

Occupational Factors and Problem Drinking among a Japanese Working Population

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Abstract: Problem drinking is a serious public health problem in the workplace. However, few Japanese epidemiological studies have investigated the occupational characteristics of problem drinking. The purpose of this study is to clarify the occupational risk factors for problem drinking among a Japanese working population. We used data from a random-sampling survey about mental health and suicide, conducted among Hamamatsu City residents aged 15 to 79 yr old during May and June in 2008. The relation between occupational factors and problem drinking was analyzed with multiple logistic regression models stratified by gender. CAGE questionnaire was used to assess problem drinking. With regard to employment types, problem drinkers were more prevalent among self-employed women. With regard to occupational types, clerical and service professions had more problem drinkers of either sex, while administrative/managerial and sales professions had more women with such problem. With regard to company size, male problem drinkers were more prevalent in smaller companies than in larger ones. These results indicate that the prevalence of problem drinkers in the workplace depends on where one works. It is necessary to consider these characteristics to provide effective measures to address problem drinking in the workplace.

Key words: Problem drinking, Workplace, CAGE questionnaire, Employment types, Occupational types, Company size

Introduction

Problem drinking has various harmful effects, not only on individuals who drink, but also on their families and communities, causing serious public health problems. Problem drinking is defined as alcohol dependence and alcohol abuse/harmful drinking, and as well as having alcohol-related problems/consequences or being at risk for

such difficulties^{1, 2)}. It is estimated that approximately 2.5 million people die of alcohol-related problems yearly, and that alcohol was responsible for 3.8% of all deaths in the world in 2004³⁾. “The global strategy to reduce the harmful use of alcohol” was endorsed by the Sixty-Third World Health Assembly in 2010, asking member states for the formulation of effective policy measures at the local, national and regional level³⁾. Based on this strategy, member states are beginning to employ their own national policy measures and interventions.

Problem drinking has also been a serious public health concern in Japan. A survey reported that 34,988 Japanese

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people die of alcohol-related problems yearly, being responsible for 3.1% of all deaths in 2008⁴). Japanese per capita consumption of alcohol beverages was 8.0 liters of pure alcohol consumed by every person aged 15 years or older in each year from 2003–2005⁵). This figure is comparable to the international prevalence; the worldwide average is: 6.1 liters; USA: 9.4; and China: 5.9⁵). The Ministry of Health, Labour and Welfare of Japan launched the national health care campaign, Health Japan 21 (Kenko Nippon 21) in 2000, one major agenda of which was alcohol-related problems⁶). Health Japan 21 set several objectives for the reduction of problem drinking, which must be achievable by 2012: a 20% reduction of the proportion of heavy drinkers, elimination of under-age drinkers, and more Japanese citizens who understand how to drink properly⁶). Despite setting such goals, Japan has launched few effective policy measures tackling problem drinking in the last decade.

Most importantly, measures are urgently required for preventing and managing problem drinking in the workplace. Occupational characteristics were reported to be one of the major contributors to the development of problem drinking, because work is an important sphere, accounting for about one third of the human life span⁷). On the other hand, not only on-the-job drinking, but also heavy drinking away from work causes many serious problems in the workplace and in society as a whole, such as long-term absence, impaired job performance, accidents caused by drunk driving, child abuse or neglect, domestic violence, debt, and crime^{3, 8}).

The purpose of this study is to clarify the occupational risk factors for problem drinking among a Japanese working population for the development of effective measures against problem drinking in the workplace. Occupational factors include employment types, occupational types, company size and working hours per week. Problem drinking was assessed with the CAGE questionnaire, classically used internationally for the brief assessment of problem drinking⁹). To our knowledge, there have been no studies mentioning the relation between occupational factors and problem drinking using the CAGE questionnaire among a Japanese working population. This study tests the hypothesis that there are several occupational risk factors for problem drinking in the workplace in a Japanese working population.

Subjects and Methods

Study subjects

A cross-sectional survey, the “Hamamatsu Survey on Mental Health and Measures against Suicide” was conducted in 2008 to grasp the actual state of suicidality in Hamamatsu City and for the establishment of a suicide prevention strategy. Between May and June, 2008, self-administered questionnaires were mailed to 1,950 Hamamatsu City residents aged 15–79 yr, selected by stratified random sampling based on their gender, age, and residential area. Among them, a total of 1,051 responded (response rate, 53.9%). The response rates were 43.7% in male and 59.6% in female respectively, and the response rate by each age group were: in male 31.0% in the 24 yr old or younger group, 35.8% in the 25–34 yr old group, 33.7% in the 35–44 yr old group, 44.3% in the 45–54 yr old group, 53.7% in the 55–64 yr old group, and 65.7% in the 65 yr old or older group, and in female 48.6% in the 24 yr old or younger group, 50.6% in the 25–34 yr old group, 59.8% in the 35–44 yr old group, 63.9% in the 45–54 yr old group, 65.3% in the 55–64 yr old group, and 66.0% in the 65 yr old or older group. After excluding 154 subjects for having incomplete data (non-responders), the remaining 897 (responders) were analyzed. The study objectives were explained to the subjects via a form distributed at the time of the survey; only subjects who agreed to participate in this survey responded. This procedure followed the ethical guidelines of the Ministry of Education, Culture, Sports, Science and Technology Education, and the Ministry of Health, Labour and Welfare of Japan¹⁰). The survey data were anonymously collected by Hamamatsu City, and made available to researchers after making individual identification impossible. This study procedure was reviewed and approved by the Ethical Research Committee of Hamamatsu University School of Medicine.

Measures

Problem drinking

The CAGE questionnaire was used to assess problem drinking. In this study, we defined problem drinking as alcohol dependence and alcohol abuse/harmful drinking proven to be detected by CAGE questionnaire under self-administered questionnaire^{1, 11, 12}). All subjects were asked to complete this questionnaire (APPENDIX) translated into Japanese¹³). Because the CAGE questionnaire has been used to screen for problem drinking in the general population with a binary score, the presence of problem drinkers was categorized either as negative (0–1 score) or

positive (2–4 score) according to the commonly recommended cutoff value (2/1 score) suggested by Ewing and other previous studies^{9, 12, 14, 15}. Adequate reliability and validity of both the English and Japanese versions of the CAGE questionnaire have been demonstrated in several studies^{16, 17}.

Occupational factors

Occupational factors included employment types, occupational types, company size and working hours per week. Employment types were assessed by a single question, “What type of employment do you engage in?” followed by 6 categories, i.e., “full-time,” “part-time,” “self-employed,” “housewife/househusband,” “unemployed,” and “student.” Subjects who chose “full-time,” “part-time,” and “self-employed,” in the above question could answer questions about occupational types, company size and working hours per week. Occupational types were assessed by a single question, “What type of occupation do you engage in?” followed by 10 categories, i.e., “specialist/technical,” “administrative/managerial,” “clerical,” “sales,” “service,” “security,” “agriculture/forestry/fishery,” “transport/communication,” “production process and related” and “other.” These were followed by the Japanese Standard Occupational Classification¹⁸. Because their total number of subjects was 15 or less, the following occupational types were classified as “others”: “security,” “agriculture/forestry/fishery,” “transport/communication” and “other.” Company size was assessed by a single item question, “Indicate the number of employees in the company where you work,” followed by 2 choices, i.e., “49 or less” and “50 or more.” Working hours per week were assessed by a single item question, “Indicate the number of working hours per week in the company where you work?” followed by 4 choices, i.e., “39 or less,” “40–48,” “49 or more,” and “unstable.”

Controlling factors

These factors consisted of gender, age, marital status, depressive symptoms and annual family income. Marital status was categorized into 3 variables, i.e., “married,” “single” and “separated (widow/widower or divorced).” Depressive symptoms were assessed with the Japanese version of CES-D (Center for Epidemiologic Studies Depression Scale)¹⁹. Adequate reliability and validity of the Japanese version of CES-D have been reported in several studies^{20, 21}. Those with a total of score of sixteen or more were considered positive (depressed). There were 5 categories of annual family income, i.e., “1,999,999 yen or

less,” “2,000,000–3,999,999 yen,” “4,000,000–6,999,999 yen,” “7,000,000 yen or more,” and “unknown.” This classification followed the Japan National Survey of Labor Force²².

Statistical analysis

The prevalence of problem drinkers by each variable was computed using χ^2 test. In order to assess the possibility of sampling bias, the differences of the above-mentioned variables between responders and non-responders were evaluated. Since previous studies had reported that several risk factors for problem drinking were different between men and women²³, the correlation between each factor and problem drinking was analyzed with logistic regression models stratified by gender. This analysis was done after making adjustments for age (Model 1), and age with marital status, depressive symptoms, annual family income, employment types, occupational types, company size, and working hours per week (Model 2). In order to identify the occupational factors for problem drinking among a working population, this analysis was conducted only among the subjects who selected “full-time,” “part-time,” or “self-employed,” in the question about employment types (298 men and 285 women). Odds ratio (OR), 95% confidence interval (95% CI) and *p* values were calculated. *P* values of 0.05 or less were considered statistically significant. All statistical calculations were performed with SPSS for Windows, version 17.0 (SPSS Inc., Chicago).

Results

The prevalence of problem drinking by each variable was presented in Table 1. Problem drinkers were found in 16.5% of men and 3.8% of women. Those 55–64 yr old among men and 25–34 yr old among women showed the highest prevalence of problem drinking. With regard to marital status, married men and separated women showed the highest proportion of problem drinking. Problem drinkers were more prevalent in depressed subjects in both sexes. Problem drinkers were more prevalent in men with a family income of 4,000,000–6,999,999 yen. With regard to employment types, problem drinkers were more prevalent in self-employed subjects in both sexes. With regard to occupational types, a higher prevalence rate of problem drinking in men was found in the clerical and service professions, while in women, the higher prevalence was in administrative/managerial and service professions. Only in men, problem drinkers were more prevalent among those

Table 1. Prevalence of problem drinking^a (N=897)

| Factors | Total | | | Men | | | Women | | |
|--------------------------------|----------|-----------------------------------|----------------|----------|-----------------------------------|----------------|----------|-----------------------------------|----------------|
| | <i>n</i> | Problem drinking ^a (%) | <i>p</i> value | <i>n</i> | Problem drinking ^a (%) | <i>p</i> value | <i>n</i> | Problem drinking ^a (%) | <i>p</i> value |
| Age | | | 0.037 | | | 0.01 | | | 0.015 |
| ≤24 | 106 | 0.9 | | 43 | 0.0 | | 63 | 1.6 | |
| 25–34 | 131 | 12.2 | | 59 | 16.9 | | 72 | 8.3 | |
| 35–44 | 157 | 9.6 | | 61 | 18.0 | | 96 | 4.2 | |
| 45–54 | 155 | 9.7 | | 64 | 12.5 | | 91 | 7.7 | |
| 55–64 | 200 | 12.0 | | 89 | 25.8 | | 111 | 0.9 | |
| ≥65 | 148 | 8.8 | | 79 | 16.5 | | 69 | 0.0 | |
| Marital status | | | 0.026 | | | 0.001 | | | 0.13 |
| Married | 640 | 10.9 | | 283 | 20.8 | | 357 | 3.1 | |
| Single | 197 | 4.6 | | 95 | 5.3 | | 102 | 3.9 | |
| Separated | 60 | 8.3 | | 17 | 5.9 | | 43 | 9.3 | |
| Depressive symptoms | | | 0.168 | | | 0.459 | | | 0.006 |
| Negative | 625 | 8.5 | | 294 | 15.6 | | 331 | 2.1 | |
| Positive | 272 | 11.4 | | 101 | 18.8 | | 171 | 7.0 | |
| Annual family income in yen | | | 0.112 | | | 0.006 | | | 0.662 |
| ≤1,999,999 | 64 | 9.4 | | 28 | 17.9 | | 36 | 2.8 | |
| 2,000,000–3,999,999 | 227 | 9.3 | | 99 | 15.2 | | 128 | 4.7 | |
| 4,000,000–6,999,999 | 277 | 12.6 | | 128 | 25.0 | | 149 | 2 | |
| ≥7,000,000 | 229 | 7.9 | | 111 | 11.7 | | 118 | 4.2 | |
| Unknown | 100 | 4.0 | | 29 | 0.0 | | 71 | 5.6 | |
| Employment type | | | <0.001 | | | 0.006 | | | 0.025 |
| Full-time | 372 | 12.1 | | 226 | 16.4 | | 146 | 5.5 | |
| Part-time | 124 | 5.6 | | 14 | 21.4 | | 110 | 3.6 | |
| Self-employed | 87 | 25.3 | | 58 | 31.0 | | 29 | 13.8 | |
| Househusband/housewife | 137 | 1.5 | | 1 | 0.0 | | 136 | 1.5 | |
| Unemployed | 124 | 6.5 | | 76 | 9.2 | | 48 | 2.1 | |
| Student | 53 | 0.0 | | 20 | 0.0 | | 33 | 0.0 | |
| Occupational type | | | <0.001 | | | 0.007 | | | 0.001 |
| Specialist/technical | 126 | 10.3 | | 62 | 19.4 | | 64 | 1.6 | |
| Administrative/managerial | 48 | 22.9 | | 46 | 21.7 | | 2 | 50.0 | |
| Clerical | 104 | 12.5 | | 23 | 30.4 | | 81 | 7.4 | |
| Sales | 51 | 11.8 | | 18 | 22.2 | | 33 | 6.1 | |
| Service | 79 | 20.3 | | 35 | 31.4 | | 44 | 11.4 | |
| Production process and related | 109 | 6.4 | | 84 | 8.3 | | 25 | 0.0 | |
| Others | 66 | 12.1 | | 30 | 23.3 | | 36 | 2.8 | |
| Company size | | | <0.001 | | | 0.002 | | | 0.177 |
| ≤49 | 279 | 15.4 | | 134 | 26.1 | | 145 | 5.5 | |
| ≥50 | 304 | 10.2 | | 164 | 14.0 | | 140 | 5.7 | |
| Working hours (per week) | | | <0.001 | | | 0.131 | | | 0.295 |
| ≤39 | 171 | 10.5 | | 51 | 23.5 | | 120 | 5.0 | |
| 40–48 | 190 | 12.1 | | 87 | 18.4 | | 103 | 6.8 | |
| ≥49 | 202 | 15.3 | | 153 | 19.0 | | 49 | 4.1 | |
| unstable | 20 | 10.0 | | 7 | 14.3 | | 13 | 7.7 | |

^aCAGE positive (2-4 score) was considered as problem drinking.

who work in a company with less than 49 employees, as opposed to companies with 50 or more employees. With regard to working hours per week, men working 39 h or less presented the highest prevalence of problem drinking.

Table 2 illustrates the results of logistic regression

analysis, showing the associations between each factor and problem drinking in men. Among occupational factors, clerical and service professions and a company size of 49 or less showed higher odds ratios for problem drinking. As for controlling factors, a family income of 1,999,999

Table 2. Logistic regression analysis for factors associated with problem drinking in men (N=298)

| Factors | OR (95% CI) ^a | | | |
|--------------------------------|--------------------------|----------------|-------------------|----------------|
| | Model 1 | <i>p</i> value | Model 2 | <i>p</i> value |
| Marital status | | | | |
| Married | 1 (reference) | | 1 (reference) | |
| Single | 0.34 (0.11–1.08) | 0.067 | 0.36 (0.11–1.20) | 0.095 |
| Separated | 0.26 (0.03–2.04) | 0.199 | 0.27 (0.03–2.42) | 0.241 |
| Depressive symptoms | | | | |
| Negative | 1 (reference) | | 1 (reference) | |
| Positive | 1.37 (0.71–2.67) | 0.349 | 1.27 (0.60–2.69) | 0.537 |
| Annual family income in yen | | | | |
| ≤1,999,999 | 5.26 (0.94–29.59) | 0.060 | 5.29 (0.64–43.82) | 0.122 |
| 2,000,000–3,999,999 | 1.62 (0.65–4.04) | 0.302 | 1.60 (0.55–4.66) | 0.392 |
| 4,000,000–6,999,999 | 2.94 (1.39–6.25) | 0.005 | 2.97 (1.26–7.01) | 0.013 |
| ≥7,000,000 | 1 (reference) | | 1 (reference) | |
| Unknown | – ^b | | – ^b | |
| Employment type | | | | |
| Full-time | 1 (reference) | | 1 (reference) | |
| Part-time | 1.07 (0.26–4.41) | 0.931 | 0.99 (0.19–5.12) | 0.986 |
| Self-employed | 1.84 (0.91–3.71) | 0.089 | 1.32 (0.52–3.33) | 0.563 |
| Occupational type | | | | |
| Specialist/technical | 1 (reference) | | 1 (reference) | |
| Administrative/managerial | 0.88 (0.33–2.34) | 0.792 | 0.82 (0.28–2.41) | 0.719 |
| Clerical | 1.92 (0.62–5.89) | 0.256 | 1.90 (0.54–6.73) | 0.320 |
| Sales | 1.05 (0.28–3.97) | 0.947 | 0.49 (0.11–2.07) | 0.329 |
| Service | 1.98 (0.73–5.35) | 0.177 | 1.64 (0.54–4.96) | 0.381 |
| Production process and related | 0.39 (0.14–1.09) | 0.071 | 0.30 (0.10–0.88) | 0.028 |
| Others | 0.82 (0.27–2.51) | 0.728 | 0.61 (0.18–2.13) | 0.443 |
| Company size | | | | |
| ≤49 | 1.91 (1.01–3.60) | 0.045 | 2.06 (0.90–4.74) | 0.089 |
| ≥50 | 1 (reference) | | 1 (reference) | |
| Working hours (per week) | | | | |
| ≤39 | 1.07 (0.43–2.65) | 0.881 | 0.93 (0.34–2.57) | 0.895 |
| 40–48 | 1 (reference) | | 1 (reference) | |
| ≥49 | 1.16 (0.57–2.35) | 0.690 | 0.93 (0.42–2.04) | 0.849 |
| unstable | 1.05 (0.11–10.00) | 0.965 | 0.46 (0.03–7.71) | 0.592 |

Model 1: Adjusted for age. Model 2: Adjusted for age, marital status, depressive symptoms, annual family income, employment types, occupational types, company size and working hours. ^a OR: odds ratio; CI: confidence interval. ^b There were no such subjects.

yen or less and 4,000,000 to 6,999,999 yen showed higher odds ratios for problem drinking.

Table 3 presents the results of logistic regression analysis, showing the association between each factor and problem drinking in women. Among occupational factors, the self-employed, and those in administrative/managerial, clerical, and sales and service professions showed higher odds ratios for problem drinking. Again, regarding controlling factors, those separated, those with depressive symptoms, and those with a family income of 2,000,000 to 3,999,999 yen or unknown showed higher odds ratios for problem drinking.

Discussion

To the best of our knowledge, our study is the first to investigate the association between occupational factors and problem drinking using the CAGE questionnaire among a Japanese working population, after controlling for multiple confounders. In addition, our study is the first to mention the relation between smaller company size and problem drinking in men.

Our study showed that 16.5% of men and 3.8% of women were problem drinkers according to the CAGE questionnaire. In addition, the peak age of problem

Table 3. Logistic regression analysis for factors associated with problem drinking in women (N=285)

| Factors | OR (95% CI) ^a | | | |
|------------------------------------|--------------------------|----------------|-------------------------|----------------|
| | Model 1 | <i>p</i> value | Model 2 | <i>p</i> value |
| Marital status | | | | |
| Married | 1 (reference) | | 1 (reference) | |
| Single | 1.10 (0.23–5.20) | 0.907 | 0.84 (0.10–7.00) | 0.868 |
| Separated | 5.64 (1.44–22.06) | 0.013 | 5.03 (0.72–35.42) | 0.104 |
| Depressive symptoms | | | | |
| Negative | 1 (reference) | | 1 (reference) | |
| Positive | 3.52 (1.12–11.06) | 0.031 | 2.94 (0.70–12.35) | 0.141 |
| Annual family income in yen | | | | |
| ≤1,999,999 | 1.65 (0.16–16.54) | 0.672 | 0.43 (0.01–16.48) | 0.653 |
| 2,000,000–3,999,999 | 4.17 (1.05–16.60) | 0.043 | 4.86 (0.73–35.59) | 0.103 |
| 4,000,000–6,999,999 | 0.51 (0.09–2.92) | 0.452 | 0.75 (0.09–6.01) | 0.784 |
| ≥7,000,000 | 1 (reference) | | 1 (reference) | |
| Unknown | 2.80 (0.50–15.78) | 0.244 | 1.67 (0.17–16.66) | 0.663 |
| Employment type | | | | |
| Full-time | 1 (reference) | | 1 (reference) | |
| Part-time | 0.86 (0.23–3.22) | 0.826 | 0.29 (0.04–2.32) | 0.245 |
| Self-employed | 4.27 (0.99–18.36) | 0.051 | 11.33 (0.95–135.53) | 0.055 |
| Occupational type | | | | |
| Specialist/technical | 1 (reference) | | 1 (reference) | |
| Administrative/managerial | 84.21 (2.50–2,841.61) | 0.014 | 139.37 (1.47–13,242.89) | 0.034 |
| Clerical | 5.01 (0.57–43.68) | 0.145 | 3.70 (0.33–41.54) | 0.289 |
| Sales | 8.44 (0.67–106.24) | 0.099 | 18.44 (0.77–442.79) | 0.072 |
| Service | 12.67 (1.35–118.88) | 0.026 | 15.11 (1.02–222.94) | 0.048 |
| Production process and related | – ^b | | – ^b | |
| Others | 2.96 (0.17–51.01) | 0.455 | 3.69 (0.14–96.96) | 0.434 |
| Company size | | | | |
| ≤49 | 1.13 (0.39–3.25) | 0.826 | 0.67 (0.15–2.90) | 0.591 |
| ≥50 | 1 (reference) | | 1 (reference) | |
| Working hours (per week) | | | | |
| ≤39 | 0.86 (0.26–2.80) | 0.799 | 0.61 (0.11–3.31) | 0.571 |
| 40–48 | 1 (reference) | | 1 (reference) | |
| ≥49 | 0.52 (0.10–2.68) | 0.432 | 0.34 (0.05–2.51) | 0.291 |
| unstable | 0.96 (0.11–8.75) | 0.971 | 0.10 (0.00–6.69) | 0.278 |

Model 1: Adjusted for age. Model 2: Adjusted for age, marital status, depressive symptoms, annual family income, employment types, occupational types, company size and working hours. ^a OR: odds ratio; CI: confidence interval. ^b There were no such subjects.

drinking was 55–64 yr old for men and 25–34 yr old for women. A Japanese epidemiological study reported that the prevalence rate of problem drinkers detected with the CAGE questionnaire among 2,165 Japanese civil servants was 6.8% of men and 1.3% of women in 2003²⁴). In this study, the peak age of problem drinkers was 70–79 yr old for men and 20–29 yr old for women²⁴). One Spanish study using CAGE questionnaire reported that 14.3% of men and 3.6 of women in the general Spanish population were problem drinkers in 1992¹⁴). In addition, one Korean study reported that 18.4% of men and 3.2 of women in the general Korean population had a positive CAGE in 2001¹⁵). The prevalence of problem drinkers in our

study was different from that in previous Japanese study, although it was almost equal to the prevalence of problem drinkers found by studies in other countries. One of the major factors responsible for differences in the prevalence and peak age of problem drinking between our study and previous Japanese study may be the difference of subjects' backgrounds, such as age and occupational distribution. This difference may also be due to the methodological differences between the studies, because previous Japanese study used face-to-face interviews, not self-administrative questionnaires²⁴). The years when this earlier Japanese survey were conducted may be one another factor in these differences, since the prevalence of problem drinkers in

Japan has been changing year by year^{4, 24}).

Problem drinkers were more prevalent in separated women. Our result is consistent with the previous study mentioning that more separated women suffer from problem drinking²⁵). This can be explained by the greater psychological, social and economical instability among these women as a result of separation²⁵).

Our study showed that problem drinkers were more prevalent in depressed women. With regard to gender difference, Fillmore *et al.* reported that the relation between problem drinking and depression is stronger in women than men²⁶), while Cooper *et al.* showed the opposite pattern²⁷). Such an inconsistency may be due to differences in how problem drinking and depression are assessed, and whether or not the subjects are a sample of the general population²³), which may be particularly true in our study.

In the present study, problem drinkers were more prevalent among workers with a family income of several categories. Previous studies conducted in the US reported a positive relation between income and alcohol use^{28, 29}), while others in Britain and the US found a negative relation^{30, 31}). Having enough money to purchase alcohol beverages and job- and socially-related networking that accelerates social drinking, can explain the positive relation between income and alcohol use^{32, 33}), while the negative relation between income and alcohol use can be explained by the use of alcohol as a form of stress-coping to relieve higher stressors; the notion of “self-medication”³⁴). The reason our result was unable to show the above-mentioned relation may be due to the differences in subject background, such as the age and occupational distribution of study subjects.

As for occupational types, clerical and service professionals in both sexes and administrative/managerial and sales professionals in women were more likely to have problem drinking, though the number of female administrative/managerial workers was very small. Marchand *et al.* reported that those in clerical/service occupations are particularly at risk for problem drinking in Canada³⁵). In the US, service professionals of both sexes and female administrators were reported to be more likely to have problem drinking^{36, 37}). To explain the relation between occupational types and problem drinking, four hypothetical models have been proposed: structural, social control, social availability, and motivational models³⁸). In the first model, the occupation itself has a peculiar structure that could readily encourage development of problem drinkers, including low job complexity, lack of organization of work, or easy accessibility of alcohol³⁸). In the

second model, little inhibition of alcohol intake through lack of supervision (e.g., doctors, lawyers, executives) or social pressure to drink at work serves to explain the association³⁸). In the third model, workers in a number of occupations have social norms that drinking is one of the determining factors for socialization and promotion, are more likely to develop alcoholism³⁸). In the fourth model, separation from normal social and sexual relationships, very high or low income levels, noxious/uncomfortable work conditions, or high responsibility, produce the motivation to drink as a form of stress-coping³⁸).

According to these models, the more numerous problem drinkers found among clerical and service professions in our study can be explained by structural, social availability and motivational models (clerical), and by structural, social control, and social availability models (service)³⁸). The social availability and motivational models can explain the higher prevalence of problem drinkers in administrative/managerial professions³⁸). Structural and motivational models can explain the higher prevalence of problem drinking among sales professions³⁸).

In terms of employment types, problem drinkers were more prevalent in self-employed women. A study conducted in the Czech Republic showed that alcohol consumption was higher among self-employed women³⁹). Self-employed workers have greater autonomy and authority over more decisions, and more manageable job demands than their non-self-employed counterparts^{40, 41}). On the other hand, they may experience more psychological pressures^{40, 41}). These stresses may produce the motivation to drink as a form of stress-coping.

Men working in companies with 49 or fewer employees have shown a higher prevalence of problem drinking. In Japan, companies that have 50 or more employees are required to have an occupational health physician by the Occupational Health and Safety Law. Thus, lack of a physician's supervision may be one of the reasons why a company with fewer employees is more likely to have problem drinkers (social control model)³⁸). In addition, an employee tends to have more duties in a smaller company, compared with a larger one.

Another explanation for why there are more problem drinkers among self-employed or smaller companies may be that they have more insufficient preventive and social supportive systems for mental health problems in the workplace. Compared with larger and more organized companies, self-employed or smaller companies have less funds, and fewer security and hygiene administrators, committees, or specialists working to combat problem

drinking. Moreover, they have less support from the government, and are not mandated to make an ex post facto report on medical examinations⁴²⁾. Such issues must be addressed to combat alcohol-related problems among the working population.

Gender difference may also impact occupational stresses on workers. In our study, more problem drinkers were found in the smaller-sized companies (only in men), and in self-employed, administrative/managerial or sales workers (only in women). In general, men tend not to express their psychological difficulties, which is more particular to the Japanese male-chauvinistic culture⁴³⁾. These characteristics are particularly true in more familial and hierarchical smaller-sized companies, which may accelerate their alcohol consumption. Gender differences in the impacts of occupational stress factors on alcohol consumption have also been reported⁴⁴⁾. Only among women, occupational stresses such as higher job strain, poor social support, and a poor accord between an individual's ability and the demands of the work, were reportedly associated with poor mental health problems such as high alcohol consumption^{44, 45)}. In particular, self-employed or administrative/managerial female workers tend to have higher job strain, higher work demands and poorer social support than women in other employment or occupational types.

Several limitations should be considered when interpreting our results. First, the cross-sectional design used in our study does not necessarily demonstrate that the factors associated with problem drinking are causal. Second, the small sample size of a study conducted in a small area of Japan calls for cautious interpretation of the results; thus, generalizability may be an issue. Third, the present study did not question subjects about education history or the age when they started drinking. Low education and starting to drink earlier were reported to be associated with problem drinking^{46, 47)}, and may have confounded our results. Selection bias is a fourth possible limitation because 1) the characteristics of the occupational distribution in our study were such that there were disproportionately more workers engaged in specialist/technical, service and production processes and related occupation. Moreover 2) non-responders were likely to be male, have a low income and be separated. Thus, the prevalence of problem drinking might be underestimated since male, low income and being single are risk factors for problem drinking^{15, 24, 28)}. In addition, regarding age, it is possible that the prevalence of problem drinking among younger age groups might be underestimated because the response rates among younger age groups in both sexes were lower than those among

older age groups. Despite these limitations, our study indicated that problem drinking is associated with several occupational factors, and showed the importance of intervention targeting the working population.

In conclusion, self-employed women, clerical and service professional men, and administrative/managerial, clerical, sales and service professional women may have the occupational factors putting them at risk for problem drinking. In addition, small company size may be a factor in male problem drinking. In order to develop effective measures for problem drinking in the workplace, it is important to consider these findings, in addition to targeting individual psychological and behavioral factors.

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APPENDIX. CAGE questionnaire

1 Have you ever felt you should *Cut down* on your drinking?

(0) No (1) Yes

2 Have people *Annoyed you by criticizing* your drinking?

(0) No (1) Yes

3 Have you ever felt bad or *Guilty* about your drinking?

(0) No (1) Yes

4 Have you ever had a drink in the morning to get rid of a hangover? (*Eye-opener*)

(0) No (1) Yes
