Disaster evacuation intentions of persons with mental health problems receiving employment support in Japan

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Abstract

Aim: A major earthquake is expected in Japan. Previous reports suggest that persons with mental health issues may not evacuate during earthquakes, owing to anxieties about living in evacuation centers. This study aimed to examine the disaster evacuation intentions and related factors of Support Office for Continuous Employment (SOCE)-registered persons with mental health problems living in areas at risk of earthquake damage.

Methods: With the cooperation of the SOCE, this study recruited 52 persons with mental health problems. The K-DiPS Checklist was used to collect demographic and disaster-related information, and assessed preparedness for disaster, evacuation intention, problems with daily living owing to mental health problems and attention difficulties, necessity of support in case of emergency, and crisis management in an emergency. Logistic regression was used to examine the relationship between intention to evacuate and predictor variables including age, main disorder, and ability to imagine disease condition worsening.

Results: A total of 31 (59.6%) participants were aware of the area’s disaster-related characteristics and vulnerability; 24 (46.2%) participants stated that they would want to evacuate if evacuation recommendations were issued. Those who knew about disaster-related characteristics and vulnerability expressed a wish to evacuate if they had evacuation assistance in the event of an evacuation recommendation issuance (OR = 7.71, 95% confidence intervals [1.76–33.76]).

Conclusions: It may be possible to increase evacuation compliance in individuals unwilling to evacuate by offering information about the disaster-related characteristics and vulnerability of residential areas. Persons with mental health problems should receive more evacuation support.

Key words: disaster, earthquake, evacuation intentions, Japan, mental health problems

INTRODUCTION

Natural Disasters destroy lives and livelihoods worldwide. Japan is located in the Pacific Rim earthquake zone, which is characterized by intense crustal movements and high earthquake activity. Approximately 20% of earthquakes of magnitude 6 or more that occurred worldwide from 1994 to 2003 occurred in Japan (Cabinet Office, 2017). In Japan, the occurrence of a major Nankai Trough earthquake is expected. Its epicenter would lie offshore, but it would affect areas such as Shizuoka, Shikoku, and Kyushu.

The Japanese Cabinet Office has predicted that a Nankai Trough earthquake could, at worse, kill 224,000 people and destroy 169,000 houses (Cabinet Office, 2013a). The Japanese government has issued recommendations for immediate evacuation in the event of a disaster, and has set up a disaster prevention plan. This aims to help people to evacuate safely and survive on...
their own until central support systems are established. Checks of evacuation sites, measures to ensure prompt evacuation by residents, and implementation of evacuation drills for residents have also been recommended (Cabinet Office, 2018). Mimaki, Takeuchi, and Shaw (2009) conclude that the activities of the Voluntary Disaster Preparedness Organization promoted by the Japanese government to help communities have been useful. Takao, Motoyoshi, Sato, Fukuzendo, Seo and Ikeda (2011) discuss the factors that determine preparedness for floods in large cities in Japan. Disaster prevention plans and disaster prevention drills designed by individuals and communities are particularly important for protecting the lives of residents (Tabish & Syed, 2015). The mortality rate for persons with mental health problems owing to the 2011 Great East Japan Earthquake was twice that for persons without mental health problems (Cabinet Office, 2013b). Persons classed as having mental health problems are those who have received recognition of their disability from the government (Cabinet Office, 2012); however, many persons with disabilities have not received official recognition of their persons-with-mental-health-problems status. For example, 80% of persons with mental health problems have not received such recognition (Cabinet Office, 2016a; Ministry of Health, Labour and Welfare, 2018). Therefore, the actual mortality rate for all types of persons with disabilities after an earthquake may be higher than the estimated rate.

Of the 810 million persons with disabilities who live at home in Japan (Cabinet Office, 2016a), 45% have mental health problems. Since 1998, measures have been adopted to improve the development and security of persons with mental health problems, and there has been a recent increase in users of welfare services for persons with mental health problems. There was approximately a 12-fold increase in the number of people seeking employment support between 1998 and 2012 (Ministry of Health, Labour and Welfare, 2013). Since 2018, the statutory employment rate has risen and a further increase is expected (Ministry of Health, Labour and Welfare, 2015). The Support Office for Continuous Employment (SOCE) is a facility to help persons with disabilities improve their skills and knowledge to obtain general employment (Ministry of Health, Labour and Welfare, 2015).

Individuals who use the SOCE have been diagnosed with mental disorders such as schizophrenia or bipolar disorder and have been recognized as persons with a disability by the Japanese disability certification system. During the Great East Japan Earthquake (March 11, 2011), some individuals with mental health problems felt anxious about managing interpersonal relationships at evacuation shelters and remained in the waiting room of an earthquake-damaged psychiatric hospital (Kanno 2014). In one survey of power-dependent home care patients, participants stated their unwillingness or inability to evacuate owing to the difficulty of continuing their treatment under evacuation conditions (Nakai et al, 2016a). Therefore, persons with disabilities who state that they “would not want to evacuate” may actually wish to evacuate, but feel they would not survive if they did so, or believe that living in a shelter would be too stressful.

There are many reports of the mental health of communities after disasters (Fergusson, Horwood, Boden, & Mulder, 2014; Frits van Griensven et al., 2019); however, there are no studies on disaster preparation for persons with mental health problems. Tsunami evacuation guidelines recommend that individuals evacuate to high ground for the best protection (Yamada & Kishimoto, 2017). Risk recognition and rapid evacuation are necessary to reduce the number of tsunami-related fatalities (Sugimoto, Murakami, Kozuki, Nishikawa, & Shimada, 2003). Therefore, it is important that evacuation occurs immediately after the local government issues an evacuation recommendation. However, many persons with mental health problems are unable to evacuate quickly. In a survey of older persons after Hurricane Katrina, which first struck the southern United States on August 25, 2005, approximately 13% indicated that they would not evacuate in response to an evacuation recommendation issued by local governments (Rosenkoetter, Covian, Cobb, Bunting, & Weinrich, 2007). A survey in the town of Otuchi, which was affected by the Great East Japan Earthquake, showed that approximately half of persons who were killed at home had not evacuated, and the mortality of persons with mental health problems was particularly high (Mugikura, Kajiwara, & Takamatsu, 2015). To encourage residents to evacuate quickly, it is necessary to first clarify how their intention to evacuate relates to different situations. This could help to develop disaster countermeasures that take into account the evacuation intentions of people with mental health problems living in areas where earthquake and tsunami damage is expected.

In this study, we aimed to examine the disaster evacuation intentions and related factors of SOCE-registered persons with mental health problems living in areas where damage by a Nankai Trough earthquake and tsunami is expected.
METHODS

Terminology

Evacuation recommendations and instructions

Evacuation recommendations and instructions were published in the Basic Act on Disaster Management (November 15, 1961). Evacuation recommendations are issued to encourage residents to evacuate if the risk of a disaster increases. Evacuation instructions are stronger demands for residents to evacuate areas in which a disaster is highly likely to occur, if there is a possibility of danger from the disaster, and if the need for evacuation is urgent.

Target area

The target area of the study was Kochi city in the Shikoku region of Japan. Kochi is a city with a population of 330,000 located on the Pacific coast. There is a 70% chance that Kochi city will be affected by huge earthquakes and tsunamis within 30 years and would flood within 20 minutes in the event of the largest possible earthquake (Cabinet Office, 2013c). It is also predicted that flooding will occur over a long period of time following the resulting tsunami, owing to subsidence (Furumura, Imai, & Maeda, 2011).

Data collection

For the purposes of this study, we asked one SOCE to cooperate with the study. According to 2014 statistics, ~15% of people with mental health problems living at home have worked at the SOCE (Ministry of Health, Labour and Welfare, 2013). Therefore, we chose to access persons with disabilities through the SOCE. Participants were individuals with a psychiatric diagnosis of mental health problems who were receiving employment support and training to work in general corporations. All participants had received a psychiatric diagnosis in the past and currently had mental and behavioral difficulties. Table 1 shows the main disorders diagnosed. These included alcohol dependence and developmental disabilities. Alcohol dependence and developmental disabilities are considered mental health problems in Japan; therefore, we included participants with these two diagnoses. In this paper, the category of developmental disabilities comprises autism spectrum disorders and attention-deficit hyperactivity disorder. The SOCE identified 52 persons with disabilities as possible participants. For data collection, we used the Kanazawa and Kochi Disaster Preparedness System Checklist (K-DiPS Checklist). The K-DiPS Checklist permits the collection of demographic information and disaster-related information. Participants complete the checklist

| Variable          | Category     | Overall Means and SDs or n (%) | Evacuation intention in response to evacuation recommendations n (%) | p value |
|-------------------|--------------|--------------------------------|---------------------------------------------------------------------|---------|
|                   |              | I would want to evacuate/or I would want to evacuate if evacuation assistance was available | I would want to evacuate, but would be too socially anxious to do so/I would not want to evacuate |         |
| Age               |              | 46.7 ± 12.2                      | 36 (69.2)                                                          | 16 (30.8) | 0.186† |
|                   | Sex          | Male 28 (53.8)                   | 17 (47.2)                                                          | 11 (68.8) | 0.229‡ |
|                   |              | Female 24 (46.2)                 | 19 (52.8)                                                          | 5 (31.3)  |         |
|                   | Cohabiting/separated | Cohabiting 26 (50.0)            | 18 (50.0)                                                          | 8 (50.0)  | 1.000‡ |
|                   |              | Separated 26 (50.0)              | 18 (50.0)                                                          | 8 (50.0)  |         |
|                   | Medication   | Yes 48 (92.3)                    | 36 (69.2)                                                          | 12 (23.1) | 0.007‡ |
|                   |              | No 4 (7.7)                       | 0 (0.0)                                                            | 4 (7.7)   |         |
|                   | Main disorder| Schizophrenia 25 (48.1)          | 20 (55.6)                                                          | 5 (31.3)  | 0.297‡ |
|                   |              | Bipolar disorder 3 (5.8)         | 1 (1.9)                                                            | 2 (12.5)  |         |
|                   |              | Depression 3 (5.8)               | 1 (1.9)                                                            | 2 (12.5)  |         |
|                   |              | Alcoholism 3 (5.8)               | 2 (5.6)                                                            | 1 (6.3)   |         |
|                   |              | Developmental disability 9 (17.3)| 7 (19.4)                                                           | 2 (12.5)  |         |
|                   |              | Other 9 (17.3)                   | 5 (13.9)                                                           | 4 (25.0)  |         |
|                   | Schizophrenia/others | Schizophrenia 25 (48.1)         | 20 (55.6)                                                          | 5 (31.3)  | 0.138‡ |
|                   |              | Other disorders 27 (51.9)        | 16 (44.4)                                                          | 11 (68.8) |         |

SD, standard deviation. †chi-squared test; ‡Fisher’s exact test.

p < 0.01.
with the help of a professional care worker in charge of daily living support (Nakai et al., 2016b). In addition to the items on the K-DiPS Checklist, we also assessed problems with daily living owing to mental disorder, special support necessary at the time of a disaster, and crisis management. The data collection interview was conducted by a nurse at the SOCE business office. The data collection period was from December 2016 to December 2017.

Questions

Basic items
We collected data on age, sex, cohabitation/separation, name of the main disorder/disease, medication, and possession of a mobile phone.

Status of preparation for disaster
Participants were asked whether they had in the home 13 items needed to cope with a disaster, such as water, food, clothing, medicines, and hygiene items. We also asked about knowledge of disaster characteristics and vulnerability in the residential area, tsunami inundation area, landslide risk, ground strength, shelter location, and evacuation route. The response options were “I know about this” or “I do not know about this”.

Evacuation intention
We asked participants about would you want to evacuate: “I would want to evacuate”, “I would want to evacuate if evacuation assistance was available”, “I would want to evacuate, but would be too socially anxious to do so”, or “I would not want to evacuate”.

Problems with daily living owing to mental health problems and attention difficulties
We asked participants about difficulties they have in their daily living, such as concerns about clean air, water, and food; problems related to excretion, physiology, and similar tasks; the need to keep warm and clean; depression; engaging in activities and maintaining attention; obtaining sufficient rest and sleep; maintaining interpersonal relationships and commitment; maintaining vitality and keeping oneself and others safe; and managing medication needs.

Necessity of support in case of an emergency
We asked participants to respond to seven items about their needs in an emergency: air, water, food; excretion/physiology; temperature maintenance/cleanliness; activity, rest, sleep, and attention; maintaining interpersonal relationships and commitment; keeping oneself and others safe; and medication behavior.

Crisis management in an emergency
We asked participants if they could imagine the deterioration of their disease condition, and if they could cope with deterioration in their condition in an emergency evacuation situation.

Analysis
We calculated the number and proportion of the four evacuation intention responses (wanting to evacuate, wanting to evacuate if there was support, refusal to evacuate, not wanting to evacuate) separately for both evacuation recommendations and evacuation orders. Then we classified the evacuation intention at the time of evacuation recommendation issuance into two groups: the first group comprised “I would want to evacuate” and “I would want to evacuate if I had evacuation assistance” and the second group comprised “I would want to evacuate, but would be too socially anxious to do so” and “I would not want to evacuate.” We then tested differences in scores on the factors status of preparation for disaster, problems with daily living owing to mental health problems and attention difficulties, necessity of support during disasters, and crisis management in disasters using the chi-squared test or Fisher’s exact test. Next, we set as the dependent variable the intention to evacuate in the event of an evacuation recommendation issuance. We set the independent variables as variables that showed a significant difference: age, main disorder/disease name, and ability to imagine the condition worsening. We then performed logistic regression analysis on the data. The software package, SPSS version 24 (SPSS Inc., Chicago, IL, USA), was used for statistical analysis. Values of $p < 0.05$ were considered statistically significant.

Ethical considerations
This research was conducted in accordance with the Declaration of Helsinki, 1995 (as revised in Seoul, 2008), and was carried out with the consent of the University Medical Research Ethics Review Committees at the authors’ universities (Nos. 16-20 and No. 594). We provided each participant with a written description of the research that stated the purpose of the study, the respect for participants’ decisions about whether they were going to take part, freedom of withdrawing research cooperation, protection of anonymity and privacy, and consideration of the mental and physical burden of taking part. Informed consent was provided by all participants.
### RESULTS

The mean age of the 52 participants was 46.7 ± 12.2 years (mean ± standard deviation). Of the 52, 28 (53.8%) were male and 26 (50.0%) were cohabiting. The main diseases/disorders were schizophrenia in 25 (48.1%), developmental disabilities in nine (17.3%), depression in three (5.8%), and alcoholism in three (5.8%) (Table 1).

Participants with alcoholism had a previous diagnosis of alcoholism, but had succeeded in avoiding alcohol and were currently receiving employment support and aiming to work in the region.

### Preparing for disaster

There were 16 (30.8%) participants who had prepared water and a radio, 14 (26.9%) had prepared flashlights, but no more than eight participants had prepared the other items (Table 2).

### Table 2 Preparation for disasters by evacuation intention in response to evacuation recommendations (n = 52)

| Item                     | Category  | Overall n (%) | Evacuation intention in response to evacuation recommendations n (%) | Fisher's exact test; p value |
|--------------------------|-----------|---------------|---------------------------------------------------------------------|-----------------------------|
|                          |           |               | I would want to evacuate/ I would want to evacuate if evacuation assistance was available | I would want to evacuate, but would be too socially anxious to do so/I would not want to evacuate |                             |
| Water                    | Equipped  | 16 (30.8)     | 10 (27.8)                                                            | 6 (37.5)                    | 1.000                       |
|                          | Not equipped | 36 (69.2) | 26 (72.2)                                                            | 10 (62.5)                  |                             |
| Food                     | Equipped  | 8 (15.4)      | 7 (19.4)                                                             | 1 (6.3)                     | 0.642                       |
|                          | Not equipped | 44 (84.6) | 29 (80.6)                                                            | 15 (93.8)                  |                             |
| Clothing                 | Equipped  | 2 (3.8)       | 2 (5.6)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 50 (96.2) | 34 (94.4)                                                            | 16 (100.0)                 |                             |
| Medicine                 | Equipped  | 7 (13.5)      | 5 (13.9)                                                             | 2 (12.5)                    | 0.608                       |
|                          | Not equipped | 45 (86.5) | 31 (86.1)                                                            | 14 (87.5)                  |                             |
| First aid kit            | Equipped  | 1 (1.9)       | 1 (2.8)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 51 (98.1) | 35 (97.2)                                                            | 16 (100.0)                 |                             |
| Mask                     | Equipped  | 2 (3.8)       | 2 (5.6)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 50 (96.2) | 34 (94.4)                                                            | 16 (100.0)                 |                             |
| Tissues and toilet paper | Equipped  | 3 (5.8)       | 3 (8.3)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 49 (94.2) | 33 (91.7)                                                            | 16 (100.0)                 |                             |
| Diapers and sanitary articles | Equipped | 1 (1.9) | 1 (2.8)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 51 (98.1) | 35 (97.2)                                                            | 16 (100.0)                 |                             |
| Radio                    | Equipped  | 16 (30.8)     | 12 (33.3)                                                            | 4 (25.0)                    | 0.705                       |
|                          | Not equipped | 36 (69.2) | 24 (66.7)                                                            | 12 (75.0)                  |                             |
| Flashlight               | Equipped  | 14 (26.9)     | 12 (33.3)                                                            | 2 (12.5)                    | 1.000                       |
|                          | Not equipped | 38 (73.1) | 24 (66.7)                                                            | 14 (87.5)                  |                             |
| Helmet                   | Equipped  | 5 (9.6)       | 5 (13.9)                                                             | 0 (0.0)                     | 0.308                       |
|                          | Not equipped | 47 (90.4) | 31 (86.1)                                                            | 16 (100.0)                 |                             |
| Shoes                    | Equipped  | 3 (5.8)       | 3 (8.3)                                                              | 0 (0.0)                     | 0.544                       |
|                          | Not equipped | 49 (94.2) | 33 (91.7)                                                            | 16 (100.0)                 |                             |
| Rescue whistle           | Equipped  | 2 (3.8)       | 2 (5.6)                                                              | 0 (0.0)                     | 1.000                       |
|                          | Not equipped | 50 (96.2) | 34 (94.4)                                                            | 16 (100.0)                 |                             |

### Disaster knowledge

A total of 31 (59.6%) participants were aware of the disaster characteristics and vulnerability of the area, 30 (57.7%) knew about evacuation shelters, and 27 (51.9%) knew about evacuation routes (Table 3).

### Evacuation intention

A total of 24 (46.2%) participants stated that they would want to evacuate if evacuation recommendations were issued and 12 (23.1%) would want to evacuate if they received assistance for evacuation. A total of 37 (71.2%) participants would want to evacuate if evacuation instructions were issued and 10 (19.2%) would want to...
evacuate if they received assistance for evacuation (Table 4).

**Problems with daily living, need for disaster support, and crisis management**

A total of 42 (80.8%) participants experienced difficulties with medication, 34 (65.4%) had difficulties obtaining adequate rest and sleep, 47 (90.4%) wanted support with medication behavior, and 34 (65.4%) wanted support with activity, rest, and sleep. In relation to crisis management in the event of a disaster, 35 (67.3%) participants responded that they could deal with a deterioration in their condition and 34 (65.4%) knew the signs that their condition was worsening (Table 5).

**Factors related to evacuation intention**

Participants who could imagine their condition worsening tended to respond that they would want to evacuate if they had evacuation assistance in the event of an evacuation recommendation being issued (odds ratio [OR] = 6.46; 95% confidence interval [CI]: 1.21–34.44). Those who knew about disaster characteristics and vulnerability of the residential area tended to respond that they would want to evacuate if they had evacuation assistance in the event of an evacuation recommendation issuance (OR = 7.71 95% CI [1.76–33.76]). Participants with schizophrenia tended to respond that they would want to evacuate, but would be too socially anxious to do so (OR = 0.14; 95% CI [0.02–0.77]). The model fitness was indicated by $R^2 = 0.382$ and Hosmer–Lemeshow chi-squared = 4.712 ($p = 0.581$), indicating acceptable goodness of fit (Table 6).

**DISCUSSION**

A 2017 Internet survey of general population prepared-

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Table 3  Knowledge of disasters by evacuation intention in response to evacuation recommendations (n = 52)

| Item Category | Overall | Evacuation intention in response to evacuation recommendations n (%) | Fisher's exact test; p value |
|---------------|---------|------------------------------------------------------------------|----------------------------|
| Item          | I would want to evacuate | I would want to evacuate if evacuation assistance was available | I would want to evacuate, but would be too socially anxious to do so/I would not want to evacuate |
| Disaster knowledge | | | |
| Disaster characteristics and vulnerability in residential areas | Know 31 (59.6) 26 (72.2) 5 (31.3) 0.013$^*$ | |
| | Do not know 21 (40.4) 10 (27.8) 11 (68.8) | |
| Tsunami inundation district | Know 24 (46.2) 20 (55.6) 4 (25.0) 0.070 | |
| | Do not know 28 (53.8) 16 (44.4) 12 (75.0) | |
| Mudslide | Know 2 (3.8) 1 (2.8) 1 (6.3) 0.525 | |
| | Do not know 50 (96.2) 35 (97.2) 15 (93.8) | |
| Ground strength | Know 4 (7.7) 3 (8.3) 1 (6.3) 1.000 | |
| | Do not know 48 (92.3) 33 (91.7) 15 (93.8) | |
| Evacuation shelter | Know 30 (57.7) 24 (66.7) 6 (37.5) 0.070 | |
| | Do not know 22 (42.3) 12 (33.3) 10 (62.5) | |
| Evacuation route | Know 27 (51.9) 21 (58.3) 6 (37.5) 0.232 | |
| | Do not know 25 (48.1) 15 (41.7) 10 (62.5) | |

*p < 0.05.

Table 4  Evacuation intention in response to evacuation recommendations and evacuation instructions (n = 52)

| Type of evacuation order | I would want to evacuate | Evacuation intention n (%) | I would want to evacuate if there was support | I would want to evacuate, but would be too socially anxious to do so | I would not want to evacuate |
|-------------------------|--------------------------|-----------------------------|---------------------------------------------|-----------------------------------------------------------------|-----------------------------|
| Evacuation recommendation | 24 (46.2) 12 (23.1) 0 (0) 16 (30.8) | | | | |
| Evacuation instruction | 37 (71.2) 10 (19.2) 0 (0) 5 (9.6) | | | | |
Table 5  Evacuation intention by problems with daily living, need for disaster support, and crisis management (n = 52)

| Item                                                                 | Category | Overall | Evacuation intention in response to evacuation recommendations n (%) | Fisher’s exact test; p value |
|----------------------------------------------------------------------|----------|---------|---------------------------------------------------------------------|----------------------------|
|                                                                      |          |         | I would want to evacuate/ I would want to evacuate if evacuation assistance was available |                             |
|                                                                      |          |         | I would want to evacuate, but would be too socially anxious to do so/ I would not want to evacuate |                             |
| Problems with daily living owing to mental health problems/repetitive patterns of behavior |          |         |                                                                      |                             |
| Concerns about clean air, water, and food                            | Yes      | 25 (48.1) | 19 (52.8) | 6 (37.5) | 0.376 |
|                                                                      | No       | 27 (51.9) | 17 (47.2) | 10 (62.5) |                             |
| Excretion and physiology                                             | Yes      | 18 (34.6) | 10 (27.8) | 8 (50.0) | 0.206 |
|                                                                      | No       | 34 (65.4) | 26 (72.2) | 8 (50.0) |                             |
| Keeping warm and clean                                               | Yes      | 12 (23.1) | 9 (25.0) | 3 (18.8) | 0.733 |
|                                                                      | No       | 40 (76.9) | 27 (75.0) | 13 (81.3) |                             |
| Activity, rest, sleep, and attention                                 | Yes      | 34 (65.4) | 21 (58.3) | 13 (81.3) | 0.129 |
|                                                                      | No       | 18 (34.6) | 15 (41.7) | 3 (18.8) |                             |
| Maintaining interpersonal relationships and commitment               | Yes      | 33 (63.5) | 22 (61.1) | 11 (68.8) | 0.758 |
|                                                                      | No       | 19 (36.5) | 14 (38.9) | 5 (31.3) |                             |
| Need for support in case of emergency                                | Clean air, water, and food                        | Yes      | 22 (42.3) | 17 (47.2) | 5 (31.3) | 0.368 |
|                                                                      | No       | 30 (57.7) | 19 (52.8) | 11 (68.8) |                             |
| Excretion/physiology                                                 | Yes      | 17 (32.7) | 10 (27.8) | 7 (43.8) | 0.340 |
|                                                                      | No       | 35 (67.3) | 26 (72.2) | 9 (56.3) |                             |
| Keeping warm and clean                                               | Yes      | 9 (17.3) | 7 (19.4) | 2 (12.5) | 0.704 |
|                                                                      | No       | 43 (82.7) | 29 (80.6) | 14 (87.5) |                             |
| Activity, rest, sleep, and attention                                 | Yes      | 34 (65.4) | 22 (61.1) | 12 (75.0) | 0.529 |
|                                                                      | No       | 18 (34.6) | 14 (38.9) | 4 (25.0) |                             |
| Maintaining interpersonal relationships and commitment               | Yes      | 30 (57.7) | 22 (61.1) | 8 (50.0) | 0.548 |
|                                                                      | No       | 22 (42.3) | 14 (38.9) | 8 (50.0) |                             |
| Keeping oneself and others safe                                      | Yes      | 5 (9.6) | 2 (5.6) | 3 (18.8) | 0.163 |
|                                                                      | No       | 47 (90.4) | 34 (94.4) | 13 (81.3) |                             |
| Medication behavior                                                  | Yes      | 47 (90.4) | 34 (94.4) | 13 (81.3) | 0.163 |
|                                                                      | No       | 5 (9.6) | 2 (5.6) | 3 (18.8) |                             |
| Disaster risk management                                             | Signs of worsening disease condition               | Know     | 34 (65.4) | 25 (69.4) | 9 (56.3) | 0.367 |
|                                                                      | Do Not Know | 18 (34.6) | 11 (30.6) | 7 (43.8) |                             |
| Able to imagine deteriorating disease condition                      | Able     | 31 (59.6) | 24 (66.7) | 7 (43.8) | 0.139 |
|                                                                      | Unable    | 21 (40.4) | 12 (33.3) | 9 (56.3) |                             |
| Dealing with deteriorating disease condition                         | Able     | 35 (67.3) | 26 (72.2) | 9 (56.3) | 0.340 |
|                                                                      | Unable    | 17 (32.7) | 10 (27.8) | 7 (43.8) |                             |
| Able to live in a general evacuation center                          | Able     | 10 (19.2) | 6 (16.7) | 4 (25.0) | 0.475 |
|                                                                      | Unable    | 42 (80.8) | 30 (83.3) | 12 (75.0) |                             |
ness for disasters showed that ~70% of people had prepared emergency water provisions, ~45% had a radio, and ~63% had other types of emergency provisions (Sompo Japan NIPPONKOA, 2017). In an Internet survey conducted by the Japanese Cabinet Office in 2016, ~38% of people had prepared water and foodstuffs and ~45% had radios and flashlights (Cabinet Office, 2016b). Although the subjects and methods in these surveys differed from those in the present survey, the preparedness of all our subjects was lower than reported in previous surveys, indicating that persons with mental health problems who receive support from the SOCE are probably insufficiently prepared for disasters.

In this survey, those who responded that they could imagine the deterioration of their condition were more likely to want to evacuate if evacuation recommendations were issued than those who could not imagine the deterioration of their condition. That is, people who are more aware of their condition tend to be more aware of their situation if a disaster occurs. Research shows that to prevent the recurrence of schizophrenia, it is important for individuals to recognize the signs of deterioration in their condition and to seek early intervention (van Meijel, van der Gaag, Kahn, & Grypdonck, 2003). This suggests that people with medical conditions who have higher levels of self-care are more likely to feel able to evacuate in the event of a disaster. Conversely, individuals who cannot imagine negative health changes are unable to consider their likely situation in the event of a disaster, so are less likely to evacuate even if an evacuation recommendation is issued.

We found that participants who knew about the disaster characteristics and vulnerability of the residential area were more willing to evacuate if an evacuation recommendation was issued than those without such knowledge. This suggests that experience and knowledge of the effect of a disaster in a residential area increases the intention to evacuate.

Approximately 31% indicated that they would not want to evacuate. This suggests that lack of knowledge about disaster characteristics and the vulnerability of a residential area may lead to an intention not to evacuate.

Therefore, informing residents about the experience of previous victims of disasters in their residential area, and explaining to them the extent of danger from disasters, may prompt them to follow the municipality evacuation recommendations. These findings suggest the need for educational interventions for home-care recipients that address the vulnerability and disaster characteristics of the community.

Our findings suggest that people with schizophrenia are less willing to evacuate following an evacuation recommendation issuance than people with other disorders. People with schizophrenia often lack social skills, such as effective communication, ability to make friends, and effective problem solving (Chien et al., 2003; Seo, Ahn, Byun, & Kim, 2007). Therefore, it is possible that persons with schizophrenia may indicate an intention not to evacuate, as they feel that they may not be able to cope with group interactions in the evacuation destination. Some of the individuals that violated evacuation orders during Hurricane Katrina in the USA in 2005 could not leave their homes because of physical problems or because they had to care for someone else (Blendon et al., 2007). Nearly half of home-care recipients and families who require the regular use of medical equipment refuse to evacuate in natural disasters (Nakai et al., 2016a). People with mental health problems tend to be independent in their daily living and do not experience behavioral limitations; however, our findings suggest that they are unwilling to evacuate, as they fear that they cannot cope with life after the evacuation. We believe it is

### Table 6 Logistic regression analysis of evacuation intention in response to evacuation instructions (n = 52)

| Independent variable | Comparison category | Odds ratio | 95% confidence intervals | p value |
|----------------------|---------------------|------------|-------------------------|---------|
| Disaster characteristics and vulnerability in residential areas | 0: I know about this | 7.71 | 1.76 | 33.76 | 0.007** |
| | 1: I do not know about this | | | | |
| Main disorder | 0: Other disorders | 0.14 | 0.02 | 0.77 | 0.024* |
| | 1: Schizophrenia | | | | |
| Able to imagine deteriorating disease condition | 0: Unable | 6.46 | 1.21 | 34.44 | 0.029* |
| | 1: Able | | | | |
| Constant | | 0.873 | | | 0.84 |

1, I would want to evacuate; I would want to evacuate if evacuation assistance was available; 0, I would want to evacuate, but would be too socially anxious to do so; I would not want to evacuate. Contribution rate (R²): 0.382. Correct answer rate: 69.2%. Hosmer–Lemeshow chi-squared = 4.712 (p = .581) (df = 6). Independent variables not in this table: age.

*p < 0.05; **p < 0.01.
necessary to develop an evacuation environment that takes into consideration the individual characteristics of people with disabilities. The central government and the municipalities of Kochi prefecture have formulated a plan to support persons with mental health problems during and after evacuation, and have stated that they will announce the plan in advance of disasters.

Future research
Follow-up studies of persons with mental health problems who do not work at the SOCE are needed to further explore evacuation intentions. Further studies are also needed to clarify why people with schizophrenia tend to be unwilling to evacuate. It is also necessary to consider how evacuation shelters could better accommodate persons with mental health problems, including individuals with schizophrenia.

Conclusions
Persons with mental health problems who worked at the SOCE were most likely to obtain water, radios, and food in preparation for an emergency. However, the rates of preparedness for all items were lower than rates for the general population in Japan. Strategies need to be developed to support persons with mental health problems to become more prepared for disasters. Individuals who can imagine their disorder getting worse, and thus are more likely to want to evacuate, need assistance to evacuate early when evacuation is recommended.

Individuals who knew about the disaster characteristics and vulnerability of the area were more willing to evacuate in response to evacuation recommendations than those who did not have this information. It may be possible to increase evacuation compliance in those not willing to evacuate by offering information about disaster characteristics, vulnerability of residential areas, and previous disaster situations. Therefore, educational interventions on regional vulnerability and disaster characteristics are necessary. Individuals with schizophrenia are less willing to evacuate following an inconvenient evacuation recommendation than individuals with other disorders. However, in some cases, it may be better for such individuals not to evacuate, as they may find it too difficult to cope with group living once evacuated. It is necessary to develop evacuation environments that take into consideration persons with diseases or disabilities.

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AUTHORS’ CONTRIBUTIONS
HN designed the study, performed the statistical analysis, and wrote the initial draft of the manuscript; TI contributed to the analysis and interpretation of the data, and assisted in the preparation of the manuscript. All the other authors contributed to data collection and interpretation, and critically reviewed the manuscript. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

DISCLOSURES
None of the authors have any conflicts of interest to disclose.

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