

AMCoR

Asahikawa Medical University Repository <http://amcor.asahikawa-med.ac.jp/>

Prehospital and disaster medicine (2012.Feb) 27卷1号:59~63.

Post-traumatic stress disorder and job stress among firefighters of urban Japan

Saijo Yasuaki, Ueno Takeji, Hashimoto Yoshihiro

Post-Traumatic Stress Disorder and Job Stress among Firefighters of Urban Japan

Yasuaki Saijo, MD, Ph.D.,^{1,*} Takeji Ueno, MD, Ph.D.,² Yoshihiro Hashimoto, Ph.D.³

¹Division of Community Medicine and Epidemiology, Department of Health Science, Asahikawa Medical University, Midorigaoka, E2-1-1-1, Asahikawa, Hokkaido 078-8510, Japan

²Department of Social Work, School of Social Welfare, Hokusei Gakuen University

³Sapporo Fire Bureau

Grant sponsors and numbers: a Grant-in-Aid for Scientific Research from the Ministry of Education, Culture, Sports, Science and Technology of Japan (18590585).

Correspondence to: Yasuaki Saijo, Division of Community Medicine and Epidemiology, Department of Health Science, Asahikawa Medical University, Midorigaoka, E2-1-1-1, Asahikawa, Hokkaido 078-8510, Japan. E-mail: y-saijo@asahikawa-med.ac.jp

Telephone: +81 166 68 2402

Fax: +81 166 68 2409

1 **Abstract**

2 **Introduction:** Post-traumatic stress disorder (PTSD) is a common condition among firefighters. In
3 this study involving Japanese firefighters, we aimed to elucidate the relationships between job stress,
4 social support, and depressive stress with PTSD scores estimated by the Impact of Event
5 Scale-Revised (IES-R).

6 **Methods:** A total of 1667 Japanese firefighters working for the local government were provided a
7 questionnaire to gather information pertaining to age, gender, job type, job class, marital status, and
8 smoking and drinking habits. The Center for Epidemiologic Studies Depression Scale (CES-D), the
9 National Institute for Occupational Safety and Health (NIOSH) generic job stress questionnaire, and
10 the IES-R were also included.

11 **Results:** After adjustment for age and sex, subjects in the PTSD-positive group had significantly
12 higher scores for intergroup conflict, role ambiguity, and CES-D as well as significantly lower
13 scores for social support from supervisor compared to those in the PTSD-negative group.

14 **Conclusions:** High intergroup conflict and role ambiguity, as well as low social support from
15 supervisors and the presence of depressive symptoms, may influence PTSD development among
16 Japanese firefighters.

17 **INTRODUCTION**

18 Post-traumatic stress disorder (PTSD), classified as an anxiety disorder, develops after
19 exposure to actual or threatened death, serious injury, or threats to the physical integrity of self or
20 others.¹ In North America and European countries, the estimated lifetime prevalence of PTSD in the
21 general population is approximately 7–8%,^{1, 2} but increases to 17.3–22.2% among firefighters.^{1, 3}

22 The work of firefighters includes not only firefighting but also ambulance and rescue duties,
23 which often involve tragic events related to the risk of developing PTSD. The estimated prevalence
24 of PTSD in Japanese ambulance and rescue workers as well as firefighters is high at approximately
25 20% for ambulance and rescue workers⁴ and 9.3–21.9% for firefighters.⁵⁻⁹

26 Job stress (evaluated using the Japanese Brief Job Stress Questionnaire) may influence PTSD
27 among Japanese firefighters.¹⁰ Furthermore, social support has been implicated as a possible
28 influence on the development of PTSD among American rescue workers and paramedics^{11, 12} and
29 Japanese firefighters.¹⁰ PTSD frequently exists as a comorbid condition in conjunction with
30 depressive disorders.¹³

31 In this study, we aimed to elucidate the relationship of PTSD scores with job stress, social
32 support, and depressive stress using the Impact of Event Scale-Revised (IES-R) among Japanese
33 firefighters. The National Institute for Occupational Safety and Health (NIOSH) generic job stress
34 questionnaire was used to evaluate different job stresses and social support, while the Center for

35 Epidemiologic Studies Depression Scale (CES-D) questionnaire was used to evaluate depressive

36 symptoms.

37

38 **MATERIAL AND METHODS**

39

40 Subjects investigated in this study included 1767 firefighters working for the local government
41 18–60 years of age, with a rank of Section Chief or lower. Self-administered questionnaires were
42 distributed in September and October 2005. Responses were received from 1731 of the 1767
43 firefighters (response rate = 98.0%). A total of 64 respondents were excluded because they were
44 employees on loan from a city office (n = 8) or had provided responses with missing information (n
45 = 56). The final study group consisted of 1667 subjects (effective response rate [ERR] = 94.3%).

46 The questionnaire was intended to gather information related to age, gender, job type and class,
47 marital status, smoking and drinking habits, the Japanese version of the CES-D,^{14, 15} and the NIOSH
48 generic job stress questionnaire.¹⁶⁻¹⁸ The Japanese version of the NIOSH generic job stress
49 questionnaire has demonstrated consistently high levels of internal reliability (Cronbach's alpha,
50 0.68–0.95) and test–retest reliability over a one-year period (r , 0.44–0.71).^{17, 18} The following
51 measures were chosen for further evaluation from the NIOSH generic job stress questionnaire:
52 quantitative workload, variance in workload, cognitive demand, job control, intragroup conflict,
53 intergroup conflict, role ambiguity, role conflict, social support from a supervisor, coworker, and
54 family or friends, non-work activity, self-esteem, and job satisfaction. The standard CES-D uses a
55 cutoff score of 16 points for depressive symptoms.^{14, 15} PTSD assessed using the Japanese version

56 of the IES-R comprised of 22 items, in which a score of 25 points or more typically indicates a
57 PTSD-positive status.¹⁹

58 Age was categorized as <30, 30–39, 40–49, and >50 years. Subjects were classified into
59 “nonsmoker” comprising never- and ex-smokers or “current smoker” groups depending on their
60 reported smoking habits. Drinkers were defined as those who consumed alcohol once a week or
61 more. Marital status was classified as “unmarried” or “married.” Job classes included “Firefighter,”
62 “Assistant Fire Sergeant,” “Fire Sergeant,” “Fire Lieutenant,” “Fire Captain,” and “Battalion
63 Chief.” Job types encompassed “firefighting,” “ambulance work,” “rescue work,” “other shift
64 work” (fire inspection and command work), and “daytime work” (general affairs and fire
65 prevention). Subjects involved in “firefighting,” “ambulance work,” “rescue work,” and “other shift
66 work” engaged in 24-h shifts (from 8:45 to 8:55 the next day), and rested four days every two
67 weeks.

68 This study was approved by the Institutional Ethical Board for Epidemiological Studies of
69 Asahikawa Medical University.

70

71 **Statistical Analysis**

72 PTSD-positive and -negative groups were compared with regards to sociodemographic factors,
73 means of each measure of the NIOSH generic job stress questionnaire, and CES-D scores using χ^2

74 or *t*-tests. Logistic regression analysis was used to estimate age- and sex-adjusted odds ratios (ORs)
75 of marital status, smoking and drinking habits, job class, job type, and depression (CES-D \geq 16).
76 Analysis of covariance was used to compare age- and sex-adjusted scores of each measure of the
77 NIOSH generic job stress questionnaire and CES-D between PTSD-positive and -negative groups.
78 *P* values < 0.05 were deemed statistically significant. All analyses were conducted using IBM SPSS
79 Statistics 18.0 for Windows (SPSS Inc., Chicago, IL, USA).

80

81 **RESULTS**

82 The number of subjects identified as PTSD-positive was 162 (9.7%). Crude differences
83 between PTSD-positive and -negative group characteristics with regard to mean scores of the
84 NIOSH generic job stress questionnaire and CES-D are detailed in Table 1.

85 Table 2 specifies age- and sex-adjusted ORs of marital status, smoking and drinking habits, job
86 class, job type, and depression (CES-D \geq 16) for PTSD-positive respondents. Compared to rescue
87 work, ORs were significantly higher for firefighting (2.01; 95% confidence interval CI = 1.18–2.91,
88 $P = 0.011$) and daytime work (1.96; 95% CI = 1.04–3.67, $P = 0.036$). Depression (CES-D \geq 16) had
89 an insignificant but marginally higher OR (1.44; 95% CI = 1.00–2.07, $P = 0.052$).

90 Comparison of age- and sex-adjusted scores for each measure of the NIOSH generic job stress
91 questionnaire and CES-D scores between PTSD-positive and -negative groups is presented in Table
92 3. Compared to the PTSD-negative group, the PTSD-positive group had significantly higher scores
93 for intergroup conflict, role ambiguity, and CES-D; they had significantly lower scores for social
94 support from supervisors.

95

96 **DISCUSSION**

97 This study elucidates significant relationships between intergroup conflict, role ambiguity,
98 social support from supervisor, and CES-D scores with PTSD development among Japanese
99 firefighters. To our knowledge, no previous report has investigated the relationship between PTSD
100 development and the stress factors assessed by the NIOSH generic job stress questionnaire among
101 firefighters.

102 Of the 1672 firefighters questioned, 162 (9.7%) were PTSD-positive (IES-R \geq 25). Recent
103 studies investigating Japanese firefighters have estimated the prevalence of PTSD at 9.4% (40/425;
104 ERR not provided),⁷ 11.2% (77/689; ERR = 72.9%),⁸ 15.6% (236/1516; ERR = 79.2%),⁵ 12.5%
105 (77/618; ERR = 60.9%),⁶ 17.7% (43/231; ERR = 77.8%),¹⁰ and 21.9% (28/128; ERR = 81.5%)⁹
106 using the IES-R. The prevalence of PTSD reported in our study (9.7%) is low but comparable to
107 these other Japanese studies. Furthermore, the number and ERR of subjects who participated in our
108 study was greater than that of the other studies. The estimated prevalence of PTSD among North
109 American and European firefighters/ambulance workers is reported to be approximately 20%.⁴ The
110 lower prevalence rate reported in our study may be due to Japan's low violent crime rate.²⁰
111 Furthermore, the subjects of this study work in a well-maintained city that experiences natural
112 disasters to a lesser extent compared to other Japanese regions, which frequently encounter
113 earthquakes and volcanic eruptions. The aging population of Japan is reflected in the present study

114 by the fact that 37.7% of respondents were >50 years of age; this detail may have influenced our
115 results since older individuals are known to be less vulnerable to PTSD compared to their younger
116 counterparts.¹⁹

117 Among the job types performed by Japanese firefighters, firefighting had a significantly higher
118 OR for PTSD. A paper from Japan has speculated that injuries or deaths of coworkers may be
119 related to PTSD.⁷

120 A recent study using the Japan Brief Job Stress Questionnaire¹⁰ reported that high job stress is
121 related to PTSD development; however, the particular job stresses assessed in that analysis were not
122 reported. In our study, we found intergroup conflict to be significantly related to positive PTSD
123 status. A significant relationship between intergroup conflict and depressive symptoms has been
124 reported; thus lower intergroup conflict probably has a beneficial effect on the mental health of
125 workers and may have a protective effect against PTSD development.^{21, 22}

126 Role ambiguity was also found to have a significant relationship with PTSD development in
127 our study. Relationships between role ambiguity, depressive symptoms, and burnout have been
128 reported;²³ as such, less role ambiguity may provide a protective effect against PTSD development.

129 Other studies have investigated factors with protective effects against PTSD among
130 firefighters,¹⁰⁻¹² and many have reported that lower levels of social support are associated with
131 increased PTSD symptoms.²⁴⁻²⁶ We found no significant relationship between social support of

132 coworkers and family with PTSD; however, support from supervisors was determined to be
133 significantly related to PTSD development. Social support from supervisors has been linked to
134 perceptions of healthier work environments,²⁷ less work-related stress,^{28, 29} and fewer depressive
135 symptoms.^{30, 31} In addition, because firefighting requires strict military-like discipline, supervisors
136 may have more pronounced effects on their subordinate officers.

137 The PTSD-positive group had significantly higher CES-D scores compared to the
138 PTSD-negative group, and depression (CES-D \geq 16) had a marginally significant higher OR for
139 PTSD. PTSD is known to be a frequent comorbidity in conjunction with depressive disorders.¹³ It
140 has been reported that preexisting major depression may render individuals more vulnerable to
141 PTSD in the aftermath of trauma.^{32, 33} Likewise, when PTSD and depression co-occur, they may
142 represent a single traumatic stress construct with shared vulnerability and similar predictor
143 variables.³⁴ PTSD and other major depressive episodes share a number of symptoms, including
144 sleep disturbance, poor concentration, guilt, restricted affect, and suicidal ideation.¹³

145 Among the types of jobs performed by Japanese firefighters, firefighting had a significantly
146 higher OR for PTSD. A Japanese paper speculated that injuries or deaths of coworkers were related
147 to PTSD,⁷ and there is a greater chance of encountering these situations when firefighting. Daytime
148 workers also had significantly higher ORs for PTSD. Another Japanese paper speculated that the
149 reason for this trend may be due to daytime workers having lower levels of support.⁶ Moreover,

150 people with mental health disorders tend to change to daytime work to lessen the chance of
151 encountering situations which can cause PTSD. However, the work of firefighters varies among
152 countries, and there have been few reports detailing the relationship between PTSD and the various
153 jobs performed by firefighters.³⁵

154

155 **Limitations**

156 Our study has several limitations. The cross-sectional design precludes determination of the
157 causal order of the association between stress measures, depressive symptoms, and PTSD with
158 certainty. Furthermore, the small sample size of female subjects in our study restricted
159 gender-specific analysis. Also, if non-responding subjects had higher stress levels, depressive
160 symptoms, and PTSD, the relationship between investigated factors and PTSD could have been
161 underestimated. However, selection bias can be ruled out for this study due to the high response rate.
162 Japanese and United States firefighters perform additional tasks, such as emergency services and
163 rescue work, in addition to firefighting; therefore, our results cannot be directly compared to
164 firefighters from other countries who engage purely in firefighting. Finally, because there were
165 many variables involved, the significance revealed could be the result of chance alone; however, the
166 significant results were somewhat comparable to previous findings reported by other researchers.

167 **CONCLUSION**

168 High intergroup conflict and role ambiguity, low social support from supervisors, and
169 depressive symptoms are significantly related to PTSD among Japanese firefighters. Further
170 prospective studies are needed to elucidate whether these factors chronologically precede PTSD
171 development and whether alleviation of these factors can prevent PTSD development among
172 firefighters.

173 **REFERENCES**

- 174 1. Vieweg WV, Julius DA, Fernandez A, Beatty-Brooks M, Hettema JM, Pandurangi AK:
175 Posttraumatic stress disorder: clinical features, pathophysiology, and treatment. *Am J Med*
176 2006;119:383-90.
- 177 2. de Vries GJ, Olf M: The lifetime prevalence of traumatic events and posttraumatic stress
178 disorder in the Netherlands. *J Trauma Stress* 2009;22:259-67.
- 179 3. Wagner D, Heinrichs M, Ehler U: Prevalence of symptoms of posttraumatic stress
180 disorder in German professional firefighters. *Am J Psychiatry* 1998;155:1727-32.
- 181 4. Alexander DA, Klein S: Ambulance personnel and critical incidents: impact of accident
182 and emergency work on mental health and emotional well-being. *Br J Psychiatry* 2001;178:76-81.
- 183 5. Hatanaka M, Matsu iY, Maruyama S, Koshiro E, Takatsuka Y: Traumatic stress in
184 Japanese Firefighters. *Traumatic stress* 2004;2:67-75 (in Japanese, English abstract).
- 185 6. Koga A, Maeda M, Shinto H, Maruoka T, N K: Traumatic Stress for Firefighters and
186 Rescue Service Staff Members: Results from an Epidemiologic Study of Fukuoka City Firefighters.
187 *Kyushu Neuropsychiatry* 2003;49:49-50 (in Japanese, English abstract).
- 188 7. Yamashita Y, Sato E, Ishizawa K, Hoshino N, Pak S, Owada Y, Matsura S, Hanada N,

- 189 Sugawara C, Murakami K, Fujimori Y: Stress of fire officials due to vocational traumatic event. *J St.*
190 *Marianna Medical Institute* 2005;5:67-72 (in Japanese).
- 191 8. Shinto H: Posttraumatic stress disorder among firefighters. *JPN Bull Soc Psychiat*
192 2005;14:78-86 (in Japanese, English abstract).
- 193 9. Mitani S: Comparative analysis of the Japanese version of the revised impact of event
194 scale: a study of firefighters. *Prehosp Disaster Med* 2008;23:s20-6.
- 195 10. Mitani S, Fujita M, Nakata K, Shirakawa T: Impact of post-traumatic stress disorder and
196 job-related stress on burnout: a study of fire service workers. *J Emerg Med* 2006;31:7-11.
- 197 11. Fullerton CS, McCarroll JE, Ursano RJ, Wright KM: Psychological responses of rescue
198 workers: fire fighters and trauma. *Am J Orthopsychiatry* 1992;62:371-8.
- 199 12. Regehr C, Goldberg G, Glancy GD, Knott T: Posttraumatic symptoms and disability in
200 paramedics. *Can J Psychiatry* 2002;47:953-8.
- 201 13. Oquendo M, Brent DA, Birmaher B, Greenhill L, Kolko D, Stanley B, Zelazny J, Burke
202 AK, Firinciogullari S, Ellis SP, Mann JJ: Posttraumatic stress disorder comorbid with major
203 depression: factors mediating the association with suicidal behavior. *Am J Psychiatry*
204 2005;162:560-6.
- 205 14. Shima S, Shikano T, Kitamura T, Asai M: New self-rating scales for depression. *Clinical*
206 *psychiatry* 1985;27:717-23.

- 207 15. Radloff LS: The CES-D scale: a self-report depression scale for research in the general
208 population. *Appl Psychol Measurement* 1977;1:385-401.
- 209 16. Hurrell JJ, Jr., McLaney MA: Exposure to job stress--a new psychometric instrument.
210 *Scand J Work Environ Health* 1988;14 Suppl 1:27-8.
- 211 17. Haratani T, Kawakami N, Araki S, Hurrell JJ, Jr., Sauter SL, Swanson NG: Psychometric
212 properties and stability of the Japanese version of the NIOSH job stress questionnaire. *The 25th*
213 *International Congress on Occupational Health Book of Abstracts Pt2* 1996:393.
- 214 18. Haratani T, Kawakami N, Araki S: Reliability and validity of the Japanese version of
215 NIOSH Generic Job Stress Questionnaire. *Jpn J Ind Health* 1993;35 Suppl:S214 (in Japanese).
- 216 19. Asukai N, Kato H, Kawamura N, Kim Y, Yamamoto K, Kishimoto J, Miyake Y,
217 Nishizono-Maher A: Reliability and validity of the Japanese-language version of the impact of
218 event scale-revised (IES-R-J): four studies of different traumatic events. *J Nerv Ment Dis*
219 2002;190:175-82.
- 220 20. Kuhne HH: Comparisons in good and bad: criminality in Japan and Germany. *Forensic Sci*
221 *Int* 1994;69:187-93.
- 222 21. Tsuno K, Kawakami N, Inoue A, Ishizaki M, Tabata M, Tsuchiya M, Akiyama M,
223 Kitazume A, Kuroda M, Shimazu A: Intragroup and intergroup conflict at work, psychological
224 distress, and work engagement in a sample of employees in Japan. *Ind Health* 2009;47:640-8.

- 225 22. Inoue A, Kawakami N: Interpersonal conflict and depression among Japanese workers with
226 high or low socioeconomic status: findings from the Japan Work Stress and Health Cohort Study.
227 *Soc Sci Med* 2010;71:173-80.
- 228 23. Tunc T, Kutanis RO: Role conflict, role ambiguity, and burnout in nurses and physicians at
229 a university hospital in Turkey. *Nurs Health Sci* 2009;11:410-6.
- 230 24. Yuan C, Wang Z, Inslicht SS, McCaslin SE, Metzler TJ, Henn-Haase C, Apfel BA, Tong
231 H, Neylan TC, Fang Y, Marmar CR: Protective factors for posttraumatic stress disorder symptoms
232 in a prospective study of police officers. *Psychiatry Res* 2010.
- 233 25. Brewin CR, Andrews B, Valentine JD: Meta-analysis of risk factors for posttraumatic
234 stress disorder in trauma-exposed adults. *J Consult Clin Psychol* 2000;68:748-66.
- 235 26. Guay S, Billette V, Marchand A: Exploring the links between posttraumatic stress disorder
236 and social support: processes and potential research avenues. *J Trauma Stress* 2006;19:327-38.
- 237 27. Lowe GS, Schellenberg G, Shannon HS: Correlates of employees' perceptions of a healthy
238 work environment. *Am J Health Promot* 2003;17:390-9.
- 239 28. Thompson BM, Kirk A, Brown DF: Work based support, emotional exhaustion, and
240 spillover of work stress to the family environment: A study of policewomen. *Stress and Health*
241 2005;21:1999-207.
- 242 29. De Lange AH, Taris TW, Kompier MAJ, Houtman ILD, Bongers PM: The relationships

- 243 between work characteristics and mental health: examining normal, reversed and reciprocal
244 relationships in a 4-wave study. *Work & Stress* 2004;18:149 - 166.
- 245 30. Tak S, Driscoll R, Bernard B, West C: Depressive symptoms among firefighters and
246 related factors after the response to Hurricane Katrina. *J Urban Health* 2007;84:153-61.
- 247 31. Dolbier CL, Smith SE, Steinhardt MA: Relationships of protective factors to stress and
248 symptoms of illness. *Am J Health Behav* 2007;31:423-33.
- 249 32. Breslau N, Davis GC, Peterson EL, Schultz L: Psychiatric sequelae of posttraumatic stress
250 disorder in women. *Arch Gen Psychiatry* 1997;54:81-7.
- 251 33. Bromet E, Sonnega A, Kessler RC: Risk factors for DSM-III-R posttraumatic stress
252 disorder: findings from the National Comorbidity Survey. *Am J Epidemiol* 1998;147:353-61.
- 253 34. O'Donnell ML, Creamer M, Pattison P: Posttraumatic stress disorder and depression
254 following trauma: understanding comorbidity. *Am J Psychiatry* 2004;161:1390-6.
- 255 35. Koga A, Maeda M, T A: Firefighters and Traumatic Stress. *Kurume University*
256 *Psychological Reseach* 2003;2:89-96 (in Japanese, English abstract).

257

Table 1—Subject characteristics and CES-D scores

	PTSD-Negative	PTSD-Positive	<i>P</i> Value
	n = 1,505	n = 162	
Male	1,465 (97.3)	156 (96.3)	0.444 ^a
Age (years)	43.5 ±10.4	44.6 ±9.8	0.202 ^b
<30	208 (13.8)	13 (8.0)	0.209 ^c
30–39	285 (18.9)	35 (21.6)	
40–49	449 (29.8)	49 (30.2)	
50<	563 (37.4)	65 (40.1)	
Marital Status			
Married	1265 (84.1)	137 (84.6)	0.865 ^a
Current smoker	966 (57.5)	89 (54.9)	0.559 ^a
Drinker	1132 (75.2)	113 (69.8)	0.129 ^a
Job class			
Firefighter	489 (32.5)	51 (31.5)	0.321 ^c
Fire Sergeant	475 (31.6)	50 (30.9)	
Fire Lieutenant	328 (21.8)	45 (27.8)	
Fire Captain	170 (11.3)	14 (8.6)	
Battalion Chief	43(2.9)	2 (1.2)	
Type of job			
Firefighting	768 (51.0)	95 (58.6)	0.072 ^c
Ambulance work	267 (17.7)	17 (10.5)	
Rescue work	153 (10.2)	12 (7.4)	

Other shift work	80 (5.3)	31 (4.3)	
Daytime work	237 (15.7)	7 (19.1)	
CES-D scores	11.8 ±7.1	13.6 ±8.4	0.010 ^b
CES-D ≥ 16	324 (21.5)	46 (28.4)	0.046 ^a

Abbreviations: PTSD = post-traumatic stress disorder; CES-D = Center for Epidemiologic Studies Depression Scale

^a chi-square test of 2 by 2 table

^b *t*-tests

^a chi-square test of 2 by n table

Table 2— NIOSH Generic Job Stress Questionnaire scores

	PTSD-Negative	PTSD-Positive	<i>P</i> Value
	n = 1,505	n = 162	
	Mean ± SD	Mean + SD	
Quantitative workload	33.8 ±6.4	33.1 ±5.9	0.204
Variance in workload	8.4 ±3.1	7.9 ±3.1	0.050
Cognitive demand	15.6 ±2.3	15.5 ±2.5	0.610
Job control	42.0 ±12.0	40.9 ±11.8	0.235
Intragroup conflict	18.5 ±5.1	19.5 ±6.3	0.075
Intergroup conflict	19.5 ±4.1	20.2 ±4.3	0.029
Role ambiguity	18.2 ±5.4	19.5 ±6.3	0.010
Role conflict	26.7 ±7.8	27.6 ±8.4	0.190
Social support from supervisor	15.8 ±3.2	15.1 ±4.1	0.044
Social support from coworkers	16.7 ±2.7	16.5 ±3.1	0.542

Social support from family/friends	16.8 ±3.0	17.1 ±2.6	0.192
Non-work activity	1.0 ±0.7	1.1 ±0.8	0.339
Self-esteem	33.7 ±6.3	32.6 ±5.6	0.033
Job satisfaction	9.9 ±1.8	9.6 ±1.9	0.060

Abbreviations: PTSD = post-traumatic stress disorder; NIOSH = National Institute for Occupational Safety and Health (NIOSH) Generic Job Stress Questionnaire

3 Table 3. Age- and sex-adjusted job stress variables and CES-D score comparison

	PTSD (-)	PTSD (+)	<i>P</i> value
	(n = 1505)	(n = 162)	
Quantitative workload	33.7 ± 6.3	33.2 ± 6.3	0.266
Variance in workload	8.3 ± 3.1	7.9 ± 3.1	0.077
Cognitive demand	15.6 ± 2.4	15.5 ± 2.4	0.646
Job control	42.0 ± 11.8	40.7 ± 11.8	0.160
Intragroup conflict	18.5 ± 5.2	19.2 ± 5.1	0.085
Intergroup conflict	19.5 ± 4.1	20.2 ± 4.1	0.037
Role ambiguity	18.1 ± 5.5	19.6 ± 5.5	0.002
Role conflict	26.7 ± 7.8	27.7 ± 7.8	0.140
Social support from supervisor	15.8 ± 3.3	15.1 ± 3.3	0.019
Social support from coworkers	16.7 ± 2.7	16.6 ± 2.7	0.683
Social support from family/friends	16.8 ± 2.9	17.2 ± 3.0	0.160
Non-work activity	1.0 ± 0.7	1.1 ± 0.7	0.486
Self-esteem	33.7 ± 6.2	32.6 ± 6.2	0.051
Job satisfaction	9.9 ± 1.9	9.6 ± 1.8	0.067
CES-D scores	11.8 ± 7.2	13.5 ± 7.2	0.005

4 CES-D, Center for Epidemiologic Studies Depression Scale; PTSD, post-traumatic stress disorder

5 Variables presented as mean ± SD

6