Original

Association between Recovery Experience and Mental Health in Firefighters as Compared with Clerical Staff: A Cross-sectional Study

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Abstract

Objectives: "Recovery experiences" are the way that workers spend their off-time to recover from work-related stress. Recovery experiences were reported to be associated with favorable mental health. In firefighters who are exposed to unique stressors, the significance of recovery experiences in maintaining mental health may differ from that of other occupations. However, few studies have examined the associations between recovery experiences and mental health in firefighters. Therefore, we examined the associations between recovery experiences and depressive symptoms in firefighters, in comparison with clerical staff.

Methods: This cross-sectional study was conducted in November 2013. Subjects were male firefighters and clerical staff working in a local municipality. Depressive symptoms were assessed using the Japanese version of the Center for Epidemiologic Studies Depression Scale. Those with a score of 16 points or higher were regarded as having depressive symptoms. Recovery experiences were assessed with the Japanese Version of the Recovery Experience Questionnaire (REQ-J). REQ-J has four subscales: psychological detachment, relaxation, mastery, and control. Each subscale score was calculated independently. Multiple logistic regression analysis was performed for each occupation with depressive symptoms as the dependent variable, and each recovery experience subscale as the independent variables. Adjusted odds ratios (AdjORs) and 95% confidence intervals (95% CI) were calculated.

Results: A total of 299 firefighters and 510 clerical staff were included in the analysis. The absence of depressive symptoms was significantly associated with a high relaxation score [AdjORs (95% CI) 2.05 (1.03–4.06)] in firefighters. Whereas, the absence of depressive symptoms was significantly associated with psychological detachment [1.36 (1.00–1.84)], relaxation [1.90 (1.26–2.86)], and mastery [1.49 (1.11–2.01)] in clerical staff.

Conclusions: Relaxation was the only dimension that was significantly associated with the absence of depressive symptoms in firefighters, whereas relaxation as well as psychological detachment and mastery were significant in clerical staff, showing a possible difference in the associations between firefighters and clerical staff. Therefore, measures focusing on relaxation to prevent depressive symptoms may be useful for firefighters.

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—Key words—

firefighters, recovery experiences, depressive symptoms

Introduction

Recently, the number of ambulance dispatches has been rapidly increasing in Japan and an emergency car, such as an ambulance, is dispatched once every 5.3 seconds, according to the report of the Ministry of Internal Affairs and Communications of Japan[1)]. Firefighters are required to be ready for emergency calls and to take on various responsibilities, such as firefighting, emergency care, and/or rescue work. These responsibili-

ties often come with the exposure to life-threatening situations and emotionally traumatic experiences. Firefighters are thus continuously exposed to both physical burden and psychological stress[2)3)], and therefore, burnout among firefighters is a concern, particularly due to increases in their workload[2)].

These stressful situations cannot be avoided in view of the work mission of firefighters, and hence they need to be adequately managed. One strategy is to intervene in stressors, such as variance in workload[4)], intergroup conflict[4)], role conflict[4)], and organization system[5)] among firefighters.

Another strategy is to focus on how to spend their off-time to recover from work-related stress. Recovery in this situation refers to the recovery process during which an individual's psychobiological systems that have been taxed during a stressful experience return to their baseline levels[6)7)]. Recovery can also be seen as a process opposite to the strain process, during which the detrimental effects of stressful situations are alleviated or eliminated[7)8)]. Sonnentag *et al.*[7)] called this process "recovery experiences", and demonstrated that recovery experiences have the following four dimensions: psychological detachment, relaxation, mastery, and control. Psychological detachment means physically and mentally distancing oneself from work and being in a state of not thinking about work[7)9)]. Relaxation is characterized by a state of low activation and associated with a positively toned affect[7)10)]. Mastery is personal development of leisure time[7)]. Control is the degree to which a person can decide which activity to pursue during leisure time, as well as when and how to pursue this activity[7)].

According to a previous study, recovery is regarded as an explanatory mechanism in the relationship between acute stress reactions and chronic health impairment[11)]. Particularly, psychological detachment is considered to be a significant dimension for maintaining mental health in work settings[12)13)]. High psychological detachment scores are associated with good psychological well-being[7)8)14)]. These studies suggest that achieving psychological detachment from work during off-time can weaken the negative impact of stress during work. However, for firefighters who have a prolonged period of preparation for emergency on a regular basis[3)], it may be difficult to psychologically detach from work during their off-times. In the aforementioned studies, the relationship between recovery experiences and mental health has been examined among subjects with various occupations, such as transport and postal services, whole sale and retail trade, accommodation, food industry[8)], social workers and psychiatric staff[15)], or teachers and hotel staff together[16)], but not firefighters who are exposed to unique stressors[3)17)].

Among the four dimensions of the recovery experience, the dimension that significantly affects health status may differ among occupations. Although psychological detachment has been examined in various studies[7)8)11)13)14)], the other dimensions has been examined in only a few studies to our knowledge[12)16)18)]. For example, a previous study by de Bloom *et al.* on knowledge-intensive workers, such as media, information technology, engineering, medical staff, education, etc., showed that self-rated health was strongly associated with relaxation, although they did not stratify a large sample by occupational characteristics[18)]. A previous study on various occupational workers, such as teachers and hotel staff, showed that occupational well-being was associated with mastery[16)]. However, findings of mastery and control were less consistent compared with psychological detachment as mentioned in a review study[12)]. Elucidation of a significant dimension among firefighters may lead to the development of effective stress management strategies for firefighters.

We therefore examined the associations between all four dimensions of recovery experience and depressive symptoms in firefighters, to identify the dimensions that significantly affected their depressive symptoms. In order to compare with firefighters who are exposed to unique stressors[3)17)], we also examined the association among clerical staff as a representative of a general occupation and examined the interactions between these two occupations.

Methods

Subjects and procedures

This cross-sectional study was conducted in November 2013. Self-administered questionnaires were distributed to all 3,115 employees aged 18 to 65 in a Japanese municipality with a population of about 470,000, and were collected 1 week after the distribution. As more than 90% of the firefighters were men, we decided to include only male firefighters and clerical staff in the analysis. The study was approved by the ethics committee

of Tokyo Medical University (study approval no. 2506) before commencement and has been carried out in compliance with the Declaration of Helsinki.

Depressive symptoms

Depressive symptoms were assessed using the Japanese version of the Center for Epidemiologic Studies Depression Scale (CES-D)[19)20)]. The scale is composed of 20 items. All items were scored on a four-point Likert scale ranging from 0 (less than 1 day during the past week) to 3 (5–7 days during the past week), and scores were summed. Persons with a score of 16 points or higher were regarded as having depressive symptoms according to a previous study[20)].

Recovery experiences

Recovery experiences were assessed using the Japanese Version of the Recovery Experience Questionnaire (REQ-J) developed by Shimazu *et al.*[21)]. This scale was translated from the original version created by Sonnentag *et al.*[7)]. Participants were asked about how they spend their time after their day's work is over. All items were scored on a five-point Likert scale ranging from 1 (do not agree at all) to 5 (fully agree). The items are grouped into four subscales that reflect the underlying dimensions of recovery experience: psychological detachment (4 items) (e.g., "I distance myself from my work"), relaxation (4 items) (e.g., "I do relaxing things"), mastery (4 items) (e.g., "I do things that challenge me"), and control (4 items) (e.g., "I determine for myself how I will spend my time"). Responses for each item were summed and divided by item number to get an average score for each subscale. Higher scores indicate positive experiences.

Subject attributes and other questions

Participants were asked their age, marital status (yes or no to the presence of a spouse), presence of chronic diseases (yes or no), smoking status (yes or no), alcohol consumption status (<20 g, 20 to 40 g, or ≥40 g), sleep time (<6 hours, 6 to 7.5 hours, or ≥7.5 hours), exercise (yes or no to exercising two or more days a week), job position (managerial or non-managerial), and amount of overtime work hours. For chronic diseases, participants were asked if they had a history of high-blood pressure, stroke, heart attack, or diabetes. The response was 'yes' if the participant had one or more illnesses and 'no' if they had none of those illnesses. Smoking status was 'yes' for current smokers and 'no' for past and non-smokers. For alcohol consumption status, daily alcohol consumption was calculated using the brief-type self-administered diet history questionnaire[22)]. Respondents were divided into three groups, <20 g, 20 to 40 g, and ≥40 g, based on 20 g as the cutoff for the appropriate amount of alcohol[23)] and 40 g as the cutoff for the amount of alcohol that increases the risk of developing lifestyle diseases[24)]. For sleep time, participants were asked how long they slept each day on average in hours and minutes. About 7 hours is said to be the cutoff for the amount of sleep with low health risks for healthy adults[25)–27)], so sleep time was divided into <6 hours, 6 to 7.5 hours, or ≥7.5 hours. For exercise, participants were asked how many days a week they exercised, and responses were dichotomized at 2 days a week (yes or no to ≥2 days/week) that is the recommendation for all generations in Japan[28)]. For overtime work, participants were asked how many hours of overtime they had worked during the past month.

Statistical analysis

To assess internal consistency reliability of recovery experiences among this study sample, Cronbach's α coefficients were calculated. To compare firefighters and clerical staff, chi-squared tests were performed on marital status, chronic diseases, smoking status, alcohol consumption status, sleep time, exercise, job position, and depressive symptoms and Mann-Whitney U tests were performed on age, overtime work, and recovery experience scores. Spearman's rank correlation coefficient analyses were performed to compare recovery experiences by occupation (firefighters or clerical staff). Multivariate logistic regression analyses were performed for each occupation with the absence of depressive symptoms as the dependent variable and the recovery experience subscales (psychological detachment, relaxation, mastery, and control) as the independent variables, and the adjusted odds ratios (AdjORs) of the absence of depressive symptoms and 95% confidence interval (95% CI) were calculated. We adjusted for age, marital status, chronic diseases, smoking status, alcohol consumption status, sleep time, exercise, job position, overtime work, and each of the recovery experience subscales. The goodness-of-fit of the models were confirmed with the Hosmer-Lemeshow test. In addition, we checked the multicollinearity of each subscale by calculating the variance inflation factor (VIF) for each recov-

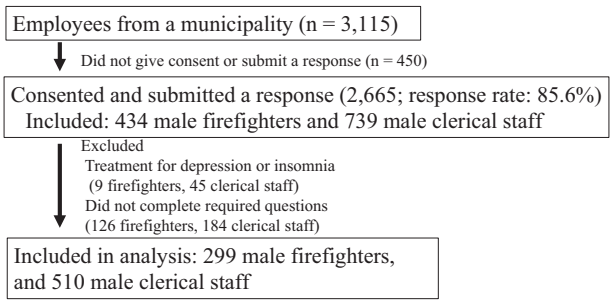

Fig. 1 Flowchart of participant recruitment

ery experience subscale. We also calculated the interaction terms of each recovery experience with occupation (firefighters and clerical staff) adjusted for all the variables, combining the data of firefighters and clerical staff. Statistical analyses were performed using IBM SPSS Statistics ver. 22.

Results

A total of 2,665 employees consented to the study and submitted responses (response rate: 85.6%). Among these, 434 male firefighters and 739 male clerical staff were included in the study. Of these, 9 firefighters and 45 clerical staff under treatment for depression or insomnia and 126 firefighters and 184 clerical staff who did not complete the required questions were excluded. Finally, 299 firefighters and 510 clerical staff were included in the analysis (Fig. 1).

The mean age was 40.4 ± 10.5 years for firefighters and 43.3 ± 11.5 years for clerical staff. The prevalence of depressive symptoms was 15.1% for firefighters, which was significantly less than the 23.3% for clerical staff (P=0.005). The mean scores for psychological detachment were 3.30 ± 0.83 and 3.38 ± 0.90 for firefighters and clerical staff, respectively. The means scores for relaxation were 3.77 ± 0.77 and 3.70 ± 0.79, for mastery 3.19 ± 0.80 and 3.00 ± 0.92, for control were 3.86 ± 0.82 and 3.96 ± 0.76. The detachment score and the control score of firefighters were marginally lower than those of clerical staff (P=0.099 for the detachment score and P=0.074 for the control score, respectively) and the mastery score of firefighters was significantly higher than that of clerical staff (P=0.002) (Table 1).

Correlation analyses among the four recovery experience subscales revealed weak or moderate correlations (<0.7). Cronbach's α coefficients for each subscale were within an acceptable range (0.82–0.89) (Table 2).

Logistic regression analyses demonstrated that relaxation was the only subscale significantly associated with the absence of depressive symptoms in the firefighters [AdjORs (95% CI) 2.05 (1.03–4.06)]. On the other hand, significant associations were observed between the absence of depressive symptoms and psychological detachment, relaxation, and mastery in clerical staff [psychological detachment AdjORs (95% CI) 1.36 (1.00–1.84), relaxation 1.90 (1.26–2.86), and mastery 1.49 (1.11–2.01)] (Table 3). Hosmer-Lemeshow goodness-of-fit tests demonstrated an adequate model fit (P>0.05). VIF values were all in an acceptable range (1.58 to 2.64 in firefighters and 1.38 to 2.26 in clerical staff). The interaction terms were not significant between relaxation and occupation (P=0.749), mastery and occupation (P=0.700), and control and occupation (P=0.109), but marginally significant between psychological detachment and occupation (P=0.090) (data not shown).

Discussion

In the present study, we investigated the association between each dimension of recovery experiences and absence of depressive symptoms in firefighters compared with clerical staff working for a local municipality. We demonstrated the absence of depressive symptoms to be significantly associated only with relaxation in firefighters but with psychological detachment, relaxation, and mastery in clerical staff, showing a difference in the associations between firefighters and clerical staff. Furthermore, calculation of interaction terms of each recovery experience with occupation suggested the differences in association between psychological detachment and depressive symptoms.

Table 1 Characteristics of the study participants

	Firefighters n = 299		Clerical staff n = 510		P[a]
	n	%	n	%	
Age (years; mean ± SD)	40.4 ± 10.5		43.3 ± 11.5		< 0.001
Marital status					
Yes	237	79.3	337	66.1	< 0.001
No	62	20.7	173	33.9	
Chronic diseases[b]					
Yes	30	10.0	99	19.4	< 0.001
No	269	90.0	411	80.6	
Smoking status					
Yes	122	40.8	143	28.0	< 0.001
No	177	59.2	367	72.0	
Alcohol consumption status (g/day)					
< 20	187	62.5	331	64.9	0.286
20 to 40	64	21.4	87	17.1	
≥ 40	48	16.1	92	18.0	
Sleep time (hours/day)					
< 6	53	17.7	83	16.3	0.444
6 to 7.5	207	69.2	373	73.1	
≥ 7.5	39	13.0	54	10.6	
Exercise (≥ 2 days/week)					
Yes	202	67.6	150	29.4	< 0.001
No	97	32.4	360	70.6	
Job position					
Managerial	49	16.4	142	27.8	< 0.001
Non-managerial	250	83.6	368	72.2	
Overtime work (hours/month; mean ± SD)	7.2 ± 7.7		20.2 ± 22.4		< 0.001
Recovery experience score (mean ± SD)					
Psychological detachment	3.30 ± 0.83		3.38 ± 0.90		0.099
Relaxation	3.77 ± 0.77		3.70 ± 0.79		0.372
Mastery	3.19 ± 0.80		3.00 ± 0.92		0.002
Control	3.86 ± 0.82		3.96 ± 0.76		0.074
Depressive symptoms[c]					
Yes	45	15.1	119	23.3	0.005
No	254	84.9	391	76.7	

[a] P values were assessed by the Mann-Whitney U test or chi-square test

[b] Chronic diseases: high-blood pressure, stroke, heart attack, or diabetes

[c] Depressive symptoms: Center for Epidemiologic Studies Depression Scale ≥ 16

Table 2 Cronbach's α and Spearman's rank correlation coefficients of recovery experience subscales

		Subscale (range)	Cronbach's α	1	2	3	4
Firefighters n = 299	1	Psychological detachment (1–5)	0.85	1.000			
	2	Relaxation (1–5)	0.88	0.571*	1.000		
	3	Mastery (1–5)	0.85	0.185*	0.444*	1.000	
	4	Control (1–5)	0.86	0.441*	0.692*	0.530*	1.000
Clerical staff n = 510	1	Psychological detachment (1–5)	0.86	1.000			
	2	Relaxation (1–5)	0.86	0.555*	1.000		
	3	Mastery (1–5)	0.89	0.204*	0.348*	1.000	
	4	Control (1–5)	0.82	0.301*	0.584*	0.405*	1.000

*P < 0.05

The detachment score was marginally lower, meaning less detached, in firefighters compared to clerical staff, and there was no association of psychological detachment with depressive symptoms in firefighters. This might be due to the characteristics of firefighter-work, such as being on-call for emergencies[3], suggesting that it may be more difficult for firefighters to psychologically detach from work compared with other occupations, such as clerical staff.

Our study showed that individuals with high relaxation were less likely to show depressive symptoms

Table 3 Adjusted odds ratios of recovery experience subscales for absence of depressive symptoms

	Recovery experience subscales	AdjORs	95% CI	P-value
Firefighters n = 299	Psychological detachment	0.79	(0.44–1.41)	0.428
	Relaxation	2.05	(1.03–4.06)	0.040
	Mastery	1.39	(0.75–2.59)	0.291
	Control	1.71	(0.94–3.10)	0.077
Clerical staff n = 510	Psychological detachment	1.36	(1.00–1.84)	0.047
	Relaxation	1.90	(1.26–2.86)	0.002
	Mastery	1.49	(1.11–2.01)	0.008
	Control	1.08	(0.75–1.54)	0.694

Adjusted by age, marital status, chronic diseases, smoking status, alcohol consumption status, sleep time, exercise, job position, and recovery experiences (psychological detachment, relaxation, mastery, and control)
AdjORs: Adjusted odds ratios
95% CI: 95% confidence interval
Hosmer-Lemeshow goodness-of-fit test demonstrated an adequate model fit in both firefighters and clerical staff ($P > 0.05$).

among both firefighters and clerical staff. A previous study on knowledge-intensive workers showed that self-rated health was strongly associated with relaxation rather than detachment[18]. Thus, measures focusing on relaxation may be useful not only for knowledge-intensive workers but also for firefighters to maintain their psychological health.

No association was found between mastery and depressive symptoms among firefighters, which was in contrast with the significant association among clerical staff. Because mastery requires expending more physical and cognitive resources, mastery may not necessarily promote recovery or result in depressive symptoms[17]. Mastery in this study was evaluated through items such as the following: I seek out intellectual challenges, or I do things that challenge me[7][21]. The percentage of those who exercise in their leisure time as well as mastery score were significantly higher in firefighters than clerical staff. Firefighters are required to be physically fit because of their occupational characteristics[3][17]. Previous studies as to "recovery activities" (e.g. watching TV, meeting friends, and physical exercise) showed that the amount of time spent on job-related activities in their off-time is negatively associated with well-being[12][29]. In this instance, "mastery experience" is not fully independent from "mastery activity"[12]. Therefore, many of the participants, with or without depressive symptoms, may be doing mastery activities, including exercise, as an element of their occupation, which could lead to no statistical association of mastery with depressive symptoms among firefighters observed in this study. In addition, the sample size of firefighters in this study was nearly one-half that of clerical staff, and this may have led to the lack of statistical significance.

A marginal association between control and depressive symptoms was found only in firefighters, and the reason for this remains unclear. However, control during their off-time may be important for maintaining mental health among firefighters, and more research on control is warranted.

In the present study, we found that the prevalence of depressive symptoms in firefighters (15.1%) was lower than in clerical staff (23.3%), and the difference was statistically significant. Workers in emergency care teams have strong stress-coping skills[30]. Moreover, it is generally known that firefighters experience strong social bonding, referred to as a 'brotherhood'[5][31]. Low levels of social bonding were correlated with poor mental well-being[31]. Although we did not assess stress-coping and social bonding in this study, these factors may contribute to differences in the prevalence of depressive symptoms.

Previous studies on firefighters found a higher prevalence (22.3%)[4] and similar prevalence (17.3%)[32] of depressive symptoms, compared with our subjects. Previous studies also reported that the prevalence of depressive symptoms differed by job type among firefighters, such as firefighting, ambulance work, rescue work, etc[4][32]. Differences in the composition ratio of job types may be the reason for the differences in the prevalence of depressive symptoms between previous studies and this study.

This study has some limitations. First, no causal relationships can be determined as the study was a cross-sectional survey. For example, it is possible that a non-depressed mood is not caused by performing self-development (high mastery), but rather that a depressed mood actually disables workers from engaging in self-development. Therefore, longitudinal or intervention studies are needed for further clarification. Second, we did not investigate occupational stress factors, such as job demands, control, or dimensions of the effort-reward imbalance model[33)34)]. Although we used overtime work as a factor, we did not investigate any other stress factors. As a result, we could not confirm whether or not occupational stress factors are confounding variables. Thirdly, as all data were from employees in one particular municipality, it is unclear whether these results can be generalized, and we should take caution in extrapolating the data to other municipalities. Lastly, as previous stated, the small sample size of firefighters in this study may be also one of limitations. However, this is the first study in which the associations between each dimension of recovery experiences and psychological health were examined in firefighters.

Conclusion

Among the recovery experience dimensions, relaxation was the only dimension significantly associated with the absence of depressive symptoms in firefighters, whereas relaxation as well as psychological detachment and mastery were significant in clerical staff, showing a possible difference in the associations between firefighters and clerical staff. These results indicate that measures focusing on relaxation to prevent depressive symptoms may be useful for firefighters.

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利益相反：

Conflicts of interest

The authors declare that they have no conflicts of interest associated with this study.

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―キーワード―
消防士，リカバリー経験，抑うつ

目的：就業時のストレスから回復するための余暇の過ごし方はリカバリー経験と呼ばれ，労働者の精神的健康と関連することが報告されている．消防職という特殊なストレス下にある職業においては，精神的健康に効果的なリカバリー経験が他の職業と異なる可能性が考えられるが，消防職を対象とした研究はこれまで行われていない．そこで，消防職におけるリカバリー経験と抑うつとの関連を検討し，事務職と比較を行った．

方法：2013 年 11 月に横断研究を行った．地方自治体勤務の男性消防職と男性事務職を対象とした．抑うつの評価は，抑うつ自己評価尺度（CES-D）日本語版を用い 16 点以上を抑うつ有りとした．リカバリー経験については 4 つのサブスケール（心理的距離，リラックス，熟達，コントロール）からなるリカバリー経験質問紙日本語版を用い，それぞれのサブスケール得点を算出した．抑うつの有無を従属変数，リカバリー経験の各サブスケール得点を独立変数として，職種別に多重ロジスティック回帰分析を行い，調整オッズ比（AdjORs）と 95% 信頼区間（95%CI）を算出した．

結果：消防職 299 名および事務職 510 名を分析対象とした．消防職では抑うつがないこととリラックス得点が高いことが関連［AdjORs（95%CI）2.05（1.03～4.06）］し，事務職では抑うつがないことと心理的距離［1.36（1.00～1.84）］，リラックス［1.90（1.26～2.86）］，熟達［1.49（1.11～2.01）］得点が高いことが関連した．

結論：消防職においては，リラックスのみが抑うつのないことと関連し，事務職と異なる結果であった．消防職の抑うつ予防にはリラックスに重点を置いた対策が重要かもしれない．

利益相反：利益相反基準に該当無し

（日職災医誌，66：404―412，2018）