

Differences in psychological distress between managers and non-managers in female workers: a cross-sectional study in Tsukuba Science City, Japan

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ABSTRACT

The Japanese government has made efforts towards the advancement of women into society; thereby, the proportion of female managers has been increasing. Recent reports have shown that managers tend to be in poor health condition. However, little research has been conducted to examine the psychological health of female managers. Therefore, the aim of our study was to reveal the difference of psychological distress by occupational position in female workers with focus on occupational stress.

A cross-sectional survey was conducted in 2017 via an anonymous, self-administered questionnaire distributed to workers in Tsukuba City, Japan. Student unpaired t test was used to compare occupational stress and psychological distress by occupational position. Binomial logistic regressions were used to analyze factors that affect psychological distress separately in managers and non-managers.

A total of 1543 women (168 managers, 1375 non-managers) were analyzed. Managers showed higher occupational stress but lower psychological distress than non-managers. Problems in interpersonal relationships was positively associated with psychological distress, whereas occupation as a researcher/academic was negatively associated with psychological distress in managers. Mental workload and problems in interpersonal relationships were positively associated with psychological distress, whereas reward from work and support were negatively associated with psychological distress in non-managers. Managers and non-managers both showed an association between psychological distress and problems of interpersonal relationships. Non-managers might have higher psychological distress due to lower reward from work. It is important to increase reward from work and to develop female workers' interpersonal skills in order to reduce the psychological distress of female workers.

Keywords: female managers, female workers, occupational stress, psychological distress, risk factors

Abbreviations:

OR: odds ratio

CI: confidence interval

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INTRODUCTION

Since the enactment of the Equal Employment Opportunity Law in 1985, the Japanese government has been making efforts towards women's advances into a society that has traditionally been strongly patriarchal. The Basic Act for Gender Equal Society, states as a goal that the Japanese government would raise the percentage of women in management position to at least 30%.¹ The Japanese government declared that it should encourage women to play active roles in Japanese society. This so-called "womenomics"² has been one of the important priorities of its administration. At the Annual meeting of the International Monetary Fund and the World Bank held in Tokyo in 2012, the International Monetary Fund Managing Director said that "women are potential. Women could save Japan's economy." Women's advances into society have since been considered as necessary to restart the Japanese economy. Japan reportedly has lower proportions of women in management positions; in 2018, for example, the proportion of section heads was 18.6%, section chiefs was 10.3%, and directors was only 6.6%.³ However, the proportions of female managers have been increasing each year; the proportion of section chiefs, for example, was 2.0% in 1989, 7.9% in 2012 and 10.3% in 2018.^{3,4}

On the other hand, previous studies have revealed that managers tend to be in poor health condition. In studies examining male workers, the work burden of managers was reported to increase, while the overtime hours of non-managerial employees have decreased due to the influence of social conditions.⁵ A trend study from Japan has also shown that the all-cause mortality of managers was rising.⁵ Longitudinal evidence has indicated that increased job demands and stressful work environments have a negative effect on the health of management workers.⁶ In studies examining female workers, it has been reported that female managers had higher levels of occupational and psychological stress than male managers.⁷ It has been shown that female managers experience higher stress levels than male managers, both at work and at home.⁸ In another study, involving workers from various industries, managers were reported to be in poor psychological health.⁹ Additionally, mental or occupational stress have been reported to be related to the occurrence of sudden death¹⁰ or insomnia, which could be a risk factor for future depression in workers.¹¹

There has been concern about the mental health of female managers, in a society where the number of female managers is predicted increase. Only a few studies have reported about the psychological health of female managers and, to our knowledge, little research has been conducted to examine the psychological distress (in terms of occupational stress) that female workers experience when becoming managers. We consider that clarifying the difference of psychological distress between female managers and female non-managers will contribute to supporting the mental health of female workers as a whole. Therefore, in this study, we aimed to reveal the difference of psychological distress by occupational position in female workers with focus on occupational stress.

METHODS

Study design and participants

This is one of a series of studies that uses data obtained from a survey conducted by the Tsukuba Science City Network. The Tsukuba Science City Network consists of 89 organizations, including research institutes, universities, educational funds, local governments, and private enterprises located in Tsukuba City, Ibaraki Prefecture, Japan. Tsukuba City, also known as Tsukuba Science city, is home to many national and private research institutes and is one of

the largest hubs of scientific research in the world. Many of the residents of Tsukuba City are researchers in the various fields of advanced sciences and technology. Since 1986, the Tsukuba Science City Network has conducted the Living Condition and Workplace Stress Survey in order to investigate the mental health status, living conditions, and workplace environments of workers in Tsukuba once every five years.^{12,13} This survey is cross-sectional, web-based, self-administered, and anonymous. In our research, we used data from the 7th living Condition and Workplace Stress Survey conducted in 2017. A total of 19481 workers agreed to participate. The questionnaire included 2 scales for measuring distress and occupational stress (K6 Distress Scale and the Brief Scale for Job Stress), and collected demographic information on employment status, job type, occupational position, sex, age, marital status, having children, household income, exercise habit, and smoking status. Detailed methodology from the Living Condition and Workplace Stress Survey was described elsewhere.^{14,15}

Of the 19481 employees, 7255 completed the questionnaire (response rate: 37.2%). Participants who were not female were excluded (n=4577), as were female participants over 65 years of age (n=15). Participants who were part-time or temporary workers were also excluded (n=1120). Previous studies showed that inadequate employment^{16,17} or working hour had negative effects on mental health,^{18,19} therefore, we analyzed full-time workers in order to compare non-managers to managers in same terms of employment. Finally, data from 1543 participants were analyzed.

Basic attributes and lifestyle habits

Occupational position was categorized into 2 groups: managers or non-managers. This was assessed with the question “Are you in managerial position or not?”, with the answer options “yes” or “no.” In this study, we defined managers as workers who thought they were in managerial position. The questionnaires also asked about basic demographic characteristics, such as age, sex, marital status (single, married or divorced/bereaved), having children (yes or no), parents living together (father or mother), job type (researcher/academic, technician/engineer, clerk/administration or others), household income (<4 million yen, 4–8 million yen, 8–12 million yen, and ≥12 million yen), employment status (part-time/temporary, full-time [fixed-term] or full-time [permanent]), exercise habit (less than once a month, several times a month, once a week, or more than once a week), and smoking status (yes, past, or no). It is reported that mental health of women have association with family status including household income.^{20,21} The covariates of marital status, having children, parents living together and household income were included to test the hypothesis that female workers who were unmarried, have children, or have low household income, were at greater risk of poor mental health. It is also reported that occupational status affected mental health of workers²²; thus, job type was set as a covariant. Additionally, exercise habit and smoking status were reported to associate with mental health.²³⁻²⁵ Therefore, we formed a hypothesis that female workers who take little exercise or smoke were in poor mental health, and we included them as co-variants.

Occupational stress

Occupational stress, as perceived by the workers themselves, was assessed using the Brief Scales for Job Stress developed by Nishikido and colleagues.²⁶ It consists of 20 questions with a 4-point rating scale (from 1 = disagree to 4 = agree) across 6 subscales: workload, mental workload, problems in personal relationships, job control, reward from work, and support from colleagues and superiors. Reward from work in the Brief Scales for Job Stress mainly means psychological reward. A higher score indicates a higher level of job-related stress or buffer against job-related stress. This questionnaire is used in many studies and its reliability and validity have been confirmed.^{12,27}

Psychological distress

Psychological distress was measured using the K6 Distress Scale,²⁸ which is widely used in many countries to screen mood or anxiety disorders or to measure their severity. It consists of 6 questions and its total scores range is from 0 to 24. A standard cutoff score of 13 or higher on the K6 is used to identify people with serious mental illness. Workers with a score of 5 or more were designated as having psychologically distress.²⁹

Statistical analysis

Student unpaired t test was used to examine significant differences of occupational stress and psychological distress according to job position. Binomial logistic regression analyses were performed to examine the effects of occupational stress on psychological distress separately in managers and non-managers. Basic characteristics were used as covariates to obtain odds ratios (OR) and 95% confidence intervals (CI). Two-tailed values of less than 0.05 were considered statistically significant. SPSS version 25 for Windows was used for the analyses, with a 5% significance threshold.

Ethical approval

The survey's webpage stated that the response to the survey was voluntary, that the survey was anonymous and privacy-conscious, and that the data would be kept secure. It was also noted that providing a response to this survey would be considered as agreeing to participate in the study. The aims and the use of this survey were also described on the survey's webpage. This study was approved by the Ethics Committee of the Faculty of Medicine, University of Tsukuba (approval #1374). All procedures were conducted in accordance with the ethical standards of the national research committee and the Helsinki Declaration.

RESULTS

Table 1 shows the characteristics of the participants. Regarding job position, female managers numbered 168 (10.9%) while female non-managers numbered 1375 (89.1%). Managers in occupation as researchers/academics were 78 (46.4%) and non-managers in the area were 461 (33.5%).

The relationship between job position and occupational stress and psychological distress are presented in Table 2. Student unpaired t test showed that managers had a significantly higher workload, mental workload, job control, and reward from work compared to non-managers. Managers had a significantly lower psychological distress compared to non-managers ($P < 0.01$).

A comparison of occupational stress between demographic factors is shown in Table 3. Among female managers, researchers/academics had a higher workload (2.71) and/or mental workload (2.56) and higher job control (3.14) and/or reward from work (3.31) than those in other job types; workload (2.28), mental workload (2.35), job control (2.71) and reward from work (2.49) in clerk/administration or workload (2.19), mental workload (2.33), job control (3.08) and reward from work (3.09) in technician/engineer. Among female non-managers, a similar trend was shown.

The effects of occupational stress on psychological distress are shown in Table 4. Managers had a significantly positive association between psychological distress and problems in personal relationships (OR = 3.58; 95% CI = 1.61–7.97) and had a significantly negative association between psychological distress and working in academic/research fields (OR = 0.23; 95% CI = 0.06–0.88). Non-managers had significantly positive associations between psychological distress and mental workload (OR = 1.97; 95% CI = 1.69–2.43) and problems in personal relationships (OR = 1.42; 95% CI = 1.20–1.67), and had significantly negative associations between

Table 1 Characteristics of the participants

	Managers n=168		Non-managers n=1375	
	n	(%)	n	(%)
Age				
20–29	2	(1.2)	211	(15.3)
30–39	18	(10.7)	455	(33.1)
40–49	68	(40.5)	479	(34.8)
50–59	76	(45.2)	208	(15.1)
60–64	4	(2.4)	22	(1.6)
Marital status				
Single	35	(20.8)	464	(33.7)
Married	122	(72.6)	832	(60.5)
Divorced/bereaved	11	(6.5)	79	(5.7)
Having children				
Yes	103	(61.3)	633	(46.0)
No	65	(38.7)	742	(54.0)
Father living together				
Yes	7	(4.2)	146	(10.6)
No	161	(95.8)	1229	(89.4)
Mother living together				
Yes	17	(10.1)	198	(14.4)
No	151	(89.9)	1177	(85.6)
Job type				
Clerk/Administration	54	(32.1)	701	(51.0)
Researcher/Academic	78	(46.4)	461	(33.5)
Technician/Engineer	31	(18.5)	191	(13.9)
Others	5	(3.0)	22	(1.6)
Household income (yen)				
<4 million	7	(4.2)	256	(18.6)
4–8 million	34	(20.2)	503	(36.6)
8–12 million	53	(31.5)	366	(26.6)
≥12 million	74	(44.0)	250	(18.2)
Employment status				
full-time [fixed-term]	25	(14.9)	488	(35.5)
full-time [permanent]	143	(85.1)	887	(64.5)
Exercise habit				
Less than once a month	77	(45.8)	604	(43.9)
Several times a month	24	(14.3)	244	(17.7)
Once a week	45	(26.8)	355	(25.8)
More than once a week	22	(13.1)	172	(12.5)
Smoking status				
Yes	2	(1.2)	53	(3.9)
Past	7	(4.2)	107	(7.8)
No	159	(94.6)	1215	(88.4)

Table 2 The relationship between job position and occupational stress/psychological distress

	Female				p-value ²
	Managers		Non-managers		
	n=168		n=1375		
	Mean	SD ¹	Mean	SD ¹	
Brief Scale for Job Stress					
Workload	2.46	0.88	2.03	0.84	<0.01
Mental workload	2.45	0.79	2.12	0.84	<0.01
Problems in personal relationships	2.03	0.63	2.06	0.82	0.54
Job control	3.00	0.63	2.71	0.76	<0.01
Reward from work	3.02	0.75	2.68	0.86	<0.01
Support from colleagues and superiors	2.82	0.61	2.85	0.72	0.48
K6 score	4.85	4.36	6.24	5.22	<0.01

¹SD: standard deviation

²Statistical analyses were conducted using Student unpaired t test

Table 3 Comparisons of the Brief Scale for Job Stress among demographic factors

	Brief Scale for Job Stress					
	Work-load	Mental work-load	Problems in personal relationship	Job control	Reward from work	Support from colleague/superior
Managers						
Clerk/Administration	2.28	2.35	2.07	2.71	2.49	2.56
Researcher/Academic	2.71	2.56	1.98	3.14	3.31	3.02
Technician/Engineer	2.19	2.33	2.10	3.08	3.09	2.72
Others	2.20	2.53	1.87	3.47	3.60	3.15
Non-managers						
Clerk/Administration	1.93	1.99	2.08	2.52	2.41	2.81
Researcher/Academic	2.19	2.32	2.04	2.96	3.03	2.90
Technician/Engineer	2.00	2.07	2.05	2.82	2.74	2.87
Others	2.27	2.30	2.03	2.86	3.03	3.02

Table 4 The effects of occupational stress and demographic factors on psychological distress

		Managers n=168		Non-managers n=1375	
		OR ¹	[95%CI]	OR ¹	[95%CI]
Brief Scales for Job Stress (continuous)					
	Workload	1.61	[0.83–3.14]	1.04	[0.86–1.26]
	Mental workload	1.48	[0.67–3.28]	1.97	[1.69–2.43] **
Problems in personal relationships		3.58	[1.61–7.97] **	1.42	[1.20–1.67] **
	Job control	0.95	[0.39–2.29]	0.98	[0.80–1.19]
	Reward from work	0.47	[0.20–1.10]	0.67	[0.56–0.80] **
Support from colleagues/superiors		1.52	[0.66–3.52]	0.78	[0.63–0.97] *
Age	20–29	(ref.)		(ref.)	
	30–39	1.96	[0.04–109]	0.98	[0.65–1.48]
	40–49	1.99	[0.04–107]	0.87	[0.57–1.34]
	50–59	0.71	[0.01–39.6]	0.91	[0.54–1.52]
	60–64	0.14	[0.00–19.2]	0.28	[0.09–0.85] *
Marital status	Single	(ref.)		(ref.)	
	Married	0.70	[0.17–2.83]	1.12	[0.77–1.64]
	Divorced/bereaved	1.26	[0.16–10.1]	0.96	[0.53–1.72]
Having children	Yes	(ref.)		(ref.)	
	No	1.76	[0.57–5.41]	0.89	[0.64–1.23]
Living with father	Yes	(ref.)		(ref.)	
	No	0.84	[0.08–8.76]	1.09	[0.61–2.00]
Living with mother	Yes	(ref.)		(ref.)	
	No	1.74	[0.28–10.9]	0.78	[0.47–1.30]
Job type	Clerk/Administration	(ref.)		(ref.)	
	Researcher/Academic	0.23	[0.06–0.88] *	0.76	[0.56–1.02]
	Technician/Engineer	0.27	[0.07–1.02]	1.02	[0.71–1.47]
	Others	0.54	[0.04–6.54]	1.63	[0.60–4.45]
Household income	<4 million	(ref.)		(ref.)	
	4–8 million	0.55	[0.06–5.41]	0.59	[0.41–0.86] *
	8–12 million	0.78	[0.08–7.83]	0.63	[0.41–0.96] *
	≥12 million	0.43	[0.04–4.36]	0.53	[0.33–0.87] *
Employment status	full-time [fixed-term]	(ref.)		(ref.)	
	full-time [permanent]	0.64	[0.15–2.70]	1.24	[0.95–1.63]
Exercise habit	Less than once a month	(ref.)		(ref.)	
	Several times a month	0.86	[0.24–3.10]	1.15	[0.83–1.61]
	Once a week	1.83	[0.69–4.86]	1.09	[0.82–1.47]
	More than once a week	1.14	[0.30–4.28]	0.92	[0.63–1.34]
Smoking status	Yes	(ref.)		(ref.)	
	Past	0.00	[0.00–0.00]	0.64	[0.31–1.35]
	No	0.00	[0.00–0.00]	0.72	[0.38–1.34]
Nagelkerke R ²		0.45		0.23	

¹OR: odds ratio²CI: confidence interval

* < 0.05

** < 0.01. Statistical analyses were conducted using binomial logistic regression.

psychological distress and reward from work (OR = 0.67; 95% CI = 0.56–0.80), support from colleagues and superiors (OR = 0.78; 95% CI = 0.63–0.97), and household income (OR = 0.59; 95% CI = 0.41–0.86).

DISCUSSION

The aim of this study was to reveal the difference of psychological distress between managers and non-managers in female workers. We also investigated how occupational stress affects psychological distress by occupational position.

The difference of occupational stress and psychological distress by occupational position

We found that female managers had higher workload, mental workload, job control and reward from work compared to female non-managers. However, female managers had significantly lower levels of psychological distress compared to female non-managers.

A previous study among male workers has shown that male managers had more workload due to longer work hours and mental workload because they were expected to be proficient in their work and have negotiation and managerial skills.³⁰ Although little research had been conducted about female managers' occupational stress, managers have the same job demands regardless of gender. Female managers are just as likely to be asked to perform longer work hours and exhibit the same skill and proficiency as male managers.³¹ Therefore, female managers are more likely to have a higher workload and mental workload than female non-managers. However, female managers showed lower levels of psychological distress despite the higher workload and mental workload. This result was different from that of a previous study in which female managers were reported to have high psychological distress.⁹ This result might be affected by the high percentage of researchers/academics in our population. In Japan, the percentage of female researchers is only 14.6%³²; whereas, the percentage of researchers/academics in our population was 46.4% among managers, respectively, much higher than the national average.

The Effort-Reward Imbalance Model and the Job Demand-Control Model have shown that imbalanced occupational stress has an effect on mental disorders.³³⁻³⁵ Researchers and academics have high job demands and need to make great effort, however, they achieve sufficient levels of reward. Considering the Effort-Reward Imbalance Model, researchers and academics spend high levels of effort and receive high reward; therefore, they are at relatively small risk of poor mental health. Similarly, in the Job Demand-Control Model, they have high levels of job demand, however, they have sufficient job control, thus their mental health is also good.

In a study of mental health of researchers, they were reported to have high stress-coping ability.¹³ Takao and colleagues reported that managers tended to be in worse health condition than non-managers because of reduced leisure time.²² Managers in as research/academic occupations had high levels of job control, which may result in them having enough leisure time and, therefore, less psychological distress.

Previous studies have reported that female managers gained higher levels of job satisfaction than male managers or female non-managers.^{36,37} Female non-managers had less job demand, and, therefore, less reward from their work and less job satisfaction; consequently, this might account for the higher levels of psychological distress observed in our study.

Psychological distress of female managers

In the present study, we found an association between problems in personal relationships and psychological distress in female managers. It has been reported that female managers had

occupational stress because they tended to have difficulties with male subordinates.³⁸ Therefore, female managers are likely to feel high psychological distress that stems from difficult workplace relationships. Previous studies have shown associations between poor mental health and low job control, unperceived support and/or effort-reward imbalance in female managers.^{7,9} Because the female managers in this study, especially the researchers/academics, had sufficient job control, support, and reward from work, they might exhibit less psychological distress than non-managers. Nevertheless, it is important to develop interpersonal relationship stress management techniques.

Psychological distress of female non-managers

Our results show associations between poor mental health and mental workload or problems of interpersonal relationships in female non-managers. We also found associations between reward from work, support from colleagues and superiors, and household income.

In our study, female non-managers had high levels of psychological distress. To reduce mental stress, it is important to provide workers with appropriate support and reward from work; however, our results suggest that female non-managers might gain little reward from their work. One study reported that female non-managers would achieve more reward from work by actively promoting the participation of women in society or by offering greater support for balancing work and life.³⁹ This same study also reported that support from superiors played an important role regarding reward from work; however, female workers received less support compared to male workers.³⁹ It has been reported that companies do not give sufficient training or experience to female non-managers towards getting them promoted to managerial positions.⁴⁰ If companies provide female non-managers with more opportunities, greater support, and job control, they are likely to experience more reward from their work and less psychological distress. Although female non-managers tended to avoid promotion,^{41,42} assuming that managers work harder and longer hours, promotion might actually lead to female workers enjoying more job control and reward from their work, and less psychological distress.

Previous studies have shown that women in jobs of lower occupational status showed poorer psychological and physical health,⁴³ lower levels of job control and high levels of work-related stress.⁴⁴ Although the mental health of female non-managers has been reported to be relatively good,⁹ it is possible that they are at a greater risk for poor mental health. In Japanese society, where the number of female workers is increasing, we need more research on mental and physical health among female workers in order to support the female workforce better.

Strengths and limitations

The present study has several strengths. To our knowledge, this is the first study to clarify the association between good psychological health and female managers working in research/academia. This is also the first to demonstrate the relationship between female non-managers and poor mental health in Japan. In addition, our study had a considerable sample size, with a total of 1543 female participants, including many researchers. Few Japanese studies on female workers have included researchers.

However, the present study also carries some limitations. First, since our study is a cross-sectional design, the causal correlation between psychological distress and occupational position was not evaluated. It is possible that workers with psychological distress may have been less likely to be promoted as managers. As a result, the mental health of managers may have been observed to be better. A longitudinal study is needed to research this causal correlation further in the future. Second, the response rate was relatively low, so there may have been a non-response or selection bias that could have affected the results. Female workers with mental distress may not have participated in the survey due to absence from work or reluctance to answer. This selection

bias would need to be considered in future research. Third, in the current study, fewer female managers participated than female non-managers. Female managers are likely to have the same work demands as male managers, therefore, there might be a survivorship bias. Future research should aim to recruit a larger number of participants who are female managers. Forth, in this study, we defined managers as workers who thought they were in managerial position. Gender Equality Bureau Cabinet Office defines managers as workers who are section chief or higher position,⁴⁵ however, the definition of managers is different depending on studies or occupations. In future studies, it is necessary to clearly define what exactly constitutes a manager. Fifth, our target population was not a random sample from the general working population in Japan; our study included a lot of researchers/academics who are likely to be highly educated. Future studies should include participants with other occupations or more generalized occupations. Sixth, in this survey, not all the factors related to the mental health of female workers were considered. For example, female workers have been reported to have higher work-family conflict than male workers.⁴⁶ However, we could not ask about actual roles and time engaged in household chores or child raising. Further research is required to address the subject of work-family conflict and examine work-related indicators, such as working hours. Seventh, we did not show the difference of psychological distress between males and females in this study. In order to clarify mental health of female workers, it is important to examine the difference by sex, which will be examined in future studies.

CONCLUSION

The current study indicates that female managers have more occupational stress than female non-managers; however, female managers also have less psychological distress than female non-managers. In both female managers and non-managers, there is an association between psychological distress and interpersonal relationship problems. Female non-managers might have higher psychological distress due to lower reward from work. The findings of the current study shed light on improving mental health of female workers and hope that this study will contribute to the promotion of active female participation in Japanese society to enhance the quality of life of female managers in Japan.

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CONFLICT OF INTEREST STATEMENT

Nagisa Shiraki, Tomohiko Ikeda, Yu Ikeda, Tsukasa Takahashi, Shotaro Doki, Daisuke Hori, Yuichi Oi, Shin-ichiro Sasahara and Ichiyo Matsuzaki are volunteer members of the working group for the survey conducted by Tsukuba Science City Network. Shotaro Doki, Daisuke Hori, Yuichi Oi, Shin-ichiro Sasahara and Ichiyo Matsuzaki are volunteer members of the Occupational Health Committee of Tsukuba Science City Network. The authors declare no financial relationships.

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