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Original Article

Precarious Employment and Health: Analysis of the Comprehensive National Survey in Japan

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Abstract: Recent studies suggest that unstable employment contracts may affect the health of workers. Many Japanese workers working full time in ostensibly permanent positions actually operate within unstable and precarious employment conditions. We compared the health status of Japanese workers with precarious employment contracts with that of permanent workers using the 2007 Comprehensive Survey of Living Conditions of the People on Health and Welfare (n=205,994). We classified their employment status as 'permanent' *vs.* 'precarious' (part-time, dispatch, or contract/non-regular) and compared their health conditions. Among both sexes, precarious workers were more likely than permanent workers to have poor self-rated health or more subjective symptoms, with more workers in full-time employment suffering from serious psychological distress (SPD) and more female workers who smoke. Using logistic regression, we identified a positive association between precarious employment and SPD and current smoking among workers engaged in full-time employment after adjusting for age, marital status, and work-related conditions. This study demonstrates that precarious employment contracts are associated with poor self-rated health, psychological distress, and tobacco use, especially among people working full-time jobs. These results suggest that engagement in full-time work under unstable employment status impairs workers' health.

Key words: Employment contract, Precarious workers, National survey, Self-rated health, Psychological distress, Smoking, Health examinations

Introduction

After the economic crisis of the 1990s, the labor markets of developed countries grew more fluid, resulting in an increase in the number of non-permanent or "precarious" workers[1, 2]. Among Japan's 51.12 million workers, 17.43 million (34%) are workers with precarious employment situations (precarious workers) characterized by part-time, temporary, or contract positions[3]. The decline in permanent employment since 1995 has increased precarious employment, resulting in a sustained increase in overall employment[3]. This situation has, however, provided primarily young people with fewer opportunities for permanent employment, and more workers who desire permanent employment have had to accept unstable, precarious jobs[4].

Companies are hiring precarious workers to reduce their labor costs[3, 4]. For instance, the use of temporary workers, who contract with a temporary agency and are dispatched to a company, was initially limited in Japan to certain specific types of businesses requiring professional mastery. Nonetheless, as regulations concerning temporary employment have relaxed during the last 10 yr, temporary workers are now allowed in a wide range of sectors and

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occupations, including those in manufacturing[5]. Consequently, low-wage temporary workers now assume full-time work equivalent to that of permanent workers[6].

Whereas Western company's pay wages are based on the service content, Japanese companies adopted a seniority-based wage system following the end of World War II. This resulted in significant differences between precarious workers and permanent workers in terms of wages, insurance benefits, and pensions and leave systems, even when precarious and permanent workers provide the same service to the company[6, 7]. Additionally, Japanese companies have traditionally filled permanent contract positions with new entrants into the labor market. Consequently, the probability of transitioning from precarious to permanent employment is extremely limited after an individual begins his or her career as a precarious worker after graduation[8]. Furthermore, the number of permanent workers recruited is heavily dependent on the overall economic situation of the nation at any given time. In the wake of the long-term global recession since the 1990s, Japanese companies have significantly reduced the number of new permanent employees[9]. Thus, a social problem has emerged in which the number of impoverished workers, referred to as the "working poor"—an indicator developed in 2000 by the International Labour Organization, being defined as "those who work and at the same time belong to poor households" —is increasing, primarily among precarious workers[1, 9, 10]. These circumstances have led the Organisation for Economic Cooperation and Development (OECD) to issue a recommendation to the Japanese government in 2008 to reduce the gap in effective protection between regular and non-regular workers[4].

The categories in the Japanese labor statistics that are used to classify precarious employees differ significantly from the classification standards adopted in Western nations[11]. Precarious employment may be conceptually classified by three criteria: working hours, terms of employment, and relationship with the employer (direct or indirect employment). Accordingly, "part time" refers to a worker for whom the fixed working hours per week are less than those for permanent workers employed at the same company (based on the Act on Improvement, etc. of Employment Management for Part-time Workers), "contract/non-regular" refers to workers who are employed on a fixed-term employment contract, and "dispatch worker" refers to workers who enter into an employment contract with dispatch agencies and are deployed by those dispatch agencies [based on the Act for Securing the Proper Operation of Worker Dispatching Undertakings and Improved Working Conditions for Dispatched Workers (Worker Dispatch Law)].

However, this classification does not necessarily correspond to the actual working status in the place of employment. For example, there are many part-time workers whose working hours are similar to those of permanent workers, and contract workers who have effectively no limited employment period due to repeated contracts over long periods. Accordingly, it is difficult to make clear-cut classifications of employment status based on working hours and terms of employment. The actual classification into categories of employment type in the Labour Force Survey published by the Ministry of Internal Affairs and Communications principally reflects the interviewee's status as it is usually designated at the workplace, without referring to the characteristics of the job (e.g., working hours and terms of employment)[4]. Although this classification standard is unusual from an international perspective, it may be necessary in order to obtain an accurate reflection of the current situation of the labor market in Japan, in which the working conditions of workers are determined by their positions in the workplace rather than by their actual occupation, as noted above[6, 8, 9].

Previous research has suggested that employment conditions have powerful effects on health and health equity[1, 2]. During the last decade, the influence of unstable employment contracts on health has been a subject of research, but primarily in Western nations. Researchers have found that precarious workers tend to have higher mortality rates[12, 13], poorer mental status[14–16], more work-related injuries[17], and fewer sick-leave days than permanent workers[18]. However, results are not always consistent across countries, partly because each nation has its own classifications of the labor environment and non-regular employment. In addition, these findings were primarily based on particular job categories, and no large-scale nationwide survey has been conducted on this topic. In Japan, only a few studies have compared precariously and permanently employed workers[19, 20].

As we described above, one of the major issues for precarious workers in Japan is the wide socioeconomic gap compared with permanent workers. Even though precarious workers are engaged in full-time work equivalent to that of permanent workers for long periods, the wage gap between them and full-time workers in terms of working hours is wide. On the other hand, many workers, mainly housewives, voluntarily choose short-time precarious employment because they can receive favorable treatment from the tax and social insurance systems when they are

a dependent of their spouse. Therefore, although both are of precarious worker status, it is considered that the effect of precarious employment status on full-time workers is probably different from that on short-time workers. In recent years, full-time precarious workers in Japan have increasingly become predominantly male; however, the effect of unstable full-time work on workers' health remains largely unknown.

The purpose of this study was to examine the effects of precarious *vs*. permanent work on physical and mental health status. The analyses were undertaken separately for each sex in order to identify gender differences. To explore whether the effects on health differ between full-time workers and part-time workers, the data were analyzed separately for those working less than 40 h per week and those working more than 40 h, which is the statutory number of working hours as defined by the Labour Standards Act in Japan. To achieve this goal and ensure generalizability, comprehensive national survey data were used to study and compare the health status of workers with each kind of employment contract.

Subjects and Methods

Data source and samples

The present study was based on data obtained by the Comprehensive Survey of Living Conditions of the People on Health and Welfare, which is one of the Designated Statistics of Japan[21]. This cross-sectional national survey has been conducted every 3 yr since 1986 and investigates health care, medical services, and related topics in order to aid in policy making. The survey is based on questionnaires addressing all members of households selected from all enumeration districts of the population census during the census year, by a stratified random sampling method. The present study was based on the health and household questions of the 2007 survey, which were analyzed individually.

The survey included 287,807 households; after excluding those with missing data, 229,821 households with 535,789 individuals were included in the analyses. Of the final sample, 371,294 were aged 18–64 yr at the time of the survey conducted in June. We extracted those who engaged in "income-earning jobs" and whose employment status was identified as "employee" from this sample.

Workers were classified as either permanently or precariously employed; the latter included those considered to be either part-time, temporary employment agency contract, or contract/non-regular workers by the Ministry of Health, Labour and Welfare according to type of contract. A specific statement in the questionnaire urges interviewees to select "the status designated at the workplace" from among: 1. Permanent worker/employee, 2. Part-time worker, 3. Arbeit (Short-term, part-time worker), 4. Temporary worker dispatched from a temporary employment agency, 5. Contract/non-regular worker, or 6. Other. Only the dispatch worker is explained as "the worker who is employed by and sent from a temporary agency which is in conformity with Worker Dispatch Law"[5]. We excluded those who did not disclose their employment status. Figure 1 illustrates the process by which subjects were excluded or included in the study population. Finally, this study analyzed data obtained from 205,994 individuals (females: 46.2%; average age: 41.2 ± 12.3 yr).

The large-scale survey data used in this study are derived from official statistics. Before conducting this study, we obtained permission to use individual data from the 2007 Comprehensive Survey of Living Condition of the People on Health and Welfare for purposes other than those intended by the Ministry of Health, Labour, and Welfare of Japan. We determined that an ethical review of the obtained data was not required based on the "Ethical Guidelines for Epidemiological Research" of the Japanese Government (http://www.niph.go.jp/wadai/ekigakurinri/ethical-gl/guidelines.htm).

Outcome variables

Health status

We used "self-rated health" and "subjective symptoms" as variables indicating health status in the health questionnaire. The category of "poor self-rated health" referred to those who answered "not good" or "bad" to the following question: "How do you feel about your health?" Subjective symptoms referred to those who reported having one or more of 42 general and physical symptoms (e.g., fever, cough and sputum, loss of appetite, diarrhea, joint pain, and fracture).

Psychological distress

The questionnaire included the Japanese version of the Kessler 6 (K6), a scale measuring psychological distress that is characterized by high internal consistency and reliability[22, 23]. This instrument measures nonspecific psychological distress that is sensitive to discriminating DSM-IV cases from non-cases in the general population[24]. The K6 consists of six items beginning with "how often in the past month did you feel…"; it includes specific symptoms of psychological distress (e.g., "feeling so sad that nothing

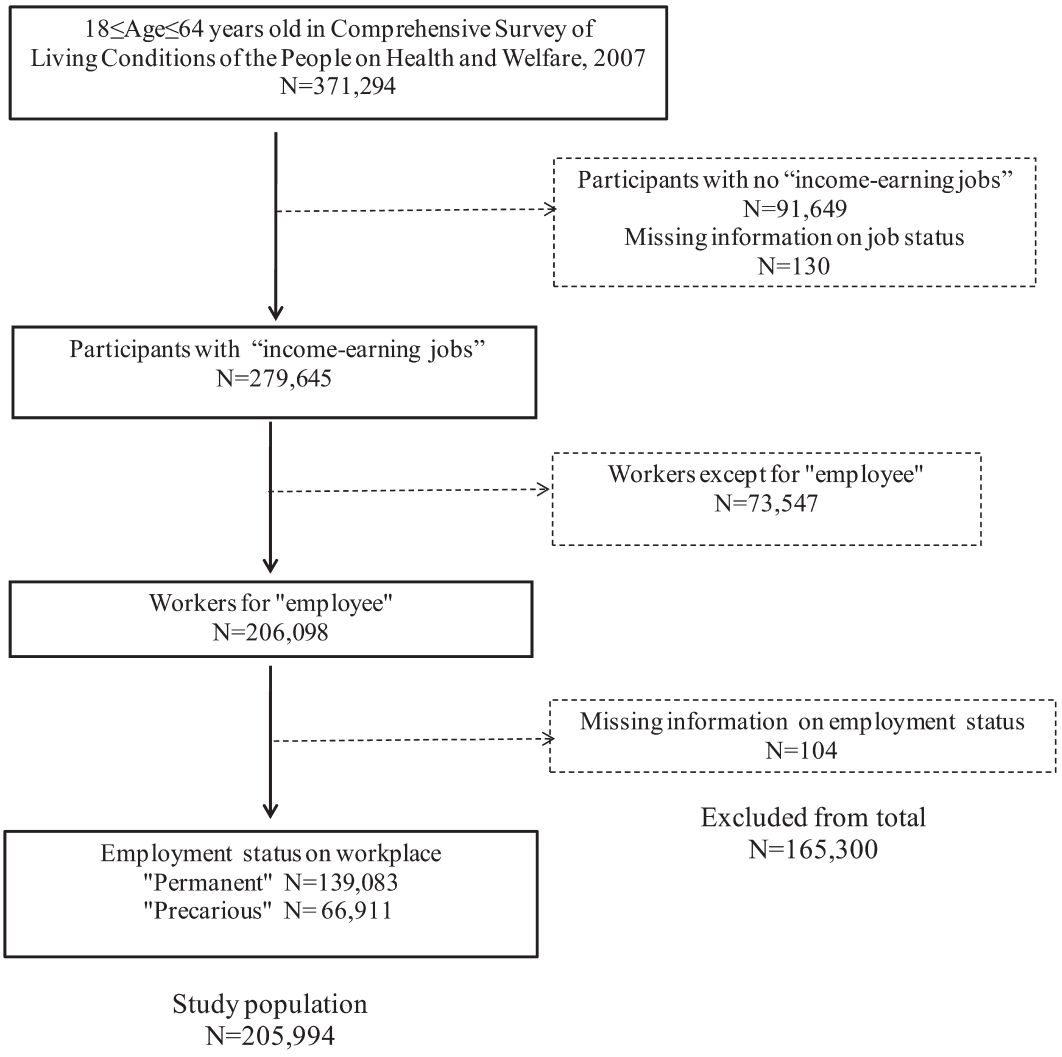

Fig. 1. Sequential exclusion of participants in the study.

can cheer you up"). Respondents self-report on a scale from 0 ("none of the time") to 4 ("all of the time"), and the scores of the items are added to obtain a total score ranging from 0 to 24. Calibration studies indicate that scores of 13–24 represent high psychological distress (high likelihood of mental disorder), those of 8–12 represent moderate psychological distress (possible mental disorder), and those of 0–7 represent low psychological distress (mental disorder unlikely)[22, 24, 25]. Based on these studies, the present study focused on cases with total K6 scores of 13 or higher as reflective of serious psychological distress (SPD). The scale is copyright-free and downloadable from the National Comorbidity Survey homepage (http://www.hcp.med.harvard.edu/ncs/k6_scales.php).

Health behaviors

For health behaviors, we evaluated smoking and undergoing health examinations for general checkups and for cancer screening. Subjects were classified as current, past, or nonsmokers. For the general health examination, respondents were asked whether they had undergone health checkups or completed physical examinations during the past year. With regard to cancer, questions were asked about screening for stomach, lung, uterine, breast, and/or colon cancer during the past year.

Other indicators (demographic and occupational characteristics)

Age, sex, marital status, occupation, work hours per week, job tenure, and company size were used as factors in health and employment status. Subjects were classified

into groups at each mid-decade between the ages of 18 and 64 yr, and each group was used as a categorical variable. Marital status was classified as never, currently, or previously married. Occupation was classified as Managerial/Professional, Clerical, Sales/Service, Manual Worker (including security, agriculture/forestry/fisheries, transportation, communication, and production process worker), and Not Classified, based on the Standard Occupational Classification for Japan[26]. The category of work hours per week was divided further into the two designations of less than 40 h and 40 or more hours, based on the legal hours designated by the Labour Standard Law of Japan. Job tenure was classified as permanent or more than a year, between a month and a year, and less than a month. Based on the number of workers, company size was categorized as ≤30, 30–100, 100–500, 500–1,000, or >1,000. According to the scale used by the questionnaire to measure company size, government and municipal offices were classified into a separate category; the same categorization system was used in our analysis.

Data analysis

We compared permanent and precarious workers to study each attribute of health status and behavior. Because of marked sex differences in the workforce, we conducted separate analyses for males and females. Data are presented as percentages. χ^2 tests were used to compare categorical variables, and Wilcoxon's rank-sum test was used to compare continuous variables. In evaluating the rate ratio (RR), odds ratio (OR), and 95% confidence interval (CI), permanent workers were used as a reference, and each analysis was made separately according to gender. Considering the large number of subjects, we separately examined the results for RR or OR >1.2 versus less. Logistic regression analyses were adjusted for age, marital status, occupation, and company size to evaluate the association between employment status and health status. We used SAS for Windows (v. 9.1) for analysis, and the significance level of tests was set at 5%.

Results

Table 1 depicts the attributes of those surveyed, including the results of the analysis of working conditions by employment status. A total of 66,911 workers, comprising 17.3% of the males and 50.1% of the females surveyed, were precarious workers. Females constituted 71.3% of the precarious workers. The precarious workers were older than the permanent workers (mean age = 42.3 ± 13.3 *vs.* 40.7 ± 11.7 yr). The largest group of precarious workers was represented by sales/service workers (40.0%); the largest group of permanent workers was the managerial/professional group (39.2%). More than one-third of precarious workers reported working at least 40 h (males: 53.7%, females: 28.9%). Among the precarious workers, 41.7% worked for companies with fewer than 30 workers.

Tables 2 and 3 show the RR for each health-related indicator by employment status and the 95%CI by gender and working hours. Among male precarious workers, significantly increased RRs were observed for poor self-rated health, severe psychological distress (SPD), and subjective symptoms, in comparison to permanent workers. In the analysis per working hours, there was no significant difference in self-rated health or SPD according to employment status for males working fewer than 40 h per week. On the other hand, for males working more than 40 h per week, there were significant differences in all health indices according to employment status, and the smoking rate was significantly higher among precarious workers compared with permanent workers. Among women who were precarious workers, a significantly higher rate for current smoking and slightly higher rates for poor self-rated health and subjective symptoms were noted. For females working fewer than 40 h per week, no significant difference in self-rated health or smoking according to employment status was observed, and the rate for SPD was significantly higher among permanent workers than precarious workers. Moreover, for females working more than 40 h per week, the rate for SPD was significantly higher among precarious employees, and the OR for smoking was also considerably higher. The RRs for "attendance at annual health examination" and "attendance at examination for cancer" were significantly lower for both male and female precarious workers compared with permanent workers.

Table 4 presents the results of the logistic regression analysis by work time and gender. For males who were precarious workers working fewer than 40 h per week, the OR for subjective symptoms was slightly elevated, and the OR for current smoking was significantly lower after adjusting for age, marital status, and work-related conditions. In contrast, for males working more than 40 h per week, the OR for SPD was significantly higher, and the ratios for poor self-rated health, subjective symptoms, and current smoking were slightly elevated. Among females working fewer than 40 h per week, precarious workers had a slightly lower risk for poor self-rated health. For females working more than 40 h per week, the OR for current smoking was significantly increased, and the OR for SPD

Table 1. Socio-demographic characteristics of workers by employment status (n=205,994)

Characteristics	Men				Women			
	Total (n=110,889)	Permanent (n=91,165)	Precarious (n=19,224)	*p*-value	Total (n=95,105)	Permanent (n=47,418)	Precarious (n=47,687)	*p*-value
	No (%)	No (%)	No (%)		No (%)	No (%)	No (%)	
Age, year								
18–24	10,264 (9.2)	6,452 (7.0)	3,812 (19.9)	<0.0001	10,912 (11.5)	6,144 (13.0)	4,768 (9.9)	<0.0001
25–34	26,092 (23.5)	22,202 (24.2)	3,890 (20.2)		22,280 (23.4)	13,375 (28.2)	8,905 (18.7)	
35–44	26,894 (24.3)	24,253 (26.5)	2,641 (13.7)		22,843 (24.0)	11,029 (23.3)	11,814 (24.8)	
45–54	25,492 (23.0)	22,899 (25.0)	2,593 (13.5)		23,009 (24.2)	10,635 (22.4)	12,374 (26.0)	
55–64	22,147 (20.0)	15,859 (17.3)	6,288 (32.7)		16,061 (16.9)	6,235 (13.1)	9,826 (20.6)	
mean ± SD	41.7 ± 12.3	41.6 ± 11.5	41.9 ± 15.7	<0.01	40.7 ± 12.2	39.0 ± 11.9	42.5 ± 12.3	<0.001
Marital status, %								
Never married	33,633 (30.3)	25,066 (27.4)	8,567 (44.6)	<0.0001	28,629 (30.1)	18,132 (38.2)	10,497 (22.0)	<0.0001
Currently married	72,719 (65.6)	63,140 (68.8)	9,579 (49.8)		56,648 (59.6)	24,734 (52.2)	31,914 (66.9)	
Previously married	4,537 (4.1)	3,459 (3.8)	1,078 (5.6)		9,828 (10.3)	4,552 (9.6)	5,276 (11.1)	
Occupation, % [a]								
Managerical/Professional	40,960 (38.3)	37,059 (41.8)	3,901 (21.2)	<0.0001	24,348 (26.5)	17,405 (37.9)	6,943 (15.1)	<0.0001
Clerical	10,727 (10.0)	9,561 (10.8)	1,166 (6.3)		22,672 (24.7)	13,867 (30.2)	8,805 (19.1)	
Sales/Service	21,330 (19.9)	15,262 (17.2)	6,068 (33.0)		29,042 (31.6)	8,350 (18.2)	20,692 (44.9)	
Manual worker	31,428 (29.4)	25,043 (28.3)	6,385 (34.7)		13,307 (14.5)	5,576 (12.2)	7,731 (16.8)	
Not classificated	2,596 (2.4)	1,705 (1.9)	891 (4.8)		2,577 (2.7)	688 (1.5)	1,889 (4.1)	
Work time per week, %								
<40 h	18,785 (16.9)	9,885 (10.8)	8,900 (46.3)	<0.0001	41,785 (43.9)	7,898 (16.7)	33,887 (71.1)	<0.0001
≥40 h	92,104 (83.1)	81,780 (89.2)	10,324 (53.7)		53,320 (56.1)	39,520 (83.3)	13,800 (28.9)	
Job tenure, %								
permanent or >1 yr	10,673 (91.7)	90,755 (99.0)	10,918 (56.8)	<0.0001	76,372 (80.3)	46,820 (98.7)	29,552 (62.0)	<0.0001
1 month - 1 yr	7,267 (6.6)	701 (0.8)	6,566 (34.2)		16,293 (17.1)	460 (1.0)	15,833 (33.2)	
dairy - 1 month	1,949 (1.7)	209 (0.2)	1,740 (9.0)		2,440 (2.6)	138 (0.3)	2,302 (4.8)	
Company size, %								
1–29	35,950 (32.4)	27,873 (30.4)	8,077 (42.0)	<0.0001	36,370 (38.1)	16,563 (34.8)	19,807 (41.6)	<0.0001
30–99	17,986 (16.2)	14,707 (16.0)	3,279 (17.1)		16,879 (17.8)	8,519 (18.0)	8,360 (17.5)	
100–499	20,811 (18.8)	17,372 (19.0)	3,499 (17.9)		18,155 (19.1)	9,561 (20.2)	8,594 (18.0)	
500–999	6,568 (5.9)	5,593 (6.1)	975 (5.1)		4,951 (5.2)	2,545 (5.4)	2,406 (5.1)	
≤1,000	19,346 (17.5)	16,788 (18.3)	2,558 (13.3)		11,595 (12.2)	5,456 (11.5)	6,139 (12.9)	
Government offices	10,228 (9.2)	9,332 (10.2)	896 (4.6)		7,155 (7.6)	4,774 (10.1)	2,381 (5.0)	

Permanent: permanent workers, Precarious: part-timers, temporary workers, contracted workers, etc. χ^2 tests or Wilcoxon's rank-sum tests were used to examine differences between permanent and precarious workers. Missing data: [a]n=3,848 (male), 3,159 (female).

was slightly increased. All precarious workers had fewer general health examinations, regardless of working hours or gender. In addition, a high risk for not undertaking cancer screening tests was observed among all precarious workers, except for males working fewer than 40 h. In an analysis of workers between 25 and 64 yr of age, the OR for receiving cancer screening tests was significantly lower among precarious workers compared with permanent workers (OR=0.79, 95%CI: 0.73–0.86, data not shown).

Discussion

This study indicates that precarious employment is related to workers' higher subjective symptoms, psychological distress, and poor self-rated health and behaviors. Precarious workers who worked full-time showed a higher risk for SPD, poor self-rated health, and smoking. Based on a government survey utilizing large-scale sampling, this study has the following strengths. We were able to minimize the imbalance of factors related to vocational status, including age, gender, location, and occupation. We

Table 2. Rate ratios (RR) and 95% confidence intervals (CI) for health indicators among male precarious workers compared with permanent workers (n=110,889)

Total

Variables	Total (n=110,889)	Permanent (n=91,165)	Precarious (n=19,224)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	15,716 (14.9)	12,559 (14.4)	3,157 (17.2)	1.24 (1.19, 1.30)	<0.0001
1≤ subjective symptoms[b]	26,131 (25.1)	21,245 (24.7)	4,886 (27.2)	1.03 (1.02, 1.04)	<0.0001
Serious psychological distress ‡[c]	3,359 (3.5)	2,650 (3.3)	709 (4.4)	1.34 (1.24, 1.47)	<0.0001
Current smoking[d]	44,147 (41.3)	36,670 (41.4)	7,477 (40.8)	0.98 (0.94, 1.01)	0.13
Attendance at annual health examination[e]	75,010 (82.1)	64,989 (85.3)	10,021 (65.9)	0.43 (0.42, 0.44)	<0.0001
Attendance at examination for cancer[f]	47,598 (47.8)	40,213 (48.8)	7,385 (43.3)	0.80 (0.77, 0.83)	<0.0001

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=5,171, [b]n=6,816, [c]n=15,404, [d]n=4,031, [e]n=19,538, [f]n=11,359.

Work time < 40 h/week

Variables	Total (n=18,785)	Permanent (n=9,885)	Precarious (n=8,900)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	3,232 (18.2)	1,728 (18.7)	1,504 (17.8)	0.94 (0.87, 1.01)	0.12
1≤ subjective symptoms[b]	4,815 (27.7)	2,429 (26.8)	2,386 (28.7)	1.02 (1.01, 1.03)	0.0062
Serious psychological distress ‡[c]	646 (3.4)	330 (3.3)	316 (3.6)	1.07 (0.91, 1.25)	0.43
Current smoking[d]	6,810 (38.1)	3,774 (40.2)	3,036 (35.8)	0.83 (0.78, 0.88)	<0.0001
Attendance at annual health examination[e]	10,824 (73.9)	6,609 (82.6)	4,215 (63.4)	0.48 (0.45, 0.50)	<0.0001
Attendance at examination for cancer[f]	7,913 (47.8)	4,197 (48.5)	3,716 (47.0)	0.94 (0.88, 0.99)	0.04

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=1,054, [b]n=1,405, [c]n=3,081, [d]n=919, [e]n=4,131, [f]n=2,227.

Work time ≥ 40 h/week

Variables	Total (n=92,104)	Permanent (n=81,780)	Precarious (n=10,324)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	12,484 (14.2)	10,831 (13.9)	1,653 (16.8)	1.25 (1.18, 1.33)	<0.0001
1≤ subjective symptoms[b]	21,316 (24.6)	18,816 (24.4)	2,500 (25.8)	1.02 (1.01, 1.03)	0.0024
Serious psychological distress ‡[c]	2,713 (3.0)	2,320 (2.8)	393 (3.8)	1.36 (1.22, 1.51)	<0.0001
Current smoking[d]	37,337 (14.5)	32,896 (41.6)	4,441 (45.1)	1.16 (1.10, 1.21)	<0.0001
Attendance at annual health examination[e]	64,186 (83.7)	58,380 (85.7)	5,806 (67.9)	0.45 (0.43, 0.46)	<0.0001
Attendance at examination for cancer[f]	39,685 (47.8)	36,016 (48.8)	3,669 (40.0)	0.70 (0.67, 0.73)	<0.0001

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=4,117, [b]n=5,411, [c]n=12,323, [d]n=3,112, [e]n=15,407, [f]n=9,132.

also could include temporary workers who did not stay at a single, fixed workplace, and in contrast to surveys conducted in the workplace, our subjects were surveyed in an environment where they were free from their employers' influence and thus were less likely to show reporting bias. In addition, we could minimize the information bias created by the investigators.

Self-rated health is often used in studies with many participants because it provides an easy index of the general health of an individual, and this measure is known to be associated with mortality rates[27]. Western research on employment status and self-rated health has reported various degrees of influence due to precarious employment[28–30]. The results of previous studies are not necessarily compa-

Table 3. Rate Ratios (RR) and 95% Confidence Intervals (CI) for health indicators among female precarious workers compared with permanent workers (n=95,105)

Total

Variables	Total (n=95,105)	Permanent (n=47,418)	Precarious (n=47,687)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	14,878 (16.3)	7,287 (16.1)	7,591 (16.6)	1.04 (1.01, 1.08)	0.02
1≤ subjective symptoms[b]	29,882 (33.4)	14,300 (32.1)	15,582 (34.7)	1.04 (1.03, 1.05)	<0.0001
Serious psychological distress ‡[c]	3,662 (4.4)	1,804 (4.4)	1,858 (4.5)	1.09 (1.01, 1.19)	0.25
Current smoking[d]	13,359 (14.5)	6,124 (13.4)	7,235 (15.7)	1.21 (1.17, 1.26)	<0.0001
Attendance at annual health examination[e]	55,955 (71.6)	30,945 (79.4)	25,010 (63.8)	0.57 (0.56, 0.58)	<0.0001
Attendance at examination for cancer[f]	46,920 (54.1)	24,306 (56.1)	22,614 (52.0)	0.85 (0.83, 0.87)	<0.0001

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=4,069, [b]n=5,688, [c]n=12,720, [d]n=3,169, [e]n=16,907, [f]n=8,289.

Work time < 40 h/week

Variables	Total (n=41,785)	Permanent (n=7,898)	Precarious (n=33,887)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	6,691 (16.7)	1,290 (17.1)	5,401 (16.6)	0.96 (0.90, 1.03)	0.28
1≤ subjective symptoms[b]	13,874 (35.2)	2,482 (33.5)	11,392 (35.7)	1.03 (1.02, 1.05)	0.0004
Serious psychological distress ‡[c]	1,612 (3.9)	334 (4.2)	1,278 (3.8)	0.89 (0.78, 1.00)	0.06
Current smoking[d]	5,933 (14.7)	1,121 (14.8)	4,812 (14.7)	0.99 (0.92, 1.06)	0.78
Attendance at annual health examination[e]	22,050 (64.0)	4,836 (74.0)	17,214 (61.6)	0.68 (0.65, 0.71)	<0.0001
Attendance at examination for cancer[f]	20,391 (54.1)	3,920 (54.8)	16,471 (53.0)	0.93 (0.88, 0.98)	0.0045

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=1,714, [b]n=2,422, [c]n=5,588, [d]n=1,462, [e]n=7,321, [f]n=3,538.

Work time ≥ 40 h/week

Variables	Total (n=53,320)	Permanent (n=39,520)	Precarious (n=13,800)	RR (95%Cl)	*p*-value
	No (%)	No (%)	No (%)		
Poor self-rated health[a]	8,187 (16.1)	5,997 (15.9)	2,190 (16.7)	1.06 (1.01, 1.12)	0.02
1≤ subjective symptoms[b]	16,008 (32.0)	11,818 (31.8)	4,190 (32.4)	1.01 (0.99, 1.02)	0.16
Serious psychological distress ‡[c]	2,050 (3.8)	1,470 (3.7)	580 (4.2)	1.13 (1.03, 1.25)	0.011
Current smoking[d]	7,426 (14.4)	5,003 (13.1)	2,423 (18.2)	1.48 (1.41, 1.56)	<0.0001
Attendance at annual health examination[e]	33,905 (77.5)	26,109 (80.5)	7,796 (69.1)	0.63 (0.61, 0.65)	<0.0001
Attendance at examination for cancer[f]	26,529 (54.6)	20,386 (56.3)	6,143 (49.7)	0.77 (0.74, 0.80)	<0.0001

RR: Rate ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. ‡Psychological distress was defined as scores ≥13 on the K6 scale. χ^2 tests were used to assess differences between permanent and precarious workers. Missing data: [a]n=2,355, [b]n=3,266, [c]n=7,132, [d]n=1,707, [e]n=9,586, [f]n=4,751.

rable because the classification criteria for each employment status and the legal and social supports for non-regular workers vary among countries. In Japan, several studies examining the correlation between socioeconomic status (SES) and self-rated health have generally linked low SES and poor health[31, 32]. However, none has investigated the relationship between employment contracts and self-rated health. In the present study, only males who were precarious workers and who worked full-time were identified as having low self-rated health status. It appears that male full-time precarious workers may experience low self-related health because 1) many male workers "unwill-

Table 4. Unadjusted and adjusted odds ratios (OR) and confidence intervals (CI) from logistic regression for health-related indicators among precarious workers compared to permanent workers (n=205,99)

Work time < 40 h/week

Variables	Male		Female	
	Crude OR (95%CI)	Adjusted† OR (95%CI)	Crude OR (95%CI)	Adjusted† OR (95%CI)
Poor self-rated health[a]	0.94 (0.87, 1.02)	0.95 (0.88, 1.04)	0.96 (0.90, 1.03)	0.93 (0.86, 0.997)
1≤ subjective symptoms[b]	1.11 (1.04, 1.19)	1.18 (1.10, 1.26)	1.09 (1.03, 1.15)	1.04 (0.99, 1.10)
Serious psychological distress‡[c]	1.04 (0.89, 1.22)	0.98 (0.82, 1.17)	0.87 (0.77, 0.99)	0.93 (0.81, 1.06)
Current smoking[d]	0.83 (0.78, 0.88)	0.88 (0.83, 0.95)	0.99 (0.92, 1.06)	0.99 (0.92, 1.08)
Attendance at annual health examination[e]	0.42 (0.39, 0.45)	0.47 (0.43, 0.51)	0.60 (0.57, 0.64)	0.55 (0.52, 0.59)
Attendance at examination for cancer[f]	0.94 (0.88, 1.00)	0.97 (0.91, 1.04)	0.93 (0.88, 0.98)	0.86 (0.81, 0.91)

OR: Odds Ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. †Logistic regression analyses adjusted for age, marital status, occupation, and company size were performed. ‡Psychological distress was defined as scores ≥13 on the K6 scale. Missing data: [a]n=5,171, [b]n=6,816, [c]n=15,404, [d]n=4,031, [e]n=19,538, [f]n=11,359.

Work time ≥ 40 h/week

Variables	Male		Female	
	Crude OR (95%CI)	Adjusted† OR (95%CI)	Crude OR (95%CI)	Adjusted† OR (95%CI)
Poor self-rated health[a]	1.25 (1.19, 1.33)	1.19 (1.12, 1.26)	1.06 (1.01, 1.12)	1.03 (0.98, 1.09)
1≤ subjective symptoms[b]	1.06 (1.01, 1.11)	1.08 (1.03, 1.14)	1.03 (0.99, 1.08)	1.02 (0.98, 1.07)
Serious psychological distress‡[c]	1.42 (1.27, 1.59)	1.41 (1.26, 1.58)	1.17 (1.07, 1.30)	1.18 (1.07, 1.31)
Current smoking[d]	1.16 (1.11, 1.21)	1.14 (1.09, 1.19)	1.48 (1.41, 1.56)	1.40 (1.33, 1.48)
Attendance at annual health examination[e]	0.39 (0.37, 0.41)	0.43 (0.41, 0.45)	0.56 (0.54, 0.59)	0.58 (0.55, 0.60)
Attendance at examination for cancer[f]	0.70 (0.67, 0.73)	0.71 (0.67, 0.74)	0.77 (0.74, 0.80)	0.75 (0.72, 0.78)

OR: Odds Ratio, CI: Confidence Interval. Permanent: permanent workers, Precarious: part-timer, temporary workers, contracted workers, and others. †Logistic regression analyses adjusted for age, marital status, occupation, and company size were performed. ‡Psychological distress was defined as scores ≥13 on the K6 scale. Missing data: [a]n=4,069, [b]n=5,688, [c]n=12,720, [d]n=3,169, [e]n=16,907, [f]n=8,289.

ingly" opted to be precarious workers, despite preferring permanent contracts, and experience psychological stress due to continued full-time work for long periods with no opportunity to gain permanent employment status; and 2) compared with permanent workers, precarious workers are often assigned to work that includes physical strain, hazardous tasks, or manual labor with low levels of job control, leading to greater health risks[1, 2]; and 3) precarious workers who cannot take regular employment because of poor health may have potentially low self-rated health. However, if they are forced to take full-time work due to financial difficulties, they would further suffer from low self-rated health. One assumes that in addition to low SES, poor self-rating of health status reflects the poor working conditions and great psychological pressure of continuous unstable employment.

In the context of the recent increase in precarious employment, employment contracts have been recognized as being important to the mental health of workers. Many studies have reported an association between unstable employment contracts and mental health conditions such as depression, anxiety, and suicide[2, 14–16, 19, 20, 33]. Population surveys have reported that certain levels of SPD imply that respondents have coexisting mental disorders such as major depressive episodes, phobias, anxiety disorders, and depression[34]. The increase in depression and suicide among workers has become a serious problem in Japan, which has the highest suicide rate among the developed countries[35]. The Institute of Medicine in the U.S. estimates that 90% of those who have committed suicide suffered from a diagnosable psychiatric disorder at the time of their deaths[36]. In our study, 3.5% of male workers and 4.4% of female workers were suspected of having SPD. These rates are lower than comparable figures for workers of the same age in the U.S. (5.9%), according to a U.S. National Health Interview Survey[37]. Although the prevalence of

SPD according to K6 differs among countries, previous studies have indicated that the depressive and dysthymic symptoms included in SPD affect work productivity and limit work ability due to related disabilities, sickness, and absence, and may even lead to withdrawal from the labor force[38–40].

The present study also demonstrates that both male and female precarious workers who work full time have a higher risk for SPD. The number of temporary and contract workers who work more than 35 h per week is increasing[3]. In addition to having a workload similar to that of permanent workers, they tend to be under greater psychological pressure to remain employed, while receiving less support at the workplace than do permanent workers. All of these factors suggest a greater likelihood of developing mental disorders[2, 14–16, 19, 20, 33]. Although mental disorders require medical treatment and rest, reports indicate that fewer precarious workers take sick leave compared with permanent workers[2, 18]. This suggests that precarious workers may not disclose their illness for fear of losing their jobs, and this precludes early detection and treatment of mental disorders.

Some studies indicate a high mortality rate of precarious workers resulting from tobacco and alcohol consumption[12]. Although no research has been conducted on this topic in Japan, studies have pointed out a link between SES and smoking and excessive consumption of alcohol[41, 42]. Our study identified a high risk for smoking among all precarious workers engaged in full-time jobs. Additional analysis is needed to clarify whether the stress from working long hours or a low SES triggers smoking in precarious workers.

This study also confirms that precarious workers are less likely to have general health examinations or cancer screenings. The Japanese government mandates that employers provide health examinations for precarious workers who have no limited employment period by contract and who are scheduled to be employed for more than one year, or whose work hours are 75% or more of the work hours of the regular workers in the same office[43]. A survey of Japanese regular workers revealed that whereas 93.1% of permanent workers reported attendance at health screenings, only 82.1% of contract workers and 49.2% of part-time workers did so[44]. In addition, a survey of temporary day workers indicated that only 23.8% attended annual health examinations[45]. In our study, among precarious workers, including those with contracts for an employment period of less than one year or working fewer than 40 h per week, the overall percentage of attendance at health examinations was 66.2%. Therefore, our results cannot be directly compared with those of the other surveys. Nonetheless, these results suggest a strong correlation between factors related to employment status and workers' use of health and medical services[46].

The result of our analysis identified an association between precarious employment contracts and self-rated health conditions and subjective symptoms in males; no such association was found in females. Among OECD countries, Japan has a relatively high proportion of temporary employment for females, despite no difference in educational background between Japanese males and females of working age (25–54 yr)[47]. This suggests the possibility that the effects of precarious employment on health are unknown, and that females may have chosen precarious work in spite of their higher educational background. Characteristics of the Japanese labor market force females into more unstable employment at wages lower than those paid to males. A work environment that supports stable employment of females has not yet been provided, and a cultural consciousness exists in which it is still desirable for females to devote themselves to housework or child rearing as housewives[48, 49]. In the context of these situations, it is suggested that Japanese men and women choose precarious employment for different reasons. Although quite a few female workers voluntarily chose precarious employment to fulfill their desire to balance work with family life, many of the male precarious employees had no other choice but to engage in unstable employment due to the recession at the time they entered the labor market[50, 51]. It can be hypothesized that such a tendency caused the differences between males and females in the relationship between precarious contracts and self-rated health status.

The effect of employment contracts on health was not as obvious in workers working fewer than 40 h per week compared to full-time workers. Workers doing in part-time work include a variety of people such as students, housewives, and retired elderly persons, and they are more varied than full-time workers in their lifestyles such as education, household chores, and child-raising. These workers would choose part-time work even if they had good enough health to do full-time work. Additionally, the income of other household members including their spouses is secured in many cases, which leads us to the assumption that they have relatively less financial difficulties than those of full-time precarious employees. Therefore, the effect of employment contracts on health in full-time workers can be considered to be weakened in workers engaged in part-time work.

Some limitations of this study should be noted before generalizing its results. First, the survey used self-completed questionnaires for health status, which might not have reflected the participants' objective conditions. The prevalence of SPD based on the K6 would not include persons with serious mental illness who were being treated successfully, a limitation shared by all measures that assess symptoms[37]. Also, bias might have existed in relation to the misclassification of health status. Precarious workers who are aware of their poor working conditions might have provided negative answers about their health condition, thus strengthening the association between employment status and health outcome. Second, the lack of information about workers' income, education, and dependents could constitute confounding biases. People with a lower SES are known to have a less desirable lifestyle and more health problems, including chronic diseases and smoking[31, 32, 52]. Furthermore, workers with less education represent a greater proportion of precarious workers of the same age[3]. To address this deficiency, additional comprehensive analyses that include socioeconomic information about education and income are essential. The third point for consideration is the possibility of selection bias. Many people with the most serious illnesses are institutionalized, and because the statistics in this study were drawn from a household survey, these people were not included. In addition, workers who completed this survey might have had a better standard of living, even though this survey was carried out using a statistical sampling. The questionnaires were delivered to each household and collected later by the surveyors. The surveyors might not have always been able to give the survey directly to non-regular workers who had irregular work schedules or who frequently moved. Thus, these workers were likely under-represented in the survey, and the true association between precarious employment and poor health may be stronger than the results indicated. The response rate of the survey was 67.7%, and it is necessary to consider the possibility that more precarious workers than permanent workers were included among those who could not respond. If such workers would have responded to the questionnaire, the health status of precarious workers would have appeared worse. Lastly, although this study implies a causal relation between unstable employment and poor health, as previous studies have suggested, it is difficult to clearly demonstrate causality because this is a cross-sectional study[52–54].

In conclusion, our results demonstrate associations between precarious employment contracts and higher frequencies of self-rated poor health, subjective symptoms, and unfavorable health behaviors. Workers who engaged in full-time precarious jobs were more likely to report psychological distress and smoking. This result suggests that inequality in working environments, such as working long hours with an unstable employment contract, impairs the health of workers. The main issues concerning precarious employment contracts have focused on wages and social welfare, but this study clarifies the need for awareness of the influence of unstable employment on workers' health.

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