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Research Article

Emotional labor and job types of male firefighters in Daegu Metropolitan City

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ABSTRACT

Background: Research on the emotional labor of firefighters is actively being carried out, but studies that analyze emotional labor separately by job types, working departments, and other conditions of firefighters are insufficient. The purpose of this study is to investigate the difference in emotional labor level between departments and other conditions of firefighters.
Methods: A total of 287 Korean firefighters were included for analysis. The demands of emotional labor and emotional damage were measured using the Korean Emotional Labor Scale. To analyze the conditions and factors affecting the emotional labor level of the firefighters, logistic regression analysis was performed using the emotional labor high risk group as a dependent variable.
Results: The average score of overall emotional labor level of the firefighters was 47.2 ± 17.3, and the prevalence of high risk firefighters with emotional labor was 27.1%. It was found that the emergency medical service and administration departments showed a higher prevalence of high risk emotional labor firefighters than did other departments. The result of multiple logistic regression analysis for the high risk emotional labor firefighters showed that the adjusted odds ratio of emergency medical service department compared to the reference group (the rescue department) was 2.89 (95% confidence interval [CI]: 1.02–8.24).
Conclusions: Among the firefighters, the emergency medical service department is a high risk factor for emotional labor. Therefore, education and prevention training on emotional labor should be more thorough before work shifts.

Keywords: Korean Emotional Labor Scale; Emotional Labor; Firefighters; Emergency Medical Services Department

BACKGROUND

In recent years, the service industry has grown as a tertiary industry. The characteristics of a service industry are that they interact with customers directly, and service workers may be in situations where they must express themselves differently from their actual feelings, thus easily experiencing mismatches of emotion [1].

The concept of emotional labor is derived from the "managed heart" study of Hochschild [2]. During interactions with customers, workers express themselves in a tone or gesture that the organization has set, and they have a process for controlling their own emotions. "Emotional labor" is a term that refers to the process, or to the act of selling services as a commodity, or to the job itself [3].

According to a study on the application of the Korean Emotional Labor and Violence Investigation Tool, which was investigated by the Occupational Safety and Health Research Institute in 2014 to compare emotional labor levels among the 13 occupational groups (industry), the high risk occupation groups were call center counselors, followed by service clerks, hotel service workers, and bankers [4]. However, such studies on emotional labor have been conducted on private sector employees.

Recently, emotional labor has been reported to negatively affect organizational commitment and job satisfaction, especially for public sector employees. And emotional labor research has been increasing on public employees such as civil servants, police officers, and firefighters [5].

Researches on firefighters among them have been studied in various aspects such as posttraumatic stress disorder [6] and job stress [7], but research on emotional labor is lacking.

Firefighters play an important role not only in the traditional role of fire suppression and fire prevention, but also in promoting public welfare in society, such as rescue, emergency medical services, and safety education. Fire suppression firefighters can be exposed to hazards such as toxic gas and burns, and since fire suppression work is urgent, there are risks of various safety accidents. In recent years, service functions have been emphasized in the work of firefighting officers. Compared with existing firefighting work such as fire suppression, work performance with somewhat different job characteristics such as rescue, and emergency medical service is increasing, and mental stress such as emotional labor related to this is increasing [8].

In 2017, the National Security Agency announced that many firefighters have committed suicide [9]. And a study has shown that high emotional demands might play a crucial role in developing suicidal ideation [10]. It can be hypothesized that the cause of high suicide rate of firefighters is the high intensity of emotional labor.

Meanwhile there have been reported several conditions for affecting on emotional labor, some studies report that women have a high emotional labor intensity, while other reports show that men are significantly higher than women in the areas of supportive and protective organizational systems, and organizational surveillance and monitoring [4,11]. A study reported that the higher the age, the higher the level of emotional labor in men and the lower in women. Married men had a high level of emotional labor, but it was not statistically significant, while single females had a high level of emotional labor [12]. It is reported that the longer the emotional labor working hours, the lower the monthly household income and the greater the emotional labor intensity [11]. In addition, emotional labor was high among highly educated people [13], and low for those who had a hobby [14]. Insomnia and emotional labor have a positive correlation [15], and there are reports that people who work in shifts experience higher emotional labor [16]. Studies reported that emotional labor did not show significant relationships with smoking [17,18]. Another study found that people in the service sector with high emotional labor tend to drink a great deal, while another found

that among workers who deal directly with customers, there is a high rate of depression [19,20]. A study showed that there was a negative correlation between emotional labor and resilience [21].

In particular, the firefighters have similar job contents in the same department, it is believed that emotional labor will vary depending on the actual job content of each department in firefighters. In other words, there will be a difference between fire suppression, a task of traditional firefighting officers, and emergency services, a task added only in recent years. Therefore, the intensity of emotional labor may be also considered to be different in each department. However, regardless of the differences in departmental emotional labor, most studies were grouped into a single category called "firefighters," and studies that analyzed the difference in emotional labor between the departments have not been sufficient. Therefore, the purpose of this study was to investigate the differences in emotional labor level between departments of fire station and other conditions using the Korean Emotional Labor Scale (K-ELS) [4].

METHODS

Participants
The number of firefighters in Daegu Metropolitan City in 2016 is 2,174, which was promulgated in the local self-government decentralization office (December 14, 2016) (No. 91). During the month of May 2016, firefighters visited a senior medical institution in Daegu Metropolitan City for a health checkup. A total of 762 firefighters belonging to the unit fire stations in 9 districts were analyzed. The questionnaires were distributed to 297 people who agreed to be surveyed on emotional labor research. There were only 10 female firefighters— very few—so they were excluded, and total of 287 male firefighters were enrolled in the study. Of these, 14 people who did not fill out the questionnaire or who missed data were excluded, and the remaining 273 subjects were included in the study.

General, occupational and personal psychological characteristics
Characteristics such as age, education, marital status, hobbies, sleeping time, recovery of fatigue after sleeping, alcohol drinking and smoking were investigated. Occupational characteristics were examined, such as working period, working department, working hours, and shift work. Alcohol drinking questionnaires were used for the drinking habits questionnaire (AUDIT-K) [22].

Personal psychological characteristics were investigated for depression, sleep disorders, and resilience. Depression was assessed using the Korean version of the depression screening tool (Patient Health Questionnaire-9 [PHQ-9]). When a participant scores 5 or more, or 1 point or more in the last item by PHQ-9, it is judged that he may have depression. Sleep disorders used the Athens Insomnia Scale (AIS). AIS is known to be a good evaluation tool with proven validity and reliability in diagnosing sleep-related problems and insomnia. If the total score of AIS is 6 or more, it can be considered as clinical insomnia [23,24]. Two other questions were added in addition to the original 8 to identify the wrong answer. Resilience was evaluated using an abbreviated version of the Conner-Davidson Resilience Scale-2 (CD-RISC-2). CD-RISC was developed by Conner and Davidson to measure the level of resilience to stress, and CD-RISC-2 was an abbreviated version of CD-RISC with a total of 0–4 points for a total of 2 questions, with scores ranging from 0 to 8. It consists of 2 paragraphs: "Item 1:

Able to adapt to change" and "Item 2: Tend to bounce back after illness or hardship" [25-27]. In the previous study, the reliability factor of CD-RISC-2 using Cronbach's α was 0.84 [25] and the Cronbach's α in this study was 0.95, and it showed positive correlation with Rosenberg's self-esteem measure, and negative correlation with Beck's depression measure, stress scale, and event impact scale, showing a high level of validity [28]. Thus, the possibility of clinical use was proposed [26].

High risk group survey of emotional labor

This appraisal tool for emotional labor is K-ELS [4], which was developed in 2013 by Brotheridge and Lee [29] for college students in business administration by Jang Se-jin and others to be translated into Korean to suit Korean workers. In 2016, Lee and others reported that the Cronbach's α of K-ELS was 0.83, and its composite reliability was at an appropriate level of 0.91 [30]. Correlation analysis among sub-factors and correlation analysis with relevant measures such as task stress and exhaustion were also found to be relevant.

We calculated and analyzed the scores of 100 points for each of 5 categories ("emotional demand and registration," "overload and conflict in customer service," "emotional disharmony and hurt," "organizational support and monitoring," and "organizational supportive and prevention system"). All 5 categories were added together and converted to a perfect score of 100, and this was compared and analyzed as the "Overall Emotional Labor Level". In addition, only 3 categories out of the 5 categories, including "emotional demand and registration," "overload and conflict in customer service," and "emotional disharmony and hurt," were calculated separately with a score of 100 points, which was set as "intensity of emotional labor" and the results were analyzed [4].

The selection of high risk groups of K-ELS assessment tools was referred to in the 2016 "Emotional Labor Status of Employment Labor Workers, Risk Factors, Health Effects Research" [11]. Among the results of this study, the criteria for the high risk group of emotional labor were taken as cut-off values by the receiver operating characteristic (ROC) curve analysis based on depression. The cut-off values for 5 categories as "emotional demand and registration," "overload and conflict in customer service," "emotional disharmony and hurt," "organizational support and monitoring," and "organizational supportive and prevention system" were 76.67, 61.11, 58.33, 38.89, and 45.24, respectively, and those of the intensity of emotional labor, the overall level of emotional labor were 60.37 and 58.51, respectively. Based on these, the high risk group and the normal group were divided into a comparative analysis.

Statistical analysis

Statistical processing of the collected data was done using the SPSS 23.0 program (IBM Corp., Armonk, NY, USA). Departmental differences of general, occupational, and psychological characteristics and emotional labor were analyzed by χ^2 test, Fisher's exact test, one-way analysis of variance, and Kruskal-Wallis test; a post hoc test was performed as well. To analyze the conditions affecting the emotional labor of firefighters, χ^2 test and Fisher's exact test were performed between high risk group and normal group. And another χ^2 test and Fisher's exact test were carried out, excluding administrative departments because the demographic characteristics of administrative departments are somewhat different from those of other departments. In addition, the odds ratio for high risk groups according to department was obtained by various models, adjusting for demographic, psychological, and occupational conditions. The statistical significance was that the p-value was less than 0.05.

RESULTS

General, occupational, and psychological characteristics by departments

The study participants were 40.1 ± 9.2 years old, and 79.9% had an academic background beyond college. The proportion of married people was 76.9%, those with hobbies were 85.0%; 38.1% said they slept less than 7 hours, while 33.3% said they did not recover from fatigue. In addition, 50.9% had more than 10 years employed, while 47.3% worked more than 40 hours per week. Two hundred and twenty-eight participants (83.5%) were in shift work and 18.3% of the participants smoked. When drinking history was surveyed with AUDIT-K and a score higher than 8 points was classified as having a drinking problem, the drinking problem group was 20.9%. Fifteen participants (5.5%) complained of mild depression, and 31.1% said they had insomnia. The results showed that 5.9 ± 2.0 out of 8 were considered resilient. Comparing the 4 departments of rescue, emergency medical service, fire suppression, and administration, the emergency medical service department was significantly lower at 33.1 ± 6.4 years old than others ($p < 0.001$), and the number of people with less than 10 years employed was the highest in the emergency medical service department at 83.1% ($p < 0.001$). Also, the percentage of unmarried participants was the lowest in the emergency medical service department at 47.5% ($p < 0.001$), and the percentage of shift workers in the emergency medical service department was 100.0%, which was higher than those of other departments ($p < 0.001$) (**Table 1**).

Comparison of emotional labor index by departments

The results showed that emergency medical service and administration department had a larger emotional labor index than rescue and fire suppression departments. The overall level of emotional labor was 47.2 ± 17.3 points, 52.6 ± 17.5 points for emergency medical service, and 54.0 ± 15.2 points for administration were significantly higher than 42.9 ± 16.4 points for rescue and 43.9 ± 17.1 points for fire suppression ($p < 0.001$). This trend was the same for the intensity of emotional labor ($p < 0.001$). Among the 5 categories of emotional labor, there were significant differences in 4 categories: "emotional demand and registration" ($p = 0.019$), "overload and conflict in customer service" ($p < 0.001$), "emotional disharmony and hurt" ($p < 0.001$), and "organizational support and monitoring" ($p = 0.007$), but there was no significant difference in the category of "organizational supportive and prevention system" ($p = 0.929$) (**Table 1**).

Distribution of the high risk emotional labor group according to general, occupational, and psychological characteristics

In the preceding study, the cut-off value calculated on the basis of the ROC curve for depression in the overall emotional labor level score was 58.51 points, and a value above that was defined as being in a high risk group [4,31]. Comparing the 2 groups by dividing them into high risk and normal groups, 27.1% were in the high risk group, and there were no significant differences in age, marital status, hobby, sleep time, employment period, working hours, smoking status, and alcohol drinking status, but there were significant differences among education level, recovery of fatigue after sleeping, shift work, depression symptoms status, insomnia, resilience, and department (**Table 2**).

Table 1. General, occupational and psychological characteristics and emotional labor scale of the firefighters by departments

Characteristics	Departments					p-value[§]	post-hoc[**]
	Rescue[1] (n = 45)	Emergency medical service[2] (n = 59)	Fire suppression[3] (n = 126)	Administration[4] (n = 43)	Total (n = 273)		
Age (years)						< 0.001	
Less than 40	24 (53.3)	51 (86.4)	49 (38.9)	14 (32.6)	138 (50.5)		
40 or higher	21 (46.7)	8 (13.6)	77 (61.1)	29 (67.4)	135 (49.5)		
Total*	38.5 (10.0)	33.1 (6.4)	42.8 (8.6)	43.1 (8.1)	40.1 (9.2)	< 0.001	2 < (1 = 3 = 4)
Education						0.183	
Less than high school	13 (28.9)	7 (11.9)	27 (21.4)	8 (18.6)	55 (20.1)		
College or higher	32 (71.1)	52 (88.1)	99 (78.6)	35 (81.4)	218 (79.9)		
Marital status						< 0.001	
Single	14 (31.1)	28 (47.5)	17 (13.5)	4 (9.3)	63 (23.1)		
Married	31 (68.9)	31 (52.5)	109 (86.5)	39 (90.7)	210 (76.9)		
Hobby						0.317	
No	5 (11.1)	10 (16.9)	16 (12.7)	10 (23.3)	41 (15.0)		
Yes	40 (88.9)	49 (83.1)	110 (87.3)	33 (76.7)	232 (85.0)		
Sleep time (hours)						0.920	
Less than 7 hours	19 (42.2)	23 (39.0)	46 (36.5)	16 (37.2)	104 (38.1)		
7 hours or more	26 (57.8)	36 (61.0)	80 (63.5)	27 (62.8)	169 (61.9)		
Recovery of fatigue after sleeping						0.149	
No	10 (22.2)	22 (37.3)	40 (31.7)	19 (44.2)	91 (33.3)		
Yes	35 (77.8)	37 (62.7)	86 (68.3)	24 (55.8)	182 (66.7)		
Employment period (month)						< 0.001	
Less than 10 years	22 (48.9)	49 (83.1)	50 (39.7)	13 (30.2)	134 (49.1)		
10 years or more	23 (51.1)	10 (16.9)	76 (60.3)	30 (69.8)	139 (50.9)		
Working hours per week						0.161	
Less than 40 hours	22 (48.9)	27 (45.8)	66 (52.4)	29 (67.4)	144 (52.7)		
40 hours or more	23 (51.1)	32 (54.2)	60 (47.6)	14 (32.6)	129 (47.3)		
Shift work						< 0.001	
No	2 (4.4)	0 (0.0)	8 (6.3)	35 (81.4)	45 (16.5)		
Yes	43 (95.6)	59 (100.0)	118 (93.7)	8 (18.6)	228 (83.5)		
Smoking						0.460	
Non-smoker or ex-smoker	36 (80.0)	45 (76.3)	104 (82.5)	38 (88.4)	223 (81.7)		
Current smoker	9 (20.0)	14 (23.7)	22 (17.5)	5 (11.6)	50 (18.3)		
Alcohol drinking						0.016	
Normal	31 (68.9)	42 (71.2)	110 (87.3)	33 (76.7)	216 (79.1)		
At-risk drinking	14 (31.1)	17 (28.8)	16 (12.7)	10 (23.3)	57 (20.9)		
Depression symptoms						0.073[‖]	
No	43 (95.6)	58 (98.3)	120 (95.2)	37 (86.0)	258 (94.5)		
Mild depression or major	2 (4.4)	1 (1.7)	6 (4.8)	6 (14.0)	15 (5.5)		
Insomnia						0.584	
No	34 (75.6)	42 (71.2)	85 (67.5)	27 (62.8)	188 (68.9)		
Yes	11 (24.4)	17 (28.8)	41 (32.5)	16 (37.2)	85 (31.1)		
CD-RISC-2*	6.3 (1.5)	5.9 (2.0)	5.8 (2.1)	6.1 (2.1)	5.9 (2.0)	0.343	
K-ELS*							
Overall level of emotional labor[†]	42.9 (16.4)	52.6 (17.5)	43.9 (17.1)	54.0 (15.2)	47.2 (17.3)	< 0.001	(1 = 3) < (2 = 4)
Intensity of emotional labor[‡]	45.8 (20.8)	57.8 (20.0)	47.0 (20.6)	59.9 (19.7)	51.2 (21.1)	< 0.001	(1 = 3) < (2 = 4)
Emotional demand and registration	57.5 (24.0)	64.1 (21.7)	61.0 (22.5)	71.3 (19.1)	62.7 (22.4)	0.019	(1 = 3) < 4
Overload and conflict in customer service	48.4 (24.1)	66.3 (21.8)	43.7 (24.7)	56.3 (25.9)	51.4 (25.7)	< 0.001[¶]	(1 = 3) < (2 = 4)
Emotional disharmony and hurt	31.5 (24.2)	43.0 (25.4)	36.4 (24.1)	52.2 (25.3)	39.5 (25.3)	< 0.001[¶]	(1 = 3) < (2 = 4)
Organizational support and monitoring	29.6 (22.3)	40.9 (28.4)	28.9 (24.4)	40.8 (28.2)	33.5 (26.1)	0.007[¶]	3 < (2 = 4)
Organizational supportive and prevention system	47.4 (21.1)	48.6 (18.1)	49.6 (20.4)	49.2 (17.0)	49.0 (19.5)	0.929	

Values are presented as number (%).
K-ELS: Korean Emotional Labor Scale; CD-RISC-2: Conner-Davidson Resilience Scale-2.
*Expressed by mean (standard deviation); [†]Overall level of emotional labor: all 5 categories of the K-ELS were added together and the score was calculated as a score of 100; [‡]The intensity of emotional labor: only 3 categories of the 5 categories including emotional demand and registration, overload and conflict in customer service, and emotional disharmony and hurt calculated as a score of 100; [§]Calculated by one way analysis of variance or χ^2 test; [‖]Calculated by Fisher's exact test; [¶]Calculated by Kruskal-Wallis test; [**]Number 1,2,3, and 4 represent the: rescue, emergency medical service, fire suppression, and administration respectively.

Table 2. Distribution of the high risk emotional labor group of firefighters according to participants and several characteristics

Characteristics	All participants (n = 273)			Participants excluding administration department (n = 230)		
	High risk group (n = 74)	Normal group (n = 199)	p-value[*]	High risk group (n = 56)	Normal group (n = 174)	p-value[*]
Age (years)			0.702			0.713
Less than 40	36 (26.1)	102 (73.9)		29 (23.4)	95 (76.6)	
40 or higher	38 (28.1)	97 (71.9)		27 (25.5)	79 (74.5)	
Education			0.045			0.090
Less than high school	9 (16.4)	46 (83.6)		7 (14.9)	40 (85.1)	
College or higher	65 (29.8)	153 (70.2)		49 (26.8)	134 (73.2)	
Marital status			0.320			0.236
Single	14 (22.2)	49 (77.8)		11 (18.6)	48 (81.4)	
Married	60 (28.6)	150 (71.4)		45 (26.3)	126 (73.7)	
Hobby			0.271			0.805
No	14 (34.1)	27 (65.9)		7 (22.6)	24 (77.4)	
Yes	60 (25.9)	172 (74.1)		49 (24.6)	150 (75.4)	
Sleep time (hours)			0.178			0.259
Less than 7 hours	33 (31.7)	71 (68.3)		25 (28.4)	63 (71.6)	
7 hours or more	41 (24.3)	128 (75.7)		31 (21.8)	111 (78.2)	
Recovery of fatigue after sleeping			0.003			0.032
No	35 (38.5)	56 (61.5)		24 (33.3)	48 (66.7)	
Yes	39 (21.4)	143 (78.6)		32 (20.3)	126 (79.7)	
Employment period (month)			0.719			0.449
Less than 10 years	35 (26.1)	99 (73.9)		27 (22.3)	94 (77.7)	
10 years or more	39 (28.1)	100 (71.9)		29 (26.6)	80 (73.4)	
Working hours per week			0.592			1.000
Less than 40 hours	41 (28.5)	103 (71.5)		28 (24.3)	87 (75.7)	
40 hours or more	33 (25.6)	96 (74.4)		28 (24.3)	87 (75.7)	
Shift work			0.033			1.000[†]
No	18 (40.0)	27 (60.0)		2 (20.0)	8 (80.0)	
Yes	56 (24.6)	172 (75.4)		54 (24.5)	166 (75.5)	
Department			0.006			0.025
Rescue	8 (17.8)	37 (82.2)		8 (17.8)	37 (82.2)	
Emergency medical service	22 (37.3)	37 (62.7)		22 (37.3)	37 (62.7)	
Fire suppression	26 (20.6)	100 (79.4)		26 (20.6)	100 (79.4)	
Administration	18 (41.9)	25 (58.1)		-	-	
Smoking			0.585			0.449
Non-smoker or ex-smoker	62 (27.8)	161 (72.2)		47 (25.4)	138 (74.6)	
Current smoker	12 (24.0)	38 (76.0)		9 (20.0)	36 (80.0)	
Alcohol drinking			0.604			0.553
Normal	57 (26.4)	159 (73.6)		43 (23.5)	140 (76.5)	
At-risk drinking	17 (29.8)	40 (70.2)		13 (27.7)	34 (72.3)	
Depression symptoms			0.032[†]			1.000[†]
No	66 (25.6)	192 (74.4)		54 (24.4)	167 (75.6)	
Mild depression or more	8 (53.3)	7 (46.7)		2 (22.2)	7 (77.8)	
Insomnia			0.019			0.038
No	43 (22.9)	145 (77.1)		33 (20.5)	128 (79.5)	
Yes	31 (36.5)	54 (63.5)		23 (33.3)	46 (66.7)	
CD-RISC-2			0.007			0.031
Normal	37 (21.5)	135 (78.5)		28 (19.6)	115 (80.4)	
Low resilience	37 (36.6)	64 (63.4)		28 (32.2)	59 (67.8)	

Values are presented as number (%).

CD-RISC-2: Conner-Davidson Resilience Scale-2.

[*]Calculated by χ^2 test; [†]Calculated by Fisher's exact test.

Distribution of the high risk emotional labor group of firefighters according to several characteristics, excluding administration departments

Unlike the 3 departments such as rescue, fire suppression, and emergency medical service, the percentage of shift workers was significantly lower at 18.6%, with the highest age at 43.1 years on average in the administration department. Therefore, the analysis of emotional labor level difference was conducted only with the staff of 3 departments such as rescue, emergency

medical service, and fire suppression excluding those registered as working in administration departments, since administration department performed indoor work, unlike other departments that mostly did outdoor work. Analysis of differences between high risk and normal groups based on overall emotional labor levels of 230 participants, excluding 43 participants in the administration department, showed that the conditions that differed statistically were whether they recovered fatigue after sleeping (p = 0.032), the department in which they worked (p = 0.025), their level of insomnia (p = 0.038), and resilience (p = 0.031) (**Table 2**).

The results of multiple logistic analysis of high risk emotional labor groups according to sub-factors of emotional labor and various models

For the 5 categories on the emotional labor survey, multiple logistic regression was performed by setting the rescue departments as a control group out of the 3 departments, excluding administration department, and applying various models. Model I obtained a crude odds ratio that did not adjust anything, model II adjusted the demographic characteristics, model III adjusted the demographic and psychological characteristics, and model IV adjusted the demographic, psychological and occupational characteristics. According to the analysis, the scores of the emergency medical service department were high in the categories of "overload and conflict in customer service" and "organizational support and monitoring," and the scores of the emergency medical service department were also high at the overall level of emotional labor. These results show similar tendencies for models I, II, III, and IV. For model IV, which was implemented by adjusting all major variables, the emergency medical service department was 3.03 times higher in category of "overload and conflict in customer service" (95% confidence interval [CI]: 1.22–7.55) and 2.98 times higher in category of "organizational support and monitoring" (95% CI: 1.21–7.32). Overall level of emotional labor was 2.89 times higher (95% CI: 1.02–8.24) (**Table 3**).

DISCUSSION

In this study, K-ELS was used to investigate the status of the firefighters' emotional labor and to determine the relevant conditions and factors. Research on the health effects of emotional labor has been reported through studies of the effects of occupational factors such as occupational satisfaction, intention of turnover, and actual turnover, to studies of mental and physical health, including depression, well-being and exhaustion [32-38], and demonstrated the importance of studies on emotional labor in the media and other social issues. According to a 2016 study on emotional labor by the Occupational Safety and Health Research Institute, the level of emotional labor is reported to be high among flight attendants, guides or receptionists in offices, people who drive cars for a living, and sales people. The study reported that variables such as an organization's management system have a significant impact on emotional labor strength. The emotional labor intensity increased when daily average customer-facing hours were long, and emotional labor levels increased even when the workplace was large. As for demographic characteristics, it was found that the level of emotional labor increased for those whose incomes were lower, as well as for women, unmarried men, smokers, and the drinking risk group. However, when both demographic and occupation-related conditions and factors were controlled, it was found that none of these factors were significant other than income [11].

Since this study was on men, gender differences could not be analyzed. And there were no differences in factors such as marriage, working hours, hobbies, smoking, or alcohol

Table 3. Adjusted odds ratio for high risk emotional labor groups in the various model, according to departments excluding the administration department of firefighters (n = 230)

Korean Emotional Labor Scale	Model I		Model II		Model III		Model IV	
	OR	95% CI	OR*	95% CI	OR*	95% CI	OR*	95% CI
Overall level of emotional labor[†]								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	2.75[§]	1.09–6.96	3.09[§]	1.12–8.53	2.85[§]	1.01–8.03	2.89[§]	1.02–8.24
Fire suppression	1.20	0.50–2.89	0.97	0.38–2.44	0.86	0.34–2.21	0.87	0.34–2.24
Intensity of emotional labor[‡]								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	1.89	0.81–4.37	1.43	0.58–3.52	1.49	0.58–3.82	1.49	0.58–3.84
Fire suppression	0.98	0.45–2.11	0.75	0.33–1.70	0.64	0.27–1.50	0.64	0.27–1.50
Emotional demand and registration								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	1.13	0.44–2.94	0.95	0.35–2.62	1.07	0.38–3.04	1.07	0.38–3.06
Fire suppression	1.20	0.52–2.77	0.92	0.38–2.21	0.86	0.35–2.13	0.87	0.35–2.15
Overload and conflict in customer service								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	2.98[‖]	1.33–6.66	2.70[§]	1.13–6.43	2.98[§]	1.21–7.37	3.03[§]	1.22–7.55
Fire suppression	0.61	0.30–1.25	0.51	0.24–1.10	0.44[§]	0.20–0.98	0.45	0.20–1.00
Emotional disharmony and hurt								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	1.42	0.58–3.49	1.35	0.50–3.65	1.51	0.53–4.37	1.58	0.53–4.65
Fire suppression	0.87	0.38–1.98	0.60	0.24–1.48	0.54	0.21–1.40	0.56	0.22–1.46
Organizational support and monitoring								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	2.81[§]	1.25–6.34	2.83[§]	1.20–6.72	3.02[§]	1.24–7.38	2.98[§]	1.21–7.32
Fire suppression	1.11	0.53–2.30	1.09	0.50–2.34	1.01	0.46–2.21	1.00	0.46–2.20
Organizational supportive and prevention system								
Rescue	1.00		1.00		1.00		1.00	
Emergency medical service	0.94	0.43–2.05	1.22	0.52–2.83	1.17	0.47–2.90	1.17	0.47–2.92
Fire suppression	1.39	0.70–2.76	1.12	0.54–2.33	0.99	0.45–2.16	0.98	0.45–2.15

OR obtained by logistic regression analysis. Model I: unadjusted crude odds ratio; Model II: adjusted with general characteristics such as age, education, marital status, hobby, sleep time, recovery of fatigue after sleeping, smoking, and alcohol drinking; Model III: adjusted with general characteristics and psychological characteristics such as depression symptoms, insomnia, and resilience score; Model IV: adjusted with general, psychological, and occupational characteristics such as employment period, working hours per week, and shift work.

OR: odds ratio; CI: confidence interval.

*Adjusted with variable according to each models; [†]Overall level of emotional labor: all 5 categories of the K-ELS were added together and the score was calculated as a score of 100; [‡]The intensity of emotional labor: only 3 categories out of the 5 categories including emotional demand and registration, overload and conflict in customer service, and emotional disharmony and hurt calculated as a score of 100; [§]*p*-value < 0.05; [‖]*p*-value < 0.01.

drinking. The higher the educational background, the higher the emotional labor, and the better the recovery after sleep, the lower the emotional labor was. In cases of depression, emotional labor was higher, and the more resilient the individual was, the lower their emotional labor was found to be. What's interesting is that shift workers show a low level of emotional labor. However, the adjustment of each variable resulted in no statistically significant differences in variables other than academic background, sleep, or departmental affiliation. Excluding the administration department, the results showed significant differences in sleep and department. The analysis of variables with adjusting all them demonstrated that the only condition showing a significant difference was department.

In other words, the most noticeable difference in this study was the type of department in which the subjects worked. Emotional labor level differed statistically significantly between departments, with the emergency medical service department having higher scores of emotional labor and more high risk group compared to the rescue and fire suppression departments. A study on the posttraumatic stress disorder status of firefighters performed by the National Emergency Management Agency in 2008 found that there was a difference in the frequency of call made by each department. The percentage of people who answered

that they responded to more than 30 calls a week was the highest in the emergency medical department (26%), while on the other hand, fire suppression was about 10%, rescue was 20%, and administration was less than 10% [39]. Although it is difficult to interpret the frequency of call equally due to different tasks, the frequency of call must be considered to influence emotional labor. In addition, there are differences in the content of the tasks, and fire suppression department is mainly responsible for extinguishing fires, which happens less frequently than public tasks. Rescue work is often related to animals or objects, so the frequency of civil contact is low. Emergency medical services are often responsible for the transfer of patients in medical emergency situations, and the medical institution carries out continuous public service until it is handed over to the medical institution. Emergency medical services, compared to the fire suppression and rescue departments, had a greater frequency of exposure to civil complaints due to the nature of their work, which would have affected the difference in emotional labor level. However, age was not significant among the general characteristics, nor was educational background, marital status, or shift work. This was not consistent with previous research findings, which found that emotional labor is higher in the younger age group, among higher educated persons, unmarried persons, and shift workers [4,11]. In previous studies on age, the results were relatively high in people in their 30s and 40s and decreased in those in their 20s, which was not a linear result of higher emotional labor in their younger ages, and there was no difference in other studies [4,40]. Although the difference reflects an improvement in the ability to withstand or control emotional labor as age increases, age differences in different occupational groups can be interpreted to produce different results. It is estimated that this tendency in the existing research is due to the steady increase in the number of employed people in the service sector in recent years, with the number of young college graduates mostly employed, increasing the number of young, educated, and emotional workers who are single [13]. However, in the case of fire service personnel, the general service sector's characteristics were not reflected in the professional nature, which would have resulted in a result that was not significant.

In addition to the unique task of extinguishing fires, firefighters have recently been recognized as being part of a comprehensive response service package that provides diverse services such as rescue, first aid, patient transfer, living safety, and even location tracking. Also, the role of firefighters has recently been emphasized under the goal of promoting public safety and welfare, especially in a department where emergency medical service has stronger characteristics than other departments. This is because the emergency medical service department includes not only patients with medical problems but also transfer services to a comprehensive medical institution under various circumstances. Directly or indirectly, the mental health of firefighters is known to be worse than that of the general public due to physical burdens, drunken assaults, civil complaints, and posttraumatic stress, which can result in direct exposure to high-level emotional labor [41]. As a result, direct exposure to such activities as transporting or disposing of drunken people is thought to be a big part of the occurrence of high risk groups of emotional labor. Also, it was predicted that the administration has a high level of emotional labor, as a study of call center counselors showed that responding to emergency call requests appears to cause emotional labor level as a public service in a tense state [42]. As a result, contact with civil petitions is essential due to the nature of the work, and the burden on service providers will increase according to users' expectations, so workers are likely to suffer from emotional labor and high risk emotional labor [43]. However, in this study, the basic characteristics such as age, shift work status in the administration department were somewhat different compared to those of other departments.

Thus, after those characteristics have been adjusted, there were no statistically significant differences of emotional labor between administration department and other departments.

Meanwhile, in this study, the overall level of emotional labor was 47.2 points, lower than other jobs [11]. In this study, it is believed that there will be an effect on health workers that results in lower levels of death and disease for the working population compared to the general population, by conducting surveys on a worker's health. However, the important thing expressed by each department is that the average score does not represent all the departments. Fire service personnel average 47.2 points overall, which is lower than 51.2 points for the steward and 52.9 points for the guards, for example—positions known to have high emotional labor in all occupations, including firefighters [11]—but it is even worse for emergency or administrative departments, with 52.6 points and 54.0 points, respectively.

On the other hand, other study [11] showed that the emotional labor level of firefighters was higher than one in this study, and it is likely to differ depending on the nature of the survey. In this study, emotional labor items are included as items of examination under the local fire station and the general examination convention, whereas in other studies, there may be differences in design focused only on various types of emotional labor surveys for investigation of pure emotional labor, and if items of emotional labor are included in the examination, the desire for psychologically healthy results is included with other examination items, including physical examination, and thus are not likely to be underestimated. In such cases, however, if the total score of the emotional labor of firefighters is undervalued but still assessed by the department, all participants are under the same conditions, and thus the significance of different departments remains unchanged. Therefore, it can still be emphasized that the purpose of this study is to find vulnerable departments in the survey of emotional labor by department.

Analysis conducted by subcategories of emotional labor resulted in significant differences in "overload and conflict in customer service" and "organizational support and monitoring". This means that there are differences between departments in categories of customer characteristics (overload and conflict in customer service) and organizational characteristics (organizational support and monitoring) rather than in categories of emotion or effort that are subjectively felt (emotional demand and registration, emotional disharmony and hurt). Moreover, it indicates that the differences in those 2 categories eventually affect the level of overall emotional labor. These results will be available as a basis for presenting measures against emotional labor.

As a limitation of this study, we focused on the phenomenon of divisional differences by job contents in emotional labor and did not conduct an analysis of the health effects resulting from differences in emotional labor. Other prior studies have shown that emotional labor has an impact on reduced organizational commitment, increased suicidal ideation, reduced job satisfaction, and increased burn-out [5,10,44]. Combining this study with the design of prior research, it is thought that an analysis of the differences in emotional labor level and the health effects of different departments will be necessary in the future. Since there has been no specific assessment of the factors of emotional labor in each department, further evaluation of the relevant factors of emotional labor by each department is required, as is further study of the specialized management methods of each department. Another limitation is that the number of subjects studied was rather small, was male-only, and only specific areas were examined. Furthermore, this study was conducted retrospectively for

a firefighter who visited the hospital for a medical checkup. The representative sampling method was not applied because of the small sample size, which is a limitation of its validity. In addition, there may be a possibility of underreporting because public officials are worried about the exposure of subjects' real names as public servants in the country.

Finally, based on the results of this study, it is necessary to prevent emotional labor risks by thoroughly doing preventive and follow-up management, including moving at-risk firefighter to other departments or placing them in a new job in the emergency medical service department. In the case of departments at high risk of emotional labor, it is necessary to apply occupational medical assessment, such as the investigation of resilience and pre-placement medical exams, to select firefighter with low thresholds for emotional labor, and to establish a system to actively attempt to deploy transition in the future if necessary. Furthermore, it is necessary to make institutional changes, such as special examinations for the estimated 6 million emotional labor workers in Korea.

CONCLUSIONS

In this study, the analysis of firefighters indicated that the education and prevention of emotional labor prior to their assignment needs to be done more thoroughly, as more high risk emotional labor may occur in the emergency medical service department depending on the characteristics of the work.

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