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홍기훈[1] · 최병선[2] · 박정덕[2]

[1]중앙대학교 의과대학 예방의학교실 박사과정, [2]중앙대학교 의과대학 예방의학교실 교수

Effect of Team Work on Depressive Mood in Korean Employees

Kihun Hong[1] · Byung-Sun Choi[2] · Jung-Duck Park[2]

[1]Ph.D. Student, Department of Preventive Medicine, College of Medicine, Chung-Ang University, Seoul, Republic of Korea
[2]Professor, Department of Preventive Medicine, College of Medicine, Chung-Ang University, Seoul, Republic of Korea

Purpose : Job stress is a risk factor for depression. Many employees work in teams. However, few studies have examined the effect of team work and team climate on employees' mental health in the workplace. We investigated the associations between team work and depression among Korean employees.

Methods : We conducted a secondary analysis of data from the 5th Korean Working Conditions Survey (KWCS), a cross-sectional national survey. The sample comprised 30,235 wage employees over the age of 15, including 14,555 men and 15,680 women. To measure team work, respondents were asked, "Do you work in a group or team that has common tasks and can plan its work?" Depressive mood was measured using the 5-item World Health Organization (WHO-5) Well-Being Index. The analysis was conducted by univariate and multiple logistic regression analyses to estimate the effect of team work on depressive mood.

Results : Depressive mood was observed in 26.6% of team employees and 29.5% of those without a team (out of all wage employees), indicating a significant difference. After adjusting for demographic and workplace characteristics as potential confounding variables, as compared to non-team work, the odds ratios of depressive mood for team work were 0.96 (95% CI: 0.88-1.04) for men, which was not statistically significant, and 0.80 (95% CI: 0.73-0.87) for women, which was statistically significant.

Conclusion : Our findings can be used to develop safety and health policies to improve the mental health of Korean employees. Reorganizing companies to support team work would also benefit the mental health of wage employees, especially female employees.

Keywords: depression, employee, job stress, team work
핵심어: 우울증, 근로자, 직무 스트레스, 팀 근무

Corresponding author
Jung-Duck Park
Department of Preventive Medicine, College of Medicine, Chung-Ang University, 84 Heukseok-ro, Dongjak-gu, Seoul 06974, Republic of Korea
Tel: +82-2-820-5668
E-mail: jdpark@cau.ac.kr

Background

Depression can be caused by certain life events, and has many risk factors[1]. Among the risk factors for depression, Lee et al.[2] examined demographic traits, while Duchaine et al.[3] investigated diverse elements of the workplace. Several workplace elements such as long working hours, work-life imbalance, quality of supervisor's behavior, workplace discrimination, workplace violence, and shift work have been identified as risk factors for depression[4-9].

Many researchers have identified job stress as a risk factor for depression[10,11]. Generally, three models have been used to measure job stress[11]. First, the job strain model, which measures job demand and job control; second, the organizational justice model, which consists of distributive justice, procedural justice, and interactional justice; and third, the team climate model, which examines team climate and has four major dimensions: vision, participation safety, task orientation, and support for innovation[12-15]. While several South Korean researchers have used the job strain and organizational justice models in their studies, they have not employed the team climate model.

Similarly, researchers in other countries have also applied the job strain and organizational justice models, but few studies have used the team climate model[14,15]. The team climate model examines team climate, which has four major dimensions: vision, participation safety, task orientation, and support for innovation[13]. Sinokki et al.[14] found that a poor team climate at work was associated with depressive disorders, and Piirainen et al.[15] reported that a tense, prejudiced atmosphere has a greater association with work-related symptoms than a relaxed and supportive climate does.

Several researchers have investigated how team work influences aspects of the efficient management of human resources, communication, and organizational conflict in the Republic of Korea[16-18]. However, no studies have examined the effect of team work on depression among South Korean workers. However, there has been no research on the association between team work and mental health in Korea.

Therefore, we investigated the associations between team work and depression among employees in the Republic of Korea using data from the 5th Korean Working Conditions Survey (KWCS).

Methods

1. Data source

We analyzed the 5th KWCS conducted by the Occupational Safety and Health Research Institute (OSHRI) under the Ministry of Employment and Labor. The KWCS is a repeated cross-sectional study conducted every three years since 2006. The KWCS is a large-scale national survey to investigate occupational and environmental risk factors, and provide preliminary data for improving working conditions. It is based on the European Working Conditions Survey (EWCS) and the British Labour Force Survey (LFS) to establish safety and health policies[19]. This survey sampled approximately 50,000 households through a secondary probability proportion stratified cluster sample survey. The final respondents were determined as employees over the

age of 15 who reside in the sampled households, and the respondents as those who have worked at least one hour solely for the purpose of earning an "income" over the past one week from the survey.

2. Study sample

We extracted data from the 5th KWCS. The 5th KWCS surveyed 50,205 respondents. Furthermore, to determine the effect of team work on depression among wage employees, we excluded 19,905 respondents who were self-employed without employees, self-employed with employees, and unpaid family employees. Additionally, we excluded 65 respondents who refused to respond. Thus, our final sample consisted of 30,235 respondents (Figure 1).

3. Variables

These variables were referred from the 5th KWCS questionnaire items.

1) Independent variable

Team work: The item for this aspect was, "Do you work in a group or team that has common tasks and can plan its work?" Respondents were divided into two categories: the "team work" group comprised those who marked "Yes, always with the same one" or "Yes, with several," and the "non-team work" group comprised those who marked "I do not work with such a team or group."

2) Dependent variable

Depressive mood: The primary outcome of this study was depressive mood, which was measured using the 5-item World Health Organization (WHO-5) Well-Being Index[20]. The item was, "For each of the five statements, please indicate which tone most closely describes how you have been feeling over the past two weeks." It included 5 sub-items: "I have felt cheerful and in good spirits," "I have felt calm and relaxed," "I have felt active and vigorous," "I have woken up feeling fresh and rested," and "My daily life has been filled with things that interest me." The options for each sub-item
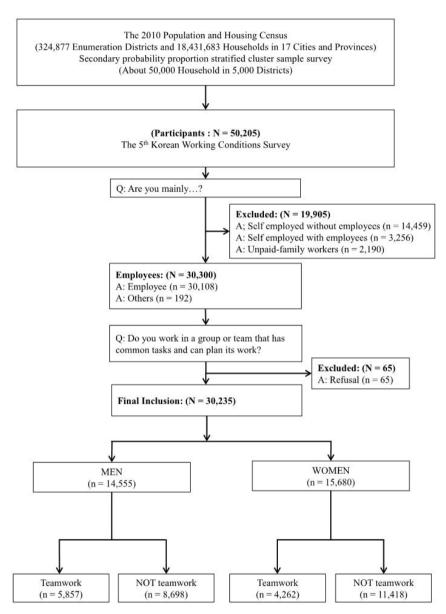
Fig. 1. Flow chart of analyzed subjects. The main variables are depressive mood and team work

were, "All the time," "Most of the time," "More than half of the time," "Less than half of the time," "Sometimes," and "Not applicable." Based on these items (responses ranging from 0 to 5), we computed the WHO-5 score by multiplying the raw score by 4. We defined ≥50 points as "depressive mood" and < 50 points as "normal mood."[20]

3) Other independent variables

We considered confounding variables related to depressive mood. Age and socio-economic status (education level, income, and occupation) were selected as demographic characteristics. We re-categorized the 11 categories of the Korean Standard Classification of Occupations into five groups: "office workers," "administrators/professionals/soldiers" (including administrators, professionals, engineers, semi-professionals, and soldiers), "services/sales," "blue-collar" (including skilled agriculture, forestry and fisheries, technical skilled work, related skills, equipment-machinery operators, and assembly workers), and "simple labor".

Additionally, we explored diverse workplace characteristics. We categorized employment into the

two groups: "full-time employees" and "part-time employees," including temporary and day employees. To examine the experience of dealing directly with people and handling angry clients, we used the item "Please tell me, using the same scale, does your main paid job involve...?" with a sub-item "experience of dealing directly with people who are not employees at your workplace, such as customers, passengers, students, patients, etc.," and "handling angry clients." Then, we identified "experience of dealing directly with people" and "handling angry clients," if the respondent spent more than half of their working hours dealing directly with people or handling angry clients. To determine work-life imbalance, we used the item "How do your working hours fit in with your family or social commitments outside of work?" The answers "not very well" and "not well at all" indicated work-life imbalance. We measured the quality of a supervisor's behavior through a 6-item questionnaire. The items included: "My immediate boss respects me as a person" and "My immediate boss praises and recognizes me when I do a good job." Other items included: "Is there success in getting people to work together?" "Is your manager helpful in getting the job done?" "Provides useful feedback on my work," and "Encourages and supports my development." The options for these items were 1=strongly agree, 2=agree somewhat, 3=neither agree nor disagree, 4=disagree somewhat, and 5=strongly disagree. The index for the quality of a supervisor's behavior ranged from 6 to 30, using the median value of 13 as the cut-off, with higher scores indicating a more promising quality. By adding the 6-item survey, the reliability analysis indicated a Cronbach's coefficient alpha of 0.907 for supervisor's behavior index.

To identify workplace discrimination, we used the item, "Over the past 12 months, have you experienced any discrimination at work?" This included discrimination based on age, race, ethnicity, nationality, sex (male/female), religion, disability, sexual orientation, educational level, hometown, and employment status. The options for

the items were "Yes", "No", "Don't Know/No Answer", and "Refusal". In this study, we considered an answer of "Yes" to indicate that the respondent had experienced workplace discrimination. To identify workplace violence, we used the item, "Over the past month, have you been subjected to any of the following during work?" This included verbal abuse, unwanted sexual attention, threats, and humiliation. The options for the items were "Yes", "No", "Don't Know/No Answer", and "Refusal". In this study, we considered an answer of "Yes" to indicate that the respondent had experienced workplace violence.

4. Statistical analyses

We performed descriptive statistics (proportions) and followed x^2 tests to establish the prevalence of depressive mood by comparing demographic characteristics and workplace characteristics by sex. Then, we performed univariate and multiple logistic regression analyses to estimate the effect of team work on depressive mood in wage employees. In Model 1, we adjusted demographic traits, including sex, age group, educational level, and occupation. We further adjusted Model 2 by including workplace characteristics as potential confounding variables, such as employment status, hours worked per week, experience of dealing directly with people, work-life imbalance, supervisory behavior, workplace discrimination, workplace violence, and shift work. To evaluate the variables of model 1 and model 2, we analyzed the variables included in the univariate and multiple logistic regression analyzes. Therefore, we calculated the odds ratios (ORs) and 95% confidence intervals (CIs) using multiple logistic regression after adjusting for potential confounding variables to estimate the effect of demographic and workplace characteristics on depressive mood in wage employees. We excluded the experience of handling angry clients, which did not significantly affect depressive mood as per multiple logistic regression analysis. Although shift work did not affect depressive mood in the multiple logistic regression, we included it, as many researchers have

reported it as a significant risk factor for depression[21]. We used the PASW Statistical package, version 19 (SPSS Inc., Chicago, IL, USA). A p-value ⟨0.05 was considered statistically significant.

Results

1. Distribution of subjects and the prevalence of depressive mood according to demographic characteristics and workplace characteristics by sex

Among the 30,235 respondents, 48.1%(14,555) were men and 51.9%(15,680) were women (Table 1). Table 1 shows that the prevalence of depressive mood among wage employees was 28.5%, with 28.3% (4,121) for men and 28.7% (4,505) for women. There was no statistically significant difference in terms of

sex. The prevalence of depressive mood increased with age, lower educational level, and lower average monthly household income. In terms of occupation, office employees had the lowest prevalence of depressive mood at 22.1%, followed by administrators/professionals/soldiers, services/sales, blue-collar, and simple laborers.

Additionally, the prevalence of depressive mood is increased by part-time employee, work-life imbalance, poor supervisor behavior, workplace discrimination, and workplace violence. The prevalence of depressive mood among women did not differ based on whether they worked more or less than 40 hours a week. Contrary to expectations, the prevalence of depressive mood was lower among all wage employees who dealt directly with people

Table 1. Distribution of study subjects and prevalence of depressive mood by demographic and workplace characteristics in the study subjects among Korean employees

	Men			Women			Total		
	Subjects	Depressive Mood		Subjects	Depressive Mood		Subjects	Depressive Mood	
	N	N	(%)	N	N	(%)	N	N	(%)
Total	14,555	4,121	(28.3)	15,680	4,505	(28.7)	30,235	8,626	(28.5)
p-value*									0.42
Demographics characteristics									
Age groups									
15 – 29	981	182	(18.5)	1,102	215	(19.5)	2,083	397	(19.1)
30 – 39	3,106	740	(23.8)	2,679	573	(21.4)	5,785	1,313	(22.7)
40 – 49	3,818	1,001	(26.2)	3,859	1,013	(26.2)	7,677	2,014	(26.2)
50 – 59	3,368	991	(29.4)	4,311	1,225	(28.4)	7,679	2,216	(28.9)
60 ≤	3,282	1,207	(36.8)	3,729	1,479	(39.7)	7,011	2,686	(38.3)
p-value†			⟨ 0.01			⟨ 0.01			⟨ 0.01
Education									
Middle or below	1,459	652	(44.7)	2,372	1,052	(44.3)	3,831	1,704	(44.5)
High	4,801	1,590	(33.1)	5,754	1,701	(29.6)	10,555	3,291	(31.2)
College or above	8,283	1,878	(22.7)	7,543	1,749	(23.2)	15,826	3,627	(22.9)
p-value†			⟨ 0.01			⟨ 0.01			⟨ 0.01
Occupations									
Office worker	3,379	713	(21.1)	3,518	813	(23.1)	6,897	1,526	(22.1)
Administrator/Professional/Soldier	2,374	595	(25.1)	2,385	541	(22.7)	4,759	1,136	(23.9)
Services/Sales	2,763	679	(24.6)	6,254	1,755	(28.1)	9,017	2,434	(27.0)
Blue-collar	3,752	1,145	(30.5)	865	251	(29.0)	4,617	1,396	(30.2)
Simple labor	2,261	985	(43.6)	2,630	1,142	(43.4)	4,891	2,127	(43.5)
p-value†			⟨ 0.01			⟨ 0.01			⟨ 0.01

Monthly household income, KRW		Trend							
Below 1,000,000	752	268	(35.6)	2,315	882	(38.1)	3,067	1,150	(37.5)
1,000,000 – 1,999,999	2,481	839	(33.8)	6,790	2,037	(30.0)	9,271	2,876	(31.0)
2,000,000 – 2,999,999	4,252	1,258	(29.6)	4,403	1,097	(24.9)	8,655	2,355	(27.2)
3,000,000 ≤	6,933	1,708	(24.6)	2,057	451	(21.9)	8,990	2,159	(24.0)
p-value[†]			⟨ 0.01			⟨ 0.01			⟨ 0.01
Workplace characteristics									
Employment status									
Full-time	11,863	3,104	(26.2)	11,370	2,953	(26.0)	23,233	6,057	(26.1)
Part-time	2,692	1,017	(37.8)	4,310	1,552	(36.0)	7,002	2,569	(36.7)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01
Working hours									
Less than 40 Hrs/w	7,817	2,005	(25.6)	10,021	2,883	(28.8)	17,838	4,888	(27.4)
Over 40 Hrs/w	6,738	2,116	(31.4)	5,659	1,622	(28.7)	12,397	3,738	(30.1)
p-value*			⟨ 0.01			0.89			⟨ 0.01
Dealing directly with people									
No	8,804	2,655	(30.2)	6,810	2,216	(32.5)	15,614	4,871	(31.2)
Yes	5,751	1,466	(25.5)	8,870	2,289	(25.8)	14,621	3,755	(25.7)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01
Handling angry clients									
No	13,292	3,791	(28.5)	13,876	4,025	(29.0)	27,168	7,816	(28.8)
Yes	1,263	330	(26.1)	1,804	480	(26.6)	3,067	810	(26.4)
p-value*			0.07			0.03			0.01
Shift work									
No	12,476	3,444	(27.6)	14,057	4,055	(28.8)	26,533	7,499	(28.3)
Yes	2,075	674	(32.5)	1,621	450	(27.8)	3,696	1,124	(30.4)
p-value*			⟨ 0.01			0.36			0.01
Work-life imbalance									
No	10,787	2,781	(25.8)	12,406	3,391	(27.3)	23,193	6,172	(26.6)
Yes	3,745	1,331	(35.5)	3,262	1,107	(33.9)	7,007	2,438	(34.8)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01
Index for quality of supervisor's behavior									
Higher	6,517	1,324	(20.3)	6,788	1,393	(20.5)	13,305	2,717	(20.4)
Lower	7,800	2,680	(34.4)	8,427	2,919	(34.6)	16,227	5,599	(34.5)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01
Workplace discrimination									
No	12,669	3,521	(27.8)	13,775	3,877	(28.1)	26,444	7,398	(28.0)
Yes	1,886	600	(31.8)	1,905	628	(33.0)	3,791	1,228	(32.4)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01
Workplace violence									
No	13,548	3,731	(27.5)	14,653	4,160	(28.4)	28,201	7,891	(28.0)
Yes	1,007	390	(38.7)	1,027	345	(33.6)	2,034	735	(36.1)
p-value*			⟨ 0.01			⟨ 0.01			⟨ 0.01

*: Pearson's chi-square analysis, [†]: non-parametric trend analysis.

or handled angry clients than in those who did not have such experience. Among male shift employees, the prevalence of depressive mood (32.5%) was significantly higher than non-shift employees (27.6%).

2. The effect of team work on the respondents' depressive mood

Among the 30,235 wage employees, 33.5%(10,119) worked on teams and 66.5%(20,116) did not (Table 2). According to Model 1, after adjusting for demographic factors, the odds ratios of depressive mood for team work were 0.94 (95% CI: 0.87-1.02) for men, which were not statistically significant, and 0.80 (95% CI: 0.73-0.87) for women, which were statistically significant. In Model 2, after adjusting for demographic characteristics and workplace factors that were potentially confounding, team work no longer had a statistically significant effect on men. Furthermore, team work reduced depressive mood by 20% among women.

Depressive mood was observed in 26.6% of team employees and 29.5% of those without a team (out of all wage employees), indicating a significant difference. The prevalence of depressive mood among male team employees was 27.4%, while it was 28.9% among those without a team, suggesting a

significant difference. The univariate regression revealed that the risk of depressive mood was 7% lower in team work than in non-team work. For women, the prevalence of depressive mood among team employees was 25.5%, while it was 29.9% among those who did not work on a team, implying a significant difference. The univariate regression revealed that the risk of depressive mood was 20% lower in team work than in non-team work.

3. Effect of demographic characteristics and workplace factors on depressive mood in the study sample

We performed multiple logistic regression analysis to examine the effect of demographic characteristics and workplace factors on depressive mood (Table 3). The odds ratios of depressive mood for part-time employees, work-life imbalance, a supervisor's behavior being of lower quality, and workplace violence were 1.16 (95% CI: 1.08-1.25), 1.30 (95% CI: 1.22-1.38), 1.91 (95% CI: 1.81-2.02), and 1.35 (95% CI: 1.22-1.50), respectively. However, dealing directly with people was significantly associated with lowering depressive mood, with an odds ratio of 0.79 (95% CI: 0.74-0.84).

Depressive mood increased significantly by 8% for all wage employees who worked over 40 hours per

Table 2. Odds ratios for depressive mood according to team work in the study subjects

	Men			Women			Total		
	N(%)	OR*	95% CI†	N(%)	OR*	95% CI†	N(%)	OR*	95% CI†
Team work									
No	8,698(59.8)			11,418(72.8)			20,116(66.5)		
Normal	6,181(71.1)			8,001(70.1)			14,182(70.5)		
Depressive mood	2,517(28.9)			3,417(29.9)			5,934(29.5)		
Yes	5,857(40.2)			4,262(27.2)			10,119(33.5)		
Normal	4,253(72.6)			3,174(74.5)			7,427(73.4)		
Depressive mood	1,604(27.4)			1,088(25.5)			2,692(26.6)		
Crude		0.93	0.86-1.00†		0.80	0.74-0.87		0.87	0.82-0.91
Model 1		0.94	0.87-1.02		0.80	0.73-0.87		0.87	0.82-0.92
Model 2		0.96	0.88-1.04		0.80	0.73-0.87		0.88	0.83-0.93

Model 1: Adjusted for sex, age groups, education, occupations, and monthly household income.
Model 2: Adjusted for demographic variables which were included in model 1, and workplace characteristics variables (employment status, working hours, dealing directly with people, work-life imbalance, index for quality of supervisor's behavior, workplace discrimination, workplace violence, and shift work).
OR*: Adjusted odds ratios, CI†: 95% confidence intervals, †: p-value: 0.042.

Table 3. Multiple logistic regression analysis of contributing factors to depressive mood in the study subjects among Korean employees

	Men		Women		Total	
	OR*	95% CI†	OR*	95% CI†	OR*	95% CI†
Demographics characteristics						
Sex						
Men					1.00	Ref
Women					0.97	0.91–1.03
Age groups						
15 – 29	1.00	Ref	1.00	Ref	1.00	Ref
30 – 39	1.95	1.59–2.40	1.19	0.99–1.43	1.50	1.31–1.72
40 – 49	2.21	1.80–2.71	1.57	1.32–1.87	1.81	1.59–2.07
50 – 59	2.28	1.85–2.79	1.58	1.32–1.87	1.82	1.60–2.08
60 ≤	2.14	1.74–2.62	1.85	1.53–2.24	1.93	1.68–2.21
Education						
Middle or below	1.00	Ref	1.0	Ref	1.0	Ref
High	0.82	0.71–0.95	0.76	0.67–0.88	0.78	0.71–0.86
College or above	0.62	0.52–0.73	0.73	0.62–0.86	0.66	0.59–0.74
Occupations						
Office worker	1.00	Ref	1.00	Ref	1.00	Ref
Administrator/Professional/Soldier	1.28	1.12–1.45	1.09	0.96–1.25	1.20	1.09–1.31
Services/Sales	1.09	0.94–1.25	1.09	0.97–1.24	1.10	1.00–1.20
Blue-collar	1.12	0.99–1.27	0.96	0.79–1.15	1.10	0.99–1.21
Simple labor	1.48	1.26–1.75	1.36	1.16–1.59	1.43	1.28–1.60
Monthly household income, KRW						
Below 1,000,000	1.00	Ref	1.00	Ref	1.00	Ref
1,000,000 – 1,999,999	0.81	0.66–0.98	0.88	0.78–1.00	0.85	0.76–0.94
2,000,000 – 2,999,999	0.79	0.65–0.97	0.83	0.72–0.97	0.82	0.73–0.93
3,000,000 ≤	0.72	0.58–0.89	0.75	0.63–0.89	0.75	0.66–0.85
Workplace characteristics						
Employment status						
Full-time	1.00	Ref	1.00	Ref	1.00	Ref
Part-time	1.17	1.04–1.31	1.15	1.04–1.27	1.16	1.08–1.25
Working hours						
Less than 40 Hrs/w	1.00	Ref	1.00	Ref	1.00	Ref
Over 40 Hrs/w	1.16	1.07–1.26	1.00	0.92–1.09	1.08	1.02–1.15
Dealing directly with people						
No	1.00	Ref	1.00	Ref	1.00	Ref
Yes	0.77	0.70–0.84	0.81	0.74–0.89	0.79	0.74–0.84
Handling angry clients						
No	1.00	Ref	1.00	Ref	1.00	Ref
Yes	0.94	0.82–1.09	0.99	0.88–1.12	0.98	0.89–1.07
Shift work						
No	1.00	Ref	1.00	Ref	1.00	Ref

Yes	1.04	0.93–1.16	0.98	0.87–1.11	1.02	0.94–1.10
Work–life imbalance						
No	1.00	Ref	1.00	Ref	1.00	Ref
Yes	1.30	1.19–1.42	1.30	1.19–1.43	1.30	1.22–1.38
Quality of supervisor behavior index						
Higher	1.00	Ref	1.00	Ref	1.00	Ref
Lower	1.88	1.74–2.04	1.93	1.79–2.09	1.91	1.81–2.02
Workplace discrimination						
No	1.00	Ref	1.00	Ref	1.00	Ref
Yes	1.02	0.91–1.15	1.21	1.08–1.35	1.11	1.02–1.20
Workplace violence						
No	1.00	Ref	1.00	Ref	1.00	Ref
Yes	1.38	1.20–1.60	1.33	1.15–1.54	1.35	1.22–1.50

OR*: Adjusted odds ratios; Adjusted for sex, age groups, education, occupations, monthly household income, employment status, working hours, dealing directly with people, handling angry clients, shift work, work–life imbalance, index for quality of supervisor's behavior, workplace discrimination, and workplace violence.

CI[†]: 95% confidence intervals

week compared to those who worked less than 40 hours per week; this increase was 16% among men, but not significant among women. Workplace discrimination significantly increased depressive mood among all wage employees by 11% and among women by 21%, but not among men. Moreover, the odds ratios of depressive mood among employees with experience of handling angry clients were 0.98 (95% CI: 0.89-1.07) among all wage employees, 0.94 (95% CI: 0.82-1.09) for men, and 0.99 (95% CI: 0.88-1.12) for women. Furthermore, the odds ratio of depressive mood among shift employees was 1.02 (95% CI: 0.94-1.10). Additionally, there was no statistically significant effect among all shift employees.

Discussion

This nationally representative study using data from the 5th KWCS showed that team work significantly reduced depressive mood among all wage employees. To the best of our knowledge, this is the first study that examined the effect of team work on depressive mood among South Korean wage employees.

The present study found that team work reduced depressive mood by 7% for men and by 20% for women, but no statistically significant effect was observed for men after adjusting for demographic and workplace factors that were potentially confounding (Table 2). However, there was a statistically significant effect among women. Despite the difficulty of comparing our results with those of previous studies, in other countries, previous studies have been carried out on the effect of team climate on depression in workers[11,14], but no other studies have investigated the effect of working or not working on a team on depression. Moreover, as no such studies have been previously conducted in Korea, our assessment of the relationship between team work and depressive mood has practical value, as it contributes to the mental well-being of employees. Therefore, our findings suggest that team work could improve the mental health of employees, especially women.

This study found no statistically significant differences in the prevalence of depressive mood between sexes. A previous study of 7,633 South Korean service and sales employees also revealed no statistically significant differences between sexes[22]. However, it found a higher prevalence of depressive mood than ours. Thus far, previous research has found sex differences in the prevalence of depression, depressive symptoms, and depressive disorders. Lee et al. reported that the prevalence of depressive disorder was 1.8% among men and 4.3% among women, indicating a statistically significant

difference[2]. In the US, Villarroel and Terlizzi[23] revealed a greater prevalence of depressive symptoms among women than among men. According to Kuehner[24], it is important to monitor the changing socioeconomic and cultural trends in factors affecting the sex gap. Moreover, as our sample included wage employees, the lack of differences in the prevalence of depression could be explained by respondents who did not have risk factors for depression, such as unemployment.

In this study, the prevalence of depressive mood increased with age. It is consistent with the results of Kim et al.[25], who found that the prevalence of major depressive disorder was 2.67% for those aged 20-29, 5.73% for 40-59, 13.86% for 60-79, and 18.36% for 80 and above. Additionally, depressive mood decreased with higher education and household income. This finding correlates with Hinata et al.[26], which used the 38,499 respondents aged 40-74 from the Murakami and Uonuma cohorts and demonstrated that the prevalence of depression was lower in higher education and household income groups versus lower education and household income groups.

Workplace characteristics such as part-time work, work-life imbalance, poor supervisor behavior, and workplace violence increased depressive mood (Table 3). These findings are consistent with those of Lim et al.[27], who found that work-life imbalance exacerbated depressive mood, and Hämming et al.[5], who showed that work-life conflict is associated with mental health problems. A previous study using the 6th EWCS found that poor supervisory behavior was associated with poor mental health[6]. Furthermore, this result aligns with those of previous studies in which workplace violence was found to be a risk factor for depression[8].

In this study, working over 40 hours per week had a significant effect on depressive mood, but not for women. Lee et al.[28] indicated that long working hours are associated with depressive symptoms in both men and women, but among women, it was significant only when they worked extremely long hours. Furthermore, in this study, workplace discrimination significantly influenced depressive mood only in women. Prior research has focused on workplace discrimination against women[29].

The effect of handling angry clients was not statistically significant. This outcome differs from past studies such as Chun et al.[22] who reported that the experience of handling angry clients increased depressive symptoms among service and sales employees, and Kang et al.[30], who found that depressive mood among employees with experience of handling angry clients was exacerbated as they spent more time interacting with angry clients. This deviation is likely due to differences in the study subjects and varying degrees of exposure to angry clients. Additionally, "dealing directly with people," which was associated with lowering depressive mood, may have been a confounding variable in the effect of "handling angry clients" on depressive mood. It was found that handling angry clients had a statistically significant effect on the depressive mood in men, but not in women (data were not shown).

Furthermore, previous studies on the effect of shift work on depression have yielded inconsistent results. Of the 15 studies covered in a systematic review article, shift work was associated with depressive symptoms in 12 studies[21]. In a systematic review of meta-analyses on shift work and its association with chronic health conditions, the evidence was unclear[31]. However, in the present study, there was no significant effect of shift work on depressive mood, even in the results of the multivariate regression analysis. These differences could be partly due to different working hours across countries[31].

According to our multiple logistic regression analysis for effects of demographic and workplace characteristics on depressive mood, some demographic characteristics, such as age, educational level, average monthly household income, and occupation were associated with depressive mood. Sex, however, was not associated with the depressive mood of wage employees. Moreover, workplace factors such as

employment status, working hours per week, work-life imbalance, supervisory behavior, workplace discrimination, and workplace violence were associated with depressive mood. Conversely, the workplace characteristic of dealing directly with people was associated with lowering depressive mood. Furthermore, shift work and handling angry clients were not significantly associated with depressive mood. These results were obtained after adjusting for several diverse workplace characteristics that affect depressive mood.

Blue-collar workers were mostly men, while services and sales workers were mostly women; the smallest proportion of those working on a team was found among services and sales workers (Table 4). After

multiple logistic regression that was conducted by stratifying services and sales workers and the others, results showed that team work reduced depressive mood by 22% among services and sales workers for men, but not among other types of workers. For women, team work reduced depressive mood by 32% among services and sales workers, and by only 14% among other types of workers. By occupation, team work had the greatest effect on reducing depression for services and sales employees. The varying results of the effects of team work by occupation suggest that different effects of team work according to gender may be caused by different occupation groups.

However, this study has some limitations. First, the

Table 4. Odds ratios for depressive mood according to team work in the study subjects

	Men			Women			Total		
	N(%)	OR*	95% CI†	N(%)	OR*	95% CI†	N(%)	OR*	95% CI†
Occupations									
Service/Sales									
Team work									
No	1,950(70.6)			4,772(76.3)			6,722(74.6)		
Normal	1,450(74.4)			3,343(70.1)			4,793(71.3)		
Depressive mood	500(25.6)			1,429(29.9)			1,929(28.7)		
Yes	813(29.4)			1,482(23.7)			2,295(25.4)		
Normal	634(78.0)			1,156(78.0)			1,790(78.0)		
Depressive mood	179(22.0)			326(22.0)			505(22.0)		
Crude		0.82	0.67–0.99		0.66	0.57–0.76		0.70	0.63–0.78
Model 1		0.80	0.65–0.98		0.65	0.56–0.75		0.69	0.62–0.77
Model 2		0.78	0.63–0.97		0.68	0.58–0.78		0.71	0.63–0.80
Non-Service/Sales									
Team work									
No	6,730(57.2)			6,619(70.4)			13,349(63.1)		
Normal	4,715(70.1)			4,634(70.0)			9,349(70.0)		
Depressive mood	2,015(29.9)			1,985(30.0)			4,000(30.0)		
Yes	5,036(42.8)			2,779(29.6)			7,815(36.9)		
Normal	3,613(71.7)			2,017(72.6)			5,630(72.0)		
Depressive mood	1,423(28.3)			762(27.4)			2,185(28.0)		
Crude		0.92	0.85–1.00#		0.88	0.80–0.97		0.91	0.85–0.96
Model 1		0.97	0.90–1.06		0.88	0.80–0.98		0.93	0.87–0.99
Model 2		0.99	0.90–1.07		0.86	0.77–0.96		0.93	0.87–1.00#

Model 1: Adjusted for sex, age groups, education, occupations, and monthly household income.
Model 2: Adjusted for demographic variables which were included in model 1, and workplace characteristics variables (employment status, working hours, dealing directly with people, work-life imbalance, index for quality of supervisor's behavior, workplace discrimination, workplace violence, and shift work).
OR*: Adjusted odds ratios, CI†: 95% confidence intervals, †: p-value: $\langle$ 0.05.

constraint of a cross-sectional study is that the temporal relationship between the outcome and exposure cannot be determined, as both are examined simultaneously. Second, depressive mood, described as a response to "feelings in the past two weeks," is not the same as clinical depressive disorder. Third, our results cannot be compared to those of prior research precisely because certain variables are defined differently across studies.

Despite the limitations, our results represent Korean wage employees. As the KWCS investigated many questionnaire items, these results may be more accurate for examining the effects of team work after adjusting for diverse demographic and workplace factors that may affect depression. As this study included all occupation groups, the results meaningfully contribute to the understanding of the association between depression and team work.

Conclusion

Our study identified several demographic and workplace factors that affect depressive mood, such as age, education, household income, employment status, working hours, work-life imbalance, supervisory behavior, workplace discrimination, and workplace violence. Furthermore, we demonstrated that team work could reduce depressive mood in waged employees, which has not been previously examined in the Republic of Korea. This study suggests that restructuring companies should include team work, which could improve the mental health of South Korean wage employees, especially women. Furthermore, this study could be used in the development of safety and health policies to improve the mental health of Korean employees.

감사의 글

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