

Original

Burnout among public servants after the Great East Japan Earthquake: decomposing the construct aftermath of disaster

Yuriko Suzuki^{1,3}, Maiko Fukasawa¹, Akiko Obara² and Yoshiharu Kim^{1,3}

¹Department of Adult Mental Health, National Institute of Mental Health, National Center of Neurology and Psychiatry, Kodaira, Tokyo, Japan, ²Miyagi Mental Health and Welfare Center, Osaki, Miyagi, Japan and ³National Information Center of Disaster Mental Health, National Institute of Mental Health, National Center of Neurology and Psychiatry, Kodaira, Tokyo, Japan

Abstract: Objectives: To examine whether disaster-related variables, in addition to known work-related risk factors, influence burnout and its subscales (exhaustion, cynicism, and lack of professional efficacy) among public servants who experienced a major disaster. **Methods:** Cross-sectional studies were conducted among public servants of Miyagi prefecture at 2 and 16 months after the Great East Japan Earthquake (n=3,533, response rate 66.8%); burnout was assessed at 16 months using the Japanese version of the Maslach Burnout Inventory-General Survey. We examined the relationships between burnout and its subscales with disaster-related variables at 2 months after the disaster, while controlling for age, gender, and work-related variables at 16 months after the disaster. **Results:** After controlling for age, gender, and work-related variables, a significant risk factor of burnout was having severe house damage. For the each subscale of burnout, living someplace other than their own house increased the risk of both exhaustion and cynicism, while handling residents' complaints did so only for exhaustion. Notably, workers from health and welfare departments showed an increased risk of burnout, exhaustion, and cynicism, but not lack of professional efficacy. **Conclusions:** The findings suggest that special attention is needed for workers with severe house damage to prevent burnout, as well as those who lived someplace other than their own house to prevent exhaustion and cynicism after a major disaster. Interventions directed at workers of the health and welfare department should focus more on limiting exhaustion and

cynicism, rather than promoting professional efficacy. (J Occup Health 2017; 59: 156-164)
doi: 10.1539/joh.16-0263-OA

Key words: Administrative personnel, Burnout, Disasters, Relief work

Introduction

Burnout is a psychological reaction typically to work-related stressors and it has been extensively researched using a construct comprising three dimensions—exhaustion, cynicism, and lack of professional efficacy¹. According to the theory behind this construct, the development of burnout begins with the central component of exhaustion, which in turn leads to cynicism (i.e., feelings of indifference to or distance from one's work). Alternatively, persistent exhaustion might lead to reduced professional efficacy, although this has been contested with some proposing that a lack of professional efficacy is an independent facet of burnout². Severe burnout is highly related to clinical depression among workers³, including office workers and hospital workers, during non-disaster periods^{4,5}. The associated factors have been researched extensively in the area of work-related stressors as well as non-work factors⁶.

In research on disaster mental health, the mental health of local workers has been a particular concern because they not only experience the disaster themselves, but also are pressed to respond to others' needs in the disaster's aftermath in addition to completing their regular duties⁷. Previous research has indicated that the severity of disaster damage has an influence on the mental health of workers, and that the risk factors of mental distress differ depending on the degree of damage that workers experienced⁸. Furthermore, the known risk factors of occupa-

Received November 9, 2016; Accepted November 28, 2016

Published online in J-STAGE January 11, 2017

Correspondence to: Y. Suzuki, Department of Adult Mental Health, National Institute of Mental Health, National Center of Neurology and Psychiatry, 4-1-1 Ogawa-Higashi, Kodaira, Tokyo 187-8553, Japan (e-mail: yrsuzuki@ncnp.go.jp)

tional health, e.g., adequate rest and good workplace communication, were more strongly associated than were disaster-related factors with the mental health of workers after the disaster⁹). However, despite the fact that burnout has been a notable concern in disaster research, previous studies have focused on it only among humanitarian workers¹⁰), public health workers¹¹), local health caregivers¹²), and lay disaster rehabilitation and reconstruction workers¹³); currently, no studies have looked at burnout in public servants. Public servants would require special attention because those who work in disaster-affected areas would experience the disaster themselves. The experience of the disaster then might have an additional effect on burnout among workers compared to during non-disaster periods. Thus, disaster-related factors might offer a unique contribution to workers' burnout alongside the known risk factors (e.g., workload, control, rewards, and community)¹⁴). This has some support from previous studies on peculiar psychological responses such as trauma¹⁵) and compassion fatigue¹⁶). In addition, there is an argument that burnout is a distinct phenomenon or it can be simply attributed to exhaustion or depression. The close examination of the construct of the burnout aftermath of disaster, whether the concept of burnout in normal time is applicable aftermath of disaster, is warranted.

Thus, in this paper, we examined the relationship between burnout and various disaster-related variables, in addition to known work-related variables during non-disaster periods. We, in particular, explored the relationships between these two sets of variables with the various components of burnout-exhaustion, cynicism, and lack of professional efficacy to elucidate the characteristics of each component.

Subjects and Methods

Participants

The present study targeted all public servants in the Miyagi prefectural government (n=5,305). Miyagi prefecture is proximate to the epicenter of the Great East Japan Earthquake, which occurred on March 11, 2011, and its population before the disaster was estimated to be 2,346,853¹⁷). More than 10,000 people died or went missing as a result of the disaster¹⁸). Although teachers, police, firefighters, and hospital workers are typically exposed to more severe work conditions, they were not included in the survey because of the different personnel systems among these occupations within the prefecture.

Study design

We analyzed the cross-sectional data of the two previously conducted surveys to examine the risk factors of burnout at 16 months after the disaster among various disaster- and work-related variables at 2 and 16 months after the disaster, respectively.

Procedure

The Labour Welfare Division of the Miyagi prefectural government implemented the online survey within the organizational intranet in May 2011 and July 2012—namely, 2 and 16 months after the disaster, respectively. This survey was designed and implemented to encourage self-monitoring of workers' health status after the disaster. All workers were invited to complete the online survey by logging in to the intranet with their worker identification codes. Workers were encouraged to complete the self-administered questionnaire and were offered follow-up counseling if they requested it. We obtained anonymous data with the permission of the Miyagi prefectural government. In the analysis, we used only those workers who completed both of the surveys; their data at both assessment points were identified by matching individual identification codes.

Measures

Job burnout served as the outcome measure and was evaluated using the Maslach Burnout Inventory-General Survey (MBI-GS)¹⁹). The MBI-GS comprises 16 items in three subscales: emotional exhaustion (5 items), cynicism (5 items), and professional efficacy (6 items). Respondents are asked to report how frequently each item occurred during their work on a 7-point Likert scale ranging from 0 (never) to 6 (every day); subscale scores were calculated by averaging the scores of each subscale. The validity of the Japanese version of the MBI-GS has been confirmed²⁰), and the internal consistency in this study was 0.87 for the total scale, 0.88 for emotional exhaustion, 0.87 for cynicism, and 0.90 for professional efficacy, respectively.

To examine workers' burnout, we used the "exhaustion plus 1" criterion; in other words, we considered the presence of a high risk of exhaustion and either cynicism or lack of professional efficacy as necessary for a worker to be considered to have burnout²¹). The high-risk group for each subscale was categorized as having a score above the 75th percentile for exhaustion and cynicism and below the 25th percentile for lack of professional efficacy; thus, those with a high risk of emotional exhaustion and another subscale (either cynicism or lack of professional efficacy) were considered to have a high risk of burnout. This assessment criterion has been shown to be clinically valid in the workplace²²).

As explanatory variables, we assessed two domains of disaster-related variables at 2 months after the disaster. The first was damage caused by the disaster, which included work area (coastal or inland area; coastal areas were considered more damaged, as they were severely affected by tsunami and earthquake), house damage (half collapse or more severe house damage [answers of total collapse, mostly collapsed, or half collapse] or less than half collapse [answers of partial collapse, little collapse,

or no collapse]), having dead or missing family members (yes or no), and living someplace other than their own house (e.g., a shelter) as of May 2011. The second domain comprised disaster-related work variables, which included the taking part in disaster-related work (yes or no), and more specifically, handling residents' complaints (yes or no), which was considered an indicator of exposure that might lead to compassion fatigue, and working at a morgue (yes or no), which was considered an indicator of traumatic work, as of May 2011.

Current work-related variables-including work department, degree of involvement in disaster-related work, workload, and degree of workplace communication-were also examined at 16 months after the disaster. For assessing work department, we categorized the 17 possible response options into "health and welfare department" and "others," mainly because human services workers have been reported to have a higher risk of burnout²³. For the degree of involvement in disaster-related work, participants were allocated to "yes" or "no" groups, with "yes" comprising those who answered "disaster-related work is primary work" and "mainly engage in disaster-related work," and "no" comprising those who answered "same as primary work," "mainly primary work," or "not involved." Regarding workload, we asked participants the number of overtime hours worked in the month prior to the survey; this was then recoded into 20 hours or less, more than 20 hours to 40 hours, more than 40 hours to 80 hours, and more than 80 hours. Finally, the quality of workplace communication was categorized as "poor," "neither," "reasonable," and "good." For participants' basic characteristics, we assessed gender and age (in 10-year categories).

Statistical analysis

We paired the datasets of the 4,334 respondents (out of a total of 5,233 workers) at 2 months and 4,662 respondents (out of 5,287 workers) at 16 months after the disaster, and analyzed only those who had responded to all questions at both time points ($n=3,533$, or 66.8% of all workers at 16 months after the disaster).

First, we calculated the descriptive statistics of the MBI-GS and categorized respondents according to whether they had burnout or not according to the "exhaustion plus one" criteria described above. Second, we examined the distribution of individuals with burnout and a high risk for each component of burnout according to work- and disaster-related variables via chi-square tests. Finally, we calculated the prevalence ratio (PR) and its 95% confidence interval (95% CI) for each outcome using modified Poisson regression with a robust error variance. This model was chosen because the prevalence of the outcome was relatively common, over 10%²⁴. We entered the disaster-related variables as explanatory variables while controlling for age, gender, and work-related

Table 1. Descriptive statistics of the Maslach Burnout Inventory-General Survey (Score range: 0-6 for each subscale)

	25 th percentile	Median	75 th percentile
Exhaustion	0.8	1.4	2.6
Cynicism	0.4	1	1.8
Professional efficacy	1	1.7	2.7

variables at 16 months after the disaster. All statistical analyses were conducted using Stata 13.0 for Windows (StataCorp LP, College Station, TX). We set a $p<0.05$ for statistical significance (two-tailed).

Results

The summary statistics of the subscales of the MBI-GS are presented in Table 1. According to the "exhaustion plus 1" criterion, with cut-offs of above the 75th percentile for exhaustion and cynicism and below the 25th percentile for professional efficacy, a total of 563 workers (15.9%) had burnout among all respondents ($n=3,533$). Of the workers with burnout, 514 had a high risk of exhaustion plus a high risk of cynicism, while 216 had a high risk of exhaustion plus a high risk of a lack of professional efficacy. One hundred sixty-seven workers met the criteria of high risk for all three subscales.

Table 2 shows the descriptive statistics of basic characteristics, and work-related variables at 16 months after the disaster. Workers with burnout were significantly more likely to be women, be 30-39 years old, work in the health and welfare department, be involved in disaster-related work, work longer overtime hours, and have poorer workplace communication. The same relationships were found for workers with exhaustion. Regarding cynicism, all of the basic characteristics and work-related variables except for involvement in disaster-related work were associated with cynicism. Those with a high risk of lack of professional efficacy were more likely to be women and have poorer workplace communication, but were less likely to be workers in the health and welfare department.

Table 3 shows the descriptive statistics of each outcome variable and the disaster-related variables at 2 months after the disaster. Workers with burnout were significantly more likely to have worked in coastal areas, have had a half collapse or more severe house damage, and have lived someplace other than their own house. With regard to exhaustion, having worked in a coastal area, lived someplace other than their own house, and handled residents' complaints were higher among workers at high risk of exhaustion, while only having lived someplace other than their own house was higher among

Table 2. Relationship between basic characteristics, work-related variables, and burnout (including its subscales) as measured by the Maslach Burnout Inventory-General Survey

	Burnout ¹⁾				Exhaustion				Cynicism				Lack of professional efficacy			
	(+)		(-)		(+)		(-)		(+)		(-)		(+)		(-)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
	563		2,970		801		2,732		858		2,675		982		2,551	
Basic characteristics																
Gender																
Men	368	65.4	2,348	79.1**	539	67.3	2,177	79.7**	607	70.8	2,109	78.8**	727	74.0	1,989	78.0**
Women	195	34.6	622	20.9	262	32.7	555	20.3	251	29.3	566	21.2	255	26.0	562	22.0
Age group (years)																
18-29	79	14.0	349	11.8**	112	14.0	316	11.6**	113	13.2	315	11.8**	100	10.2	328	12.9
30-39	188	33.4	669	22.5	247	30.8	610	22.3	267	31.1	590	22.1	236	24.0	621	24.3
40-49	199	35.4	1,032	34.8	297	37.1	934	34.2	322	37.5	909	34.0	355	36.2	876	34.3
50-65	97	17.2	920	31.0	145	18.1	872	31.9	156	18.2	861	32.2	291	29.6	726	28.5
Work-related variables as of July 2012																
Department																
Health and welfare	152	27.0	531	17.9**	222	27.7	461	16.9**	215	25.1	468	17.5**	168	17.1	515	20.2*
Others	411	73.0	2,439	82.1	579	72.3	2,271	83.1	643	74.9	2,207	82.5	814	82.9	2,036	79.8
Involved in disaster-related work																
No	431	76.6	2,406	81.0*	603	75.3	2,234	81.8**	674	78.6	2,163	80.9	790	80.5	2,047	80.2
Yes	132	23.5	564	19.0	198	24.7	498	18.2	184	21.5	512	19.1	192	19.6	504	19.8
Hours of overtime per month																
0-20 hours	352	62.5	2,331	78.5**	488	60.9	2,195	80.3**	607	70.8	2,076	77.6**	750	76.4	1,933	75.8
20-40 hours	118	21.0	422	14.2	171	21.4	369	13.5	149	17.4	391	14.6	149	15.2	391	15.3
40-80 hours	76	13.5	192	6.5	116	14.5	152	5.6	82	9.6	186	7.0	67	6.8	201	7.9
80+ hours	17	3.0	25	0.8	26	3.3	16	0.6	20	2.3	22	0.8	16	1.6	26	1.0
Workplace communication																
Good or reasonable	406	72.1	2,756	92.8**	618	77.2	2,544	93.1**	647	75.4	2,515	94.0**	815	83.0	2,347	92.0**
Poor or neither	157	27.9	214	7.2	183	22.9	188	6.9	211	24.6	160	6.0	167	17.0	204	8.0

Chi-square tests were used. *: p<0.05, **: p<0.01

¹⁾ Those who met the exhaustion plus 1 criterion: in other words, those who had a high risk of both exhaustion and either cynicism or lack of professional efficacy on the Maslach Burnout Inventory-General Survey. A high-risk group for each subscale was categorized as having a score above the 75th percentile (below the 25th percentile for lack of professional efficacy).

those at high risk of cynicism. None of the disaster-related variables was associated with a lack of professional efficacy.

The results of the modified Poisson regression analysis are presented in Table 4. Among the disaster-related variables, only experiencing a half collapse or more severe house damage at 2 months was associated with burnout (PR: 1.27, 95% CI: 1.02-1.58) after controlling for age, gender, and work-related variables at 16 months. For exhaustion, those who had lived someplace other than their own house (PR: 1.19, 95% CI: 1.03-1.38) and had handled residents' complaints (PR: 1.24, 95% CI: 1.00-1.54) showed an increased risk of exhaustion, while for cyni-

cism, only having lived someplace other than their own house (PR: 1.19, 95% CI: 1.03-1.38) led to an increased risk. Lack of professional efficacy again showed no association with any disaster-related variables.

Notably, among the work-related variables controlled for in the model, working at the health and welfare department, more overtime work hours, and poorer workplace communication were all associated with a higher prevalence of burnout. All of the work-related variables at 16 months after the disaster were associated with exhaustion, while working at the health and welfare department, working overtime for more than 80 hours per month, and having poorer workplace communication were associated

Table 3. Relationships between disaster-related variables and burnout (including its the subscales) according to the Maslach Burnout Inventory-General Survey

	Burnout ¹⁾				Exhaustion				Cynicism				Lack of professional efficacy			
	(+)		(-)		(+)		(-)		(+)		(-)		(+)		(-)	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
	563		2,970		801		2,732		858		2,675		982		2,551	
Disaster-related variables as of May 2011																
Work site																
Inland area	460	81.7	2,546	85.7 *	653	81.5	2,353	86.1 **	716	83.5	2,290	85.6	823	83.8	2,183	85.6
Coastal area	103	18.3	424	14.3	148	18.5	379	13.9	142	16.6	385	14.4	159	16.2	368	14.4
House damage																
Less than half collapse	396	82.5	2,321	86.2 *	582	83.4	2,135	86.3	630	84.7	2,087	86.0	717	83.7	2,000	86.4
Half collapse or more severe	84	17.5	371	13.8	116	16.6	339	13.7	114	15.3	341	14.0	140	16.3	315	13.6
Dead or missing family member (s)																
No	548	97.5	2,896	97.5	781	97.6	2,663	97.5	834	97.3	2,610	97.6	956	97.4	2,488	97.6
Yes	14	2.5	74	2.5	19	2.4	69	2.5	23	2.7	65	2.4	26	2.7	62	2.4
Lives someplace other than their own house																
No	411	73.3	2,323	78.3 **	581	72.8	2,153	78.8 **	631	73.7	2,103	78.7 **	740	75.4	1,994	78.3
Previously or currently yes	150	26.7	645	21.7	217	27.2	578	21.2	225	26.3	570	21.3	242	24.6	553	21.7
Involved in disaster-related work																
No	139	24.7	734	24.7	192	24.0	681	24.9	211	24.6	662	24.8	259	26.4	614	24.1
Yes	423	75.3	2,235	75.3	608	76.0	2,050	75.1	646	75.4	2,012	75.2	723	73.6	1,935	75.9
Works at a morgue																
No	529	94.0	2,767	93.2	757	94.5	2,539	92.9	801	93.4	2,495	93.3	918	93.5	2,378	93.2
Yes	34	6.0	203	6.8	44	5.5	193	7.1	57	6.6	180	6.7	64	6.5	173	6.8
Handles residents' complaints																
No	516	91.7	2,786	93.8	736	91.9	2,566	93.9 *	792	92.3	2,510	93.8	920	93.7	2,382	93.4
Yes	47	8.4	184	6.2	65	8.1	166	6.1	66	7.7	165	6.2	62	6.3	169	6.6

Note. Chi-square tests were used. *: $p < 0.05$, **: $p < 0.01$

¹⁾ Those who met the exhaustion plus 1 criterion: in other words, those who had a high risk of both exhaustion and either cynicism or lack of professional efficacy on the Maslach Burnout Inventory-General Survey. A high-risk group for each subscale was categorized as having a score above the 75th percentile (below the 25th percentile for lack of professional efficacy).

with an increased prevalence of cynicism. For lack of professional efficacy, only poorer workplace communication was associated with an increased risk, while working at the health and welfare department was associated with a decreased risk.

Discussion

We found that, among the disaster-related variables included in this study, only having experienced a half collapse or more severe house damage was associated with burnout after controlling for age, gender, and work-related variables. When examining the relations by the subscales of the MBI-GS, living someplace other than one's own house was associated with exhaustion and

cynicism, whereas handling residents' complaints were an additional risk factor for exhaustion. Notably, none of the disaster-related variables was associated with a lack of professional efficacy. We confirmed that known work-related risk factors for burnout—namely, working in human services, longer overtime hours, and poor workplace communication—was associated with an increased prevalence of burnout, much like during non-disaster periods^{14,23}). These increases were mainly due to the increased risk of exhaustion.

The major risk factor for burnout was house damage. Despite the fact that job burnout refers to emotional strain related to working life, recent research has begun looking at variables outside of work condition²⁵). It is likely that severe house damage led to residence instability and per-

Table 4. Prevalence ratio (PR)s and 95% confidence interval (95% CI)s for burnout and its subscales of the Maslach Burnout Inventory-General Survey according to disaster-related variables, while controlling for age, gender, and work-related variables (n=3,170)

	Burnout ¹⁾		Exhaustion		Cynicism		Lack of professional efficacy	
	PR	95% CI	PR	95% CI	PR	95% CI	PR	95% CI
Disaster-related variables as of May 2011								
Work site (reference: Inland area)								
Coastal area	1.12	0.91 - 1.38	1.12	0.96 - 1.32	1.01	0.85 - 1.19	1.08	0.92 - 1.27
House damage (reference: Less than half collapse)								
Half collapse or more severe	1.27	1.02 - 1.58	1.16	0.97 - 1.38	1.07	0.89 - 1.28	1.14	0.97 - 1.33
Dead or missing family member(s) (reference: No)								
Yes	0.81	0.45 - 1.43	0.85	0.54 - 1.34	1.00	0.68 - 1.48	0.96	0.66 - 1.37
Lives someplace other than their own house (reference: No)								
Previously or currently yes	1.15	0.95 - 1.39	1.19	1.03 - 1.38	1.19	1.03 - 1.38	1.08	0.94 - 1.25
Involved in disaster-related work (reference: No)								
Yes	0.95	0.78 - 1.16	0.97	0.83 - 1.13	0.97	0.83 - 1.12	0.95	0.83 - 1.08
Works at a morgue (reference: No)								
Yes	1.12	0.79 - 1.58	0.98	0.73 - 1.31	1.06	0.81 - 1.38	0.99	0.78 - 1.26
Handles residents' complaints (reference: No)								
Yes	1.28	0.98 - 1.67	1.24	1.00 - 1.54	1.15	0.93 - 1.43	0.98	0.77 - 1.23
Basic characteristics								
Gender (reference: Men)								
Women	1.58	1.31 - 1.90	1.50	1.30 - 1.74	1.15	0.99 - 1.34	1.26	1.10 - 1.45
Age group (reference: 18-29 years old)								
30-39 years old	1.23	0.96 - 1.57	1.15	0.95 - 1.40	1.13	0.93 - 1.38	1.14	0.92 - 1.41
40-49 years old	0.95	0.74 - 1.21	1.00	0.83 - 1.22	0.97	0.80 - 1.18	1.23	1.01 - 1.49
50-65 years old	0.70	0.52 - 0.95	0.77	0.60 - 0.97	0.63	0.50 - 0.80	1.26	1.02 - 1.55
Work-related variables as of July 2012								
Department (reference: Other than health and welfare)								
Health and welfare	1.34	1.11 - 1.62	1.46	1.26 - 1.69	1.31	1.13 - 1.51	0.80	0.68 - 0.95
Involved in disaster-related work (reference: No)								
Yes	1.17	0.96 - 1.43	1.25	1.08 - 1.46	1.13	0.96 - 1.31	0.97	0.84 - 1.14
Overtime per month (reference: 0-20 hours)								
20-40 hours	1.49	1.22 - 1.83	1.60	1.36 - 1.88	1.05	0.89 - 1.24	1.00	0.85 - 1.17
40-80 hours	1.80	1.41 - 2.29	2.11	1.77 - 2.52	1.14	0.92 - 1.41	0.89	0.70 - 1.14
80+ hours	2.76	1.87 - 4.08	3.29	2.54 - 4.26	1.80	1.27 - 2.53	1.32	0.83 - 2.10
Workplace communication (reference: Good or reasonable)								
Poor or neither	2.92	2.47 - 3.47	2.22	1.93 - 2.54	2.58	2.27 - 2.93	1.76	1.53 - 2.02

¹⁾ Those who met the exhaustion plus 1 criterion: in other words, those who had a high risk of both exhaustion and either cynicism or lack of professional efficacy on the Maslach Burnout Inventory-General Survey. A high-risk group for each subscale was categorized as having a score above the 75th percentile (below the 25th percentile for lack of professional efficacy).

sistent life stress, which might have increased stress in the work domain. The fact that the other disaster-related variables—such as work area, bereavement, or living someplace other than their own house—were not associated with burnout might be due to the nature of the outcome variable. Specifically, a traumatic event such as bereavement might have a greater influence on phenomena such as traumatic reactions, while secondary life stress (e.g., liv-

ing someplace other than their own house) might influence outcomes such as depressive symptoms, as suggested in previous research²⁶⁾.

During disasters, workers might need to engage in multiple highly stressful jobs, such as working in a morgue or handling residents' complaints, which are often unexpectedly assigned to public servants in Japan²⁷⁾. The variable of handling residents' complaints nearly reached signifi-

cance in its relation with burnout; however, the other seemingly traumatic job that we assessed—working in a morgue—was not at all associated with burnout. Again, this might also be due to our chosen outcome (job burnout); if we had selected an outcome such as mental distress or traumatic reaction, then the more traumatic experiences, such as working in a morgue, might have had a greater impact. This has been found in a previous disaster study, wherein exposure to grotesque scenes was associated with greater mental distress among recovery workers¹³.

Meanwhile, in examining each dimension of the burnout construct, different patterns of variables were associated with each subscale of burnout. The associated factors of exhaustion included the disaster-related variables of living someplace other than their own house and handling residents' complaints, as well as all of the work-related variables at 16 months after the disaster. These risk factors are similar to those found for psychological distress, such as that measured by the Kessler 6^{8,9}, which seems reasonable because the exhaustion subscale of the MBI-GS comprises items relating to emotional responses to work-related stressors. The similarity in risk factors between exhaustion and psychological distress are in line with previous discussions on how exhaustion is representative of a depressive response to job-related stress²⁸. As noted above, handling residents' complaints was significantly associated only with exhaustion, but it almost reached significance for burnout as well, which coincides with a previous finding that working in customer services is strongly related to job burnout in non-disaster periods²⁹. Handling residents' complaints might have nearly led to job burnout through its association with emotional exhaustion, which in turn might have been the result of compassion fatigue among workers¹⁶.

Concerning cynicism, the only significant risk factor among the disaster-related variables was living someplace other than their own house at 2 months after the disaster. Cynicism represents workers' distant and indifferent attitude towards their job, making it interesting that prolonged living in a place other than their own house led to a higher risk of cynicism in addition to exhaustion which is in line with the proposed theory that cumulative stressor leads to exhaustion and then cynicism. Prolonged displacement has been noted as a major stressor among workers after a natural disaster³⁰. However, it is unclear why severe house damage was only a risk factor of burnout, whereas living someplace other than their own house was only a risk factor of exhaustion and cynicism. The underlying mechanisms of these relationships warrant further investigation.

Notably, the lack of professional efficacy, or the feeling of inadequacy and incompetence in performing one's work, was not associated with any of the disaster-related variables. As noted above, there has been discussion that

lack of professional efficacy is an independent construct of burnout and is more affected by individuals' job resources or coping strategies than by job stressors³¹. Unlike the other subscales, the lack of professional efficiency was not related to work overload, as represented by overtime hours. In an additional analysis, we noted that the correlation between exhaustion and cynicism was 0.67, whereas the correlations of these two subscales with the lack of professional efficacy were only 0.03 and 0.06, respectively. This finding coincides with the results of a previous study³², and adds further empirical support for the notion that lack of professional efficacy is a distinct facet of burnout from exhaustion and cynicism.

Among the work-related factors, we found that working at the health and welfare department was significantly associated with higher risk of burnout, exhaustion, and cynicism, but a significantly decreased risk of a lack of professional efficacy. The majority of workers in the health and welfare departments of Miyagi prefecture provide public health and welfare services and work in the frontline in disaster response, which might underlie the higher risks of exhaustion and cynicism. This coincides with past findings that health care workers show a higher risk of burnout in non-disaster periods³³. Interestingly, our analysis suggested that while workers in health and welfare departments tend to be emotionally distressed and therefore experience a greater risk of exhaustion and cynicism—their professional efficacy was preserved. This implies that countermeasures should focus on reducing levels of exhaustion and cynicism for workers in health and welfare departments, such as by lessening the workload (e.g., by providing additional workforce in the health and welfare field), to ensure that they can exercise their efficacy during disasters.

Strengths and limitations

The strengths of this study were that it provided an empirical basis for the factors influencing burnout after a disaster among public servants; few past studies have been conducted on this topic despite much concern about it in disaster field. Furthermore, the study had a large sample size and drew on consecutive surveys to identify disaster-related predictors of future burnout. By identifying risk factors among the disaster-related domains, this study adds insight on the features of burnout after a disaster.

However, this study has several limitations. First, we were not able to determine the burnout levels prior to the disaster. Without such prior information, it is impossible to determine whether the burnout observed at 16 months after the disaster was newly developed or had persisted from before the disaster. However, the identified factors would likely predict burnout after the disaster, regardless of whether it was newly developed in this study or not. Second, although the quality of workplace communica-

tion showed a consistent relation with a greater risk of burnout and all three of its subscales, its measure was a single, self-reported item. Thus, the validity of this finding requires further examination. Finally, this study targeted prefectural public servants in Japan, which means that it is not generalizable to other workers therein. For example, mental distress was found to be more severe among public servants in municipalities³⁴⁾, as they were more likely to experience severe disaster damage and work conditions, and more intense interactions with residents. Furthermore, the results might differ by specific occupation—for instance, rescue workers, police, firefighters, and members of the self-defense force are likely to experience differing types of traumatic events or critical incidents. Despite these limitations, the findings of this study will serve as a reference point for understanding the degree of burnout among public servants after a disaster. To our knowledge, this has not been quantified before.

In conclusion, the findings suggest that, at 16 months after a disaster, only severe house damage at 2 months after the disaster was associated with burnout. As such, those who have experienced objective severe damage from a disaster will benefit from more careful attention at work. According to the “exhaustion plus one” criterion, priority should be given to easing exhaustion in order to prevent workers’ burnout after a disaster, including attention to living conditions after the disaster. Furthermore, careful accommodation of work-related factors during non-disaster periods might promote workers’ well-being after a disaster. Workers from the health and welfare department were significantly more likely to experience exhaustion and cynicism, but, conversely, were less likely to feel a lack of professional efficacy. Thus, work accommodations specific to health and welfare professionals, such as interventions to address work overload, might be helpful for reducing exhaustion while still promoting their professional efficacy in times of disaster.

Acknowledgments: We would like to express our deepest thanks to Professor Christina Maslach of the University of California at Berkeley, and Mind Garden. We also would like to acknowledge the dedicated efforts of Rumiko Sasaki, Toshinori Ushibukuro, and Mitsunori Sato from the Labor Welfare Division of the Miyagi prefectural government, Dr. Yuiko Kimura and Yumiko Moriya from the Miyagi Prefectural Government Health Clinic, and Akemi Toubai from the Miyagi Mental Health and Welfare Center.

This work was supported by a Health and Labor Science Research Grant for Research on Psychiatric and Neurological Diseases and Mental Health (Grant number 23201501, H27-Seishin-Shitei-003) from the Ministry of Health, Labour and Welfare, Japan.

Conflicts of interest: The authors declare that they have

no conflict of interest.

Compliance with ethical standards: All procedures in this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. We obtained permission for secondary analysis of existing data from the Miyagi prefectural government. The study protocol was approved by the institutional review board of the National Center of Neurology and Psychiatry (A2012-022).

References

- 1) Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol* 2001; 52: 397-422.
- 2) Toppinen-Tanner S, Kalimo R, Mutanen P. The process of burnout in white-collar and blue-collar jobs: eight-year prospective study of exhaustion. *J Organ Behav* 2002; 23: 555-570.
- 3) Iacovides A, Fountoulakis KN, Kaprinis S, Kaprinis G. The relationship between job stress, burnout and clinical depression. *J Affect Disorders* 2003; 75: 209-221.
- 4) Marchand A, Durand P, Haines V 3rd, Harvey S. The multi-level determinants of workers’ mental health: results from the SALVEO study. *Soc Psychiatry Psychiatr Epidemiol* 2015; 50: 445-459.
- 5) Saijo Y, Chiba S, Yoshioka E, et al. Effects of work burden, job strain and support on depressive symptoms and burnout among Japanese physicians. *Int J Occup Med Environ Health* 2014; 27: 980-992.
- 6) Winwood PC, Bakker AB, Winefield AH. An investigation of the role of non-work-time behavior in buffering the effects of work strain. *J Occup Environ Med* 2007; 49: 862-871.
- 7) Matsumoto K. [Mental health care systems and provisions in the immediate and acute phase of the Great East Japan Earthquake: situational and support activities in Miyagi Prefecture]. *Seishin Shinkeigaku Zasshi* 2014; 116: 175-188(in Japanese).
- 8) Fukasawa M, Suzuki Y, Obara A, Kim Y. Relationships between mental health distress and work-related related variables among prefectural public servants two months after the Great East Japan Earthquake. *Int J Behav Med* 2015; 22: 1-10.
- 9) Suzuki Y, Fukasawa M, Obara A, Kim Y. Mental health distress and related factors among prefectural public servants seven months after the Great East Japan Earthquake. *J Epidemiol* 2014; 24: 287-294.
- 10) Cardozo BL, Crawford CG, Eriksson C, et al. Psychological distress, depression, anxiety, and burnout among international humanitarian aid workers: a longitudinal study. *PloS One* 2012; 7. (doi: ARTN e4494810.1371/journal.pone.0044948).
- 11) Fullerton CS, McKibben JB, Reissman DB, et al. Posttraumatic stress disorder, depression, and alcohol and tobacco use in public health workers after the 2004 Florida hurricanes. *Disaster Med Public* 2013; 7: 89-95.
- 12) Fujitani K, Carroll M, Yanagisawa R, Katz C. Burnout and psychiatric distress in local caregivers two years after the 2011

- Great East Japan Earthquake and Fukushima Nuclear Radiation Disaster. *Community Ment Health J* 2016; 52: 39-45.
- 13) Ehrling T, Razik S, Emmelkamp PM. Prevalence and predictors of posttraumatic stress disorder, anxiety, depression, and burnout in Pakistani earthquake recovery workers. *Psychiatry Res* 2011; 185: 161-166.
 - 14) Maslach C, Leiter MP. Early predictors of job burnout and engagement. *J Appl Psychol* 2008; 93: 498-512.
 - 15) Javidi H, Yadollahie M. Post-traumatic stress disorder. *Int J Occup Environ Med* 2012; 3: 2-9.
 - 16) Boscarino JA. Community disasters, psychological trauma, and crisis intervention. *Int J Emerg Ment Health* 2015; 17: 369-371.
 - 17) Miyagi Prefectural Government. Statistical data. Basic Resident Register population and number of households (monthly report) (In Japanese). [Online]. [cited 2016 Nov. 2]; Available from: URL: <http://www.pref.miyagi.jp/soshiki/toukei/suikai-to-p.html>
 - 18) National Police Agency. Damage and police action after the Great East Japan Earthquake, 2011 (In Japanese). [Online]. 2016[cited 2016 Nov. 2]; Available from: URL: <http://www.npa.go.jp/archive/keibi/biki/higaijokyo.pdf>
 - 19) Maslach C, Jackson SE, Leiter MP, Schaufeli WB, Schwab RL. *Maslach Burnout Inventory instruments and scoring guides*. Menlo Park: Mind Garden 1986.
 - 20) Kitaoka-Higashiguchi K, Nakagawa H, Morikawa Y, et al. Construct validity of the Maslach Burnout Inventory-General Survey. *Stress Health* 2004; 20: 255-260.
 - 21) Brenninkmeijer V, Van Yperen N. How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research. *Occup Environ Med* 2003; 60: 16-20.
 - 22) Kitaoka-Higashiguchi K, Morikawa Y, Miura K, et al. Burnout and risk factors for arteriosclerotic disease: follow-up study. *J Occup Health* 2009; 51: 123-131.
 - 23) Kitaoka K, Masuda S. Academic report on burnout among Japanese nurses. *Jpn J Nurs Sci* 2013; 10: 273-279.
 - 24) Barros AJ, Hirakata VN. Alternatives for logistic regression in cross-sectional studies: an empirical comparison of models that directly estimate the prevalence ratio. *BMC Med Res Methodol* 2003; 3: 21. (doi: 10.1186/1471-2288-3-21).
 - 25) Merecz D, Andysz A. Burnout and demographic characteristics of workers experiencing different types of work-home interaction. *Int J Occup Med Environ Health* 2014; 27: 933-949.
 - 26) Goldmann E, Galea S. Mental health consequences of disasters. *Annu Rev Public Health* 2014; 35: 169-183.
 - 27) Takahashi S. [Mental health support for disaster relief personnel]. *Seishin Shinkeigaku Zasshi* 2014; 116: 224-230(in Japanese).
 - 28) Hakanen JJ, Schaufeli WB. Do burnout and work engagement predict depressive symptoms and life satisfaction? A three-wave seven-year prospective study. *J Affect Disord* 2012; 141: 415-424.
 - 29) Dormann C, Zapf D. Customer-related social stressors and burnout. *J Occup Health Psychol* 2004; 9: 61-82.
 - 30) Leon KA, Hyre AD, Ompad D, DeSalvo KB, Muntner P. Perceived stress among a workforce 6 months following hurricane Katrina. *Soc Psychiatry Psychiatr Epidemiol* 2007; 42: 1005-1011.
 - 31) Schaufeli WB, Salanova M. Efficacy or inefficacy, that's the question: burnout and work engagement, and their relationships with efficacy beliefs. *Anxiety Stress Coping* 2007; 20: 177-196.
 - 32) Lee RT, Ashforth BE. A meta-analytic examination of the correlates of the three dimensions of job burnout. *J Appl Psychol* 1996; 81: 123-133.
 - 33) Harry E. Stress and the healthcare worker. As complicated or as simple as fear and hope. *J Med Pract Manage* 2014; 30: 28-30.
 - 34) Sakuma A, Takahashi Y, Ueda I, et al. Post-traumatic stress disorder and depression prevalence and associated risk factors among local disaster relief and reconstruction workers fourteen months after the Great East Japan Earthquake: a cross-sectional study. *BMC Psychiatry* 2015; 15: 58. (doi: 10.1186/s12888-015-0440-y).

Journal of Occupational Health is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. To view the details of this license, please visit (<https://creativecommons.org/licenses/by-nc-sa/4.0/>).