

deliver a baby by *satogaeri* in Iwate prefecture was refused admission to hospital because she was from the Tokyo metropolitan area.⁷ This might have caused anxiety for pregnant women. In addition, some pregnant women have had to change their birth plans because hospitals now restrict families from attending childbirths to avoid infection. Many pregnant women now have to be alone during delivery, with no family support. This might affect their mental health adversely and worsen the fear of childbirth.⁸

COVID-19 has had widespread effects on perinatal mental health. It is important to thoroughly understand the impact of COVID-19 on mental health, especially in Japan, with its unique practice peculiarities, such as *satogaeri* childbirth. It is also necessary to enhance the level of support that can be implemented even under the circumstances of COVID-19. Online support is thought to be one of the most optimal options because of its high accessibility and lack of physical contact. We have developed a smartphone-based cognitive-behavioral therapy (iCBT) program for pregnant women and are conducting a randomized controlled trial aiming to evaluate the effectiveness of iCBT to prevent the onset of antenatal and post-partum depression.⁹ We hope to contribute to the implementation and dissemination of tools for the universal prevention of perinatal depression.

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Disclosure statement

The authors have no conflicts of interest to declare.

References

1. Wisner KL, Miller ES, Tandon D. Attention to prevention: Can we stop perinatal depression before it starts? *JAMA Psychiatry* 2019; **76**: 355–356.
2. MTI Ltd. Shingata koronaurusukansensyo ni kansuru “LunaLuna” dokujicyousa 2020. [Cited 1 June 2020.] Available from URL: <https://prtimes.jp/main/html/rd/p/000000688.000002943.html> (in Japanese).
3. Ministry of Health, Labour and Welfare. Jinkodotaitoukei no nenkansuikai 2019 [Annual Vital Statistics 2019]. [Cited 1 June 2020.] Available from URL: <https://www.mhlw.go.jp/toukei/saikin/hw/jinkou/suikai19/dl/2019suikai.pdf> (in Japanese).
4. Takahashi Y, Tamakoshi K. Factors associated with early postpartum maternity blues and depression tendency among Japanese mothers with full-term healthy infants. *Nagoya J. Med. Sci.* 2014; **76**: 129–138.
5. Yoshida K, Yamashita H, Ueda M, Tashiro N. Postnatal depression in Japanese mothers and the reconsideration of ‘Satogaeri bunben’. *Pediatr. Int.* 2001; **43**: 189–193.
6. Japan Society of Obstetrics and Gynecology. Ninpu no minasamae: “Satogaeri bunben” ni tsukimashite 2020. [Cited 1 June 2020.] Available from URL: http://www.jsog.or.jp/modules/jsogpolicy/index.php?content_id=11 (in Japanese).
7. Asahi Shimbun Digital. Apital iryo kenko kaigo. [Cited 1 June 2020.] Available from URL: <https://www.asahi.com/articles/ASN4S3CL5N4RULUC02R.html> (in Japanese).
8. Takegata M, Haruna M, Matsuzaki M, Shiraiishi M, Okano T, Severinsson E. Aetiological relationships between factors associated with postnatal traumatic symptoms among Japanese primiparas and multiparas: A longitudinal study. *Midwifery* 2017; **44**: 14–23.
9. Nishi D, Imamura K, Watanabe K *et al.* Internet-based cognitive-behavioural therapy for prevention of depression during pregnancy and in the post partum (iPDP): A protocol for a large-scale randomised controlled trial. *BMJ Open* 2020; **10**: e036482.

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Post-traumatic stress symptoms among medical rescue workers exposed to COVID-19 in Japan

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The novel coronavirus disease (COVID-19) has spread throughout the world. At an early stage in Japan, health-care professionals who belong to the Disaster Medical Assistance Team (DMAT) or the Disaster Psychiatric Assistance Team (DPAT) were engaged in rescue activities outside hospitals. DMAT members engaged in quarantine and treatment and DPAT members provided mental health care for people who might have had COVID-19. This included quarantine and treatment for people infected with COVID-19 on a cruise ship, the Diamond Princess.¹ It is well-known that mental health problems have occurred among health-care professionals responding to COVID-19.^{2,3} Previous studies have reported mental health problems and associated factors among health-care professionals from infectious disease outbreaks.^{4–7} However, no studies have examined associated factors with post-traumatic stress symptoms (PTSS) among health-care professionals who have been deployed to activities of emerging infectious diseases outside hospitals. The present study examined factors associated with PTSS among DMAT and DPAT members who have been deployed to COVID-19-related activities outside hospitals.

DMAT and DPAT are trained medical teams with the mobility to work in an acute phase of disaster. DMAT and DPAT members (physicians, nurses, and operational coordination staff) were dispatched to COVID-19-related activities commencing 1 February 2020; DPAT activities ended on 6 March, and DMAT activities ended on 9 March. The recruited participants in this study, including all DMAT and DPAT members who were deployed to COVID-19-related activities, met the following inclusion criteria: (i) aged 18 years or older; (ii) native Japanese speaker or non-native speaker with Japanese conversational abilities; and (iii) physically and psychologically capable of understanding and providing consent for study participation. This cross-sectional, Internet-based survey was conducted from 11 March to 2 April 2020. A written guide to this study was posted to the mailing list by the DMAT office or DPAT office. Participants accessed the URL in the written guide, read a detailed explanation of the study, and responded to a consent form and a questionnaire by 2 April. Outcomes of this study were evidence of PTSS. PTSS was assessed by the Impact of Event Scale-Revised (IES-R). Independent variables were selected based on previous studies. Peritraumatic distress was assessed by the Peritraumatic Distress Inventory (PDI), and perceived stress specific to the emerging infectious disease was assessed by the Japanese version of Stress-Related Questions (SRQ).⁸ The SRQ consists of four factors (anxiety about infection, exhaustion, workload, and feeling of being protected) and includes 16 items.⁵ The validity and reliability of the Japanese version of the IES-R, the PDI, and the SRQ have been confirmed.^{5,9,10} In addition, participants were asked about the variables that were identified in a previous study^{4–7} or from our interviews with DMAT and DPAT members as associated factors for PTSS.

This study was ethically approved by the research ethics committee of the Graduate School of Medicine and Faculty of Medicine at the University of Tokyo (No. 2019164NI) and the research ethics committee of the National Hospital Organization Disaster Medical Center (No. 2019–19).

We analyzed the dataset of participants who completed all questions of the self-report questionnaire. Univariate and multiple linear regression analyses were used to examine the association of independent variables with PTSS. All analyses were conducted using spss Version 22.0 J for Windows (SPSS, Tokyo, Japan).

Table 1 Results of univariate and multiple linear regression analysis in participants (n = 331) for post-traumatic stress symptoms

	Univariate regression			Multiple linear regression		
	β	95%CI	P	β	95%CI	P
Contact with a COVID-19 patient	0.15	-2.28, 2.59	0.90	-0.49	-2.27, 1.29	0.59
Stress prior to deployment	3.15	0.73, 5.57	0.01	-1.34	-3.24, 0.57	0.17
Adequate food and sleep or rest	-5.01	-7.22, -2.79	<0.001	0.16	-1.70, 2.02	0.87
Experience of stress due to lack of sufficient information sharing	3.85	1.52, 6.18	0.001	0.56	-1.26, 2.37	0.55
Troubles at home after deployment	4.84	2.51, 7.16	<0.001	1.83	-0.01, 3.67	0.05
Troubles at workplace after deployment	5.72	3.46, 7.98	<0.001	0.05	-1.81, 1.90	0.96
Opportunities to hear about deployment activities after deployment	-3.96	-6.31, -1.61	0.001	-1.53	-3.28, 0.20	0.08
SRQ: Anxiety about infection	0.51	0.24, 0.77	<0.001	-0.26	-0.50, -0.03	0.03
SRQ: Exhaustion	1.59	1.26, 1.92	<0.001	0.78	0.42, 1.14	<0.001
SRQ: Workload	1.95	1.29, 2.61	<0.001	-0.03	-0.66, 0.60	0.94
SRQ: Feeling of being protected	-0.92	-1.70, -0.15	0.02	0.27	-0.30, 0.84	0.35
PDI	1.00	0.89, 1.11	<0.001	0.92	0.79, 1.05	<0.001
Age	-0.03	-0.16, 0.10	0.61	0.05	-0.05, 0.14	0.33
Sex	0.04	-2.56, 2.65	0.97	-1.04	-2.90, 0.82	0.27
DMAT (Reference) or DPAT	-1.41	-4.18, 1.36	0.31	-2.14	-4.16, -0.12	0.04
R^2						0.55

Post-traumatic stress symptoms were assessed by the Japanese version of the Impact of Event Scale-Revised.

CI, confidence interval; DMAT, Disaster Medical Assistance Team; DPAT, Disaster Psychiatric Assistance Team; PDI, Peritraumatic Distress Inventory; SRQ, Stress-Related Questions.

[Correction added on 2 September, after first online publication: The P-value number of ‘Sex’ under ‘Univariate regression’ has been amended.]

Among 807 DMAT and DPAT members who were deployed to COVID-19-related activities, 414 agreed to participate in this study, and 331 (41.0%) completed all questions. Demographic characteristics are shown in Table S1. Among the participants, 105 (31.7%) had had contact with a COVID-19 patient during deployment. The results of univariate and multiple linear regression analyses about PTSS in the participants are shown in Table 1. Multiple linear regression analysis showed that anxiety about infection assessed by the SRQ, exhaustion assessed by the SRQ, PDI, and being DMAT members were associated with PTSS. The results of a univariate regression analysis of each PDI item showed that items such as “I felt I might pass out” and “I had difficulty controlling my bowel and bladder” were strongly significantly associated with PTSS (Table S2).

Although this study has some limitations, such as modest response rate and cross-sectional design, the findings of the study suggest that physical exhaustion, peritraumatic distress, and activities during deployment were very important as associated factors for PTSS among medical rescue workers. To prevent mental health problems in health-care professionals dealing with emerging infectious disease, it is essential to give them enough time for self-care, including allowing time and physical allowances (such as adequate infection-protection clothing) to use the bathroom. In addition, health-care professionals may need to have their mental health checked after deployment, especially when they have had physical contact with potential patients with emerging infectious diseases. However, this needs to be further examined because univariate regression analysis did not show significant associations between being DMAT members and PTSS. These findings could be useful for establishing a system for rescue activities for infectious diseases, including COVID-19, and for preventing mental health problems among health-care professionals.

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Disclosure statement

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References

1. Jimi H, Hashimoto G. Challenges of COVID-19 outbreak on the cruise ship Diamond Princess docked at Yokohama, Japan: A real-world story. *Glob. Health Med.* 2020; **2**: 63–65.
2. Xiang YT, Yang Y, Li W *et al.* Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry* 2020; **7**: 228–229.
3. Imai H. Trust is a key factor in the willingness of health professionals to work during the COVID-19 outbreak: Experience from the H1N1 pandemic in Japan 2009. *Psychiatry Clin. Neurosci.* 2020; **74**: 329–330.
4. Maunder RG, Lancee WJ, Balderson KE *et al.* Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg. Infect. Dis.* 2006; **12**: 1924–1932.
5. Matsuishi K, Kawazoe A, Imai H *et al.* Psychological impact of the pandemic (H1N1) 2009 on general hospital workers in Kobe. *Psychiatry Clin. Neurosci.* 2012; **66**: 353–360.
6. Lai J, Ma S, Wang Y *et al.* Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw. Open* 2020; **3**: e203976.
7. Kisely S, Warren N, McMahon L, Dalais C, Henry I, Siskind D. Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: Rapid review and meta-analysis. *BMJ* 2020; **369**: m1642.
8. Imai H, Ito A, Matsuishi K, Matsuishi K, Kitamura N, Mita T. Influence of novel influenza pandemic in 2009 on mental state of workers at local


- public hospital: An investigation using questionnaire. *Seishin. Shinkeigaku. Zasshi*. 2010; **112**: 111–115 (in Japanese).
- Asukai N, Kato H, Kawamura N *et al*. Reliability and validity of the Japanese-language version of the Impact of Event Scale-Revised (IES-R-J): Four studies of different traumatic events. *J. Nerv. Ment. Dis.* 2002; **190**: 175–182.
 - Nishi D, Matsuoka Y, Noguchi H *et al*. Reliability and validity of the Japanese version of the Peritraumatic Distress Inventory. *Gen. Hosp. Psychiatry* 2009; **31**: 75–79.

Supporting information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1 Demographic characteristics of participants.

Table S2 Results of univariate regression analysis of each Peritraumatic Distress Inventory item in participants for post-traumatic stress symptoms.

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Mental health status of the general population in Japan during the COVID-19 pandemic

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From late December 2019, a novel coronavirus (COVID-19) spread rapidly to countries throughout the world. In the absence of a vaccine, and given the high degree of transmissibility and potential lethality of COVID-19, social and physical distancing, including reducing/avoiding crowding, the closure of non-essential businesses/services, stay-at-home orders, and local/national movement restrictions, have been the main public health measures adopted to mitigate the transmission/detrimental effects of the virus.¹ Despite the potential benefits of such measures, they might also have negative short- and long-term consequences for mental health.² For example, financial loss and the socioeconomic distress that can result from quarantine may underpin the emergence of psychological disorders.³ Against this backdrop, we examined the effects of the COVID-19 pandemic on the mental health of a national sample of the Japanese population (see Appendix S1 for a description of the situation in Japan).

We administered two rounds of an online survey of the Japanese population between 16 and 18 April (1st round) and 15 and 17 May (2nd round) 2020. A commercial survey company, the Survey Research Center, sent out a set of screening questions to approximately 10 000 respondents from its commercial web panel and then constructed a sample of 1000 respondents based on their demographic characteristics. A new set of respondents was drawn in the second round. The final sample of 2000 people comprised respondents who were representative of the Japanese general population in terms of the area of their residency, sex, and age distribution. This study was approved by the Ethics Review

Committee on Human Research of Waseda University (approval #: 2020-050) and Osaka School of International Public Policy, Osaka University and conforms to the provisions of the Declaration of Helsinki. The respondents provided explicit consent and the data are completely anonymous.

The nine-item Patient Health Questionnaire⁴ was used to measure depressive symptoms, while the 7-item Generalized Anxiety Disorder Scale⁵ was used to measure anxiety symptoms (Appendix S2). We also obtained information on the age, sex, education, prefectural area of residence, employment status, household income, and household financial situation of the respondents. For the analysis we first calculated the prevalence of anxiety and depressive symptoms for each of the demographic and economic groups. Then logistic regression models were estimated with either the 7-item Generalized Anxiety Disorder Scale or nine-item Patient Health Questionnaire categories as the outcome and all the respondents' characteristics as the regressors.

The descriptive statistics of the sample stratified by the mental health variables are presented online in Table S1, while details of the mental health scores are presented in Appendix S3. In fully adjusted logistic regression models, the following factors were associated with significantly increased odds for both depressive and anxiety symptoms: being young or middle aged compared to older aged (≥ 60 years); having a worse household financial situation compared to the previous year; and being unemployed, laid off, or on leave. Being a part-time or temporary worker was associated with higher odds for depression while the association with anxiety was of borderline statistical significance (Figs S1 and S2).

Our results suggest that the mental health condition of some segments of the Japanese population may be particularly vulnerable during the ongoing COVID-19 crisis. In particular, individuals who were in an economically vulnerable situation, that is, those who were not currently working or who were employed as part-time or temporary contract-based workers, reported worse mental health. This is consistent with the notion that the effects of a faltering economy and reduction in business activities caused by COVID-19 are first and foremost likely to detrimentally affect workers without employment or without stable employment. Similarly, individuals who felt that their financial position had deteriorated in the past year also had greater odds for depression and anxiety. In addition, the mental health of young and middle-aged individuals was significantly poorer than that of older individuals. We can only speculate why the current crisis may be having an especially detrimental impact on the mental health of the working-age population. Besides financial worries, it is also possible for example, that COVID-19 may be currently giving rise to other stressors in younger age groups that might also impact their mental health, such as the need for parents to both telework from home while at the same time homeschool their children.

Our findings suggest that monitoring the mental health of younger and economically vulnerable individuals may be especially important moving forward. In addition, they also indicate that the general public's mental health during the pandemic might not only be affected by the direct health consequences of COVID-19, but also by the economic ramifications of the pandemic.

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References

- World Health Organization. Coronavirus disease 2019 (COVID-19) situation report – 72, 2020. [Cited 25 April 2020.] Available from URL: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200401-sitrep-72-covid-19.pdf?sfvrsn=3dd8971b_2
- Galea S, Merchant RM, Lurie N, Galea S. The mental health consequences of COVID-19 and physical distancing: The need for prevention and early intervention. *JAMA Intern. Med.* 2020; **180**: 817.