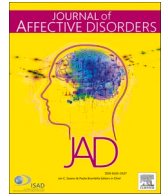




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# Economic crisis and mental health during the COVID-19 pandemic in Japan

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## ARTICLE INFO

### Keywords:

Mental health  
Depression  
Anxiety  
Recession  
COVID-19  
Japan

## ABSTRACT

**Background:** The economic crisis induced by the COVID-19 pandemic can have a serious impact on population mental health. This study seeks to understand whether the economic shocks associated with the pandemic have a differential impact by sex because the current pandemic may have disproportionately affected women compared to men.

**Methods:** We analyzed data from original online monthly surveys of the general population in Japan conducted between April 2020 and February 2021 ( $N = 9000$ ). We investigated whether individuals who had experienced a major job-related adverse change were more likely to have experienced depressive symptoms (PHQ-9) and anxiety disorders (GAD-7) during the pandemic and also if its effect varied by sex.

**Results:** The results of logistic regression suggest that depressive and anxiety symptoms were more prevalent among those who had recently experienced drastic changes in employment and working conditions, as well as among individuals with low income and those without college education. We also found that both female and male respondents who had experienced a major employment-related change exhibited depression and anxiety disorders.

**Limitations:** We do not have data on the pre-COVID mental health conditions of our respondents, and our findings are descriptive. Some segments of the population may not be represented in our sample because our surveys were conducted online.

**Conclusions:** COVID-induced economic shocks can have a detrimental effect on mental health among both economically vulnerable female and male workers.

## 1. Introduction

The COVID-19 pandemic has triggered a major economic crisis in many parts of the world. International Monetary Fund reported that the global economic growth in 2020 fell by  $-3.5\%$  due to the pandemic (IMF, 2021). This is the worst economic downturn since the Great Depression of the 1930s, being far worse than the 2008 Global Financial Crisis.

The findings of past studies suggest that mental health conditions tend to deteriorate in times of economic downturns (e.g., Bradford and Lastrapes, 2014; Barr et al., 2015; Johnston et al., 2020; Wang and Fattore, 2020). Thus, the economic crisis induced by the COVID-19 pandemic can have a serious impact on population mental health. Recent studies have found that individuals who have experienced COVID-induced economic shocks, such as reduced workload and income loss, were more likely to have worse mental health conditions

(Codagnone et al., 2020; Xiong et al., 2020). The negative effects of economic shocks on psychological well-being have been shown to be larger among economically vulnerable individuals (Cheng et al., 2021; Witteveen and Velthorst, 2020).

This study seeks to understand whether the economic shocks associated with the pandemic have a differential impact on mental health by sex. It is possible that the current pandemic has disproportionately affected women compared to men; it affected industries that were more likely to be served by women, including tourism and food services (International Monetary Fund, 2020). In addition, the burden of unpaid domestic care tends to be borne by women, and some women might have been forced to leave the workforce to care for their family members in response to school closure and other prevention measures. These changes can make them economically vulnerable, particularly because women are less likely to have a position that provides social protection (ILO, 2020), which can negatively impact their psychological status.

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<https://doi.org/10.1016/j.jad.2022.03.037>

Received 23 March 2021; Received in revised form 9 March 2022; Accepted 11 March 2022

Available online 16 March 2022

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The goal of this study is to test whether the relationship between COVID-related economic consequences and the psychological well-being was stronger among women, as compared to men. We analyzed data from original online monthly surveys of the general population in Japan conducted between April 2020 and February 2021. The survey asked respondents about the experience of job-related adverse changes as well as psychological distress. In addition to testing the possibility of differential effects of economic shocks on psychological distress by sex, our study has two distinctive improvements over previous studies. First, our data included a total of 9000 respondents who were nationally representative of the Japanese population. The sample size was much larger than that of previous studies, with the exception of Cheng et al. (2021) and Codagnone et al. (2020). Second, in contrast to previous studies focusing on the early phase of the pandemic (Cheng et al., 2021; Codagnone et al., 2020; Witteveen and Velthorst, 2020), the data of our study came from multiple phases of the pandemic, covering a much longer period. This feature allows us to obtain more recent and generalizable evidence.

2. Methods

Our analysis used data from a series of monthly online surveys that we have been conducting since April 2020. We delegated the survey to one of the major commercial survey companies in Japan. Each month, the company sent out screening questions to approximately 10,000 registered individuals and then constructed a final sample of 1000 respondents so that they were representative of the Japanese population in terms of sex, age groups, and areas of residence. This study used the surveys taken between June 2020 and February 2021 (N = 9000), as the question on their economic conditions were asked only since June.

Using the survey data, we examined how COVID-related economic consequences were associated with the psychological well-being of men and women. As measures of psychological well-being, we used the Patient Health Questionnaire nine-item scale (Spitzer et al., 1999) for depressive symptoms and the seven-item General Anxiety Disorder Scale (GAD-7) (Spitzer et al. 2006) for anxiety disorders. The Cronbach's alpha value for each of the scales was 0.91 and 0.92, respectively. For our regression analysis, we generated an indicator variable that equaled one if the total score of the PHQ-9 was 10 or higher for depressive symptoms and one if the total score of the GAD-7 was 10 or higher for anxiety symptoms.

As a primary measure of the experience of job-related adverse changes during the pandemic, we used the question asking the respondents whether they had experienced a job loss, layoff, or significant reduction in working hours in the previous three months. We categorized the respondents into three groups: those without such negative changes (hereafter “no change”), those with adverse changes (hereafter “adverse change”), and those who were not in the labor force (hereafter “not working”). We used those with no change as a reference group and compared their mental health with that of those with adverse changes. We expected that those with the experience of job-related adverse changes showed a higher prevalence of depressive and anxiety symptoms, compared to those with no change, and this relationship was stronger among women than among men. We also included those categorized as “not working” in our analysis.

In addition, we also used socioeconomic status as a measure of COVID-related economic shocks. In particular, we focused on the respondent's household income in the previous year, educational attainment, and employment status/type of employment. We expected that those with lower income, lower educational attainment, and unstable employment status were more likely to show a prevalence of depressive and anxiety symptoms. Income was categorized into four groups, such as “low income” (<4 million yen), “middle income” (between 4 and 8 million yen), “high income” (>8 million yen; the reference), and “income unreported.” Educational attainment was categorized into two groups, such as with a college degree and without it. Assuming that

those without a college degree were more negatively affected than those with it, we used the respondents with a college degree as the reference group. Employment status was measured by five distinctive groups: working regularly for a permanent position (the reference), working regularly for a non-permanent position, self-employed, searching for a job, and not in the labor force. We expected that those in the last four categories showed deteriorated mental health than those working regularly for a permanent position.

We conducted logistic regression using the entire sample as well as sex-specific samples, where the prevalence of depressive and anxiety symptoms was regressed on the indicator variables for the presence of a job-related adverse change and socioeconomic status. We adjusted for age groups (<40 years old, between 40 and 64 years of age, and aged 65 years or older), survey months, local pandemic situations using the (logged) monthly number of new Covid-19 cases and deaths in the prefecture where the respondents resided at the time of the survey. Estimation results were transformed into odds ratios and presented with a 95% confidence interval using the forester library in R (Boyes, 2021).

The survey was approved by the Ethics Review Committee on Human Research of Waseda University (approval #: 2020-050).

3. Results

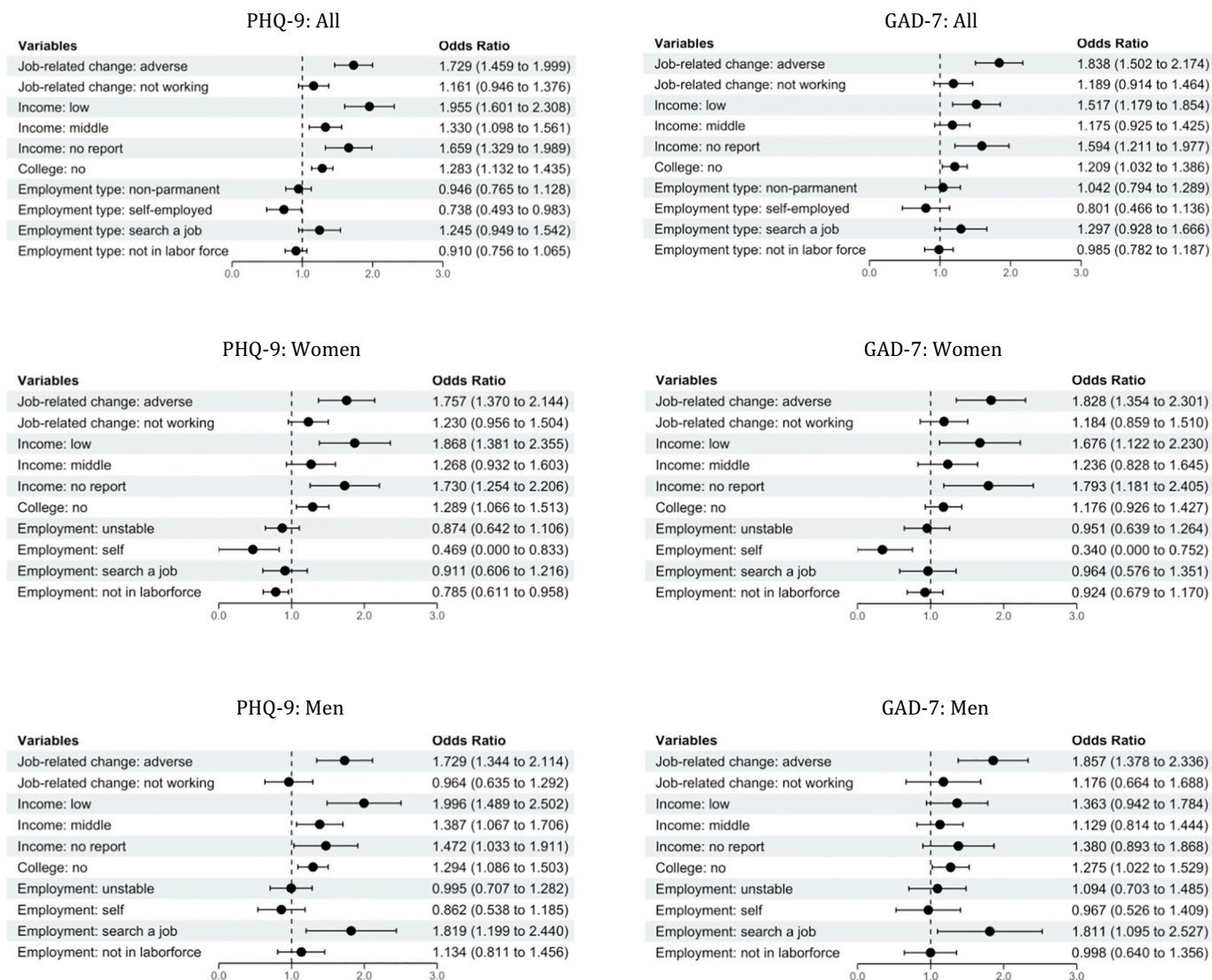
Table 1 reports the number and percentage of respondents in each category of the economic condition and socioeconomic variables by sex. About 12% of the respondents experienced an adverse change in employment during the study period. About one-third of the respondents were categorized into low- or middle-income groups. Half of the respondents had no college degree. Finally, about 11% of the respondents reported working in a non-permanent position, while about 5% of them had been searching for a job.

Fig. 1 presents the estimation results when the PHQ-9 was used as the outcome variable (left panel) and the GAD-7 as the outcome (right panel). The indicator variables for sex (when we used all respondents), age group, survey months, and the monthly total number of new cases and deaths in each prefecture were always included in the estimation, but the results are not reported.

The top panel contains the results when all the respondents were included in the estimation. Those who had experienced a job-related adverse change exhibited a higher prevalence of depressive and

**Table 1**  
The number and percentage of respondents in each category of the economic and demographic variables.

Variables	Categories	Men		Women	
		N	%	N	%
Job-related change	Not working	691	15.48	1462	32.23
	Adverse change	547	12.25	569	12.54
	No change (reference)	3226	72.27	2505	55.22
Income	Low	1239	27.76	1477	32.56
	Middle	1755	39.31	1355	29.87
	High (reference)	895	20.05	691	15.23
	No report	575	12.88	1013	22.33
	Yes (reference)	2625	58.8	1447	31.9
College graduate	No	1839	41.2	3089	68.1
	Working in a permanent position (reference)	2470	55.33	882	19.44
Employment type	Working in a non-permanent position	446	9.99	543	11.97
	Self-employed	270	6.05	76	1.68
	Searching for a job	204	4.57	242	5.34
	Not in the labor force	1074	24.06	2793	61.57
	Senior (reference)	1449	32.46	1584	34.92
Age	Young	1386	31.05	1332	29.37
	Middle	1629	36.49	1620	35.71
	Senior (reference)	1449	32.46	1584	34.92
Total		4464		4536	



**Fig. 1.** Estimated relationships between economic shocks and the prevalence of depressive symptoms and anxiety. Note: Odds ratios were based on logistic regression estimates. Sex, age groups, survey rounds, and the (log) number of monthly total of COVID-19 infections and deaths in the prefectures were adjusted.

anxiety symptoms by about 70% to 80% in the odds (1.729, 95% CI: 1.459–1.999, 1.838, 95% CI: 1.502–2.174, respectively), compared to those who experienced no change. Relative to those with high income, those with low income also had higher odds of having depressive and anxiety symptoms (1.955, 95% CI: 1.601–2.308, and 1.517, 95% CI: 1.179–1.854, respectively). Those with middle income and those who did not report their income also exhibited a higher prevalence of depressive symptoms. Those without college education also showed a higher prevalence of depressive (1.283, 95% CI: 1.132–1.435) and anxiety symptoms (1.209, 95% CI: 1.032–1.386) than those with college education. We found no difference in prevalence across employment status and type.

According to the results stratified by sex, female respondents who had experienced a major adverse change in their employment status or working conditions were more likely to have experienced depressive (1.757, 95% CI: 1.370–2.144) and anxiety symptoms (1.828, 95% CI: 1.354–2.301), compared to those who experienced no job-related change. Similarly, women with low income or those who refused to answer their income level were more likely to suffer from depressive and anxiety symptoms compared to their high-income counterparts.

Male workers who had experienced a job or income loss were more

likely to suffer from depression (1.757, 95% CI: 1.370–2.144) and anxiety symptoms (1.857, 95% CI: 1.378–2.336) relative to those without such an adverse experience. In addition, compared to those with high income, those who had lower income levels or those who did not report their income level had higher odds of depressive. Low-income males were twice as likely to have depressive symptoms compared to their high-income counterparts. In addition, men who were looking for a job had a high prevalence of depressive and anxiety symptoms.

#### 4. Discussion

This study examined whether individuals who had experienced a major job-related adverse change as well as those with low socioeconomic status were more likely to have experienced depressive and anxiety symptoms during the COVID-19 pandemic. We found that depressive and anxiety symptoms were more prevalent among those who had recently experienced drastic changes in employment and working conditions, as well as among individuals with low income and those without college education. Thus, our overall findings suggest that economically vulnerable individuals have unfavorable mental health conditions during the pandemic.

We also found that the adverse effects of employment status changes on psychological well-being were quite similar between the sexes. We found that both female and male respondents who had experienced a major employment-related change were more likely to have experienced both depression and anxiety disorders. However, male workers who were unemployed and looking for a position were more likely to suffer from psychological distress, whereas we did not find such a pattern among female workers.

This study contributes to the literature by documenting the differential effects of COVID-induced economic shocks on the mental health of women and men. Our overall findings are consistent with recent studies that demonstrated the negative impact of economic shocks on mental health conditions during the pandemic (Dawel et al., 2020; Witteveen and Velthorst, 2020), but none of these studies investigated whether the psychological impact of work-related changes differed by sex.

The current pandemic puts disproportionate burdens on women in multiple domains, which can make them vulnerable both economically and psychologically. Women were more likely to experience job losses as a result of the pandemic because they were more likely to work in the affected industries, including tourism and food industry (McKinsey & Company, 2020). In addition, some women faced increased childcare responsibilities due to long-term school and daycare closures, which may have forced them to stop looking for a job. Thus, the COVID-19 pandemic caused some women multifaceted challenges, which might explain why economically vulnerable women were more likely to suffer from both depression and anxiety disorders. Yet, the similar detrimental effect of the negative economic shocks was also found among men, suggesting that COVID-induced economic shocks were equally influential on both women and men for different reasons.

This study has several limitations. We do not have data on the pre-COVID mental health conditions of our respondents, and thus our findings are descriptive, not causal. Additionally, although our surveys were designed so that our respondents were representative of the Japanese population in terms of their sex, age group, and area of residence, it is possible that some segments of the population were not represented in our sample because they were online surveys.

Despite these limitations, this study presented evidence that COVID-induced economic shocks can have a detrimental effect on mental health among women and men. The economic ramifications of the COVID-19 pandemic can remain with us much longer than the disease itself. More work is necessary to identify vulnerable individuals during the pandemic so that we can monitor their mental health status.

### Financial support

This work was financially supported by JSPS Grants-in-Aid for Scientific Research Grant Number 20H01584. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

### CRediT authorship contribution statement

TM and MU designed a study, and collected and analyzed data. YI reviewed relevant literature. TM, YI, and MU wrote the manuscript.

### Conflict of interest

There are no conflicts of interest to declare.

### Acknowledgements

There is no acknowledgement to state.

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