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Original Article

Association between work-related changes caused by the COVID-19 pandemic and severe psychological distress among Japanese workers

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Abstract: This study aimed to evaluate the association between work-related changes caused by COVID-19 and psychological distress among Japanese workers. The cross-sectional study was conducted from August 25 to September 30, 2020. The participants were 15,454 employees who were registered as panelists with an online survey company. The Kessler psychological distress scale with a 13-point cutoff was used to measure psychological distress. Multiple logistic regression was performed. Of the respondents, 8.9% were evaluated as having severe psychological distress. Among five examined work-related changes, being laid off and changing jobs (adjusted odds ratio [aOR] = 5.43; 95% confidence interval [CI]: 4.18–7.05), experiencing temporary workplace closure (aOR = 1.94; 95% CI: 1.67–2.25), being forced to visit the workplace for paperwork (aOR = 1.84; 95% CI: 1.58–2.15), and starting telework from home (aOR = 1.18; 95% CI: 1.01–1.37) were associated with increased psychological distress; no significant association was found for participation in work-related online meetings. The impact on psychological distress was greater among men, especially for being laid off and changing jobs because of COVID-19. It is important to assess and reduce negative mental health effects among workers experiencing work-related changes caused by the COVID-19 pandemic, taking gender differences into account.

Key words: COVID-19, Mental disorder, Occupational health, Psychological distress, Worker

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has significantly impacted the employment and work style of workers. COVID-19 is an infectious respiratory disease caused by the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) pathogen[1, 2]. It was first reported in Wuhan, China, in December 2019; since then, more than 35 million people have been infected, resulting in more than one million deaths by September 2020[3]. Many countries have introduced various measures severely limiting outdoor and economic activities to prevent the spread of

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COVID-19[4, 5]. A state of emergency was declared for all of Japan in April and May 2020. In addition to recommending self-restraint in holding events and outdoor activities, companies were requested to reduce the number of workers commuting to the workplace by 70%[6]. As a result, work styles such as teleworking from home and online meetings have spread dramatically. However, companies where such measures could not be adopted have faced problems such as employee layoffs, temporary workplace closures, and employees being forced to visit the workplace for paperwork[7]. Japan experienced a second wave of COVID-19 in August 2020, but this second wave did not lead to the declaration of a state of emergency.

The COVID-19 pandemic has affected the mental health of workers. During the COVID-19 pandemic, many risk factors for psychological distress have been reported, including anxiety about the future, social isolation, low levels of interpersonal contact, and inadequate infection control measures at the workplace[8]. It has also been suggested that young people, women, individuals with chronic diseases, and workers in unstable employment are more susceptible than others to mental distress because of COVID-19[9, 10]. A previous study in Japan reported that the number of suicides among women increased during the state of emergency[11]. However, little is known about the rapid changes in employment and work styles during the COVID-19 pandemic or the associated psychological distress among workers.

The COVID-19 pandemic has brought about dynamic changes in employment and work styles, and such changes are likely to affect workers' mental health. For example, teleworking and online meetings have been reported to improve labor productivity[12] but hinder workplace communication[13]. The effects of the rapid shift to teleworking and online meetings on workers' psychological well-being have not been well evaluated. Moreover, as mentioned above, workers in workplaces where it is difficult to adopt teleworking or online meetings have faced problems such as being laid off and changing jobs, experiencing temporary workplace closures, and being forced to visit the workplace for paperwork. Although an evaluation of layoffs has been reported[14], the associations between psychological distress and other problems during the COVID-19 pandemic, such as temporary workplace closures and employees being forced to visit the workplace for paperwork, have not been empirically assessed. Therefore, this study aimed to evaluate the associations between psychological distress and work-related changes caused by the COVID-19 pandemic.

Subjects and Methods

Design and data collection

This study was undertaken as part of the Japan "COVID-19 and Society" Internet Survey (JACSIS)[14], a cross-sectional survey that was conducted using a self-report questionnaire to evaluate the health impacts and socioeconomic effects of COVID-19. The participants were approximately 2.2 million market research respondents who were registered as panelists with an online survey company (Rakuten Insight, Inc., Osaka). First, respondents were stratified by sex, age (5-year age bands), and region (47 prefectures), with the selection designed to match the population distributions according to the 2019 Comprehensive Survey of Living Conditions[15]. To allow for the expected low response rate, 224,389 respondents aged 15–79 years were randomly selected. During the period of August 25–September 30, 2020, e-mails containing the request for participation and a link to the website with the questionnaire were sent to the selected respondents. Recruitment was stopped when the target number of respondents in each stratum was reached. In total, responses were collected from 28,000 participants (response rate 12.5%). Subsequently, we excluded 10,028 respondents who reported not being employed and 2,518 respondents with invalid responses. Ultimately, the analysis was performed with data from 15,454 respondents who were currently working. At the beginning of the questionnaire, the participants were asked to provide informed consent, and only those who agreed were able to respond to the questionnaire. This study was approved by the Institutional Review Board of the Osaka International Cancer Institute (No. 20084) and the Ethics Committee of the University of Occupational and Environmental Health, Japan (R3-055).

Outcome

The Kessler psychological distress scale (K6) was used to measure psychological distress. The K6 was developed in the United States by Kessler *et al.* to screen patients with mental disorders[16]. The K6 has been translated into multiple languages for use in various countries, and the reliability and validity of the Japanese version have been confirmed[17]. The K6 comprises the following six questions: "During the past 30 days, about how often did you feel…": (1) "…nervous?"; (2) "…hopeless?"; (3) "…restless or fidgety?"; (4) "…so depressed that nothing could cheer you up?"; (5) "…that everything was an effort?"; and (6) "…worthless?" Each of the questions has the following five response options: *all the time* (four points), *most of the time*

(three points), *some of the time* (two points), *a little of the time* (one point), and *none of the time* (zero points). The points are added to calculate a total score with the range of 0 to 24. A higher score indicates more severe distress. Following a previous study[18], we considered a total score of 13 or more on the K6 scale to indicate severe psychological distress.

Independent variables

Data on sex, age, annual household income, employment status, job type, and the number of employees at the respondent's workplace were extracted from the questionnaire. Five variables representing work-related changes were selected in discussion with epidemiologists, psychiatrists, and occupational physicians in the JACSIS Project. These variables were based on the government's response policy when COVID-19 began to spread in Japan and information sources available at that time[19]. The following questions were used to assess the five work-related changes: "I was laid off and changed jobs because of COVID-19", "I experienced a temporary workplace closure because of COVID-19", "I was forced to visit the workplace for paperwork (e.g., signing documents)", "I started teleworking from home", and "I started participating in online meetings related to work". For the responses on each item, the options of *yes*, no, and *not applicable* were used.

Statistics

For the analysis, responses regarding work-related changes caused by the COVID-19 pandemic were dichotomized into *yes* and *no* categories, with *not applicable* responses considered *no*. First, descriptive statistics were used to calculate the count (n) and percentage of each factor by the presence of severe psychological distress. Next, we used the chi-square test and multiple logistic regression to assess the relationships between work-related changes caused by the COVID-19 pandemic and severe psychological distress. The adjustment variables of sex, age, household income, employment status, job type, and number of employees at the workplace were included. A sub-analysis using multiple logistic regression adjusting for age was performed to elucidate sex differences in the associations between work-related changes caused by the COVID-19 pandemic and severe psychological distress. Sex was not treated as an adjusted factor, but a sex-stratified analysis was conducted. $p<0.05$ was considered statistically significant. A two-tailed test was performed. Stata/SE 16.1 (StataCorp, College Station, TX, USA) was used for all analyses.

Results

The characteristics of the study participants are shown in Table 1. Of the 15,454 participants, 58.3% were men, and 26.0% were in their 30s. Approximately half of the participants were permanent employees (56.0%), approximately half were desk workers (48.6%), and 41.4% were employed at workplaces with 1–49 employees. Of the respondents, 1.8% had been laid off and changed jobs because of COVID-19, 11.5% had experienced a temporary workplace closure because of COVID-19, 12.8% had been forced to visit the workplace for paperwork, 18.1% had started teleworking from home, and 23.2% had started participating in online meetings related to work. The number of respondents classified as having severe psychological distress was 1,368 (8.9%), and Cronbach's alpha for the K6 was 0.94 in this study.

Table 2 shows the associations between work-related changes caused by the COVID-19 pandemic and severe psychological distress. The odds of severe psychological distress were significantly higher for respondents who were laid off and changed jobs because of COVID-19 compared with those who continued working (adjusted odds ratio [aOR] = 5.43; 95% confidence interval [CI]: 4.18–7.05). The odds of severe psychological distress were significantly higher for respondents who experienced a temporary workplace closure because of COVID-19 (aOR = 1.94; 95% CI: 1.67–2.25) and for those who were forced to visit the workplace for paperwork (aOR = 1.84; 95% CI: 1.58–2.15), compared with those without these respective experiences. A comparison of respondents who had started teleworking from home with those without such experience showed a slight positive association (aOR = 1.18; 95% CI: 1.01–1.37). However, no significant association was found for participation in work-related online meetings.

Table 3 displays the association between work-related changes caused by the COVID-19 pandemic and severe psychological distress by sex. For being laid off and changing jobs, the aOR was twice as high for men as for women (men: aOR = 8.83, 95% CI: 6.21–12.55; women: aOR = 3.73, 95% CI: 2.52–5.52). The aOR for temporary workplace closure was also slightly higher for men than for women (men: aOR = 2.37, 95% CI: 1.93–2.91; women: aOR = 1.73, 95% CI: 1.40–2.12). Conversely, sex differences were not found for being forced to visit the workplace for paperwork (men: aOR = 1.67, 95% CI: 1.38–2.01; women: aOR = 1.67, 95% CI: 1.33–2.10), and there were no significant differences between men and women in the effect of starting teleworking from home or the effect of

Table 1. Characteristics of the study participants

	Total		Non-severe psychological distress		Severe psychological distress	
	n=15,454 (100.0%)	(%)	*n*=14,086 (91.1%)	(%)	*n*=1,368 (8.9%)	(%)
Sex						
Men	9,008	(58.3)	8,250	(58.6)	758	(55.4)
Women	6,446	(41.7)	5,836	(41.4)	610	(44.6)
Age (years)						
15–29	2,326	(15.1)	1,965	(14.0)	361	(26.4)
30–39	3,024	(19.6)	2,676	(19.0)	348	(25.4)
40–49	4,021	(26.0)	3,635	(25.8)	386	(28.2)
50–59	3,301	(21.4)	3,093	(22.0)	208	(15.2)
≥60	2,782	(18.0)	2,717	(19.3)	65	(4.8)
Annual household income (yen)						
≥8,000,000	3,817	(24.7)	3,337	(23.7)	480	(35.1)
6,000,000–7,999,999	3,279	(21.2)	3,001	(21.3)	278	(20.3)
4,000,000–5,999,999	2,349	(15.2)	2,166	(15.4)	183	(13.4)
<4,000,000	3,522	(22.8)	3,281	(23.3)	241	(17.6)
Unknown	2,487	(16.1)	2,301	(16.3)	186	(13.6)
Employment status						
Permanent employee	8,666	(56.0)	7,896	(56.1)	770	(56.3)
Owner	847	(5.5)	761	(5.4)	86	(6.3)
Temporary employee	1,338	(8.7)	1,224	(8.7)	114	(8.3)
Part-time employee	2,870	(18.6)	2,626	(18.6)	244	(17.4)
Self-employed	1,733	(11.2)	1,579	(11.2)	154	(11.3)
Job type						
Physical work	4,163	(26.9)	3,825	(27.2)	338	(24.7)
Desk work	7,498	(48.6)	6,821	(48.4)	677	(49.5)
Other	3,793	(24.5)	3,440	(24.4)	353	(25.8)
Number of employees at the workplace (persons)						
1–49	6,402	(41.4)	5,886	(41.8)	516	(37.7)
50–299	3,564	(23.1)	3,226	(22.9)	338	(24.7)
300–999	1,929	(12.5)	1,732	(12.3)	197	(14.4)
≥1,000	3,559	(23.0)	3,242	(23.0)	317	(23.2)
Being laid off and changing jobs because of COVID-19	278	(1.8)	174	(1.2)	104	(7.6)
Experiencing a temporary workplace closure because of COVID-19	1,782	(11.5)	1,507	(10.7)	275	(20.1)
Being forced to visit the workplace for paperwork	1,975	(12.8)	1,707	(12.1)	268	(19.6)
Starting teleworking from home	2,799	(18.1)	2,517	(17.9)	282	(20.6)
Starting participation in online meetings related to work	3,580	(23.2)	3,251	(23.1)	329	(24.0)

COVID-19: coronavirus disease 2019

Table 2. Associations between work-related changes caused by the COVID-19 pandemic and severe psychological distress

	Severe psychological distress	Univariate			Adjusted*		
	n (%)	OR	(95% CI)	*p* value	OR	(95% CI)	*p* value
Being laid off and changing jobs because of COVID-19							
No	1,264 (8.3)	1.00	-	-	1.00	-	-
Yes	104 (37.4)	6.58	(5.13–8.44)	<0.001	5.43	(4.18–7.05)	<0.001
Experiencing a temporary workplace closure because of COVID-19							
No	1,093 (8.0)	1.00	-	-	1.00	-	-
Yes	275 (15.4)	2.10	(1.82–2.42)	<0.001	1.94	(1.67–2.25)	<0.001
Being forced to visit the workplace for paperwork							
No	1,100 (8.2)	1.00	-	-	1.00	-	-
Yes	268 (13.6)	1.77	(0.53–2.04)	<0.001	1.84	(1.58–2.15)	<0.001
Starting teleworking from home							
No	1,086 (8.6)	1.00	-	-	1.00	-	-
Yes	282 (10.1)	1.19	(1.04–1.37)	0.012	1.18	(1.01–1.37)	0.032
Starting participation in online meetings related to work							
No	1,039 (8.8)	1.00	-	-	1.00	-	-
Yes	329 (9.2)	1.05	(0.93–1.20)	0.417	1.03	(0.89–1.19)	0.696

COVID-19: coronavirus disease 2019; OR: odds ratio; CI: confidence interval
*Adjusted for sex, age, household income, employment status, job type, and the number of employees at the workplace.

Table 3. Associations between work-related changes caused by the COVID-19 pandemic and severe psychological distress by sex

	Men (*n*=9,008)				Women (*n*=6,446)			
	Severe psychological distress	Age-adjusted			Severe psychological distress	Age-adjusted		
	n (%)	OR	(95% CI)	*p* value	*n* (%)	OR	(95% CI)	*p* value
Being laid off and changing jobs because of COVID-19								
No	692 (7.8)	1.00	-	-	572 (9.1)	1.00	-	-
Yes	66 (45.2)	8.83	(6.21–12.55)	<0.001	38 (28.8)	3.73	(2.52–5.52)	<0.001
Experiencing a temporary workplace closure because of COVID-19								
No	619 (7.6)	1.00	-	-	474 (8.6)	1.00	-	-
Yes	139 (16.8)	2.37	(1.93–2.91)	<0.001	136 (14.3)	1.73	(1.40–2.12)	<0.001
Being forced to visit the workplace for paperwork								
No	594 (7.7)	1.00	-	-	506 (8.8)	1.00	-	-
Yes	164 (12.8)	1.67	(1.38–2.01)	<0.001	104 (14.9)	1.67	(1.33–2.10)	<0.001
Starting teleworking from home								
No	587 (8.2)	1.00	-	-	499 (9.1)	1.00	-	-
Yes	171 (9.2)	1.04	(0.87–1.25)	0.672	111 (11.7)	1.18	(0.95–1.47)	0.143
Starting participation in online meetings related to work								
No	555 (8.6)	1.00	-	-	484 (9.0)	1.00	-	-
Yes	203 (8.0)	0.87	(0.73–1.03)	0.099	126 (11.9)	1.19	(0.96–1.47)	0.105

COVID-19: coronavirus disease 2019; OR: odds ratio; CI: confidence interval

starting to participate in online meetings related to work.

Discussion

This study evaluated the associations between work-related changes caused by the COVID-19 pandemic and severe psychological distress among Japanese workers. Our findings revealed that approximately 8.9% of the respondents were experiencing severe psychological distress. This percentage was similar to the percentages for severe psychological distress that has been reported in nation-wide studies in Japan (8.4%–9.1%)[20, 21]. Our study also had the novel finding that the experience of being laid off and changing jobs and the experience of a temporary workplace closure was statistically associated with psychological distress. These trends were more prominent among men than among women. Job stability is important for reducing psychological distress of workers during the COVID-19 pan-

demic, especially among men. In addition, the experiences of being forced to visit the workplace for paperwork and starting teleworking from home were associated with higher levels of psychological distress. However, we did not find any association between psychological distress and beginning to participate in online meetings. We believe that these findings are important in identifying target populations in need of psychological assistance and intervention programs.

The results of this study showed that both the experience of being laid off and changing jobs and the experience of a temporary workplace closure were associated with psychological distress. This finding is in line with a previous study in the United States[22] that suggested that addressing insecure employment is critical in minimizing suicide during the COVID-19 pandemic. Importantly, we found that the associations between work-related changes caused by COVID-19 and psychological distress were more prominent among Japanese men than among their female counterparts. Mixed results have been reported in past studies comparing the psychological effects of workplace stressors on men and women[11, 23]. The number of suicides has been shown to have increased after the state of emergency declaration in Japan, especially among women[11]. Additionally, a previous study found that female workers have greater anxiety about unemployment during organizational downsizing compared with male workers, even if they escape layoffs; accordingly, the onset of major depression increases at a higher rate for these women than for their male colleagues[23]. However, in Japan, men are more likely than women to support their families financially; therefore, the impact of insecure employment on suicide is greater among men than among women in this context[24]. Substantial gender differences have also been shown in perceptions of risk for contracting COVID-19[25]. Although social support is important for people who have lost their jobs, public support to prevent organizational downsizing and to sustain employment are also crucial, while considering the different demographic of men and women.

The present survey found that severe psychological distress is associated with being forced to visit the workplace for paperwork. Jobs can be divided into two types: those where the time and place of the work are difficult to adjust and there is little flexibility, and those where the time and place of the work are flexible. Regardless of the type of job, however, many workers have been forced to commute to their workplaces because of the lack of the necessary infrastructure for telework and the difficulty of managing employee attendance. For example, some temporary workers have had to commute to their workplaces because teleworking was allowed only for permanent workers[26]. For workers forced to visit the workplace during the COVID-19 pandemic, it is necessary to eliminate such discrimination in the workplace and to reduce the psychological burden by introducing flexible work styles in addition to support[27].

We found no significant association between psychological distress and beginning participation in online meetings and a slightly positive association between starting teleworking from home and psychological distress. Therefore, participating in online meetings does not cause psychological distress, but the loneliness arising from working alone and the work environment at home are considered stressful. A previous study reported that the feeling of loneliness is higher in young people living alone during the COVID-19 pandemic[28]. Furthermore, teleworking from home has been shown to reduce the frequency of communication in the workplace[13]. Other studies have also reported that teleworking from home increases job demands, thereby causing problems such as sleep disorders, which negatively affect workers' mental health[29, 30]. Our findings that starting teleworking from home was associated with psychological distress but that participating in online meetings was not indicate that it is necessary to distinguish the challenges of teleworking from online meetings and other challenges such as loneliness and work environment.

This study has several limitations. First, because the study was cross-sectional, causality was not evaluated. Second, sampling bias should be considered because an Internet survey was used. For example, people with high psychological distress may not have been able to participate in the survey. Additionally, the response rate in this study was rather low (12.5%), and the results should be interpreted carefully because of the healthy worker effect. Third, the study period used in this study should be considered with caution. Psychological distress was evaluated during August and September 2020 in the current study, and the situation might be different in other periods, such as during the state of emergency in April and May 2020. For example, for some respondents who started teleworking, their psychological distress may have gradually decreased, whereas it may have increased for others in the same situation. Finally, the current study did not include people who were unemployed during the study period. This may have weakened the results for psychological distress, especially among those who experienced layoffs or job changes.

In conclusion, the associations between work-related changes caused by COVID-19 and psychological distress were evaluated in this study. The findings confirmed that

being laid off and changing jobs, experiencing a temporary workplace closure, being forced to visit the workplace for paperwork, and starting teleworking from home were associated with psychological distress. The impact on psychological distress was greater in men than in women, especially for those being laid off and changing jobs because of COVID-19. Conversely, no significant differences in psychological distress were found by participation in work-related online meetings. The results suggest that most work-related changes caused by the COVID-19 pandemic have likely had negative effects on workers' mental health, particularly among men. Therefore, it is important to assess and reduce mental health problems among workers experiencing work-related changes caused by the COVID-19 pandemic, while taking gender differences into account.

Conflict of interest

The authors declare no conflict of interest.

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