本 (350ml)	小コップ1杯 (90ml)	水割り ダブル1杯 (60ml)	グラス1杯 (150ml)
ドリンク数	2ドリンク	2ドリンク	2ドリンク	2ドリンク	1.5ドリンク	1ドリンク	2ドリンク	1.5ドリンク

1 以下のうち、適切な数字に○をつけてください。

問 1-1　あなたの飲酒についておうかがいします。あなたは飲酒しますか。

0　一度も飲酒したことがない　　**1**　飲酒する　　**2**　飲酒したことがあるが、この1年は飲まない

→0と答えた方は、質問7（最後の質問）に飛んでください。
それ以外の方は以下の質問に進んで下さい。

問 1-2　あなたはアルコール含有飲料をどのくらいの頻度で飲みますか。

1　毎日　　**2**　1週間に6回　　**3**　1週間に5回　　**4**　1週間に4回
5　1週間に3回　　**6**　1週間に2回　　**7**　1週間に1回　　**8**　月に3回
9　月に2回　　**10**　月に1回　　**11**　年に3-11回　　**12**　年に1-2回
0　年に1回未満

2 あなたの飲酒の状況についておうかがいします。適切な数字に○をつけてください。

問 2-1　あなたはアルコール含有飲料をどのくらいの頻度で飲みますか。

0　飲まない　　**1**　1カ月に1度以下　　**2**　1カ月に2 ～4度
3　1週に2 ～3度　　**4**　1週に4度以上

問 2-2　飲酒する時には通常どのくらいの量を飲みますか。

0　0 ～ 2 ドリンク　　**1**　3 ～ 4 ドリンク　　**2**　5 ～ 6 ドリンク
3　7 ～ 9 ドリンク　　**4**　10 ドリンク以上

問 2-3　1 度に 6 ドリンク以上飲酒することがどのくらいの頻度でありますか。

0　ない　　**1**　1カ月に1度未満　　**2**　1カ月に1度　　**3**　1週に1度
4　毎日あるいはほとんど毎日

問 2-4　過去 1 年間に、飲み始めると止められなかったことが、どのくらいの頻度でありましたか。

0　ない　　**1**　1カ月に1度未満　　**2**　1カ月に1度　　**3**　1週に1度
4　毎日あるいはほとんど毎日

問 2-5　過去 1 年間に、普通だと行えることを飲酒していたためにできなかったことが、どのくらいの頻度でありましたか。

0　ない　　**1**　1カ月に1度未満　　**2**　1カ月に1度　　**3**　1週に1度
4　毎日あるいはほとんど毎日

問 2-6　過去 1 年間に、深酒の後体調を整えるために、朝迎え酒(二日酔いの症状を緩和させるためにお酒を飲む)をせねばならなかったことが、どのくらいの頻度でありましたか。

0　ない　　**1**　1カ月に1度未満　　**2**　1カ月に1度　　**3**　1週に1度
4　毎日あるいはほとんど毎日

問 2-7　過去 1 年間に、飲酒後罪悪感や自責の念にかられたことが、どのくらいの頻度でありましたか。

0　ない　　**1**　1カ月に1度未満　　**2**　1カ月に1度　　**3**　1週に1度
4　毎日あるいはほとんど毎日

問 2-8　過去 1 年間に、飲酒のため前夜の出来事を思い出せなかったことが、どのくらいの頻度でありましたか。

0　ない　　1　1カ月に1度未満　　2　1カ月に1度　　3　1週に1度 4　毎日あるいはほとんど毎日

問 2-9　あなたの飲酒のために、あなた自身か他の誰かがけがをしたことがありますか。

0　ない　　2　あるが、過去1年にはなし　　4　過去1年間にあり

問 2-10　肉親や親戚、友人、医師、あるいは他の健康管理にたずさわる人が、あなたの飲酒について心配したり、飲酒量を減らすように勧めたりしたことがありますか。

0　ない　　2　あるが、過去1年にはなし　　4　過去1年間にあり

3　あなたの飲酒の状況についておうかがいします。空欄に適切な整数を１つのみ記入ください。

ドリンクの換算は、質問用紙の最初にある換算表を参考に回答してください。（ビールなら中ジョッキ1杯で2ドリンクとなります）

問 3-1　過去1年間に、1日に男性は5ドリンク、女性は4ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 3-2　過去1年間に、2時間以内に男性は5ドリンク以上、女性は4ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 3-3　過去1年間に、自分が飲もうと思っていた量よりもさらに多く飲酒してしまったことが何回くらいありましたか。

おおよそ　　回

問 3-4　問 3-1、3-2、3-3 の質問のうち一つでも「少なくとも1回以上」と回答した学生の方にお尋ねします。そのような飲酒をしたシチュエーションと人数についてあてはまるものすべてに○をつけてください。

＜シチュエーション＞

1　新入生歓迎コンパ　　2　卒業生追い出しコンパ　　3　忘年会　　4　新年会 5　花見　　6　合宿　　7　文化祭や体育祭などイベント後の打ち上げ 8　その他（　　）

＜人数＞

1　1人　　2　2～3人　　3　4～10人　　5　10人以上（おおよそ　　人）

問 3-5　過去1年間に、飲酒の影響で事故にあったり、けがをしたことが何回くらいありましたか。

おおよそ　　回

問 3-6　飲酒する時には1回につき、通常どのくらいの量を飲みますか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ　　ドリンク

問 3-7　あなたは、いい気分になるまでに何ドリンク飲酒する必要がありますか。（いい気分になるまで飲んだことのない方は「なし」と記載ください）

おおよそ　　ドリンク

4　飲み放題システムについてお伺いします。

問 4-1　飲み放題システムを利用したことがありますか。

1　はい　　2　いいえ→5へお進みください

問 4-2-1　問 4-1 で「はい」と回答した方のみお答えください。
飲み放題システムを利用したとき、何ドリンクくらい飲みますか。
質問用紙の最初にある換算表を参考に回答してください。
（ビールなら中ジョッキ 1 杯で 2 ドリンクとなります）

ドリンク

問 4-2-2　飲み放題システムを利用しない場合、何ドリンクくらい飲みますか。

ドリンク

問 4-3　飲み放題システムを利用する理由について、あてはまるものすべてに○をつけてください。

1　安い　　2　お得感がある　　3　たくさん飲みたい　　4　種類が豊富
5　お金を気にせず飲める　　6　それだけで楽しい　　7　その他
（　　）

5　飲酒の理由についてお尋ねします。あてはまるものすべてに○をつけてください。

1　楽しい気分・雰囲気になる　　2　リラックスできる　　3　対人関係がスムーズになる
4　食欲増進できる（美味しくなる）　　5　嫌なことを忘れる　　6　気分がハイになる
7　かっこいいと思われる　　8　寝つきが良くなる　　9　周囲の期待に応えられる
10　ストレス発散できる　　11　周囲からの強要　　12　その他（　　）

6　飲酒で経験したことについて、以下の中からあてはまるものすべてに○をつけてください。

1　楽しい気分になった　　2　ストレスを発散できた　　3　興奮状態になった
4　眠くなった　　5　気持ちが沈んだ　　6　気が大きくなった　　7　乱暴になった
8　転倒などでケガをした
9　二日酔いなど体調不良になった（具体的には？　　）
10　変わらなかった　　11　その他（　　）

7　最後に、あなた自身についておうかがいします。

問 7-1　あなたの性別、年齢をおうかがいします。該当する性別に○をつけ、年齢をご記入ください。

性別：　男　・　女　　年齢：　　歳

問 7-2　あなたの学年、学部をおうかがいします。学年、学部をご記入ください。

学年：　　年　　学部：　　学部

問 7-3　あなたの所属している部・サークルがあれば文科系か運動系かを選択してください。

1　所属していない　　2　所属している（①文科系　　②　運動系　　③両方）

＜インタビュー協力のお願い＞

問 3-2 の「過去 1 年間に、2 時間以内に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。」の質問に「1 回以上」と回答した学生の中で、その時の状況や心理状態などについてインタビューに応じていただける学生の方、別添のはがきにお名前と連絡先をご記入し投函ください。研究者が後日直接連絡を差し上げ、改めて説明文書を送らせていただきます。インタビュー参加者の方の大学がある地域や性別などに偏りが無いようにするため、お申し出頂いたにもかかわらず協力のお断りを申し出る場合がございますがご了承ください。その場合には、ご提示いただいている連絡先にこちらから連絡させていただきます。インタビューは都合が良い日程、場所を調整させていただきます。倫理的配慮は十分に致します。少しですがお礼(クオカード等)をさせていただきます。どうぞよろしくお願いいたします。

以上で質問票は終了となります。

趣旨を御理解いただき、ご協力ありがとうございました。

飲酒に関するアンケート

＜大学生および社会人用＞

・　回答時間の目安は１５分程度です。
・　このテストは１ページから６ページまであります。
・　このテストに関するご質問は下記の問い合わせ先までお願いいたします。

＜連絡先＞

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<解答例>

◇ 選択肢が番号、はい・いいえの質問の場合・・・

０　ない　　１　１カ月に１度未満　　２　１カ月に１度　　３　１週に１度
④　毎日あるいはほとんど毎日

→回答する「番号、はい、いいえ」に○をつけてください。

◇ 選択肢が、回数や数を聞かれている質問の場合・・・

問　2時間以内に飲んだ飲酒量の最高記録はどれくらいですか。

「整数」を「１つのみ」記入ください。

おおよそ　10　ドリンク　→　回答はおおよその数値で結構です。

×　おおよそ　5.25　ドリンク　→　最も近い「整数」を記載ください（この場合5）

×　おおよそ　5～6　ドリンク　→　数字は１つのみ記載してください（この場合５か6）

（注）回答中に出てくる「ドリンク」の目安は、以下の通りです（酒類、量によって数字が変わります）。

換算表	酒類	日本酒	ビール	焼酎	チューハイ	カクテル類	梅酒	ウィスキー	ワイン
	アルコール濃度	15%	5%	25%	7%	5%	12%	43%	12%
	飲酒量	1合（180ml）	缶1本 中ジョッキー1杯（500ml）	コップ半分（100ml）	缶1本（350ml）	缶1本（350ml）	小コップ1杯（90ml）	水割り ダブル1杯（60ml）	グラス1杯（150ml）
	ドリンク数	2ドリンク	2ドリンク	2ドリンク	2ドリンク	1．5ドリンク	1ドリンク	2ドリンク	1．5ドリンク

問１．あなたはアルコール含有飲料をどのくらいの頻度で飲みますか。

1	毎日	2	1週間に6回	3	1週間に5回	4	1週間に4回
5	1週間に3回	6	1週間に2回	7	1週間に1回		

問２．あなたの飲酒の状況についておうかがいします。空欄に適切な整数を１つのみ記入ください。
ドリンクの換算は、質問用紙の最初にある換算表を参考に回答してください。（ビールなら中ジョッキ１杯で２ドリンクとなります）

問 2-1　過去 30 日間に、何回飲酒しましたか。

おおよそ　　回

問 2-2　過去 30 日間に、１日に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 2-3　過去 30 日間に、2 時間以内に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 2-4　過去 30 日間に、最も多く飲酒したときにどれくらいの量を飲みましたか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ　　ドリンク

問 2-5　問 2-2 と問 2-3 で 1 回以上と回答した方は以下の設問にお答えください。それ以外の方は問３へお進みください。

問 2-5-1　問 2-2 や問 2-3 は短時間で多量の飲酒をする飲み方ですが、このような飲み方についてどのように考えますか。選択肢１～３の考え方に当てはまるものに○をつけてください。

1　このような飲み方はリスクがあると思うのでやめたほうがいいと思う
2　このような飲み方はリスクがあると思うが特にやめる必要はないと思う
3　このような飲み方にリスクを感じない

問 2-5-2 短時間での多量の飲酒をすることについて、以下のどのようなことがあるとそのような飲み方をやめる、あるいはやめた方がいいと考えるようになると思いますか。もっとも当てはまると思うものを 3 つ選んで○をつけてください。

1．翌朝二日酔いになる（頭痛、吐き気など）	2．自分自身や他の誰かがけがをする
3．飲んでいる途中に意識を失う	4．飲酒に伴う症状で学校（会社）を休む
5．救急搬送される	6．警察の厄介になる

７．友人、恋人、配偶者、親や親せきとの間で問題を引き起こす

８．周囲の人から飲酒量を減らすように勧められる

９．肝機能障害などの健康問題を指摘される

１０．ライフスタイルが変わる（具体的な内容について○をつけてください）

（ 就職、 結婚、 妊娠・出産、その他（ ） ）

１１．体力的に飲めなくなる　　１２．アルコールに関するセミナーなどに参加する

１３．やめようとはおもわない

１４．その他（ ）

問 2-5-3　短時間で多量の飲酒をする（続ける）理由として考えられるものに○をつけてください。

１　やめようと思えばいつでも辞められるから	２　実際に問題が起きていないから
３　若気の至りであるから	４　誰からも指摘されていないから
５　ストレスが発散できるから	６　いやなことを忘れられるから
７　楽しい気分になれるから	８　対人関係がスムーズになるから
９　たくさん飲めた方がかっこいい	
１０　その他（ ）	

３．自分の飲酒量について

問 3-1　自分の飲酒量について、自分自身でどう思いますか。

０　全然飲まない　１　あまり飲まない　２　同じくらい飲む　３　まあ飲む　４　かなり飲む

問 3-2　自分の飲酒量について、同年代の大学生（社会人の方は周囲）に比べてどう思いますか。

０　全然飲まない　１　あまり飲まない　２　同じくらい飲む　３　まあ飲む　４　かなり飲む

４．あなたの体質についておうかがいします。「はい」か「いいえ」に○をつけてください。

問 4-1　現在、ビール１杯程度の少量の飲酒で、すぐ顔が赤くなる体質がありますか。

０　はい　１　いいえ

問 4-2　飲酒を始めたころの 1～2 年間は、ビール１杯程度の少量の飲酒で、すぐ顔が赤くなる体質がありましたか。（問４－１で「はい」と答えた方は「はい」とお答えください。

０　はい　１　いいえ

５．飲み放題システムについてお伺いします。

問 5-1　飲み放題システムを利用したことがありますか。社会人の方は、大学卒業後の利用経験を回答ください。

１　はい　２　いいえ→５へお進みください

問 5-2-1　問 5-1 で「はい」と回答した方のみお答えください。飲み放題システムを利用したとき何ドリンクくらい飲みますか。質問用紙の最初にある換算表を参考に回答してください。
（ビールなら中ジョッキ１杯で 2 ドリンクとなります）

ドリンク

問 5-2-2　飲み放題システムを利用しない場合、何ドリンクくらい飲みますか。

ドリンク

問 5-3　飲み放題システムを利用すると飲酒量が約２倍近くになることが明らかにされています。飲み放題だとなぜ飲酒量が増えると思いますか。当てはまるものに〇をつけてください。ここにある選択肢以外でご自身で考えられる理由があれば７に〇をつけ具体的にお書きください。

１　元を取りたい	２　種類が豊富だから	３　普段我慢しているから
４　たくさん飲めた方が盛り上がるから	５　たくさん飲む人につられる	
６　飲むように強要される	７　時間制限があるから（急かされる）	
８　その他（　　）		

問６　この質問は、あなたがここ１か月に、どのくらい頻繁に、感じ・考えたかをお尋ねするものです。回数を数え上げる必要はありません。ここ１か間を振り返って、素早くお答えください。意味の似通った質問も含まれますが、独立した質問としてお答えください。　回答は、以下の選択肢の中から１つを選んで下さい。

	まったくなかった	ほとんどなかった	ときどきあった	しばしばあった	いつもあった
1. 予想もしなかった目にあってうろたえた	0	1	2	3	4
2. 大事なことを自分の思うようにできないと感じた	0	1	2	3	4
3. 神経質になり、”ストレス“を感じた	0	1	2	3	4
4. わずらわしいことをうまくかたづけることができた	0	1	2	3	4
5. 自分は身のまわりの重大な変化をうまく処理していると感じた	0	1	2	3	4
6. 自分の個人的な問題を自分でかたづける能力に自信を持った	0	1	2	3	4
7. いろいろなことが自分の思い通りにはこんでいると感じた	0	1	2	3	4
8. 自分がしなければならないことすべてに応じきれていないと感じた	0	1	2	3	4
9. いらだたしいことを自分の思うようにすることができた	0	1	2	3	4
10. 自分がものごとを思うようにコントロールできていると感じた	0	1	2	3	4
11. 自分の思い通りにならない出来事に怒りをおぼえた	0	1	2	3	4
12. うまくやり遂げなければならないことについて、あれこれと悩んだ	0	1	2	3	4
13. 自分自身の時間を自分の思い通りにつかうことができた	0	1	2	3	4
14. 難しい問題が山積みになっていて、解決できないと感じた	0	1	2	3	4

問７　大学生の方は該当する性別に〇をつけ、年齢をご記入ください。

性別：　　男　・　女　　年齢：　　歳

＊大学生の方は、これで終了になります。社会人の方は引き続き設問にご回答ください。

問８　以降の設問は、大学生の時のことを振り返ってお答えください。

問 8-1. 大学生の時、あなたはアルコール含有飲料をどのくらいの頻度で飲んでいましたか。

1　毎日	2　1週間に6回	3　1週間に5回	4　1週間に4回	
5　1週間に3回	6　1週間に2回	7　1週間に1回	8　月に3回	9　月に2回
10　月に1回	11　年に3-11回	12　年に1-2回	0　年に1回未満	

問 8-2. あなたの大学生時代の飲酒の状況についておうかがいします。空欄に適切な整数を1つのみ記入ください。ドリンクの換算は、質問用紙の最初にある換算表を参考に回答してください。(ビールなら中ジョッキ1杯で2ドリンクとなります)

問 8-2-1 大学生の時、30 日間（1 か月間）に何回飲酒していましたか。

-おおよそ	回

問 8-2-2　大学生の時、30 日間（1 か月間）に、1 日に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ	回

問 8-2-3　大学生の時、30 日間（1 か月間）に、2 時間以内に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ	回

問 8-2-4　大学生の時、30 日間（1 か月間）に、最も多く飲酒したときにどれくらいの量を飲みましたか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ	ドリンク

問 8-3-1　問 7-2-2 や問 7-2-3 のいずれかあるいは両方の問で 1 回以上と回答された方にお尋ねします。
今でも、短時間で多くの飲酒をするような飲み方をしていますか。

1　はい　⇒　問 8 へ	2　いいえ　⇒　問 8-3-2 へ

問 8-3-2　短時間で多くの飲酒をするような飲み方をやめたきっかけとしてあてはまるものがあれば○をつけてください。

1．翌朝二日酔いになった（頭痛、吐き気など）	2．自分自身や他の誰かがけがをした
3．飲んでいる途中に意識を失った	4．飲酒に伴う症状で学校を休んだ
5．救急搬送された	6．警察の厄介になった
7．友人、恋人、配偶者、親や親せきとの間で問題を引き起こした	
8．周囲の人から飲酒量を減らすように勧められた	
9．肝機能障害などの健康問題を指摘された	
10．ライフスタイルが変わった（具体的な内容について○をつけてください）	
（　就職、　結婚、　妊娠・出産、その他（　　）　）	
11．体力的に飲めなくなった	12．アルコールに関するセミナーなどに参加した
13．特に理由はない	
14．その他（　　）	

問 9-1　最後に、あなた自身についておうかがいします。
該当する性別に○をつけ、年齢をご記入ください。

性別：　男　・　女　　年齢：　　歳

問 9-2　職業について以下からお選びください。

・公務員	**・経営者/役員**	**・会社員（事務職）**
・会社員（技術系）	**・会社員（その他）**	**・自営業**
・自由業	**・専業主婦**	**・パート・アルバイト**
・無職		

以上で終了となります。趣旨を御理解いただき、ご協力ありがとうございました。

《健康教育セミナー参加（研究協力者）募集》

筑波大学社会精神保健学森田研究室では、「大学生のビンジドリンキングの予防教育プログラムの有用性の検証」のテーマで研究を行っています。本研究はこれからの大学生への健康教育の発展に貢献することを目的に行うものです。この調査研究の趣旨にご賛同いただき、ボランティアとして参加していただける方を広く募集します。参加を希望される方、ご興味をお持ちの方は件名に「大学生に対する健康教育セミナー参加希望」と記載の上、本文に所属／氏名／連絡先(メールアドレス等)を明記し、研究責任者連絡先 s1730365@s.tsukuba.ac.jp までお送りください。こちらから連絡させていただきます。

＜開催日と場所＞

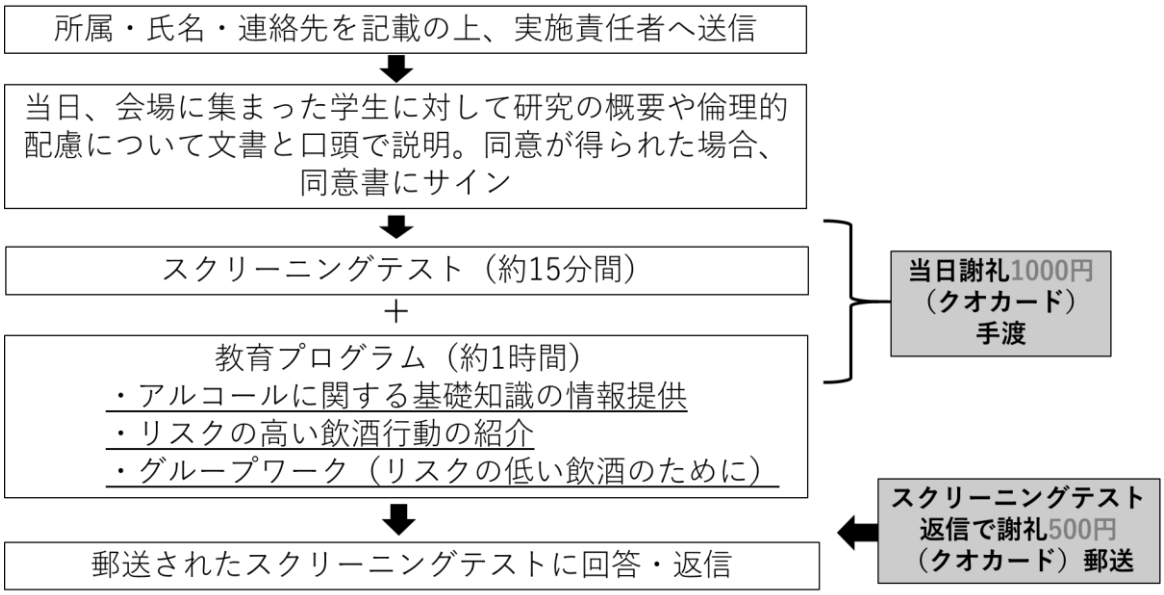
①12月　4日(火)　1430～1600（総合研究棟 D117）
②12月　5日（水）　1800～1930（総合研究棟 D117）
③12月　6日（木）　1800～1930（総合研究棟 D115）
④12月10日（月）　1800～1930（総合研究棟 D115）
⑤12月21日（金）　1800～1930（総合研究棟 D115）

＊上記以外でも12月中に希望される日（土日可）があれば調整させていただきます。

＜応募条件＞

20 歳以上の大学生・大学院生

＜研究のイメージ＞



＜研究責任者連絡先＞

筑波大学大学院人間総合科学研究科　ヒューマン・ケア科学専攻　川井田　恭子
〒３０５－８７８８　茨城県つくば市天王台１－１－１
筑波大学総合研究棟 D743 号室　電話・ファックス　029-853-3099
E-mail: s1730365@s.tsukuba.ac.jp　まで（研究指導者：社会精神保健学　准教授　森田展彰 ）

飲酒に関わるスクリーニングテスト

＜大学生版＞

・　回答時間の目安は１５分程度です。
・　このテストは１ページから６ページまであります。
・　このテストに関するご質問は下記の問い合わせ先までお願いいたします。

＜連絡先＞
【研究代表者】
筑波大学大学院人間総合科学研究科　ヒューマン・ケア科学専攻　川井田　恭子
防衛医科大学校　精神看護学講座
E-mail: s1730365@s.tsukuba.ac.jp　まで

<解答例>

◇ 選択肢が番号、はい・いいえの質問の場合・・・

０　ない　　１　１カ月に１度未満　　２　１カ月に１度　　３　１週に１度
④　毎日あるいはほとんど毎日

→ 回答する「番号、はい、いいえ」に○をつけてください。

◇ 選択肢が、回数や数を聞かれている質問の場合・・・

問　２時間以内に飲んだ飲酒量の最高記録はどれくらいですか。

おおよそ　１０　ドリンク　→ 「整数」を「１つのみ」記入ください。
回答はおおよその数値で結構です。

×　おおよそ　5.25　ドリンク　→ 最も近い「整数」を記載ください（この場合 5）

×　おおよそ　5～6　ドリンク　→ 数字は１つのみ記載してください（この場合 5 か 6）

（注）回答中に出てくる「ドリンク」の目安は、以下の通りです（酒類、量によって数字が変わります）。

換算表	酒類	日本酒	ビール	焼酎	チューハイ	カクテル類	梅酒	ウィスキー	ワイン
	アルコール濃度	15%	5%	25%	7%	5%	12%	43%	12%
	飲酒量	1合（180ml）	缶1本 中ジョッキー1杯（500ml）	コップ半分（100ml）	缶1本（350ml）	缶1本（350ml）	小コップ1杯（90ml）	水割りダブル1杯（60ml）	グラス1杯（150ml）
	ドリンク数	2ドリンク	2ドリンク	2ドリンク	2ドリンク	1．5ドリンク	1ドリンク	2ドリンク	1．5ドリンク

1．あなたはアルコール含有飲料をどのくらいの頻度で飲みますか。

1　毎日　　2　1週間に6回　　3　1週間に5回　　4　1週間に4回

5　1週間に3回　　6　1週間に2回　　7　1週間に1回　　8　月に3回　　9　月に2回

10　月に1回　　11　年に3-11回　　12　年に1-2回　　0　年に1回未満

2．あなたの飲酒の状況についておうかがいします。適切な数字に○をつけてください。

問 2-1　あなたはアルコール含有飲料をどのくらいの頻度で飲みますか。

0　飲まない　　1　1カ月に1度以下　　2　1カ月に2 ～4度

3　1週に2 ～3度　　4　1週に4度以上

問 2-2　飲酒する時には通常どのくらいの量を飲みますか。

0　0 ～ 2 ドリンク　　1　3 ～ 4 ドリンク　　2　5 ～ 6 ドリンク

3　7 ～ 9 ドリンク　　4　10 ドリンク以上

問 2-3　1 度に 6 ドリンク以上飲酒することがどのくらいの頻度でありますか。

0　ない　　1　1カ月に1度未満　　2　1カ月に1度　　3　1週に1度

4　毎日あるいはほとんど毎日

3．あなたの飲酒の状況についておうかがいします。空欄に適切な整数を1つのみ記入ください。
ドリンクの換算は、質問用紙の最初にある換算表を参考に回答してください。（ビールなら中ジョッキ1杯で2ドリンクとなります）

問 3-1　過去 30 日間に、何回飲酒しましたか。

おおよそ　　回

問 3-2　過去 30 日間に、1 日に男性は 5 ドリンク、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 3-3　過去 30 日間に、2 時間以内に男性は 5 ドリンク以上、女性は 4 ドリンク以上飲酒したことが何回ありましたか。

おおよそ　　回

問 3-4　問 3-3 で 1 回以上と回答した場合、2 時間以内で最も多く飲酒したときにどれくらいの量を飲み

ましたか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ	ドリンク

問 3-5　過去 30 日間に、最も多く飲酒したときにどれくらいの量を飲みましたか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ	ドリンク

問 3-6　飲酒する時には 1 回につき、通常どれくらいの量を飲みますか。複数の酒類を合わせて飲んでいる場合は、全てを足して答えてください。

おおよそ	ドリンク

４．あなたの飲酒についておうかがいします。「はい」か「いいえ」に○をつけてください。

問 4-1　現在、ビール 1 杯程度の少量の飲酒で、すぐ顔が赤くなる体質がありますか。

0　はい　　1　いいえ

問 4-2　飲酒を始めたころの 1～2 年間は、ビール 1 杯程度の少量の飲酒で、すぐ顔が赤くなる体質がありましたか。(問 4 - 1 で「はい」と答えた方は「はい」とお答えください。

0　はい　　1　いいえ

問 4-3　アルコールに対する自分の体質について、どう思いますか。

0　まったく弱い　1　どちらかというと弱い　2　普通　3　どちらかというと強い　4　かなり強い

問 4-4　自分の飲酒量について、自分自身でどう思いますか。

0　全然飲まない　1　あまり飲まない　2　同じくらい飲む　　3　まあ飲む　　4　かなり飲む

問 4-5　自分の飲酒量について、同年代の大学生に比べてどう思いますか。

0　全然飲まない　1　あまり飲まない　2　同じくらい飲む　　3　まあ飲む　　4　かなり飲む

問 4-6　あなたの飲酒習慣に関するお考えや行動について、現在、もっとも当てはまる項目に○をつけてください。

0　飲酒習慣を改善する必要はないと思っている
1　飲酒習慣を改善することに関心はあるが、6 か月以内に開始しようと考えていない
2　飲酒習慣の改善を、6 か月以内に実行しようと考えている
3　飲酒習慣の改善に関心があり、今後 1 か月以内に実行しようと考えている
4　飲酒習慣の改善に取り組んで、6 か月以内である
5　飲酒習慣の改善に取り組んで、6 か月以上経過している

⇒　次のページにも設問があります

問５．以下に、人々が飲酒しようと思う 20 の理由が挙げられています。以下に示す理由であなたが飲酒することがどの程度の頻度であるか、５つの選択肢から１つ選んでチェックしてください。

	まったくない	ときどきある	半分くらいある	かなりある	ほとんど毎回
1. 心配事を忘れさせてくれる	0	1	2	3	4
2. 友人が飲むように圧力をかける	0	1	2	3	4
3. パーティを楽しめるようにしてくれる	0	1	2	3	4
4. 落ち込みやイライラを解消してくれる	0	1	2	3	4
5. 社交的になれる	0	1	2	3	4
6. 気分が悪い時に元気づけてくれる	0	1	2	3	4
7. その雰囲気が好ましい	0	1	2	3	4
8. 他の人たちが飲まないということについてからかわれたくない	0	1	2	3	4
9. 刺激的である	0	1	2	3	4
10. ハイになれる	0	1	2	3	4
11. 社交的な集まりをより楽しいものにしてくれる	0	1	2	3	4
12. あなたの好きなグループに溶け込ませてくれる	0	1	2	3	4
13. 気分をよくしてくれる	0	1	2	3	4
14. パーティや祝賀会を盛り上げてくれる	0	1	2	3	4
15. 自己の自信や確信を高めてくれる	0	1	2	3	4
16. 友人と特別な機会を祝うことができる	0	1	2	3	4
17. 自分の抱えている問題を忘れさせてくれる	0	1	2	3	4
18. それ自体が愉しい	0	1	2	3	4
19. 好きになってもらえる	0	1	2	3	4
20. 無視されたくない	0	1	2	3	4

問６．以下は、飲酒中もしくは飲酒後に時々経験することの一覧です。あなたは「過去１か月以内」に、以下のような経験をしましたか？ あてはまる番号に○をつけてください。

1. 飲酒中に周囲を困らせるような言動をした
2. 翌朝二日酔いになった（頭痛、吐き気など）
3. 飲んだ後、吐き気や嘔吐があった
4. 夜の間飲まないつもりだったのに結局飲んでしまうことが度々あった
5. 飲んでいるときにばかげた危険行動をとった
6. 飲んでいる途中に意識を失った
7. 酔うのに相当量のアルコールを必要とする、あるいは、気分がハイになったり酔うのに今までの量ではそうならなくなった
8. 飲んで後で後悔するような攻撃的な行動をとった
9. 多量に飲んで長時間記憶がなくなった
10. 安全運転ができなくなるくらい飲んだとわかっていて運転した
11. 飲酒や二日酔い、飲酒に伴う症状で学校を休んだり、仕事を休んだりした
12. 飲むと後悔するような性的行動をとった
13. ときどき、どれくらい飲むかコントロールできなくなった
14. 飲むととても無礼で、嫌がられるような、侮辱的な行動をとった
15. 大量に飲むと思いもしなかったところで目を覚ました
16. 飲んだ後、自分自身のことを悪く感じた
17. 飲むとエネルギーを消耗、あるいは疲れたと感じた
18. 飲酒により仕事の質または学業成績が下がった
19. 飲酒に相当の時間を消費した
20. 飲酒により家族や仕事、学校における責務を果たせなかった
21. 飲酒により自分自身や友人、恋人、配偶者、親や親せきとの間で問題を引き起こした
22. 飲酒で太った
23. 飲酒により見た目を損なった
24. 起きた時（朝食前）に飲みたくなった

⇒ 次のページにも設問があります

問７．お酒に関する基礎知識について以下の問いに○×で回答ください。

（　　）日本人は欧米人と同じくらいアルコールに強い。

（　　）少量のお酒で赤くなる人はがんになりやすい。

（　　）飲んでも気持ちよくならない人がいる。

（　　）アルコールの血中濃度は飲み始めて 5～10 分で最高潮に達する。

（　　）ビール中瓶 1 本飲んで 3 時間後に車を運転しても問題ない。

（　　）2 時間でビールジョッキ 2 杯半以上を飲酒すると転倒などケガのリスクが 20 倍以上高まる。

（　　）多量飲酒を続けると学業成績に影響が出るという報告がある。

（　　）ストレス発散のために飲酒する学生は、短時間で大量の飲酒をしやすい。

問８．この質問は、あなたがここ１か月に、どのくらい頻繁に、感じ・考えたかをお尋ねするものです。
回数を数え上げる必要はありません。ここ１か間を振り返って、素早くお答えください。
意味の似通った質問も含まれますが、独立した質問としてお答えください。
回答は、以下の選択肢の中から１つを選んで下さい。

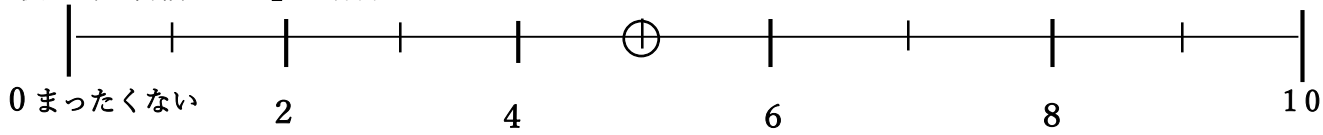
	まったくなかった	ほとんどなかった	ときどきあった	しばしばあった	いつもあった
1. 予想もしなかった目にあってうろたえた	0	1	2	3	4
2. 大事なことを自分の思うようにできないと感じた	0	1	2	3	4
3. 神経質になり、”ストレス“を感じた	0	1	2	3	4
4. わずらわしいことをうまくかたづけることができた	0	1	2	3	4
5. 自分は身のまわりの重大な変化をうまく処理していると感じた	0	1	2	3	4
6. 自分の個人的な問題を自分でかたづける能力に自信を持った	0	1	2	3	4
7. いろいろなことが自分の思い通りにはこんでいると感じた	0	1	2	3	4
8. 自分がしなければならないことすべてに応じきれていないと感じた	0	1	2	3	4
9. いらだたしいことを自分の思うようにすることができた	0	1	2	3	4
10. 自分がものごとを思うようにコントロールできていると感じた	0	1	2	3	4
11. 自分の思い通りにならない出来事に怒りをおぼえた	0	1	2	3	4
12. うまくやり遂げなければならないことについて、あれこれと悩んだ	0	1	2	3	4
13. 自分自身の時間を自分の思い通りにつかうことができた	0	1	2	3	4
14. 難しい問題が山積みになっていて、解決できないと感じた	0	1	2	3	4

問９．以下のそれぞれの人たちから勧められるお酒を断る自信はどの程度ありますか。

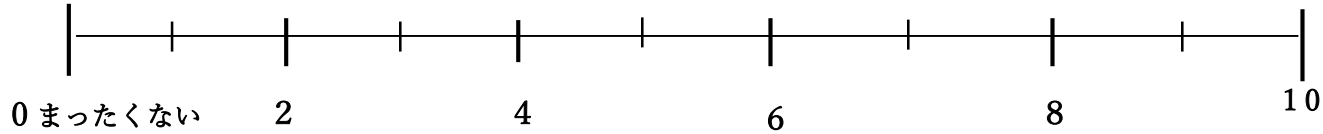
①先輩に勧められた　②同性の友人に勧められた　③異性の友人に勧められた　④後輩に勧められた

①～④の程度を下にあるスケールに○を記入してください。

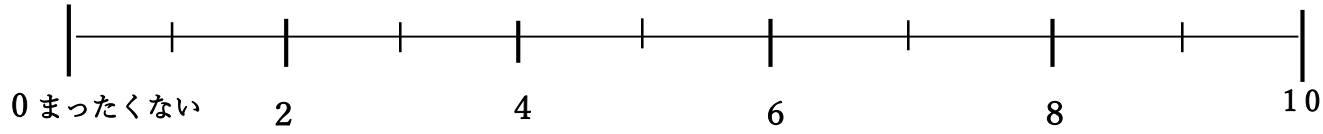
＜例：断る自信が「５」の場合＞



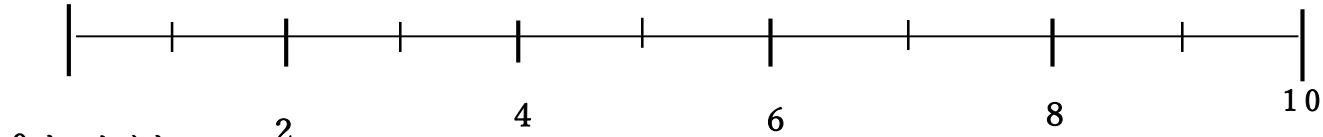
①先輩からの勧め



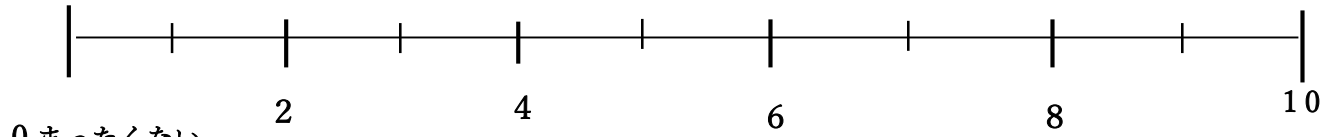
②同性の友人からの勧め



③異性の友人からの勧め



④後輩からの勧め



問１０．最後に、あなた自身についておうかがいします。

問 10-1　あなたの性別、年齢をおうかがいします。該当する性別に○をつけ、年齢をご記入ください。

性別：　男　・　女　　年齢：　　歳

問 10-2　あなたの学年、学部をおうかがいします。学年、学部をご記入ください。

学年：　　年　　学部：　　学部

問 10-3　あなたの所属している部・サークルがあれば文科系か運動系かを選択してください。

1　所属していない　　2　所属している（①文科系　　②　運動系　　③両方）

以上で終了となります。趣旨を御理解いただき、ご協力ありがとうございました。

添付資料6　教育用スライド

自分とお酒について考える
～お酒と上手に付き合うために～

平成31年1月25日
医学医療系　准教授　森田展彰
ヒューマン・ケア科学　社会精神保健学専攻　D2
筑波大学社会精神保健学　研究員
川井田　恭子

教育の目的

①アルコールに関する正しい知識と認識を持つ

②グループワークを通して自分とアルコールとの現在の関係について考える

③今後のアルコールとの付き合い方について考える

本日のメニュー

①アルコールについて
- アルコールによる酔いのメカニズム
- アルコールの弊害
- 短期的弊害のリスクを高めるビンジドリンキング

②グループワーク
- 現在のアルコールとの関係を振り返る
- 今後のつきあい方について考える

③まとめ

本日のメニュー

①アルコールについて
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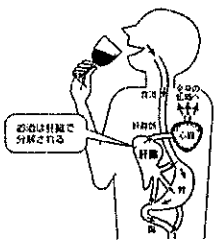
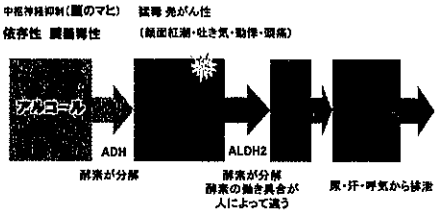
③まとめ

アルコールが身体の中に入ると、胃で20%、小腸で80%吸収され、肝臓で分解される

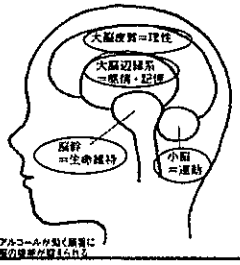


さらに肝臓ではどのようなことが行われているのか見てみましょう。

肝臓でのアルコール処理プロセス

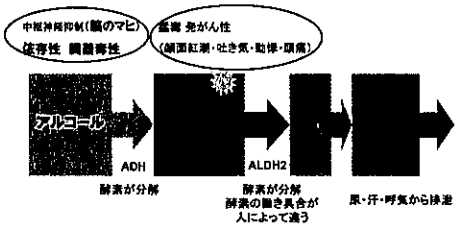


アルコールの血中濃度が上がると・・・？



アルコールは、抑制作用を持つ薬物
脳の神経細胞の働きを抑える

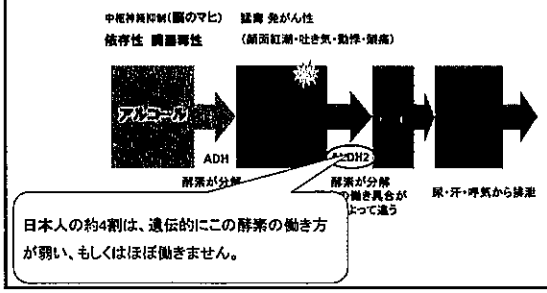
肝臓でのアルコール処理プロセス



それではすべての人が同じように
アルコールを処理できるでしょうか？

正解は ×　です。

肝臓でのアルコール処理プロセス



本日のメニュー

①アルコールについて
- アルコールによる酔いのメカニズム
- アルコールの弊害
- 短期的弊害のリスクを高めるビンジドリンキング

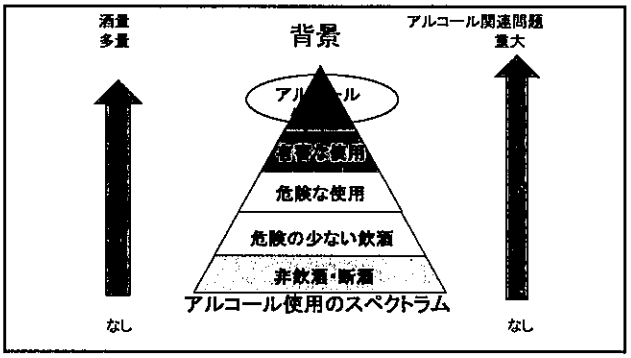
②グループワーク
- 現在のアルコールとの関係を振り返る
- 今後のつきあい方について考える

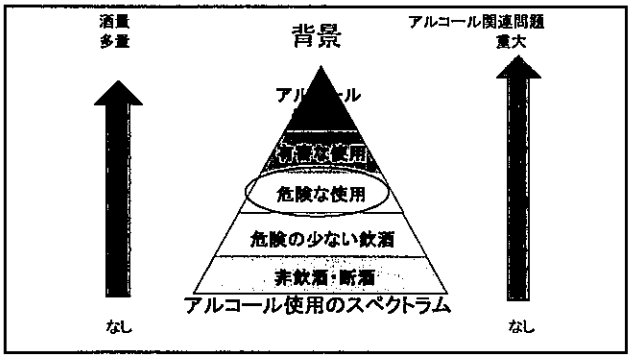
③まとめ

添付資料6　教育用スライド

アルコールを飲み続けると

どうなると思いますか？





本日のメニュー

①アルコールについて
- アルコールによる酔いのメカニズム
- アルコールの弊害
- 危険な飲酒行動のビンジドリンキング

②グループワーク
- 現在のアルコールとの関係を振り返る
- 今後のつきあい方について考える

③まとめ

皆さんはビンジドリンキング（Binge Drinking）って知ってますか？聞いたことがありますか？

Bingeとは、
①飲み騒ぎ、酒盛り、過度にすること
②大騒ぎのパーティー

動詞では、
①[･･･を]（病的に）食べ[飲み]すぎる。
②･･･にふける

ジーニアス英和大辞典より

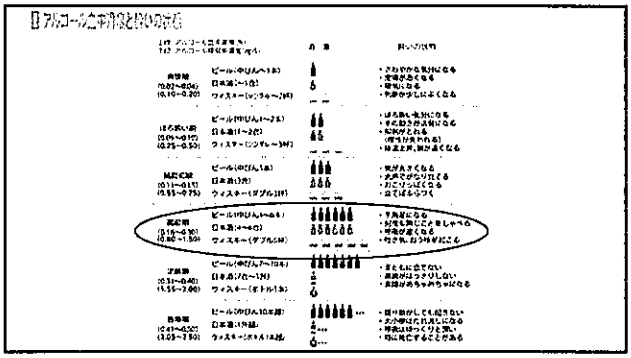
添付資料6　教育用スライド

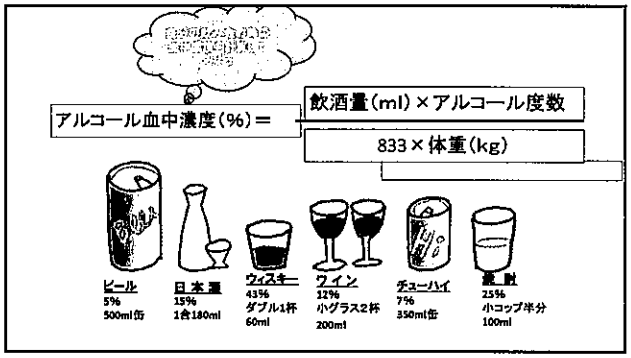
• Binge drinking(ビンジドリンキング)とは

飲み始めて2時間以内に、男性で5ドリンク*（ビール中ジョッキ約2.5杯）以上、女性で4ドリンク（ビール中ジョッキ約2杯）以上のアルコールを摂取するような飲酒パターンで「バカ飲み」や「痛飲」「暴飲」などともいわれる危険な行為**

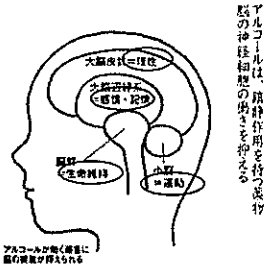
＊1ドリンクは純アルコール10g
＊＊NIAAA (National Institute of Alcohol Abuse and Alcoholism)による定義

ビンジドリンキングでは、血中のアルコール濃度が上昇してしまうことが問題なのですが、その結果どんな問題が起きるでしょうか？





アルコールの血中濃度が上がると・・・？



その結果・・・・

添付資料6　教育用スライド

大学生の飲酒に関連した有害事象

- 後になって後悔するようなことをした・・・33%
- どこで何をしていたか分からなくなった・・・21.3%
- 飲酒運転・・・15.2%(うち泥酔者2.5%)
- 避妊なしの性行為・・・11.6%
- 外傷(けが)・・・10.9%
- 警察沙汰・・・3.1%
- 人にけがをさせた・・・1.9%
- 同意なしの性行為・・・1.5%
- 自殺企図・・・1.3%

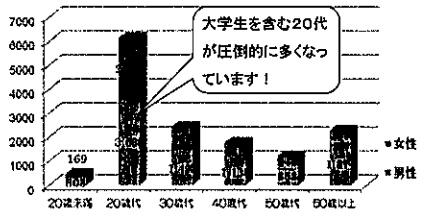
(College student alcohol abuse 教範より)

日本の大学生576名のアンケート結果より

- 二日酔いなど体調不良になった・・・27.0%
- 興奮状態になった・・・21.2%
- 気が大きくなった・・・17.6%
- 気持ちが沈んだ・・・5.9%
- 乱暴になった・・・3.3%
- 転倒などでケガをした・・・4.2%

日本の大学生ではビンジドリンキングのような短時間での多量飲酒によって外傷のリスクが約25倍高まると報告されています！

【年代別】急性アルコール中毒搬送人員(平成26年中)



ちなみに、先日テレビでテキーラを飲みすぎて緊急搬送された20歳男性の映像が放映されました。急性アルコール中毒と診断され、点滴の大量投与により数時間後には歩いて退院したのですが、その治療費はいくらだったでしょう？

なんと、9万円強！

この金額に一気に酔いは冷めたようでした。
おそらく飲み代も含めると、一晩で10万円以上の出費だったでしょう。
ビンジドリンキングはお財布も体も痛めるまさに「痛飲」ですね。(飲み放題)

ビンジドリンキングによって引き起こされる最も最悪の事態、それは

飲酒で命を落とすこと

大学生の飲酒による死亡事案

・S大学 1年生男性 ★未成年 死亡日：2017年9月13日

男子学生(18)は、9月12日に、サークル仲間である男女9人と沖縄へ旅行。宿泊先のペンションで、12日午後11時頃から翌13日午前1時までの2時間に、缶ビールやワイン、焼酎を飲んだ。学生は酔っぱらったまま床で寝ていたが、午前5時頃に仲間の一人が呼吸が停止していることに気づき119番通報。心肺停止の状態で病院へ搬送され、 午前7時頃死亡が確認。死因は急性アルコール中毒。

・京都府立大学　1年生女性　★未成年　死亡日：2015年12月16日

女子学生(19)は、16日午後5時40分ごろから、都室内で男女約10人と飲酒。午後10時　40分ごろ、他の学生が女子学生の意識が無いことに気付き、119番通報。救急搬送されたが約1時間後に死亡した。死因は急性アルコール中毒だった。女子学生が一緒に　いた学生に「ウイスキーを紙コップで2杯ぐらい飲んだ」と話していたという。

あなたはなぜビンジドリンキングを？

例：ストレス発散、楽しい気分になりたい、周りの期待に応えたいなど・・・。

どういう人がビンジドリンキングしやすいのか

・イタリアの文献で明らかになった"アルコールの効果に対する期待が高い"学生がビンジドリンキングする傾向にある

・私たちの調査では、「ストレス発散したい」「嫌なことを忘れたい」「楽しい気分になりたい」「対人関係がスムーズになる」という理由で飲酒する学生が有意にビンジドリンキングしていました。

心当たりはありますか？

グループワーク
自分とアルコールとの関係について考えてみよう

◎問1
ビンジドリンキングを続ける場合、そのメリットデメリットは？
ビンジドリンキングをやめるとしたらそのメリット、デメリットは？

	ビンジドリンキングを継続	ビンジドリンキングをやめる
メリット	①	②
デメリット	③	④

グループワークの方法

➢前後左右で数名のグループに分かれてください。

➢それぞれが、右の表の①～④の枠の中に思いつくことを準備した付箋紙に書きます。

➢その後、グループの意見をまとめます。

	ビンジドリンキングを継続	ビンジドリンキングをやめる
メリット	①	②
デメリット	③	④

添付資料6　教育用スライド

それでは、やってみましょう！

今回のグループワーク等を通して
「よりリスクの少ない飲酒」のために具体的にできそうなことを挙げてみましょう。

例：その日に飲む上限を設定しておく、
飲みすぎているときに声をかけてくれるように友人に頼む、など

わが国にはビンジドリンキングを助長しかねない危険なシステムがあります。
それは・・・。

そう！「飲み放題」

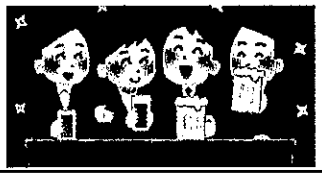
2010年5月の第63回WHO総会において全会一致で採択された「アルコールの有害な使用を低減するための世界戦略」では「安売りや飲み放題の禁止や制限」も含まれています。

本研究者が大学生を対象にして行った調査でも「飲み放題を使ったことがある」と回答した学生が約95%とほとんどの学生が利用したことが分かりました。日本はいまだにお酒に寛容な環境なのです。

まとめ

添付資料6　教育用スライド

皆様がお酒と上手に付き合い、残りの大学生活を楽しく有意義に過し、社会人として活躍されることを心の底から願っております。



Ethical approvals

平成 28 年 10 月 4 日

防衛看護学

川井田　恭子　殿

防衛医科大学校長

倫理委員会審査結果について（通知）

標記について、下記のとおり判定したので通知する。

記

1　受付番号　2567

2　審査対象　実施計画

3　課題名　大学生のビンジドリンキング（一時的多量飲酒）の実態とその関連要因（大学生のビンジドリンキングの予防に向けた教育プログラムの開発）

4　審査判定　（承認）　不承認　条件付承認

変更の勧告　非該当

5　理由　審査の結果、問題ないと認められたので承認する。

様式３（第１２条関係）

医の倫理委員会審査結果通知書

通知番号 第　1221-1　号
平成 29 年 12 月 18 日

申請者（研究責任者）
森田　展彰　　殿

医学医療系長
原　晃

平成29年11月24日付けで審査申請（変更）のありました研究の実施について、審査の結果、下記のとおり判定しましたので通知します。

記

1　研究題目　「大学生のビンジドリンキングの予防に向けた教育プログラムの開発」

2　判　定

■　承　認
□　条件付承認
□　変更の勧告
□　不承認
□　中　止
□　非該当

3　理由（判定が承認以外の場合）、留意点、改善点等

4　その他

※前回承認：平成29年9月4日、承認No. 1221

平成 30 年 2 月 5 日

精神看護学

川井田　恭子　殿

防衛医科大学校長

倫理委員会審査結果について（通知）

標記について、下記のとおり判定したので通知する。

記

1　受付番号　2854

2　審査対象　実施計画

3　課題名　大学生のビンジドリンキングの予防に向けた教育プログラムの開発

4　審査判定　(承　認)　不承認　条件付承認
変更の勧告　非該当

5　理　由　審査の結果、問題ないと認められたので承認する。

様式３（第１２条関係）

医の倫理委員会審査結果通知書

通知番号 第　1341　号
平成 30 年 11 月 14 日

申請者（研究責任者）
森田　展彰　　殿

医学医療系長
加藤光保

平成30年9月4日付けで審査申請（新規）のありました研究の実施について、審査の結果、下記のとおり判定しましたので通知します。

記

１　研究題目　「大学生に対するビンジドリンキング予防教育プログラムの有用性の検証その２」

２　判　定

■　承　認
□　条件付承認
□　変更の勧告
□　不承認
□　中　止
□　非該当

３　理由（判定が承認以外の場合）、留意点、改善点等

４　その他

様式３（第１２条関係）

医の倫理委員会審査結果通知書

通知番号 第　1323　号
平成 30 年 11 月 20 日

申請者（研究責任者）
森田 展彰　　殿

医学医療系長
加藤光保

平成30年8月6日付けで審査申請（新規）のありました研究の実施について、審査の結果、下記のとおり判定しましたので通知します。

記

１　研究題目　「大学生に対するビンジドリンキング予防教育プログラムの有用性の検証」

２　判　定

■　承　認
□　条件付承認
□　変更の勧告
□　不承認
□　中　止
□　非該当

３　理由（判定が承認以外の場合）、留意点、改善点等

４　その他

様式３（第１２条関係）

医の倫理委員会審査結果通知書

通知番号 第　1361　号
平成 31 年 1 月 9 日

申請者（研究責任者）
森田　展彰　　殿

医学医療系長
加藤光保

平成30年11月6日付けで審査申請（新規）のありました研究の実施について、審査の結果、下記のとおり判定しましたので通知します。

記

1　研究題目　「日本の大学生と社会人の飲酒行動の比較」

2　判　定

■　承　認
□　条件付承認
□　変更の勧告
□　不承認
□　中　止
□　非該当

3　理由（判定が承認以外の場合）、留意点、改善点等

4　その他

Submission papers

[Nihon Arukoru Yakubutsu Igakkai Zasshi
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Original

Prevalence of Binge Drinking and Association with Alcohol-related Consequences: A Cross-sectional Study of College Students in the Kanto Region of Japan

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Summary

Introduction: Binge drinking in college students is a major public health problem. However, data on binge drinking and alcohol-related consequences in Japanese college students are scarce. We surveyed the drinking behavior of post-secondary students and clarified the association between binge drinking and alcohol-related consequences.

Methods: This cross-sectional study consisted of a self-administered questionnaire. From December 2016 to March 2017, undergraduate and graduate students aged 20 years or older at 31 colleges in the Kanto region of Japan provided data on: 1) frequency of drinking alcohol, 2) amount of drinking per day, 3) binge drinking in the past year, and 4) alcohol-related consequences. We defined "binge drinking" as pure alcohol intake of ≥50 g for men and ≥40 g for women during a 2-hour period. Logistic regression was performed to assess the association between binge drinking and alcohol-related consequences.

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Results: A total of 1,030 questionnaires were delivered and 594 were returned (57.7% response rate). The 594 respondents included 383 (67.9%) binge drinkers. Binge drinkers and non-binge drinkers differed significantly in frequency of drinking per week (1.5 ± 1.6 vs. 0.6 ± 1.1 days) and amount of drinking (66.2 ± 41.4 vs. 26.2 ± 18.0 g/day). Among all students, binge drinkers had a history of significantly more alcohol related consequences such as "I became happy" (odds ratio 2.72[1.66-4.45]), "I felt stress relief" (odds ratio 2.65[1.62-4.34]) and "I had a hangover (headache, nausea, vomiting, etc.)" (odds ratio 2.42[1.44-4.06]) respectively.

Conclusion: Most post-secondary students engage in binge drinking. Students who engage in binge drinking experience both positive and negative consequences. Preventive intervention for binge drinking such as motivational interviewing is important.

Key words: college student, binge drinking, alcohol-related consequences

Introduction

In 2012, the World Health Organization (WHO) announced that 3.3 million people died from alcohol-related problems worldwide each year[1]. That number included young people; excessive alcohol use is the primary risk factor for premature death and disability among people between the ages of 15 and 49 years[2]. Excessive alcohol use can be classified into three categories: alcohol dependence, hazardous drinking, and harmful drinking[3]. Binge drinking is a type of harmful drinking. Its definition varies across studies, but commonly consists of the consumption of five or more drinks (for men) or four or more drinks (for women) over a period of about 2 hours[4]. Binge drinking has been reported to be associated with unintentional and intentional injuries, alcohol poisoning, sexually transmitted diseases, unintended pregnancy, and other adverse outcomes[5]. Binge drinking is most common among young adults between 18 and 34[6] and leads to various alcohol-related problems including death, injury, physical assault, and unprotected sex[7]. Regarding the prevalence of binge drinking among young people, 37.9% of college students aged 18-22 years reported binge drinking in the past month compared with 32.6% of other persons in the same age group[8]. These findings indicate that college students are a higher-risk population among young people.

Since 1984, alcohol consumption among young people aged 20 to 29 years in Japan has gradually increased[9], and excessive drinking including binge drinking has been observed particularly among young people[10]. Regarding binge drinking, the prevalence of binge drinking among college students was 56.8% for men and 47.8% for women and binge drinkers experience significantly more alcohol-related injuries (odds ratio (OR), 25.6; 95% confidence ratio (CI), 8.05-81.4)[11]. One study investigating alcohol-related consequences found headache, vomiting, memory loss, being late or absent for classes due to hangovers, use of violent language, and violence[12]. Other articles describe binge drinkers feeling down, becoming cheerful, generous, or sleepy, while some participants reported no changes after drinking[13,14]. However, there are few reports about the association between binge drinking and other positive or negative alco-

hol-related consequences. Before developing interventions to reduce risky drinking behavior among Japanese college students, it is essential to identify trends of their drinking patterns and alcohol-related consequences.

The purpose of this study is to clarify the prevalence of binge drinking and its association with alcohol-related consequences, and these results are expected to be basic data for exploring preventive interventions toward binge drinking among college students in Japan.

Materials and methods

Study design and participants

Our cross-sectional study consisted of a self-administered questionnaire. From December 2016 to March 2017, we mailed letters requesting research collaboration to the deans of 160 colleges in the Kanto region of Japan, of whom 35 departments in 31 colleges agreed to participate. The Kanto region, located in the eastern part of Japan, which consists of Tokyo metropolitan and Ibaraki, Tochigi, Gunma, Saitama, Chiba and Kanagawa Prefecture. In the Kanto region, there are various types of private and public educational institutions spanning a wide range of disciplines. The colleges are located in both urban and rural areas covered various fields. A total of 1,030 questionnaires were delivered through a single point of contact at each college. Taking minimum drinking age into account, undergraduate and graduate students above the age of 20 years were sampled at each college.

Data collection

Of 1,030 questionnaires, 594 were returned (57.7% response rate). Our questionnaire included questions about: 1) demographic data (gender and age); 2) frequency of drinking alcohol; 3) frequency of binge drinking in the past year, as evaluated by the following question: "During the last 12 months, how often did you have five or more drinks (for males) or four or more drinks (for females) containing any kind of alcohol within a 2-hour period?"; and 4) alcohol-related consequences, as evaluated by the question "What kind of consequences did you experience after drinking?" This multiple-choice question had 11 possible responses: "I became happy," "I felt stress relief," "I became excited," "I became sleepy," "My mood worsened," "I became generous," "I became rude," "I got injured from an accident," "I had a hangover (headache, nausea, vomiting, etc.)," "I didn't experience any changes," and "other consequences."

To select question items for alcohol-related consequences, we used several previous articles from inside and outside Japan that investigated alcohol-related consequences experienced after binge drinking and drinking in general[12-16] as well as the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ)[17]. Also, we tried to take Japanese social and cultural background into account to make these question items more suitable for Japanese college student. In addition, we tried to assess the validity and credibility of the survey by consulting with an expert in alcohol research. We adopted a method of multiple choices allowed to answer this question.

To improve the accuracy of the number of drinks reported, subjects were required to list everything they drank and describe the number of drinks. Types of alcohol listed in the questionnaire included *sake*, beer, *shochu* (Japanese distilled alcoholic beverage), *chuhai* (spirit-based cocktail), cocktail, plum wine, whiskey, and wine. To report the frequency of drinking, each subject was asked to choose one of the following answers: "every day," "six times a week," "five times a week," "four times a week," "three times a week," "twice a week," "once a week," "three times a month," "twice a month," "once a month," "3 to 11 times a year," "once or twice a year," and "less than once a year."

The definition of a standard drink varies from country to country. In the United States, 14 g of pure alcohol is considered to be a standard drink, compared with 10 g of pure alcohol in Japan. In this study, we used the Japanese definition of a standard drink. We defined "excessive weekly drinking" as a weekly pure alcohol intake of 140 g or more for men and 70 g or more for women. Weekly consumption was calculated by multiplying alcohol consumption frequency by the amount consumed per drinking session. Binge drinking was defined consumption pattern corresponds to consuming five or more drinks (male), or four or more drinks (female), in about two hours[4]. As I mentioned, a standard drink is 10g of pure alcohol in Japan, we defined binge drinking as drinking consumption of 50 g or more for men and 40 g or more for women in a 2-hour period. Also, subjects were classified as binge drinkers if they reported consuming a typical amount of 5 or more drinks for a man and 4 or more drinks for a woman in 2-hour period respectively.

Statistical analysis

After confirming the distribution of age, frequency of drinking, amount of drinking during each occasion, and frequency of binge drinking, the t-test was used for normally distributed variables. The chi-squared test and the Mann-Whitney U-test were used to examine differences in binge drinking experience between binge drinker and non-binge drinker. Logistic regression was conducted to assess the association between binge drinking and alcohol-related consequences. The level of statistical significance was set at $p<0.05$. All statistical analyses were performed using Stata 13.1 for Windows (Stata Corp., College Station, TX, USA).

Ethical considerations

To obtain informed consent of participants, we enclosed a document that explained the purpose, methods, and ethical considerations of research. Returning the questionnaire was deemed to be providing informed consent for participation in our study. This research was approved by the ethics committee of the National Defense Medical College (Approval number 2567).

Results

During the study period, 594 out of 1,030 students who received the questionnaire responded (57.7% response rate). After 31 were excluded due to missing data and never drink, the

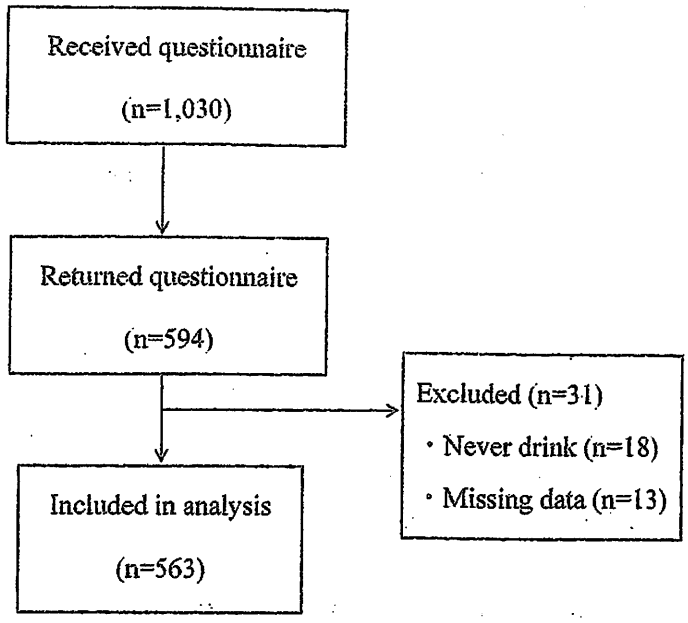

Fig 1 Study flow chart

Table 1 Characteristics of patients

Variable	Total (n=563)	Binge drinking(+) (n=382)	Binge drinking(-) (n=181)	*p*
Age (years), mean ± SD	21.7 ± 1.9	21.6 ± 1.1	21.7 ± 2.8	0.413[b]
Sex				
Male	303 (53.8)	227 (59.4)	76 (41.9)	<0.001[c]
Female	260 (47.2)	155 (40.6)	105 (58.1)	
Frequency of drinking (number of days/week), mean ± SD	1.2 ± 1.5	1.5 ± 1.6	0.6 ± 1.1	<0.001[b]
Amount of drinking (g/day), mean ± SD	53.4 ± 40.2	66.2 ± 41.4	26.2 ± 18.0	<0.001[b]
Excessive weekly drinking,[a] n (%)				
Yes	111 (19.7)	66 (21.8)	45 (17.3)	0.183[c]
No	452 (79.1)	237 (78.2)	215 (82.7)	
Alcohol-related consequences				
"I become happy"				
Yes	426 (75.7)	320 (83.8)	106 (58.6)	<0.001[c]
No	137 (24.3)	62 (16.2)	75 (41.4)	
"I felt stress relief"				
Yes	190 (33.7)	161 (42.1)	29 (16.2)	<0.001[c]
No	373 (66.3)	221 (57.9)	152 (83.8)	
"I become excited"				
Yes	121 (21.5)	104 (27.2)	17 (9.4)	<0.001[c]
No	442 (78.5)	278 (72.8)	164 (90.6)	
"I become sleepy"				
Yes	356 (63.2)	253 (66.2)	103 (56.9)	<.05[c]
No	207 (36.8)	129 (33.8)	78 (43.1)	

Variable	Total (n=563)	Binge drinking(+) (n=382)	Binge drinking(-) (n=181)	p
"My mood worsened"				
Yes	32 (5.6)	23 (6.1)	9 (4.9)	.700[d]
No	531 (94.3)	359 (93.9)	172 (95.1)	
"I become generous"				
Yes	101 (17.9)	82 (21.5)	19 (10.1)	<.05[c]
No	462 (82.1)	300 (78.5)	162 (89.5)	
"I become rude"				
Yes	19 (3.4)	14 (3.7)	5 (2.8)	0.803[d]
No	544 (96.6)	368 (96.3)	176 (97.2)	
"I got injured from an accident"				
Yes	24 (4.3)	19 (4.9)	5 (2.8)	.027[d]
No	539 (95.7)	363 (95.1)	176 (97.2)	
"I had hangover(headache, nausea,etc.)"				
Yes	152 (27.0)	126 (32.9)	26 (14.4)	<0.001[c]
No	411 (73.0)	256 (67.1)	155 (85.6)	
"I didn' t experience any changes"				
Yes	86 (15.3)	49 (12.8)	37 (20.4)	<.05[c]
No	477 (84.7)	333 (87.2)	144 (79.6)	
"Other consequences"				
Yes	18 (3.2)	6 (1.6)	12 (6.6)	<.05[d]
No	545 (96.8)	376 (98.4)	169 (93.4)	

[a]Pure alcohol intake of ≥ 140 g for men or ≥ 70g for women.
[b]t-test (binge drinker vs non-binge drinker)
[c]Chi-squared test (binge drinker vs non-binge drinker)
[d]Fisher's exact test (binge drinker vs non-binge drinker)

remaining 563 were included in the analysis. A flow chart is shown in Figure 1.

The characteristics of study participants are provided in Table 1. The subjects included 383 binge drinkers and 181 non-binge drinkers. Binge drinkers and non-binge drinkers were significantly different in terms of frequency of drinking in a week (1.5 ± 1.6 vs. 0.6 ± 1.1 days, respectively) and amount of drinking (66.2 ± 41.4 vs. 26.2 ± 18.0 g/day, respectively). Associations between binge drinking and alcohol-related consequences are shown in Table 2.

Among all students, binge drinkers had a history of significantly more alcohol related consequences such as "I became happy" (odds ratio 2.72[1.66-4.45]), "I felt stress relief" (odds ratio 2.65[1.62-4.34]) and "I had a hangover (headache, nausea, vomiting, etc.)" (odds ratio 2.42[1.44-4.06]) respectively. By gender, among male students, binge drinking was associated with alcohol-related consequences such as "I felt stress relief" (odds ratio 2.94[1.39-6.22]), "I had a hangover (headache, nausea, vomiting, etc.)" (odds ratio 2.88[1.29-6.44]), and "other consequences" (odds ratio 0.10[0.12-0.89]). On the other hand, among women, binge drinking was associated with "I became happy" (odds ratio 4.89[2.31-10.37]), "I felt stress relief" (odds ratio 2.53[1.26-5.08]), "I had a hangover (headache, nausea, vomiting, etc.)" (odds ratio 2.64[1.23-5.65]), and "I

Table 2 Alcohol-related consequences associated with binge drinking

Variables	All students (n=563)				Male students (n=303)				Female students (n=260)			
	Odds ratio	95% Confidence interval		p	Odds Ratio	95% Confidence interval		p	Odds Ratio	95% Confidence interval		p
I became happy	2.72	1.66	4.45	**0.000**	1.50	0.71	3.20	0.291	4.89	2.31	10.37	**0.000**
I felt stress relief	2.65	1.62	4.34	**0.000**	2.94	1.39	6.22	**0.005**	2.53	1.26	5.08	**0.009**
I became excited	1.71	0.89	3.24	0.102	1.38	0.58	3.26	0.468	2.56	0.91	7.18	0.075
I became sleepy	1.78	0.78	1.77	0.435	0.99	0.54	1.82	0.977	1.27	0.71	2.28	0.415
My mood worsened	1.00	0.39	2.57	0.992	0.54	0.17	1.75	0.301	2.86	0.56	14.63	0.207
I became generous	1.03	0.55	1.93	0.933	1.19	0.52	2.68	0.681	0.75	0.26	2.15	0.590
I became rude	0.63	0.17	2.36	0.496	0.61	0.11	3.28	0.567	0.59	0.06	5.66	0.654
I got injured from an accident	0.79	0.24	2.64	0.771	0.89	0.18	4.48	0.885	0.47	0.08	2.89	0.415
I had a hangover (headache, nausea,etc)	2.42	1.44	4.06	**0.001**	2.88	1.29	6.44	**0.010**	2.64	1.23	5.65	**0.012**
I didn't experience any changes	1.67	0.92	3.01	0.091	0.49	0.02	1.20	0.120	4.49	1.85	10.92	**0.001**
Other consequences	0.38	0.13	1.11	0.076	0.10	0.12	0.89	**0.040**	0.74	0.18	3.05	0.677

Adjusted for age

Values in boldface indicate significant associations between binge drinking and alcohol-related consequences

didn't experience any changes" (odds ratio 4.49[1.85-10.92]).

Discussion

This study of drinking patterns in Japanese college students revealed that 74.9% of male students and 59.6% of female students engaged in binge drinking during the past year. Frequency of drinking and was 12.0 ± 1.5 (number of day/week), amount of drinking was 53.4 ± 40.2 (g/day) .In addition, alcohol-related consequences associated with binge drinking among males were "I felt stress relief," "I had a hangover (headache, nausea, vomiting, etc.)," and "other consequences." Among female students, "I became happy," "I felt stress relief," "I had a hangover (headache, nausea, vomiting, etc.)" and "I didn't experience any changes" were associated with binge drinking.

Many college students engaged in binge drinking. In a previous study which use same definition of binge drinking, it was reported that 56.8% of male students and 47.8% of female students were binge drinkers[11]. The proportion of binge drinkers in our study was slightly higher. Same applied to frequency of drinking and amount of drinking, in the previously mentioned study, frequency of drinking was 0.8 ± 1.2 (number of day/week) and 38.0 ± 32.5 (g/day).We assume that the study participants differed in background. In the previous study, the authors recruited students through an annual health examination, whereas in our study, the return of questionnaire by students was voluntary and students who returned the ques-

tionnaire might be more interested in drinking or alcohol. In the United States, the prevalence of binge drinking in the past month was 40.1% among college students aged 18-22 years[18]. Although we cannot compare these results directly because of differences in the duration of the feedback period, it is serious problem that majority of Japanese college students experiences binge drinking.

Regarding alcohol-related consequences associated with binge drinking among all students, binge drinkers had a history of significantly more hangover (odds ratio 2.42[1.44-4.06]). Previous research reported that almost half of college students experiences hangover such headache or vomiting[12,13].

Concerning hangovers, in another previous Japanese study, 17% of students were late and 15% were absent from classes due to hangovers[12]. Although this was not alcohol-related consequences after binge drinking, we think this data demands close attention. On the other hand, binge drinkers reported that they had experience of becoming happier (odds ratio 2.72[1.66-4.45]) or felt their stress relieved more often (odds ratio 2.65[1.62-4.34]). Previous research revealed that half of Japanese college students had experiences becoming cheerful[14]. In previous foreign article, 47.5% of male students and 56.2% of female students experienced positive change such as "great fun/socializing" after drinking[19]. Also, HED (Heavy episodic drinking) associated with positive alcohol-related consequence such as becoming fan or social[20]. These results indicated that many college students in Japan and abroad experienced positive consequences after drinking. Concerning stress relief, although our research revealed 33.7% of Japanese student felt they relieved their stress by drinking alcohol, only 5.9% of male students and 1.5% of female students reported they relieved stress after drinking in United State[19]. This result indicated that Japanese students seem to befit on relieving stress by drinking alcohol more American college students.

Considering these results, it is suggested that college students have an ambivalent relationship with alcohol, in which they felt their stress relieved momentarily while recognized alcohol-related negative consequences. This ambivalence relationship is common with dependence and there is possibility some students seem to start to be alcohol dependence. Although we can look on them as a group that need preventive intervention for alcohol dependence, we afraid that they have inaccurate thought that it is easy to quit risky drinking behavior such as binge drinking when they want to do. Taking into account this reality, it is important to inform them contradiction that binge drinking make them happy while deteriorating their health or QOL and alcohol drinking could be maladaptive behavior to resolve stress. We have to try to get them to see the risk of falling into alcohol dependence against their optimistic thinking that they can change their drinking behavior as they like. Also, we think it is useful notify them to explore more effective coping skills. We propose that motivational interviewing[21] can be effective measure to tackle problems that is ambivalent and difficult to change behavior. Several studies of foreign country presented evidence of motivational interviewing for alcohol misuse among young people including college students[22-34]. It is important to support college students who engage in hazardous drinking such as binge drinking to find out their own relationship with alcohol in future with using motivational interviewing.

This study had three limitations. The first is the accuracy of the amount of alcohol consumption. It might not have been accurately reported by participants. In future studies, we will request students keep alcohol diaries to accurately record the amount and frequency of alcohol consumption. The second is that the questionnaire might not have covered all possible alcohol-related consequences. We plan to use existing scales like the B-YAACQ in future research. Finally, we cannot determine causal relationship between binge drinking and alcohol-related consequences due to the cross sectional nature of this study.

Outside of Japan, several studies have investigated that association between binge drinking and alcohol-related consequences. Our study is the first to clarify the prevalence of binge drinking, alcohol-related consequences, and the association between binge drinking and alcohol-related consequences in Japan.

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Conflict of interest

The authors of this study have no conflicts of interest to disclose.

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Reasons for Drinking among College Students in Japan: A Cross-Sectional Study

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Binge drinking by college students is a problematic behavior. However, data on binge drinking and the reasons for drinking by college students in Japan are scarce. We explored the reasons for drinking among college students. The study used a cross-sectional design and a self-administered questionnaire. From December 2016 to March 2017, we sampled undergraduate and graduate students aged 20 or older at 35 colleges in the Kanto region of Japan. The questionnaire addressed 1) frequency of drinking alcohol, 2) amount of drinking per day, 3) frequency of binge drinking in the past year, and 4) reasons for drinking (with 12 possible responses). The t-test was used to compare the means between binge drinkers and non-binge drinkers. Logistic regression analysis was conducted on binge drinking and the reasons for drinking. The participants included 303 men and 260 women. Significant differences between men and women included the presence of binge drinking (men: 74.9%; women: 59.6%). Among male students, the statistically significant reasons given for binge drinking were “to feel happy or be in a good mood” and “to relieve stress,” whereas among female students, the reasons were “to feel happy or be in a good mood,” “to facilitate interpersonal relationships,” “to forget something bad,” and “to relieve stress.” The reasons for drinking associated with binge drinking were identified. It is important to incorporate these results into preventive education about binge drinking aimed at college students in Japan.

Keywords: alcohol education; binge drinking; college students; reasons for drinking; risk factors
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Introduction

In 2012, an estimated 3.3 million deaths were caused by alcohol-related problems, accounting for 5.9% of all deaths (World Health Organization 2014). For people aged 15-49 years, the leading risk factor for death was alcohol use, followed by tobacco smoking (Lim et al. 2012), indicating that excessive drinking among young people has a significant influence on their health, both physically and mentally. Excessive alcohol use can be classified into three categories: alcohol dependence, hazardous drinking, and harmful drinking (Saitz 2005); binge drinking is considered a form of hazardous drinking. The criteria for binge drinking vary among studies, but in general, the term refers to consumption of five or more drinks (for men) or four or more drinks (for women) over a period of about two hours (NIAAA, National Institute of Alcohol Abuse and Alcoholism 2004). Binge drinking is most common among young people (Kanny et al. 2013) and leads to various alcohol-related problems including death, injury, physical assault, and unprotected sex (Hingson et al. 2009). Among young people, 40.1% of college student aged 18-22 reported binge drinking in the past month, versus 35.0% of other persons the same age (Substance Abuse and Mental

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Health Services Administration 2012). In other words, college students are more likely to binge drink.

In Japan, alcohol consumption by young people aged 20-29 has gradually increased since 1984 (Higuchi et al. 2004) and excessive drinking (including binge drinking) has been observed, especially in young people (Osaki et al. 2016). Among college students in Japan, 56.8% of men and 47.8% of women were determined to be binge drinkers, and these individuals experienced significantly more alcohol-related injuries (odds ratio 25.6 [8.05-81.4]) (Yoshimoto et al. 2017).

Before developing interventions to decrease risky drinking behaviors, including binge drinking, it is essential to identify the reasons or expectancies that lead to these behaviors. Outside of Japan, several studies have explored the factors associated with (or leading to) binge drinking, using sub-scales like the RFD (Reason for Drinking scale) (Cronin 1997), DMQ-R (Drinking Motives Questionnaire Revised) (Cooper 1994), CEOA (Comprehensive Effect of Alcohol) (Fromme et al. 1993), and Alcohol Expectancies (Ham and Hope 2003). These studies identified relationships between binge drinking and the motives for drinking, such as enhancement, social order, and coping (Lannoy et al. 2017). Moreover, binge drinkers reported that they were more strongly driven by these motives (White et al. 2016). Among older adults, social motives for drinking were the most frequently reported, followed by enhancement and coping motives (Gilson et al. 2013). To date, however, few studies have examined the motives for drinking among college students in Asian countries.

The purpose of this study was to identify the reasons for drinking among college students in Japan, making it possible to develop preventive interventions for binge drinking.

Methods

Study design and participants

This cross-sectional study was conducted by a self-administered questionnaire. From December 2016 to March 2017, we mailed letters requesting research collaboration to the deans of 160 college departments in the Kanto region of Japan. The Kanto area, located in the eastern part of Japan, consists of several prefectures including Tokyo. In the Kanto area, there are multiple types of institutions spanning a wide range of fields of study and including both private and public institutions. The locations of the colleges encompass several prefectures, including both urban and rural areas. Ultimately, 35 out of 160 college departments consented to our proposal. A total of 1,030 questionnaires were delivered through a single responsible contact at each college. Because 20 years is the legal drinking age in Japan, only undergraduate and graduate students above the age of 20 were sampled.

Data collection

We recruited subjects as described in our previous article (Kawaida et al. 2018). We chose departments by referring to a college ranking list and mailed the dean of each department requesting their cooperation with our study. This mailing included a document that explained the research outline, including the objectives, procedures, and ethical consideration of this research, along with a consent form and envelope for return. In addition, we requested that the dean inform us the name and address of the person responsible for maintaining contact and distributing questionnaires. To reach our target number, we sent our requests to 160 deans of faculties. Ultimately, 35 departments consented to our proposal. A total of 1,030 questionnaires were delivered through a single responsible person at each college, and 594 were returned (57.7% response rate). The questionnaire addressed: 1) frequency of drinking alcohol; 2) amount of drinking per day; 3) frequency of binge drinking in the past year, as evaluated by the question "During the last 12 months, how often did you have five or more (for males) or four or more (for females) drinks containing any kind of alcohol within a two-hour period?"; and 4) reasons for drinking, as evaluated by the question "What is the reason of your drinking?" (This question used a multi-answer design). The 12 possible responses to the question in (4) were "to feel happy or be in a good mood," "to be relaxed," "to facilitate interpersonal relationships," "to increase appetite," "to forget something bad," "to get high," "to impress others," "to sleep well," "to live up to expectations," "to relieve stress," "because I was forced to drink," and "other reasons." Demographic data (sex and age) was also collected. To develop a metric for the reason for drinking, we performed a literature review of studies that used the RFD (Reason for Drinking scale) (Cronin 1997), DMQ-R (Drinking Motives Questionnaire Revised) (Cooper 1994), CEOA (Comprehensive Effect of Alcohol) (Fromme et al. 1993), and Alcohol Expectancies (Ham and Hope 2003) scales. To focus on Japanese college students in particular, we also reviewed the Japanese literature about the reasons for drinking among college students in this country (Sakurai 1997; Mizuno et al. 2003; Masaki 2007; Takase and Kawai 2010; Kitada 2011; Fujioka and Ono 2013). Experts in the field reviewed the metric, and Cronbach's alpha was used to measure the reliability of the scale.

To improve the accuracy of the reported number of drinks, participants were required to list everything they drank and describe the number of each drink. Types of alcohol listed in the questionnaire included *sake*, beer, *shochu* (Japanese distilled beverage), *chuhai* (spirit-based cocktail), cocktail, plum wine, whiskey, and wine. We asked the subjects to report the frequency of drinking by giving one of the following answers: "every day," "six times a week," "five times a week," "four times a week," "three times a week," "twice a week," "once a week," "three times a month," "twice a month," "once a month," "3 to 11 times a year," "once or twice a year," or "less than once a year."

The standard definition of one drink varies from country to country: in the USA, 14 grams of pure alcohol is considered to be a standard drink, whereas in Japan the value is 10 grams. In this study, we used the Japanese definition of a standard drink. In addition, we defined "excessive weekly drinking" as a weekly pure alcohol intake of 140 g or more for men and 70 g or more for women. The amount of weekly consumption was calculated by multiplying the alcohol consumption frequency by the amount consumed per drinking session. Binge drinking was defined as 50 g or more for men, or 40 g or more for women, in a 2-hour period.

Statistical analysis

The t-test was used to compare the age, frequency of drinking, and amount of drinking per day between male and female students.

Multivariable logistic regression analysis was used to examine whether binge drinking was associated with each reason for drinking. Statistical significance was set at $p < 0.05$. All analyses were performed using Stata 13.1 for Windows (Stata Corp., College Station, Texas, USA).

Ethical consideration

The ethical committee of the National Defense Medical College approved this study.

Results

During the study period, 594 students of 1,030 who received questionnaires responded (57.7% response rate). After excluding 31 responses due to lack of data or because the participants never consumed alcohol, 563 (94.8%) questionnaires remained; this number was deemed suitable for analysis. A flow chart is shown in Fig. 1.

Characteristics of study participants are provided in Table 1. The subjects included 303 men and 260 women. Significant differences between men and women included frequency of drinking in a week (men: 1.4 ± 1.6 days vs. women: 1.0 ± 1.3 days), amount of drinking (men: 61.3 ± 44.0 g/day vs. women: 44.2 ± 33.0 g/day), and the presence of binge drinking (men: 74.9% vs. women: 59.6%).

Reasons for drinking related to binge drinking are shown in Table 2. The reliability of the metric for the reason for drinking was demonstrated by its Cronbach α value of 0.58 (0.51-0.59). Among men, the statistically significant reasons given for binge drinking were "to feel happy or be in a good mood" (OR 2.06 [CI 1.00-4.23]), and "to relieve stress" (OR 4.62 [CI 1.68-12.68]). Among women, on the other hand, the reasons correlated with binge drinking were "to feel happy or be in a good mood" (OR 2.48 [CI 1.10-5.55]), "to facilitate interpersonal relationships" (OR 2.84 [CI 1.40-5.77]), "to forget something bad" (OR 3.59 [CI 1.05-12.25]), and "to relieve stress" (OR 2.77 [CI 1.28- 6.00]).

Discussion

To our knowledge, this is the first study to explore the association between binge drinking and the reasons for drinking among college students in Japan. We identified four reasons underlying binge drinking: "to feel happy or be in a good mood," "to facilitate interpersonal relationships," "to forget something bad," and "to relieve stress." We discuss the relationship between binge drinking and these reasons, i.e., alcohol expectancies and motives for drinking. Male students tended to engage in binge drinking when they wanted to feel happy or be in a good mood or to release stress. In addition, female students engaged in binge drinking in order to facilitate interpersonal relationships or forget something bad.

Now, we will discuss these results from the point of view of motivation theory. Motivation theory asserts that motives or reasons for drinking are the final common pathway to alcohol use and abuse (Cooper 1994). Cooper developed and validated a four-factor model of motivation for alcohol use: "social," "coping," enhancement," and "conformity."

In addition, we wish to consider the reasons for drinking shared by both male and female students. Japanese college students experience the following stressors: troubles at a part-time job or club activity; personal relationships with friends, lovers, and family members; studies (e.g., homework); future path; and job hunting. Previous research revealed that students with higher stress tend to engage in more binge drinking (Chen and Feeley 2015). This phenomenon may be understood in terms of coping motives for drinking. In this study, the risk of binge drinking increased 4.6-fold among male students

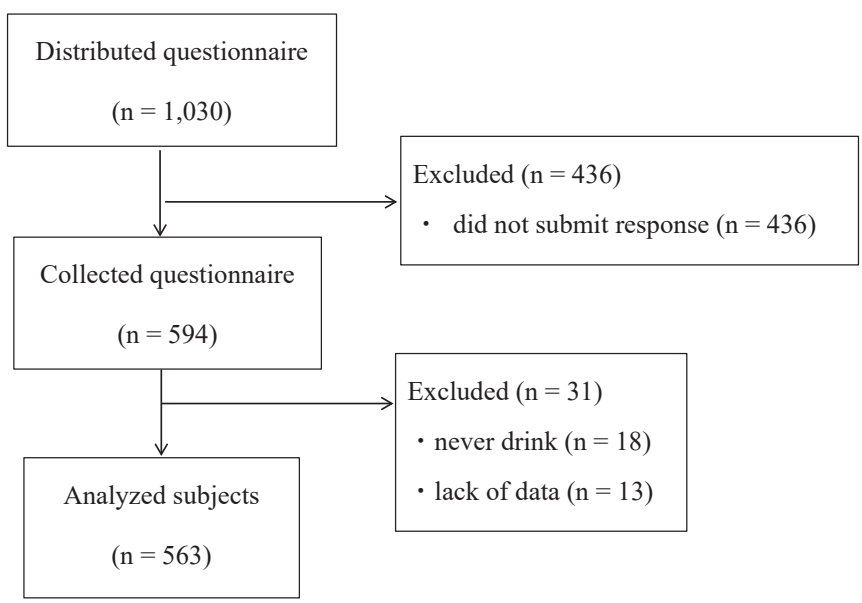

Fig. 1. Flow chart of this study.

Table 1. Characteristics of participants.

Variable	Total (n = 563)	men (n = 303)	women (n = 260)	*p*
Age (years), mean ± SD	21.7 ± 1.9	21.7 ± 1.3	21.6 ± 2.4	.232[b]
Frequency of drinking in a week, mean ± SD	1.2 ± 1.5	1.4 ± 1.6	1.0 ± 1.3	< .001[b]
Amount of drinking (g/day) mean ± SD	53.4 ± 40.2	61.3 ± 44.0	44.2 ± 33.0	< .001[b]
Excessive weekly drinking[a], n (%)				
Yes	111 (19.7)	66 (21.8)	45 (17.3)	.183[c]
No	452 (79.1)	237 (78.2)	215 (82.7)	
Binge drinking, n (%)				
Yes	382 (67.9)	227 (74.9)	155 (59.6)	< .001[c]
No	181(32.2)	76 (25.1)	105 (40.2)	
Reason for drinking				
"To feel happy or be in a good mood"				
Yes	433 (76.9)	232 (76.6)	201 (77.7)	.0835[c]
No	130 (23.1)	71 (23.4)	59 (22.3)	
"To be relaxed"				
Yes	90 (16.0)	61 (20.1)	29 (11.1)	< .005[c]
No	473 (84.0)	242 (79.9)	231 (89.9)	
"To facilitate interpersonal relationships"				
Yes	198 (35.2)	127 (41.9)	189 (27.3)	< .001[c]
No	365 (64.8)	176 (58.1)	71 (72.7)	
"To increase appetite"				
Yes	30 (5.3)	20 (6.6)	10 (5.8)	.147[c]
No	533 (94.7)	283 (93.4)	250 (96.2)	
"To forget something bad"				
Yes	90 (16.0)	58 (19.1)	32 (12.3)	< .05[c]
No	473 (84.0)	245 (80.9)	228 (87.7)	
"To get high"				
Yes	160 (28.4)	95 (31.4)	65 (25.0)	.096[c]
No	403 (71.6)	208 (68.6)	195 (75.0)	
"To impress others as cool"				
Yes	11 (1.9)	10 (3.3)	1 (3.8)	< .05[d]
No	552 (98.1)	293 (96.7)	259 (96.2)	
"To sleep well"				
Yes	74 (13.1)	41 (13.5)	33 (12.7)	.796[c]
No	489 (86.9)	262 (86.5)	227 (87.3)	
"To live up to expectations"				
Yes	9 (1.6)	5 (1.7)	4 (1.5)	1.000[d]
No	554 (98.4)	298 (98.3)	256 (98.5)	
"To relieve stress"				
Yes	146 (25.9)	77 (25.4)	69 (26.5)	.761[c]
No	417 (74.1)	226 (74.6)	191 (73.5)	
"To be forced to drink"				
Yes	32 (5.7)	20 (6.6)	12 (4.6)	.310[c]
No	531 (94.3)	283 (93.4)	248 (95.4)	
"Other reasons"				
Yes	52 (9.2)	22 (7.3)	30 (11.5)	.081[c]
No	511 (90.8)	281 (92.7)	230 (88.5)	

[a]Pure alcohol intake of ≥ 140 g for men or ≥ 70 g for women.
[b]Paired t-test (men vs. women).
[c]Chi-squared test (men vs. women).
[d]Fisher's exact test.

Table 2. Relationship between reasons for drinking and binge drinking.

Variables	All students (n = 563)				Male students (n = 303)				Female students (n = 260)			
	Odds Ratio	95% Confidence Interval		*p*	Odds Ratio	95% Confidence Interval		*p*	Odds Ratio	95% Confidence Interval		*p*
"To feel happy or be in a good mood"	2.04	1.23	3.39	.01	2.06	1.00	4.23	.049	2.48	1.10	5.55	.03
"To be relaxed"	1.14	0.61	2.14	.68	1.21	0.52	2.82	.64	1.11	0.40	3.05	.83
"To facilitate interpersonal relationships"	1.85	1.18	2.90	.01	1.31	0.70	2.46	.39	2.84	1.40	5.77	.00
"To increase appetite"	1.61	0.58	4.46	.36	2.65	0.54	13.02	.23	1.13	0.26	4.78	.86
"To forget something bad"	2.53	1.16	5.49	.02	1.94	0.69	5.47	.20	3.59	1.05	12.25	.04
"To get high"	1.65	0.98	2.77	.06	1.93	0.91	4.11	.08	1.50	0.70	3.21	.29
"To impress others as cool"	3.70	0.42	32.22	.24	2.07	0.22	19.35	.52	–	–	–	–
"To sleep well"	1.34	0.69	2.59	.39	1.26	0.47	3.34	.63	1.57	0.62	4.00	.34
"To live up to expectations"	1.65	0.26	10.44	.60	0.75	0.06	10.08	.83	3.96	0.26	60.82	.32
"To relieve stress"	3.18	1.79	5.65	.00	4.62	1.68	12.68	.00	2.77	1.28	6.00	.01
"To be forced to drink"	0.58	0.24	1.42	.23	1.08	0.31	3.79	.90	0.21	0.04	1.08	.06
"Other reasons"	1.14	0.57	2.28	.70	0.77	0.27	2.22	.63	2.53	0.92	6.95	.07

Adjusted for age.

who wished to relieve stress relative to those who did not. In such cases, physical activity may decrease perceived stress (Tavolacci et al. 2013). For students who drink due to coping motives, it might be possible to assist them by helping them to explore alternative coping measures like physical activity, which is of lower-risk than binge drinking.

Another reason for drinking for both sexes is "to feel happy or be in a good mood." Such individuals drink alcohol with enhancement motives. These motives involve drinking to increase positive affect, and consist of sensation-seeking and enjoyment motives (Ham and Hope 2003). In this study, students who drank with enhancement motives tended to engage in binge drinking. "Drinking to get drunk," an enjoyment expectancy is a strong predictor of frequent binge drinking (McCabe 2002). For students who want to drink to get drunk and therefore be happy, it is essential to provide tips about how to enjoy a party without depending on alcohol.

Next, we discuss the reasons for drinking that were associated with binge drinking only among female students. "To forget something bad" is considered a form of coping. In that sense, we can understand the relationship between this motivation and binge drinking to relieve stress. As mentioned above, in these cases it is important to help the student find another measure that helps them get rid of the undesirable thing that they are hoping to forget.

Another reason for drinking specific for female students is "to facilitate interpersonal relationships"; this can be regarded as a social motive. In early adulthood, female students tend to feel more ashamed than male students of interpersonal relationships with others (Yagi 2008). Moreover, the friendship networks of female students were relatively fixed, whereas those of male students were more flexible (Nishimura and Nagano 2009). After entrance into college, many students must establish new relationship with others, both inside and outside of the classroom, and this may be more difficult for female students. We assume that female students use alcohol to reduce their tension or anxiety and facilitate the formation of new relationships. Male students, on the other hand, have more self-confidence in interpersonal relationships than female students (Nishimura and Nagano 2009). Therefore, support for promoting self-confidence to enhance relationships is important. Among students in their 20s, the proportion who have experience with drinking is higher among females than males (Higuchi 2009), and 58.9% female students have experience with "*ikki-nomi*," chugging an entire drink without stopping to take a breath, which is considered a risky drinking pattern (Fujioka and Ono 2013). The rate of alcohol metabolism is slower in females than males due to differences in physical build (Maesato and Higuchi 2015). Consequently, women are more prone to acute alcohol intoxication. Accordingly, it is important to educate women to understand their own constitutional characteristics and to drink alcohol moderately without engaging in binge drinking, which raises BAC (blood alcohol concentration) rapidly within a short period. In particular, female students who drink alcohol to forget something bad or to facilitate interpersonal relationships tended to engage in binge drinking, so we should inform them of the risks of that drinking pattern in the future.

There were three limitations to this study. The first is the presence of geographical bias. The survey data were collected from students at 35 different colleges in the Kanto area in Japan. However, these colleges encompass various fields of study and included both national and public institutions. Consequently, we minimized geographic bias. A second limitation is sampling bias. We depended on each college to distribute questionnaires to students, and we could not control the measure of distribution. The third likely limitation is recall bias. In this study, we used self-administered questionnaires, and participants reported the amount of alcohol consumed and experiences of the past year. To more accurately measure their levels and patterns

of alcohol consumption, in future research, it might be preferable for participants to keep an "alcohol diary."

Regardless of sex, students who drink to relieve stress or feel happy are likely to engage in binge drinking. However, the association between binge drinking and the desire to facilitate interpersonal relationships or forget something bad was observed only in female students. It is essential to develop effective alcohol education for college students that considers sex-specific differences in the reasons for drinking.

Conflict of Interest

The authors declare no conflict of interest.

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The Use of All-You-Can-Drink System, *Nomihodai*, Is Associated with the Increased Alcohol Consumption among College Students: A Cross-Sectional Study in Japan

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Excessive drinking by college students is a major public health problem in Japan. However, data on heavy episodic drinking (HED) and *nomihodai*, a several-hour all-you-can-drink system, are scarce. We surveyed the drinking behavior of undergraduate and graduate students at 35 colleges, and examined the association between HED and use of *nomihodai*. The study used a cross-sectional design conducted by a self-administered questionnaire. From December 2016 to March 2017, we sampled undergraduate and graduate students aged 20 or older at 35 colleges in the Kanto area, including Tokyo. The following items were measured: 1) frequency of drinking; 2) frequency of binge drinking in the past year; 3) *nomihodai* use; 4) the number of drinks consumed when using or not using *nomihodai*; and 5) sex and age for demographic data. Paired t-test was used to compare means between use and non-use state of *nomihodai*. The Fisher's exact test was used to evaluate the significance of the distribution difference between the two types of states. A total of 511 subjects completed the questionnaire, including 274 men and 237 women. The amount of drinking was increased 1.8-fold (85.9 ± 49.7 g vs. 48.2 ± 29.5 g) among men and 1.7-fold (63.7 ± 39.3 g vs. 36.5 ± 26.7 g) among women during *nomihodai* use, comapred with non-use states. Among them, 109 (39.8%) men and 71 (30.3%) women reported HED only at *nomihodai* states. These data suggest that the use of *nomihodai* system may lead to excessive drinking among college students.

Keywords: blood alcohol concentration; college student; excessive alcohol use; heavy episodic drinking; *nomihodai*
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Introduction

Excessive drinking in young people is a major public health problem worldwide. Excessive drinking not only causes acute alcohol poisoning, but also contributes to dangerous behaviors while in the drunken state (Eaton et al. 2010; World Health Organization 2014). The World Health Organization (WHO) announced that "2.5 million people die from alcohol-related problems worldwide, including 320,000 young people aged 15 to 29" (WHO 2009). Among young people, college students consume more alcohol than non-college students (Hingson et al. 2002). A great deal of research has focused on excessive drinking by college students, and has revealed that many students experience negative alcohol-related consequences such as injury (Hingson et al. 2009; Kowalenko et al. 2013), physical assault, and drunk driving (Hingson et al. 2009). There are several types of excessive alcohol use, including heavy episodic drinking (HED) and binge drinking (White et al. 2013). HED is defined as consumption of pure alcohol intake of 60 g or more in one drinking occasion (WHO 2014), whereas binge drinking refers to consumption of five or more drinks (for men) or four or more drinks (for women) over a period of about two hours (National Institute of Alcohol Abuse and Alcoholism 2004). Both are dangerous drinking patterns that lead to alcohol intoxication.

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In Japan, alcohol consumption by young people aged 20 to 29 has gradually increased since 1984 (Higuchi et al. 2004), and HED and binge drinking have been observed, especially in young people (Osaki et al. 2016). Among Japanese college students, 56.8% of men and 47.8% of women are binge drinkers, and binge drinkers had a history of significantly more alcohol-related injuries (odds ratio 25.6) (Yoshimoto et al. 2017). Despite emerging evidence of alcohol-related problems of young people, including college students, there are no restrictions on sponsorship and no legislative provisions for alcohol-free environments (Higuchi et al. 2007). Moreover, there is a unique and common system, *nomihodai,* which enables the customer to drink various kinds of drinks within two to three hours at a fixed price. A previous study reported that "all-you-can-drink" services increase the risk of binge drinking 2.44-fold (Carlini et al. 2014) and that a set price for unlimited drinking is associated with HED among college students (Wechsler et al. 2000). Also, a significant relationship has been reported between "all-you-can-drink" and blood alcohol concentration (BAC) (Thombs et al. 2009). These results were all obtained in college students, implying that college students tend to consume excessive amounts of alcohol (resulting in high BAC) under circumstances like *nomihodai*. Policies that restrict "flat rate for unlimited drinking," which is synonymous for "all-you-can-drink," can decrease harmful drinking (WHO 2009). Recently, "all-you-can-drink" offers were outlawed in countries such as Northern Ireland and England, which instituted fines for establishments with "all-you-can-drink" offers. On the other hand, the proportion of *izakaya* (Japanese bar) establishments that provide "all-you-can-drink" services is approximately 34% of all alcohol-serving establishments, as determined by searching the *Taberogu* website (https://tabelog.com/en/), which is used as a restaurant guide all over Japan. This indicates that *nomihodai* has become prevalent among Japanese people. Also, *izakaya* establishments are the most popular place for drinking among college students (Kitada 2011). Although it is easy to imagine that college students use this service as a matter of course, no previous study has examined the influence of *nomihodai* on alcohol consumption among Japanese college students. If we could clarify the influence of *nomihodai* among Japanese college students, who should be considered a high-risk group, we could use the results to enhance students' awareness and change the current alcohol policies.

The purpose of this study was to assess the difference in the amount of alcohol consumption between *nomihodai* use and non-use states, and to clarify the association between *nomihodai* use and HED among college students, with the goal of developing effective interventions aimed at reducing the harms of alcohol use.

Materials and Methods

Study design and participants

A cross-sectional study was conduced by self-administered questionnaire. From December 2016 to March 2017, we sampled undergraduate and graduate students above the age of 20 at 35 colleges in the Kanto area of Japan. The Kanto area, which is located in the eastern part of Japan, consists of several prefectures including Tokyo. In this study, students who had experience with *nomihodai* use were included, and people under the age of 20 (who are prohibited from drinking by Japanese law) were excluded.

Data collection

In this study, we adopted the following procedure to ensure the representativeness of our sample. According to the Education, Culture, Sports, Science and Statistics Handbook of 2014 (Ministry of Education, Culture, Sports, Science and Technology-Japan 2014a), the number of college or university students was 2,868,872 in 2013. To collect samples from various backgrounds, we determined that the target number for each department of a college was 30. Subjects were selected from each of seven prefectures, including Tokyo (Kanto). In Japan, there are three main types of institutions: national, public, and private. According to a basic survey of schools performed in 2014 (Ministry of Education, Culture, Sports, Science and Technology-Japan 2014b), the relative proportions of each type of institution were as follows: national institute, 10.9%; public institute, 11.4%; and private institute, 77.7%. We selected departments based on this ratio while referring to the university ranking list. We mailed the dean of each department to request understanding of and cooperation with our study. This mailing included a document that explained the research outline, including the objectives, procedures, and ethical consideration of this research, along with a consent form and return envelope. Also, we requested that the dean notify us of the name and address of the person responsible for maintaining contact and distributing questionnaires. To reach our target number, we sent our requests to 160 deans of faculties. Ultimately, 35 departments consented to our proposal. A total of 1,030 questionnaires were delivered through a single responsible contact at each college.

The questionnaire addressed 1) frequency of drinking alcohol; 2) frequency of binge drinking in the past year, as evaluated by the following question: "During the last 12 months, how often did you have five or more (for males) or four or more (for females) drinks containing any kind of alcohol within a two-hour period?"; 3) *nomihodai* use: "Did you use *nomihodai*? (Yes or No)"; 4) the number of drinks consumed when using or not using *nomihodai*; and 5) sex and age for demographic data. To improve the accuracy of the reported number of drinks, subjects were required to list everything they drank and describe the number of drinks. Types of alcohol listed in the questionnaire included *sake*, beer, *shochu* (Japanese distilled beverage), *chuhai* (spirit-based cocktail), cocktail, plum wine, whiskey, and wine. To report the frequency of drinking, the subject chose one of the following answers: "every day," "six times a week," "five times a week," "four times a week," "three times a week," "twice a week," "once a week," "three times a month," "twice a month," "once a month," "3 to 11 times a year," "once or twice a year," and "less than once a year."

Statistical analyses

Characteristics of participants were compared between males and females. Furthermore, in both males and females, the amount of drinking and the proportion of HED were compared between *nomihodai* use states and non-use states. Paired t-test was used to compare the means of the two types of states. The Fisher's exact test

was used to examine the significance of the distribution difference between the two types of states.

The level of statistical significance was set at $P < 0.05$. All statistical analyses were performed using Stata 13.1 for Windows (Stata Corp., College Station, TX, USA).

Ethical considerations

This research was approved by the medical ethics committee of National Defense Medical College.

Results

During the study period, 594 students out of 1,030 responded (57.7% response rate). After 22 were excluded due to lack of data, the remaining 533 were suitable for analysis; of them 511 (95.8%) had experienced *nomihodai* use. In this study, the data from those 511 students were analyzed. A flow chart is shown in Fig. 1.

Characteristics of study participants are provided in Table 1. Subjects included 274 men and 237 women. Significant differences between men and women included frequency of drinking in a week (men: 1.5 ± 1.7 days; women: 1.0 ± 1.3 days), amount of drinking (men: 62.9 ± 43.5 g/day; women: 46.3 ± 32.9 g/day), and occurrence of binge drinking (men: 77.7% vs. women: 63.3%).

The amount of drinking was increased 1.8-fold (85.9 ± 49.7 g vs. 48.2 ± 29.5 g) among men and 1.7-fold (63.7 ± 39.3 g vs. 36.5 ± 26.7 g) among women during *nomihodai* use, compared with non-use states (Fig. 2). Furthermore, 109 (39.8%) men and 71 (30.3%) women reported HED only at *nomihodai* states.

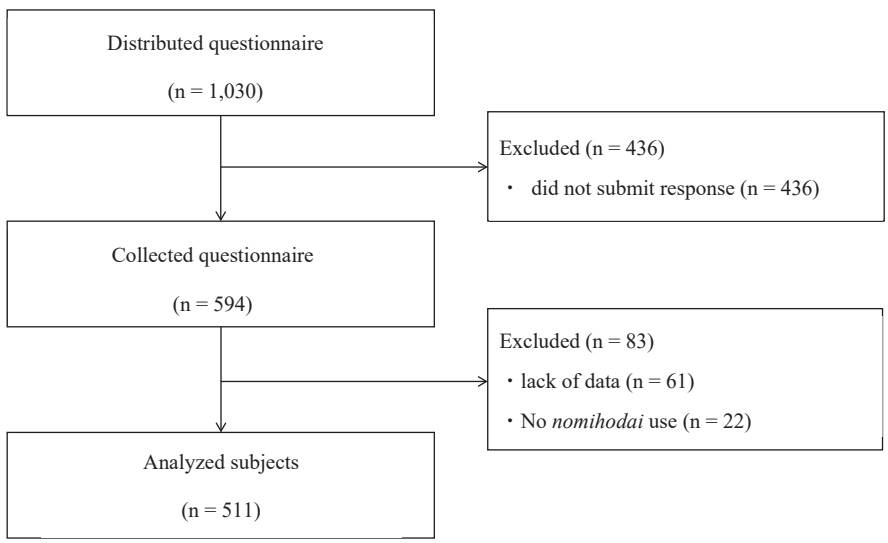

Fig. 1. Flow chart of subject selection for this study.

Table 1. Characteristics of participants.

Variable	Total (n = 511)	men (n = 274)	women (n = 237)	*P*
Age (years), mean ± SD	21.7 ± 1.9	21.8 ± 1.3	21.6 ± 2.5	0.254[b]
Frequency of drinking in one week				
mean ± SD	1. 2± 1.5	1.5 ± 1.7	1.0 ± 1.3	< 0.001[c]
Amount of drinking(g/day)				
mean ± SD	55.2 ± 39.8	62.9 ± 43.5	46.3 ± 32.9	< 0.001[b]
Excessive weekly drinking[a], n (%)				
Yes	107 (20.9)	63 (23.0)	44 (18.6)	0.220[d]
No	404 (79.1)	211 (77.0)	193 (81.4)	
Binge drinking, n (%)				
Yes	363 (71.0)	213 (77.7)	150 (63.3)	< 0.001[d]
No	148 (29.0)	61 (22.3)	87 (36.7)	

[a]Pure alcohol intake of > 140 g for men and > 70 g for women.
[b]Paired t-test (men vs. women).
[c]Mann-Whitney's U test.
[d]Chi-squared test (men vs. women).

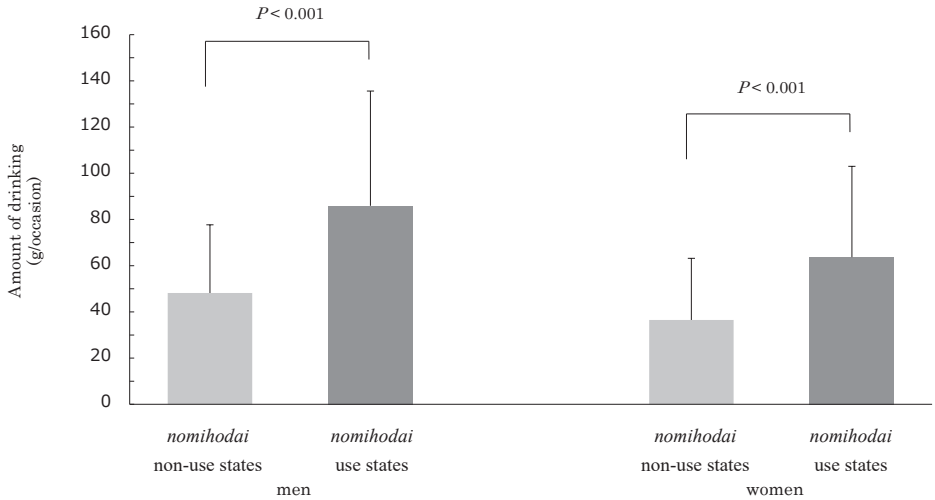

Fig. 2. Comparison of the amount of drinking during *nomihodai* use vs. non-use states.

Discussion

In this study, there was a significant difference in the amount of alcohol consumption between *nomihodai* use and non-use states. Also, approximately 60% of the students reported engaging in HED only when they used *nomihodai*, and during *nomihodai* use states 109 (39.8%) men and 71 (30.3%) women drank only in an HED manner.

Our study revealed that almost all college students had experience with *nomihodai* use. *Nomihodai* has become a common habit among Japanese people and is very prevalent. Accordingly, it is easy to imagine that college students use the service as a matter of course. We assume that these environmental factors contribute to the high ratio of *nomihodai* use among college students.

This study revealed that a significant difference in the amount of drinking between *nomihodai* use and non-use states. As mentioned above, previous studies reported that a set price for unlimited drinking is associated with HED among college students (Wechsler et al. 2000), and that there is a significant relationship between "all-you-can-drink" and BAC (Thombs et al. 2009). Moreover, Thombs et al. (2009) reported that students who do not take advantage of drink specials (e.g., "all-you-can-drink") reported consuming more drinks before bar entry than those who did participate in these promotions. Thus, college students who use systems like "all-you-can-drink" try to make the most of the occasion so that they can thoroughly enjoy drinking.

Nomihodai establishments do not permit individual use; consequently, students always participate in *nomihodai* in groups. The presence of other students may influence the amount of consumed alcohol, based on two contributory factors. One is the "peer drinking norm," which involves recognition and approval of peers' drinking behavior, including drinking frequency and the amount of alcohol consumed (Borsari and Carey 2001). If students recognize that other students are drinking more, according to the peer drinking norm, it is possible that they will feel pressured to do the same. Particularly in occasions of *nomihodai* use, students who did not drink as much were often affected by other students who engaged in heavier drinking, and encouraged to make the most of the system. The peer drinking norm can have a positive effect, and it is important that we encourage behavioral change among students by providing information about actual peer drinking behavior and correcting their misunderstandings. Another factor is "peer pressure." Mekonen et al. (2017) indicated that peer pressure is an important predictor of problematic drinking among college students. If peer pressure is excessive, there is a risk that a student will insist that other students drink more. In Japan, the proportion of the students who have experienced being insisted by others to drink has been reported as 42% (Masaki 2007), 57% (Takase and Kawai 2010), and 47% (Kawai et al. 2014), i.e., about half of all students. Furthermore, the study of Masaki (2007) revealed that 55.0% of students accepted that request, and an additional 31% drank a bit more, indicating that 86% of students did not refuse the insistence of another student to drink more, at least to some extent. It is necessary to educate students about how to enjoy the situation while understanding that some students have no or little alcohol tolerance due to a natural deficiency in acetaldehyde dehydrogenase. In addition, protective behavior can decrease risky drinking behavior among students who cannot or do not want to drink (Martens et al. 2011; Kim and Park 2015). We must support the ability of students to refuse the request to drink and to engage in self-protective behavior.

There were three limitations to this study. The first is the presence of geographical bias. The survey was conducted at 35 different colleges in the Kanto area in Japan. However, these institutions span a wide range of fields of study and included both private and public institutions, and the locations of the colleges encompass several prefectures, including both urban and rural areas.

Therefore, geographic bias was minimized. A second limitation is sampling bias, based on the fact that distribution of questionnaire to students differed among colleges. The third possible limitation is recall bias. In this study, participants reported the amount of alcohol consumed and several experiences over the course of one year, using self-administered questionnaires. To grasp the actual amount of alcohol consumed, a future study might ask subjects to record their alcohol consumption using an "alcohol diary."

This study has revealed the significant influence of *nomihodai* on the amount of drinking among college students in Japan. Future efforts should promote preventive education and awareness activities that lead to safer alcohol-related behavior of college students.

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Conflict of Interest

The authors declare no conflict of interest.

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