METHODS

Participants

A cross-sectional study with employees from two sites (ie, headquarters and one branch) of a manufacturing company located in the east coast region of Japan was conducted from July to August 2018. All variables used in the present study were measured using a self-administered web-based questionnaire. All employees except for non-executive directors, disabled employees who cannot use a computer, and absentees ($N = 353$) were invited to participate in the present study. A total of 224 employees completed the web-based questionnaire (response rate, 63%). Because the web-based questionnaire required participants to answer all the questions, no participants had missing items. The study purposes and procedures were explained to the employees, and online informed consent was obtained from them prior to study initiation. Kitasato University Medical Ethics Organization reviewed and approved the aims and procedures of the present study (No. B18-047).

Measures

Exposure: Organizational Justice

Organizational justice was measured using the Japanese version of the Organizational Justice Questionnaire (OJQ),[38–40] which comprises a seven-item procedural justice scale and a six-item interactional justice scale, both measured on a five-point Likert-type scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. The total score for each OJQ subscale is calculated by averaging the item scores (score range, 1 to 5). In this sample, Cronbach's alpha coefficients were 0.88 for the procedural justice scale and 0.94 for the interactional justice scale.

Mediator: Psychological Distress

Psychological distress was measured using the Japanese version of the K6 scale.[41,42] The K6 scale comprises six items measuring the level of psychological distress on a five-point Likert-type scale ranging from 0 = *None of the time* to 4 = *All of the time*. The total score is calculated by summing item scores (score range, 0 to 24). In this sample, Cronbach's alpha coefficient was 0.89.

Outcome: Cognitive Failures

Cognitive failures were measured using the Japanese version of the Cognitive Failures Questionnaire (CFQ).[43,44] The CFQ was developed by Broadbent et al[43] and comprises 25 items measuring cognitive slips and failures in daily activities during the past 6 months on a five-point Likert-type scale ranging from 0 = *Never* r to 4 = *Very often. The total score is calculated by summing item scores (score range, 0 to 100). Because Broadbent et al[43] argued that a single factor adequately captured the structure of the CFQ, we mainly used the total score of 25 items. However, a recent study by Rast et al[45] indicated that the CFQ items loaded on three different factors: forgetfulness (ie, a tendency to let go from one's mind something known or planned, such as names, intentions, appointments, and words), distractibility (ie, being absentminded or easily disturbed in one's focused attention mainly in social situations or interactions with other people), and false triggering (ie, interrupted processing of sequences of cognitive and motor actions). Therefore, we also calculated the scores for these three dimensions (score range for each dimension, 0 to 32) and used them in the sub-analysis. It should be noted that the sum of scores for these three dimensions does not equal the total score of the CFQ, as some items belong to more than one dimension or do not belong to any dimension. In this sample, Cronbach's alpha coefficient for the total CFQ was 0.94, and that for the three dimensions ranged from 0.84 to 0.86.*

Covariates

Covariates included demographic characteristics (ie, age, gender, education, medical history of stroke, and occupational position) and lifestyle factors (ie, drinking and smoking habits). Age was used as a continuous variable. Education was classified into four groups: graduate school, college, junior college, and high school or junior high school. Medical history of stroke was dichotomized into yes and no. Occupational position was classified into four groups: managerial employee, non-manual employee, manual employee, and other. Drinking habit was classified into three groups: rarely, sometimes, and daily. Smoking habit was also classified into three groups: never smoker, ex-smoker, and current smoker.

Statistical Analysis

Using the PROCESS macro (http://www.afhayes.com/public/processv35.zip)[46] for SPSS (IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.), we conducted a multiple mediation analysis[47] with the bootstrap method[48] to estimate the total and direct effects of organizational justice on cognitive failures as well as the mediation (or indirect) effect of psychological distress. Procedural justice and interactional justice were analyzed separately. In the analysis, procedural justice or interactional justice (ie, OJQ subscale score) was included as an exposure (or independent) variable; psychological distress (ie, K6 scale score) was included as a mediator variable; and cognitive failures (ie, CFQ score) were included as an outcome (or dependent) variable. After standardizing these variables, we calculated (i) the c coefficient (indicating the total effect of each justice dimension on cognitive failures), (ii) the c' coefficient (indicating the direct effect of each justice dimension on cognitive failures), and (iii) the difference between c and c' (ie, $c-c'$) (indicating the mediation effect of psychological distress), as well as their 95% confidence intervals (CIs), based on 5000 bootstrap samples. If the 95% CI of $c-c'$ did not include zero, it was determined that psychological distress significantly mediated the effect of each justice dimension on cognitive failures. On that basis, if the 95% CI of c' included zero, it was determined that the effect of psychological distress was that of full mediation. Conversely, if the 95% CI of c' did not include zero, the effect of psychological distress was that of partial mediation. In the series of analysis, we first calculated the crude coefficients (ie, without any adjustment) (Model 1) and subsequently adjusted for demographic characteristics and lifestyle factors (Model 2). In addition, a similar analysis was conducted using each dimension of cognitive failures (ie, forgetfulness, distractibility, and false triggering) as an outcome variable. The level of significance was 0.05 (two-tailed).

RESULTS

Detailed characteristics of the 224 study participants and Pearson's correlation coefficients for age and scale scores are shown in Tables 1 and 2, respectively.

Table 3 shows the results of the main analysis. In the crude model (Model 1), procedural justice had a significant negative total effect on cognitive failures ($c = -0.164$ [95% CI: -0.295 to -0.034]). When we included psychological distress in the model as a mediator variable, the mediation effect of psychological distress was significant ($c-c' = -0.199$ [95% CI: -0.307 to -0.107]), and the direct effect of procedural justice on cognitive failures was not significant ($c' = 0.034$ [95% CI: -0.082 to 0.150]). Therefore, psychological distress fully mediated the effect of procedural justice on cognitive failures. These patterns were unchanged after adjusting for demographic characteristics and lifestyle factors (Model 2). Furthermore, for interactional justice, patterns similar to those of procedural justice were observed.

TABLE 1. Characteristics of Employees Who Participated in the Study

Demographic Characteristics	Mean (SD)	n (%)
Age	42.9 (9.51)	
Gender		
Men		189 (84.4)
Women		35 (15.6)
Education		
Graduate school		30 (13.4)
College		99 (44.2)
Junior college		22 (9.8)
High school or junior high school		73 (32.6)
Medical history of stroke		
Yes		3 (1.3)
No		221 (98.7)
Occupational position		
Managerial employee		42 (18.8)
Non-manual employee		148 (66.1)
Manual employee		12 (5.4)
Other		22 (9.8)
Drinking habit		
Rarely		64 (28.6)
Sometimes		94 (42.0)
Daily		66 (29.5)
Smoking habit		
Never smoker		119 (53.1)
Ex-smoker		30 (13.4)
Current smoker		75 (33.5)

Scale scores*	Mean (SD)	Cronbach's α
Procedural justice (OJQ) (1–5)	3.21 (0.70)	0.88
Interactional justice (OJQ) (1–5)	3.62 (0.87)	0.94
Psychological distress (K6) (0–24)	6.64 (5.11)	0.89
Cognitive failures (total) (CFQ) (0–100)	30.8 (14.4)	0.94
Forgetfulness (CFQ) (0–32)	11.2 (5.45)	0.86
Distractibility (CFQ) (0–32)	11.8 (5.27)	0.84
False triggering (CFQ) (0–32)	7.27 (4.93)	0.85

*CFQ, Cognitive Failures Questionnaire; OJQ, Organizational Justice Questionnaire.

When we conducted a similar analysis using each dimension of cognitive failures (ie, forgetfulness, distractibility, and false triggering) as the outcome variable, patterns similar to those in the main analysis were observed for forgetfulness and distractibility (Table 4). For false triggering, the total effects of procedural and interactional justice were weaker than those on forgetfulness and distractibility. Especially, the total effect of procedural justice on

false triggering was not statistically significant ($c = -0.095$ [95% CI: -0.227 to 0.037] and -0.097 [95% CI: -0.233 to 0.038] for Models 1 and 2, respectively).

DISCUSSION

The present study demonstrated significant negative total effects of procedural and interactional justice on cognitive failures. Furthermore, a significant full mediation effect of psychological distress on the associations was observed. With one exception (ie, the total effect of procedural justice on false triggering), patterns similar to those in the main analysis were observed when we used each dimension of cognitive failures as the outcome variable.

Our results showed that both procedural and interactional justice had significant negative total effects on cognitive failures. This finding is consistent with a previous study that found that low organizational justice had an impact on cognitive decline.[23] The present study expanded this evidence including the behavioral problems that arise from cognitive decline. Given the previous finding that low job control was associated with lower levels of cognitive function,[8,9] our finding is reasonable because organizational justice captures more basic elements of the social structure where task-level job characteristics, such as job control, are operating.[49] Our finding suggests that employees are more likely to experience cognitive slips and failures in daily activities in work settings where organizational justice is lower.

We also found a significant mediation effect of psychological distress on the association of procedural and interactional justice with cognitive failures. This finding is also reasonable, since previous studies reported that lower organizational justice was prospectively associated with depressive symptoms and psychological distress[34,35] and that psychological distress adversely affected cognitive function, such as multiple memory systems, learning strategies, and encoding/retrieval of words.[36,37] When employees perceive unfair and unclear decision-making procedures in their workplace and/or unfair and disrespectful treatment from supervisors, they may be more psychologically distressed. Such distress may have an adverse effect on cognitive function, which may consequently lead to more cognitive slips and failures in daily activities. Furthermore, it is noteworthy that the significant mediation effect of psychological distress on the association of organizational justice with cognitive failures remained unchanged even after adjusting for demographic characteristics including age. The possibility that the association of organizational justice with cognitive failures can be explained by psychological distress may be true for all age groups.

A theoretical framework of the "allostatic load model"[50] could explain the pathways linking psychosocial working conditions, including organizational justice, and health.[51,52] According to the model, if the activation of the bodily systems by stressors is

TABLE 2. Pearson's Correlation Coefficients for Age and Scale Scores (189 Men and 35 Women)

	1	2	3	4	5	6	7
1. Age							
2. Procedural justice (OJQ)	0.172[b]						
3. Interactional justice (OJQ)	0.109	0.710[b]					
4. Psychological distress (K6)	−0.111	−0.341[b]	−0.445[b]				
5. Cognitive failures (total) (CFQ)	−0.006	−0.164[a]	−0.186[b]	0.570[b]			
6. Forgetfulness (CFQ)	0.011	−0.159[a]	−0.180[b]	0.521[b]	0.956[b]		
7. Distractibility (CFQ)	−0.084	−0.201[b]	−0.183[b]	0.591[b]	0.925[b]	0.833[b]	
8. False triggering (CFQ)	0.016	−0.095	−0.150[a]	0.483[b]	0.912[b]	0.887[b]	0.738[b]

CFQ, Cognitive Failures Questionnaire; OJQ, Organizational Justice Questionnaire.
[a]$P < 0.05$.
[b]$P < 0.01$.

TABLE 3. Total and Direct Effects of Organizational Justice on Cognitive Failures, and Mediation Effect of Psychological Distress: Multiple Mediation Analyses With Bootstrap Method (189 Men and 35 Women)

	Point Estimate (95% Confidence Interval)	
	Model 1[*]	**Model 2**[†]
Procedural justice		
Total effect (c coefficient)	−0.164 (−0.295 to −0.034)	−0.180 (−0.315 to −0.044)
Direct effect (c' coefficient)	0.034 (−0.082 to 0.150)	0.034 (−0.085 to 0.152)
Mediation effect ($c−c'$)	−0.199 (−0.307 to −0.107)	−0.213 (−0.323 to −0.115)
Interactional justice		
Total effect (c coefficient)	−0.186 (−0.316 to −0.056)	−0.193 (−0.328 to −0.057)
Direct effect (c' coefficient)	0.084 (−0.037 to 0.206)	0.085 (−0.038 to 0.207)
Mediation effect ($c−c'$)	−0.271 (−0.380 to −0.168)	−0.277 (−0.394 to −0.174)

[*]Crude (ie, without any adjustment).
[†]Fully adjusted (ie, adjusted for age, gender, education, medical history of stroke, occupational position, drinking habits, and smoking habits).

sustained (ie, exposed to repetitive or chronic stressors), harm is done to the body through allostatic load, which can lead to psychological distress or consequently to depression.[53,54] Furthermore, for the pathways linking psychological distress and cognitive function, studies on brain regions suggest that the hippocampus, a limbic area involved in learning and memory, is particularly sensitive to the effects of distress because it is enriched with receptors for corticosterone (ie, a glucocorticoid hormone released in response to stress) and plays a role in glucocorticoid negative feedback.[55] Based on this, when people perceive psychological

distress, corticosterone is released, which may reduce cognitive function through damaging hippocampal neurons.[56] Such psychophysiological and neurophysiological mechanisms may explain our findings, and further research on more detailed mechanisms is promising.

When we used each dimension of cognitive failures as an outcome variable, the total effect of procedural justice on false triggering was not significant. Furthermore, although statistically significant, the total effect of interactional justice on false triggering was weaker than that on forgetfulness and distractibility. This

TABLE 4. Total and Direct Effects of Organizational Justice on Each Dimension of Cognitive Failures, and Mediation Effect of Psychological Distress: Multiple Mediation Analyses with Bootstrap Method (189 Men and 35 Women)

	Point Estimate (95% Confidence Interval)	
	Model 1[*]	**Model 2**[†]
Outcome: forgetfulness		
Procedural justice		
Total effect (c coefficient)	−0.159 (−0.290 to −0.029)	−0.180 (−0.310 to −0.049)
Direct effect (c' coefficient)	0.021 (−0.099 to 0.141)	0.066 (−0.061 to 0.192)
Mediation effect ($c−c'$)	−0.180 (−0.284 to −0.096)	−0.245 (−0.348 to −0.152)
Interactional justice		
Total effect (c coefficient)	−0.176 (−0.312 to −0.040)	−0.191 (−0.327 to −0.055)
Direct effect (c' coefficient)	0.021 (−0.102 to 0.144)	0.065 (−0.063 to 0.192)
Mediation effect ($c−c'$)	−0.198 (−0.301 to −0.108)	−0.256 (−0.351 to −0.167)
Outcome: distractibility		
Procedural justice		
Total effect (c coefficient)	−0.201 (−0.330 to −0.071)	−0.215 (−0.349 to −0.081)
Direct effect (c' coefficient)	0.001 (−0.113 to 0.115)	0.000 (−0.116 to 0.116)
Mediation effect ($c−c'$)	−0.202 (−0.311 to −0.112)	−0.215 (−0.326 to −0.121)
Interactional justice		
Total effect (c coefficient)	−0.183 (−0.313 to −0.053)	−0.194 (−0.329 to −0.059)
Direct effect (c' coefficient)	0.099 (−0.019 to 0.218)	0.092 (−0.028 to 0.212)
Mediation effect ($c−c'$)	−0.283 (−0.391 to −0.182)	−0.286 (−0.396 to −0.182)
Outcome: false triggering		
Procedural justice		
Total effect (c coefficient)	−0.095 (−0.227 to 0.037)	−0.097 (−0.233 to 0.038)
Direct effect (c' coefficient)	0.079 (−0.044 to 0.202)	0.090 (−0.035 to 0.215)
Mediation effect ($c−c'$)	−0.174 (−0.284 to −0.089)	−0.187 (−0.289 to −0.099)
Interactional justice		
Total effect (c coefficient)	−0.150 (−0.281 to −0.019)	−0.140 (−0.275 to −0.005)
Direct effect (c' coefficient)	0.081 (−0.048 to 0.210)	0.099 (−0.031 to 0.229)
Mediation effect ($c−c'$)	−0.231 (−0.335 to −0.137)	−0.239 (−0.348 to −0.145)

[*]Crude (ie, without any adjustment).
[†]Fully adjusted (ie, adjusted for age, gender, education, medical history of stroke, occupational position, drinking habits, and smoking habits).

finding may be explained by the temporal stability of false triggering. Rast et al[45] have found that the three dimensions of cognitive failures change in different rates and follow different patterns of change over the life course, and that false triggering is the most stable dimension across the life span, including during tenure and even after retirement. In support of this, the present sample showed that false triggering had a smallest standard deviation (SD) among the three dimensions (see Table 1). In that sense, false triggering may be relatively less affected by external factors, such as psychosocial working conditions, compared with the other two dimensions. Future research is promising to elucidate more detailed mechanisms underlying the effects of various kinds of psychosocial working conditions on each dimension of cognitive failures.

Possible limitations of the present study should be considered. First, the present sample was drawn from one particular manufacturing company in Japan with a large proportion of highly educated non-manual male employees, who are considered to be exposed to higher levels of intellectual demands[57]; therefore, the generalization of the present findings should be performed with caution. Second, although the response rate in the present study reached 60%, which should be the goal in most research,[58] those who perceived lower levels of organizational justice and were more psychologically distressed may have been less likely to participate in the present study. Such nonresponse bias may have underestimated the true association. Third, various factors that were not measured in the present study may have confounded our findings. For example, participants with higher levels of neuroticism may have been more likely to evaluate organizational justice as lower[59] and to recall their own experiences of cognitive failures.[60] However, this risk of bias seems to be manageable because a recent study found the effects of organizational justice to be independent of personality traits.[61] Finally, causal inferences are limited due to the cross-sectional nature of the study. The present findings seem to indicate that those who frequently experienced cognitive failures may have been more psychologically distressed and perceived lower levels of organizational justice.[62,63] Therefore, further longitudinal studies are promising to confirm causal relationships between organizational justice, psychological distress, and cognitive failures.

In conclusion, our findings suggest that employees are more likely to experience cognitive failures in daily activities in work settings where organizational justice is lower, which seems to be explained by psychological distress. Future research should replicate our findings using a prospective design. Furthermore, in light of the reversibility of cognitive decline introduced earlier,[5] intervention studies examining whether improvements in organizational justice contribute to a decrease in cognitive failures through a reduction in psychological distress are also promising.

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ORIGINAL ARTICLE

Journal of Occupational Health
WILEY

Role ambiguity as an amplifier of the association between job stressors and workers' psychological ill-being: Evidence from an occupational survey in Japan

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Abstract

Objectives: We aim to examine the extent to which role ambiguity modifies the association between job stressors and workers' psychological ill-being.

Methods: We used data from 41 962 observations from 13 811 individuals (10 269 males and 3542 females) who participated in three to eight waves of an occupational survey conducted in Japan. We estimated fixed-effects models to explain psychological distress (defined by Kessler 6 score ≥13) by role ambiguity. Four types of job stressors (i.e., high job demands, low job control, high effort, and low reward), and their interactions were examined along with potential confounders. We repeated a similar analysis for job dissatisfaction.

Results: The fixed-effects models showed that role ambiguity as well as the four job stressors were positively associated with psychological distress, albeit somewhat more modestly than the results of the pooled cross-sectional models. More notably, we found that role ambiguity substantially amplified the association between job stressors and psychological distress; for example, a combination of high job demands and high role ambiguity added to the risk of psychological distress by 3.5% (95% confidence interval [CI]: 2.5%–4.5%), compared with 1.4% (95% CI: 0.4%–2.3%) for a combination of high job demands and low role ambiguity. In contrast, we did not find a modifying effect of role ambiguity on the association between low job control and psychological distress. Similar results were observed for job dissatisfaction.

Conclusion: The results underscore the importance of reducing role ambiguity to mitigate the adverse impact of job stressors on workers' psychological ill-being.

KEYWORDS
fixed-effects model, job dissatisfaction, job stressors, Kessler 6 score, psychological distress, role ambiguity

1 | INTRODUCTION

Role ambiguity (RA) is defined as the lack of clarity in understanding the actions to be taken to achieve the proposed individual goals.[1] RA makes employees doubt how their objectives can be achieved and how their performance will be assessed, causing a negative relationship between RA and job performance.[2–5] Hence, we consider RA as a key job stressor that forces employees to invest effort in clarifying the ambiguity of their role and correspondingly increases their psychological ill-being. Indeed, many studies have revealed that RA is related to depression,[6] emotional exhaustion,[7] lower job satisfaction,[2,8] and other poor mental health outcomes.

However, it might be possible that RA may work not only as a job stressor but also as an amplifier of the association between job stressors and workers' psychological ill-being. In line with this view, RA has been found to amplify the association between abusive supervision and job burnout[9] as well as between job instability and psychological distress.[10] RA is considered to have a negative effect on the motivational process in the Job Demands-Control (JD-C) model[11] via a perception of increased job demands due to their uncertainty. Further, RA is considered to lower perceived control over work tasks if those tasks are ambiguous. Similarly, additional effort needed to clarify RA and ambiguity about the expected evaluation of job performance may lead to a deterioration in the balance between effort and reward within the framework of the Effort-Reward Imbalance (ERI) model.[12]

In this study, we attempted to provide new insights into the relevance of RA in occupational health in two ways. First, we examined how RA modified the associations between key job stressors (i.e., high job demands, low job control, high effort, and low reward), which are derived from the JD-C and ERI models, and workers' psychological ill-being (i.e., psychological distress [PD] and job dissatisfaction [JD]). Based on the observations in previous studies,[9,10] we predicted that RA would amplify the adverse impact of job stressors. Unlike previous studies, however, we compared the modifying effects on key job stressors within the same analytic framework.

Second, we conducted an analysis using data from the same participants collected at different points to address this issue, in contrast to a majority of previous studies, which relied on cross-sectional data. Specifically, we estimated fixed-effects (FE) models, which control for a participant's attributes, both observed and unobserved.[13,14] The associations observed from the cross-sectional data cannot be free from biases due to these factors, as suggested by previous FE model studies,[15,16] especially because RA,

job stressors, and psychological ill-being are all subjectively evaluated, presumably leading to overestimation of their correlations.

2 | METHODS

2.1 | Study sample

We used panel data from eight survey waves of an occupational cohort study on social class and health in Japan (Japanese Study of Health, Occupation, and Psychosocial Factors Related Equity [J-HOPE]). The first wave was conducted from April 2010 to March 2011; the following waves were conducted approximately one year after the first wave. The eighth wave was conducted between April 2017 and March 2018. The study population consisted of employees working for 13 firms. The surveyed firms covered 12 industries and participated in three to eight waves. The original sample consisted of 47 960 observations from 14 388 individuals. The response rates were 77.0%, 81.6%, 78.6%, 67.5%, 63.9%, 64.6%, 64.2%, and 64.8% in the first to eighth waves, respectively. After removing 4007 observations in one industry (code 11, transportation industry) over the fourth and eighth waves (because they were asked only about their experiences in sick leave) and respondents missing key variables of RA, PD, JD, and/or job stressors, we ended up utilizing 41 962 observations from 13 811 individuals (10 269 men and 3542 women). The structures of the firms, waves, and participants in the study sample are summarized in Table S1.

The Research Ethics Committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772), Kitasato University Medical Ethics Organization (No. B12-103), and the Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (No. 10-004 and H26-115) reviewed and approved the aims and procedures of the present study. This study was conducted with the J-HOPE dataset as of June 1, 2021.

2.2 | Measures

Table 1 summarizes the key measures obtained from the survey and the definitions of the binary variables that were used in the statistical analysis. For the binary variables of high RA, high job demands, low job control, high effort, and low reward, we used the sample means of their corresponding measures as the cut-off points. More detailed explanations are provided below.

TABLE 1 Summary of key measures in the survey and the definition of the binary variables

Measures in the survey	Cronbach's alpha	Score			Definition of the binary variable	
		Range	*M*	SD		
Role clarity	0.88	6–42	29.7	6.0	High role ambiguity	Score[a] < *M*
K6 score	0.90	0–24	5.5	5.0	Psychological distress	Score ≥ 13
Job satisfaction	N.A.	1–4	2.6	0.8	Job dissatisfaction	Score = 1 (*dissatisfied*)
Job demands	0.69	12–48	32.8	5.4	High job demands	Score > *M*
Job control	0.78	24–96	65.7	10.1	Low job control	Score < *M*
Effort	0.78	3–12	7.9	1.9	High effort	Score > *M*
Reward	0.76	7–28	18.1	3.0	Low reward	Score < *M*

[a]A higher score in the survey indicated lower role ambiguity (i.e., higher role clarity).

2.2.1 | Role ambiguity (RA)

We measured RA based on the Japanese version of the National Institute for Occupational Safety and Health Generic Job Stress Questionnaire (NIOSH-GJSQ).[17,18] The internal consistency reliability and validity of the Japanese version of the NIOSH-GJSQ has been reported to be acceptable.[18] Respondents were asked to assess the accuracy of each of the six statements about their role clarity, such as "I feel certain about how much authority I have" on a seven-point scale (1 = *very inaccurate* to 7 = *very accurate*; see Table S2 for the full questionnaire). Cronbach's alpha for this sample was 0.88. We summed up the scores (range: 6–42; lower scores indicating higher levels of RA) and constructed a binary variable for high RA by allocating "1" to the score below the sample mean (29.7) and "0" to others.

2.2.2 | Psychological distress (PD) and job dissatisfaction (JD)

We considered PD and JD as workers' psychological ill-being measures. To measure PD, we used Kessler 6 (K6) scores[19,20] as the reliability and validity have been demonstrated previously in a Japanese population.[21,22] From the survey, we first obtained the respondents' assessments of psychological distress using a six-item psychological distress questionnaire: "During the past 30 days, how often did you feel (a) nervous, (b) hopeless, (c) restless or fidgety, (d) so depressed that nothing could cheer you up, (e) that everything was an effort, and (f) worthless." This questionnaire was rated on a five-point scale (0 = *none of the time* to 4 = *all of the time*). The sum of the reported scores was then calculated (range: 0–24; higher K6 scores indicating higher levels of psychological distress). Cronbach's alpha for this sample was 0.90. A binary variable of psychological distress was constructed and defined as K6 ≥ 13, as this

cutoff indicator has been found to indicate serious psychological distress in the Japanese population.[21,22] Regarding job satisfaction, the survey asked questions using a four-point scale (1 = *dissatisfied*, 2 = *somewhat dissatisfied*, 3 = *somewhat satisfied*, and 4 = *satisfied*). A binary variable of JD was constructed by allocating "1" to answers equaling 1, and "0" to others.

2.2.3 | Job demands and control

We utilized the items investigating job demands and control from the Japanese version of the Job Content Questionnaire (JCQ).[23] It is based on the JD-C model,[11] and includes scales related to job demands (five items) and job control (nine items) rated on a four-point scale (1 = *strongly disagree* to 4 = *strongly agree*). The internal consistency, reliability, and validity of the Japanese version of the JCQ have been shown to be acceptable.[24] In the present sample, Cronbach's alpha coefficients were 0.69 and 0.78 for job demands and control scales, respectively. Following the JCQ User's Guide,[23] we summarized the responses to these items into single indices of job demands (range: 12–48) and control (range: 24–96). Finally, we used their sample means (32.8 and 65.7, respectively) as the cut-off points for the binary variables that classified each worker as having either high or low job demands and control.

2.2.4 | Effort and reward

To assess effort and reward, we utilized data collected from a simplified Japanese version of the Effort-Reward Imbalance Questionnaire (ERIQ). The ERIQ was developed based on the ERI model,[13] and its Japanese version and that of the simplified ERIQ[25] used in the present study have been shown to have acceptable internal consistency,

reliability, and validity scores.[26,27] The simplified version includes sub-scales for effort (three items) and reward (seven items) rated on a four-point scale (1 = *strongly disagree* to 4 = *strongly agree*). Cronbach's alpha coefficients were 0.78 and 0.76 for the effort and reward scales, respectively. We summed the responses into single indices for effort (range: 3–12) and reward (range: 7–28). Subsequently, we used their sample means (7.9 and 18.1, respectively) as the cut-off points for the binary variables classifying each worker as exhibiting either high or low effort and rewards.

2.2.5 | Potential confounders

As potential confounders, we considered gender, age (i.e., 20s, 30s, 40s, 50s, and 60s), educational attainment (i.e., high school or below, junior college, college, and graduate school), household income, job category (i.e., managerial, manual, non-manual, and others), health behavior (i.e., smoking, daily alcohol consumption, and physical inactivity), and firm codes (i.e., 1–13). Regarding household income, we divided reported household income by the square root of the number of household members to adjust for household size,[28] and constructed binary variables for each quartile. We also constructed binary variables of "unanswered" for age, educational attainment, and household income. Among these variables, gender, educational attainment, and firm codes were time-invariant and were automatically removed from the FE regression.

2.3 | Statistical analysis

Following the descriptive analysis, which examined pairwise correlations across key variables, we estimated three linear probability models[28,29] (LPM, models 1–3), all of which linearly regressed the binary variable of PD or JD on RA, four job stressors, and potential confounders. Model 1 was a pooled cross-sectional regression model. Model 2 was a FE regression model using data from the same participants collected at different points in three to eight waves depending on the firms, as summarized in Table S1. Model 3 included the interaction terms between RA and each of the four job stressors. The estimated coefficient of the interaction term with each stressor indicates the magnitude of the modifying effect of RA on the association between each stressor and PD or JD. After regression, we calculated the sum of the estimated coefficient of each job stressor and that of its interaction term with RA to measure the RA-modified association between each job stressor and PD or JD.

In the FE models, all variables were mean-centered for each participant over the estimation period, which varied from three to eight waves depending on the participant. Unlike the pooled cross-sectional regression models, which used simply pooled data for individuals over the estimation period, FE models controlled for a participant's time-invariant attributes, both observed and unobserved, which allowed us to focus exclusively on within-participant variations.[29] We further chose LPMs, which are known to provide good estimates of the partial effects of the independent variables on the response probability,[29,30] rather than probit or logistic models for two practical reasons. First, the estimated coefficient of the interaction term can be directly interpreted in LPMs.[31] Second, FE models concentrate on within-participant variations in outcome and hence would remove participants who reported no change in PD (or JD), which was measured by its binary variable, over the estimation period.[32]

We checked the robustness of the estimation results by replacing binary variables for PD and JD with continuous variables for K6 scores (range: 0–24) and job dissatisfaction scores (range: 1–4; reversing the original order to make higher scores indicate higher dissatisfaction). We used the Stata Software Package (release 17) to perform all statistical analyses.

3 | RESULTS

3.1 | Descriptive analysis

Table 2 summarizes the key features of the study sample, dividing the respondents into those with high PA and those with low RA. As seen in this table, higher RA was associated with lower educational attainment, non-managerial jobs, higher levels of job stressors, PD, JD, and lower household income. Table 3 also confirms a high correlation between RA and job stressors, PD, and JD.

3.2 | Regression results

Table 4 presents the key estimation results obtained from models 1 to 3 to explain the probability of PD, with more detailed results provided in Table S3 in the Supplementary file. Model 1, which used pooled, cross-sectional data, confirmed that PD was positively associated with high RA and all job stressors; notably, high RA corresponded to a 4.8% (95% confidence interval [CI]: 4.3%–5.4%) higher probability of PD, compared to low RA. The magnitude of the association between RA and PD was similar to that for the four job stressors.

We observed the associations of PD with RA and job stressors in model 2, even after controlling for a participant's time-invariant attributes. However, the magnitude

TABLE 2 Key features of the respondents in the survey by role ambiguity[a]

Role ambiguity	All	High	Low
Gender			
Males	31 256 (74.5)	13 876 (69.3)	17 380 (79.2)
Females	10 706 (25.5)	6133 (30.7)	4573 (20.8)
Educational attainment			
High school or below	16 349 (39.0)	8594 (43.0)	7755 (35.3)
Junior college	7122 (17.0)	3774 (18.9)	3348 (15.3)
College	14 098 (33.6)	5738 (28.7)	8360 (38.1)
Graduate school	4341 (10.3)	1880 (9.4)	2461 (11.2)
Job category			
Managerial	7403 (17.6)	1889 (9.4)	5514 (25.1)
Manual	19 015 (45.3)	9621 (48.1)	9394 (42.8)
Non-manual	9856 (23.5)	5476 (27.4)	4380 (20.0)
Other	5688 (13.6)	3023 (15.1)	2665 (12.1)
Health behavior			
Smoking	11 656 (27.8)	5327 (26.6)	6329 (28.8)
Daily alcoholic consumption	11 750 (28.0)	4988 (24.9)	6762 (30.8)
Physical inactivity	25 214 (60.1)	12 750 (63.7)	12 464 (56.8)
Job stressor			
Job insecurity (high)	15 756 (37.5)	8964 (44.8)	6792 (30.9)
Effort (high)	23 574 (56.2)	11 795 (58.9)	11 779 (53.7)
Reward (low)	21 156 (50.4)	13 403 (67.0)	7753 (35.3)
Job demand (high)	21 054 (50.2)	10 666 (53.3)	10 388 (47.3)
Job control (low)	17 293 (41.2)	10 886 (54.4)	6407 (29.2)
Psychological distress	3977 (9.5)	2867 (14.3)	1110 (5.1)
Job dissatisfaction	3911 (9.3)	3165 (15.8)	746 (3.4)
Age (years)	M 41.5 (SD 10.6)	M 41.5 (SD 10.5)	M 42.3 (SD 10.5)
Household income (annual, thousand JPY)	M 4320 (SD 2144)	M 4027 (SD 2003)	M 4585 (SD 2231)
N	41 962	20 009	21 953

[a]Figures in parentheses indicate the proportion (%) of the total sample.

of the observed associations was somewhat attenuated compared to those in model 1, suggesting that the associations observed from cross-sectional data were overestimated. Although we did not report the results, the F test showed that the null hypothesis that individual-specific effects were equal to zero could be rejected ($P < .001$), and the Hausman test showed that the null hypothesis that individual-specific effects were not correlated with independent variables could be rejected ($P < .001$). The results of these tests confirmed that the FE model was preferred to pooled cross-sectional and random-effects models.

Model 3 showed that the coefficient of the interaction term with high RA was significantly positive for high job demands, high effort, and low reward. For example, the coefficient of the interaction between high job demands and high RA was 2.1% (95% CI: 0.8%–3.4%; denoted by

"a" in the table). As seen in the bottom part of the table, post-regression calculations showed that a combination of high job demands and high RA added to the risk of PD by 3.5% (95% CI: 2.5%–4.5%; denoted by "A + a"), compared with 1.4% (95% CI: 0.4–2.3; denoted by "A") for a combination of high job demands and low RA (denoted by "A"), both using low job demands as a reference. These results indicated that high RA amplified the association between high job demands and PD by approximately 2.5 times (=3.5%/1.4%). Such an amplifying effect of PD was observed for high effort and low reward, while it was nonsignificant for low job control. Meanwhile, the estimated coefficient of high RA became slightly negative and nonsignificant, suggesting that the association between high RA and PD was mainly through RA's amplifying effects on the association between job stressors and PD.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) High role ambiguity	1						
(2) High job demands	0.053	1					
(3) Low job control	0.316	0.067	1				
(4) High effort	0.060	0.452	0.079	1			
(5) Low reward	0.256	−0.135	0.222	−0.132	1		
(6) Psychological distress	0.158	0.118	0.182	0.124	0.077	1	
(7) Job dissatisfaction	0.213	0.081	0.252	0.088	0.157	0.311	1

TABLE 3 Pairwise correlation coefficients across key variables[*]

*$P < .001$ for all pairwise correlations.

TABLE 4 Estimated associations with psychological distress[a] ($N = 41\,962$ observations from 13 811 individuals)

		Pooled cross-sectional	Fixed effects	
		Model 1	**Model 2**	**Model 3**
		Coef. (95% CI)	**Coef. (95% CI)**	**Coef. (95% CI)**
Main effects				
High role ambiguity		0.048 (0.043, 0.054)	0.032 (0.025, 0.039)	−0.008 (−0.022, 0.006)
High job demands	A	0.038 (0.032, 0.045)	0.024 (0.017, 0.031)	0.014 (0.004, 0.023)
Low job control	B	0.030 (0.024, 0.036)	0.019 (0.011, 0.027)	0.014 (0.003, 0.025)
High effort	C	0.040 (0.034, 0.046)	0.029 (0.022, 0.037)	0.019 (0.009, 0.029)
Low reward	D	0.078 (0.072, 0.084)	0.049 (0.041, 0.056)	0.037 (0.027, 0.047)
Interaction terms				
High role ambiguity				
×High job demands	a			0.021 (0.008, 0.034)
×Low job control	b			0.009 (−0.004, 0.022)
×High effort	c			0.021 (0.008, 0.035)
×Low reward	d			0.024 (0.011, 0.037)
Post-regression calculations				
High job demands with high role ambiguity	A + a			0.035 (0.025, 0.045)
Low job control with high role ambiguity	B + b			0.023 (0.013, 0.033)
High effort with high role ambiguity	C + c			0.040 (0.030, 0.051)
Low reward with high role ambiguity	D + d			0.061 (0.051, 0.071)

Abbreviation: CI, confidence interval.

[a]Controlled for confounders (gender, age, health activity, educational attainment, and firms). See Table S3 for the full estimation results.

Figure 1 graphically illustrates the amplifying effect of RA for each job stressor to help understand the estimation results in Table 4. For each stressor, except for job control, the line for high RA has a greater slope than that for low RA, reflecting the RA's amplifying effect on the association between that stressor and PD. The line for high RA is also located above that for low RA for each job stressor, reflecting RA's amplifying effect on the associations between the other three stressors and PD.

Table 5 presents the estimation results obtained by replacing PD with JD as a dependent variable, with more detailed results provided in Table S4. We obtained results

FIGURE 1 The probability of psychological distress corresponding to a combination of different levels of each job stressor and role ambiguity[†]
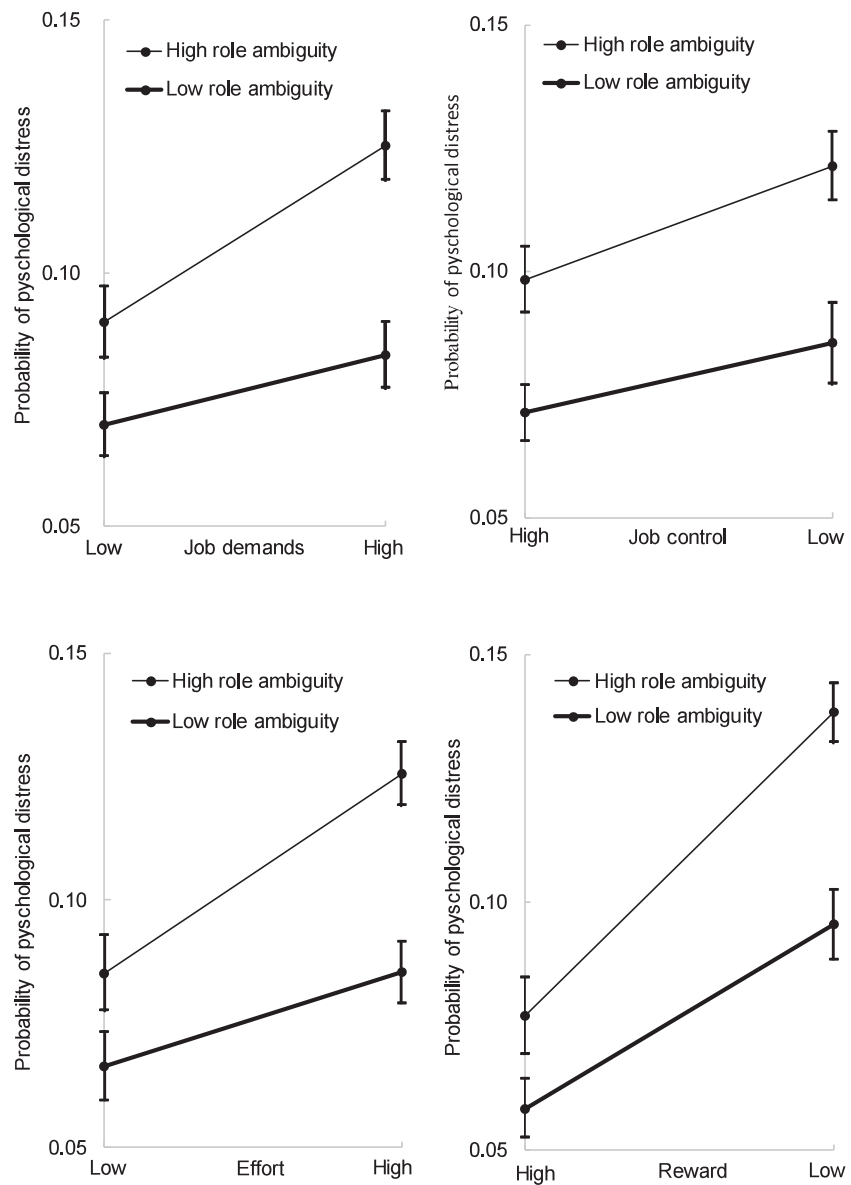
similar to those in Table 4 and confirmed RA's amplifying effect, except for job control. Tables S5 and S6 present the detailed estimation results for the continuous variables of the K6 and JD scores, respectively. The results in these tables were similar to those in Tables 4 and 5, except for the observation that RA's amplifying effect was nonsignificant for the association between high effort and JD score.

4 | DISCUSSION

In this study, we examined the extent to which RA modifies the association between job stressors and workers' psychological ill-being. Unlike most preceding studies, we estimated the FE models to control for a participant's time-invariant attributes using occupational survey data from the same participants collected at different points. The key findings and their practical implications are summarized as follows.

First, we confirmed that higher RA was related to a higher risk of PD and JD, as other job stressors were, generally in line with previous studies that have indicated the adverse impact of RA on workers' job performance and mental health outcomes.[2,6–8] Although the FE model results showed that the association between RA and workers' psychological ill-being observed from the cross-sectional data was somewhat overestimated, we confirmed the relevance of RA for occupational health.

Second, and more importantly, the results underscored that RA worked as a key amplifier for the association between job stressors and workers' psychological ill-being.

TABLE 5 Estimated associations with job dissatisfaction ($N = 41\,962$ observations from 13 811 individuals)[a]

| | | Pooled cross-sectional | Fixed effects | |
| | | Model 1 | Model 2 | Model 3 |
		Coef. (95% CI)	Coef. (95% CI)	Coef. (95% CI)
Main effects				
High role ambiguity		0.069 (0.064, 0.075)	0.050 (0.043, 0.057)	−0.006 (−0.020, 0.008)
High job demands	A	0.030 (0.024, 0.037)	0.020 (0.013, 0.027)	0.010 (0.000, 0.019)
Low job control	B	0.063 (0.057, 0.069)	0.044 (0.036, 0.052)	0.028 (0.018, 0.039)
High effort	C	0.023 (0.017, 0.029)	0.021 (0.014, 0.028)	0.013 (0.004, 0.023)
Low reward	D	0.107 (0.101, 0.113)	0.065 (0.057, 0.072)	0.042 (0.033, 0.052)
Interaction terms				
High role ambiguity				
×High job demands	a			0.021 (0.008, 0.034)
×Low job control	b			0.028 (−0.015, 0.041)
×High effort	c			0.016 (0.003, 0.030)
×Low reward	d			0.046 (0.033, 0.058)
Post-regression calculations				
High job demands with high role ambiguity	A + a			0.031 (0.021, 0.041)
Low job control with high role ambiguity	B + b			0.057 (0.047, 0.066)
High effort with high role ambiguity	C + c			0.029 (0.019, 0.040)
Low reward with high role ambiguity	D + d			0.088 (0.078, 0.098)

Abbreviation: CI, Confidence interval.

[a]Controlled for confounders (gender, age, health activity, educational attainment, and firms). See Table S4 for the full estimation results.

The correlations between job stressors and PD or JD were substantially strengthened by interaction with high RA, a result consistent with previous studies that indicated the amplifying effect of RA on the negative impact of adverse job conditions on workers' health.[9,10] We also observed that the association between RA and PD or JD became non-significant after controlling for the effects of job stressors and their interactions. This result highlights the importance of the role of RA in amplifying the effects of job stressors on psychological ill-being, while the direct effect of RA is generally limited.

Third, it should be noted that the modifying effect of RA was not uniform across types of job stressors. As seen in Tables 4 and 5 and Figure 1, the association between job control and psychological ill-being was less sensitive to RA compared to other job stressors. This is probably because low job control may be closely related to, or even caused by, high RA, implying that the concepts of low job control and high RA may overlap with each other to some extent.

This study had several limitations. First, caution should be exercised when generalizing the obtained observations. The study sample, which consisted of full-time workers in 13 firms in Japan, was dominated by men (74.5% of the total sample) and lacks representativeness of the entire working population. Second, we did not identify causation across job stressors, RA, and psychological ill-being, even though we controlled for participants' time-invariant attributes. Specifically, we cannot exclude the feedback loop from psychological ill-being to job stressors or RA. Higher levels of PD or JD are expected to enhance job stressors or RA, which were treated as exogenous variables and would likely, in turn, raise the levels of psychological ill-being further. Third, and related to the second limitation, we must extend the analysis to address the dynamics of RA and its relationships with job stressors and psychological ill-being. Longer and more successful job experiences may reduce RA over time, and in turn, its negative impact on psychological ill-being will decline. We cannot exclude the possibility that performance recognition changes the effect of RA on engagement from negative to positive, as suggested by a recent study.[33] Lastly, we did not control for potential attrition biases; participants with higher levels of psychological ill-being may have more likely dropped from the survey.

Despite these limitations and issues bring addressed in future research, the results of this study underscore the

importance of RA for occupational health. Managers, supervisors, and colleagues should help workers clarify their roles in mitigating the adverse impact of job stressors on their psychological ill-being.

DISCLOSURE
Ethical approval: The Research Ethics Committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No. 2772), Kitasato University Medical Ethics Organization (No. B12-103), and the Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (Nos. 10-004 and H26-115) reviewed and approved the aims and procedures of the present study. This study was conducted with the J-HOPE dataset as of June 1, 2021. *Informed Consent*: We obtained written consent from the survey participants. *Registry and the Registration No. of the study/trial*: N/A. *Animal studies*: N/A. *Conflict of interest*: The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTIONS
Takashi Oshio conceived the ideas; Akizumi Tsutsumi and Akiomi Inoue conducted data collection; Takashi Oshio performed the analysis; Takashi Oshio prepared the initial manuscript; and Akiomi Inoue and Akizumi Tsutsumi contributed to revising it.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the Japanese study of Health, Occupation and Psychosocial factors related Equity (J-HOPE). Restrictions apply to the availability of these data, which were used under license for this study. Data are available at https://www.med.kitasato-u.ac.jp/lab/publichealth/jhope.html with the permission of J-HOPE.

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SUPPORTING INFORMATION

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1．小規模事業場におけるストレスチェック制度の実施を促進するうえでの課題

江 口 　 尚 　 井 上 彰 臣

1．はじめに

「令和元年経済センサス基礎調査」によると，わが国の事業場の96.3％が労働者数50人未満の事業場である[1]．「労働者死傷病報告」による死傷災害発生状況（令和2年確定値）によると，死傷災害が発生した事業場に占める労働者数50人未満の事業場の割合は74.3％であった[2]．また，労働者数100人以上の事業場が対象であるが，「令和2年労働災害動向調査」によると，度数率と強度率ともに，事業場規模が小さくなるほど高くなる傾向にあることから，労働者数50人未満の事業場の度数率，強度率はさらに高くなると考えられる．平成8年（1996年）の労働安全衛生法の改正により，「すべての事業場において労働者の健康の確保が図られるためには，産業医の選任義務のない事業場においても産業保健サービスが提供される必要があることから，事業者は，これらの事業場については，当該事業場の状況に応じ，必要な場合に，労働者の健康管理等を行うのに必要な医学に関する知識を有する医師その他労働省令で定める者に，労働者の健康管理等の全部又は一部を行わせるよう努めなければならない」と規定されたにもかかわらず，いわゆる大企業と中小企業との様々な格差を表す言葉として使われる「二重構造」が安全衛生においても続いている．新型コロナウイルスの感染拡大は，この「二重構造」の格差を安全，健康など安全衛生の様々な側面からさらに広げている．

わが国では，平成26年（2014年）6月25日に公布された労働安全衛生法の一部を改正する法律に基づき，平成27年（2015年）12月1日より，常時50人以上の労働者を使用する全ての事業場において「ストレスチェック制度」を実施することが義務付けられた（労働安全衛生法第66条の10）．本制度では，労働者に対して心理的な負担の程度を把握するための検査（以下，ストレスチェック）を実施し，その結果に基づいて「高ストレス者」（自覚症状が強い者や，自覚症状が一定程度あり，職場のストレス要因や周囲のサポートの状況が著しく悪い者）を選定し，高ストレス者から申出があった場合は，当該労働者に対して，医師による面接指導を実施することを義務付けている．また，努力義務として，ストレスチェックの集団分析結果を活用した職場環境改善の実施を求めている．

ストレスチェック制度の実施状況についても「二重構造」の状況となっている．事業場におけるストレスチェック制度の実施状況については，厚生労働省「令和2年労働安全衛生調査（実態調査）」によると，労働者数50人以上の事業場では，91.5％が実施しているのに対して，50人未満の事業場では，30〜49人では62.4％，10〜29人では52.7％が実施している状況であった．さらに，同調査では，職場環境等の評価及び改善（ストレスチェック後の集団〔部，課など〕ごとの分析を含む）については，50人以上の事業場では79.6％が実施しているのに対して，30〜49人では53.0％，10〜29人では47.7％が実施している状況であった[4]．50人未満の事業場については努力義務として明記されているストレスチェック制度の実施だけでなく，特に規定のないメンタルヘルス対策の取り組み状況についても，50人以上の事業場と比較して，50人未満の事業場では，取り組んでいる事業場の割合は低い．

そこで本稿では，令和元年度厚生労働省労災

疾病臨床研究事業費補助金「ストレスチェックの集団分析結果に基づく職場環境改善の促進を目的とした調査項目及びその活用方法論の開発（190501-01）（研究代表者：井上彰臣）」で，労働者数50人未満の小規模事業場でのストレスチェック制度の実施状況やそのニーズを把握するために実施した「事業場を対象としたストレスチェック制度の実施状況に関する実態調査」[5] の結果を踏まえて，小規模事業場におけるストレスチェック制度の実施を促進する上での課題について考えてみたい．本調査は，令和元年（2019年）11月〜令和2年（2020年）1月に，既存のデータベースをもとに神奈川県内に本社を置く16,775社から無作為に抽出した6,000社に対して実施した．全体の回答数は1,379通（回答率：23.0％）であった．事業場の内訳（不明・無回答を除く）は94.1％が本社，4.9％が支社・出張所であった．このことから，本稿で示す50人未満の事業場は，大企業の分散型事業場（単独企業分散型小規模事業場）ではなく，総労働者数自体が少ない単独型小規模事業場であると考えて話を進めることにする．本調査において，50人未満の事業場の割合は1,065件（77.2％）であり，その中でストレスチェック制度を実施していた割合は8.9％であった．

2．「労働者の心の健康の保持増進のための指針」における小規模事業場の取り扱い

厚生労働省「労働者の心の健康の保持増進のための指針」では，「小規模事業場におけるメンタルヘルスケアの取組の留意事項として，メンタルヘルスケアを推進するに当たって，必要な事業場内産業保健スタッフが確保できない場合が多い．このような事業場では，事業者は，衛生推進者又は安全衛生推進者を事業場内メンタルヘルス推進担当者として選任するとともに，地域産業保健センター等の事業場外資源の提供する支援等を積極的に活用し取り組むことが望ましい．また，メンタルヘルスケアの実施に当たっては，事業者はメンタルヘルスケアを積極的に実施することを表明し，セルフケア，ラインによるケアを中心として，実施可能なところ

から着実に取組を進めることが望ましい」とされている[6]．さらに，必要な産業保健スタッフが確保できない場合，衛生推進者または安全衛生推進者を事業場内メンタルヘルス推進担当者として選任するともに，産業保健総合支援センターや地域産業保健センター等の事業外資源の提供する支援等の積極的な活用が勧められている．産業保健総合支援センターは，ストレスチェック制度にかかる個別訪問支援があり，事業場内体制の整備，ストレスチェック実施計画の作成，集団分析結果の活用，職場環境改善などについて相談できる．地域産業保健センターでは，ストレスチェックにかかる高ストレス者に対する面接指導について相談できる．

3．50人未満の小規模事業場におけるストレスチェック制度の実施状況[5]

ストレスチェック制度を実施した労働者数50人未満の小規模事業場において，ストレスチェック制度の実施にかかった労働者1人あたりの費用については，0円（費用がかからなかった）が17.9％，1円〜1,000円未満が42.1％であった．また，実施者については，産業医と回答した割合が52.6％であった．50人以上の事業場は，1円〜1,000円未満が35.1％と最も多く，次いで1,000円台が33.6％となっていた．50人未満の事業場で，産業医を選任している場合には，選任している産業医に実施者を依頼したり，事業場規模が小さいために，実施事務従事者がデータを直接入力したりして工夫することで，比較的低コストでストレスチェック制度を実施していると考えられた．

一方で，「ストレスチェック制度を実施しなかった」と回答した労働者数50人未満の小規模事業場に対して，ストレスチェック制度を実施しなかった理由を尋ねたところ，「ストレスチェック制度の実施が努力義務にとどまっている」が88.7％と最も多かった．次いで，「ストレスチェック制度の義務化を知らなかった」（20.2％），「実務上煩雑だった」（10.4％），「費用負担が大きかった」（7.6％），「プライバシーに配慮することが困難だった」（5.9％）の順番であった．50人未満の小規模事業場においては，そもそも実

施義務がないため，ストレスチェック制度そのものが事業場に認知されていない可能性がある．そのため，労働基準監督署の臨検時の確認や，50人未満の小規模事業場を対象とした啓発活動等，小規模事業場に対するさらなる周知が必要になると考えらえた．費用負担については，前述のように，比較的低コストで実施している小規模事業場も存在するため，低コストで実施した事例の紹介などをすることも有用かもしれない．プライバシーへの配慮については，小規模事業場では，プライバシーが保たれるような物理的な空間の確保や，個人情報が確保されると信頼できる窓口の確保などが難しいと考えられることから，高ストレス者に対する面接指導等で留意すべき課題である．

さらに，「ストレスチェック制度を実施しなかった」と回答した労働者数50人未満の小規模事業場に対して，「どういう効果が認められればストレスチェック制度を実施してみたいか」と尋ねたところ，「社員の満足度が上がる」が61.3％と最も多く，次いで，「労働者がいきいきと働くようになる」（57.9％），「会社の利益が上がる」（42.5％），「メンタルヘルス不調者が減る」（30.0％），「離職者が減る」（30.0％）の順番であった．Imamuraらは，ストレスチェック制度で義務付けられているストレスチェックの実施のみでは労働者のストレス反応の改善には効果的でなく，職場環境改善を組み合わせて実施することが有効である可能性があると結論づけている[7]．事業者が期待する「社員の満足度が上がる」，「労働者がいきいきと働くようになる」といった効果を得るためにも，職場環境改善の組み合わせが必要になる．職場環境改善活動ということそのものを小規模事業場の事業者がどの程度認識できているかについても実態を把握する必要がある．さらに，職場環境改善活動がより簡便に，大きな負担なく実施した事例や職場環境改善活動が会社の利益の向上に結び付いた事例の共有も有効かもしれない．

4．50人未満の小規模事業場における集団分析の実施状況[5]

ストレスチェック制度を実施した労働者数50人未満の小規模事業場のうち，集団分析を実施した割合は65.3％であった．集団分析結果の活用方法は，「経営層への報告と説明」が61.3％，「衛生委員会等での審議と職場環境改善」が22.6％であった．「活用しなかった」と回答した割合は16.1％であった．集団分析を実施しなかった理由は，「事業場が小規模であり，プライバシーの保護を考慮して集団分析の実施を控えた」と回答した割合が58.6％と最も多かった．

集団分析を実施しなかった労働者数50人未満の事業場に対して，「どういう効果が認められれば集団分析の実施や集団分析結果を活用してみたいか」と質問したところ，「メンタルヘルス不調者が減る」が53.8％と最も多く，次いで，「社員の満足度が上がる」（48.7％），「労働者がいきいきと働くようになる」（38.5％），「離職者が減る」（33.3％）の順番であった．ここで挙げている成果はすでに先行研究[8]では実証されているが，事業者からすると，ストレスチェックの項目からこれらの成果をイメージすることが難しいのかもしれない．これまでもストレスチェックの結果を活用した職場環境改善活動の効果については，マニュアルなどが出されているところであるが，労働者数50人未満の事業場の事業者や労働者に対して，事例が発生する前から関心を持ってもらえるような仕掛けづくりが必要であると考えられる．さらに，ストレスチェックの質問項目そのものにも関心を持ってもらえるような仕組みづくりが必要であると考えられた．

5．労働者数50人未満の小規模事業場における職場環境改善活動の具体的な内容[5]

本調査では，14件と少ないが，労働者数50人未満の小規模事業場における職場環境改善活動の具体的な内容を情報収集した．最も多かったのが「作業環境や職場環境の見直し」の50.0％で，次いで，「勤務時間や職場体制・態勢の見直し」（35.7％），「コミュニケーション・プログラムの実践を含む社内のコミュニケーションのあり方の見直し」（28.6％）の順番であった．14件中13件は，職場環境改善の実施にあたり外部機関は利用していなかった．このように，リソー

スの限られた50人未満の小規模事業場での職場環境改善活動は，外部機関を使わずに自前で実施していると考えられた．Eguchiらによる長野県岡谷市の中小規模事業場を対象とした調査では，事業者が負担をする形での昼食会や懇親会，ボウリング大会など低コストで職場内のコミュニケーションを促進するための取り組みを実施して良好な職場環境を維持しており，そういった活動をしている事業場では，していない事業場と比較して，労働者のメンタルヘルスが良好であった[9]．職場環境改善活動は，従業員参加型や管理監督者主導型などがあるが，一般的に，小規模事業場においては，事業者や管理監督者の姿勢の変化が全体に影響を及ぼしやすいと考えられることから，管理監督者主導型から始めてみても良いかもしれない．産業保健専門職の関わりが限定的な小規模事業場において，等身大に感じられる，自社でもできると感じられるような職場環境改善の事例の共有が必要だろう．また，前述のような形で，ストレスチェック制度の実施を，事業者が期待をする社員満足度の向上や職場の活性化につなげるためには，職場環境改善活動が必要との発信も有効かもしれない．事業者が職場環境に関心を持ち，それを改善することは事業者の責務であることの情報発信も重要であろう．

6．最後に

本稿では，小規模事業場におけるストレスチェック制度の推進について，労災疾病臨床研究の一環で実施した調査結果をもとに論を進めてきた．労働者数50人以上の事業場でストレスチェック制度が進んだのは，労働安全衛生法でその実施が義務化されたからである．そういったことからも，人的にも経済的にもリソースに限りがある小規模事業場において，努力義務にとどまっている現状の中で，ストレスチェック制度を進めることは容易ではない．しかし，本稿で紹介した調査結果では，50人未満の小規模事業場においても，ストレスチェック制度を実施し，職場環境改善活動まで行っている事業場があった．そういった事業場は，低コストで実施できるように工夫したり，結果を活かすために

経営層への報告や説明をしたりしていた．近年，大企業から中小企業まで健康経営への関心が急速に高まっている．健康経営の認定基準には，わざわざ「50人未満の事業場におけるストレスチェックの実施」という項目がある．さらに，この健康経営の認証取得の動きは，取り引き先やサプライチェーンへの広がりを期待されていることから，大企業と取り引きのある小規模事業場にとっては，ストレスチェック制度を実施するインセンティブとなりうるだろう．

ストレスチェック制度の活用が，労働者の離職を減らす，労働者の満足度を上げるなど，事業者が期待するエビデンスはすでに存在する．また，本稿で紹介したように，労働者数50人未満の小規模事業場においても，ストレスチェック制度を実施したいにもかかわらず実施できていない事業場も存在しているだろう．また，小規模事業場においては，事業者の考え方ひとつで対応が変わりうる．そのような50人未満の小規模事業場に対して，エビデンスベースの説明や情報発信だけではなく，前述したような健康経営などの文脈でのインセンティブの創出や，等身大の好事例の発信は有効だろう．小規模事業場がわが国の経済を支えているといっても過言ではない．こうした取り組みによりストレスチェック制度の実施が少しでも多くの小規模事業場に広がり，そこで働く多くの労働者のメンタルヘルスや，生産性の向上につながることを期待したい．

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ORIGINAL ARTICLE

Assessing workplace civility: Validity and 1-year test-retest reliability of a Japanese version of the CREW Civility Scale

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Abstract

Objectives: This study aimed to examine the reliability and validity of the Japanese version of the eight-item CREW Civility Scale which measures workplace civility norms and compare the civility scores among various occupations.

Methods: A longitudinal study included all employees in a social care organization ($N = 658$) and a cross-sectional study included all civil servants in one city ($N = 3242$) in Japan. Structural validity was tested through confirmatory factor analyses (CFA). Construct validity was assessed through Pearson's correlations of civility with other variables. Internal consistency was assessed by Cronbach's alpha and 1-year test-retest reliability was assessed by the Intraclass Correlation Coefficient (ICC).

Results: The results of CFA showed an acceptable level of model fit (TLI =0.929; CFI =0.949; and SRMR =0.034). CREW Civility Scale scores were significantly positively correlated with supervisor support, co-worker support, and work engagement, while significantly negatively correlated with incivility, workplace bullying, intention to leave, and psychological distress, which were consistent with our hypotheses. Cronbach's alpha coefficient was 0.93 and ICC was 0.52. Younger, high-educated, and managerial employees and, childminder/nursery staff reported higher civility. High school graduates and respondents who did not graduate from high school, part-time employees, nurses, paramedical staff, and care workers reported lower civility.

Conclusions: The Japanese version of the CREW Civility scale is a reliable, valid measure of civility, appropriate for Japanese workplaces as well as for use in multi-national studies alongside other existing versions of this scale in English, Portuguese and Farsi.

KEYWORDS

civility, Japan, reliability, scale development, validity, workers

1 | INTRODUCTION

Workplace mistreatments such as bullying occur frequently worldwide and various adverse health outcomes, as well as organizational outcomes, have been reported.[1] Even workplace incivility, which includes milder forms of workplace mistreatment than bullying, also has negative impacts on employees' outcomes; it is associated with greater psychological distress,[2] greater burnout,[2–4] lower job satisfaction and organizational commitment,[5] and higher turnover intentions.[5]

Although prevention of negative behaviors at the workplace is crucial, empirical intervention studies on workplace mistreatment are scarce and only a few studied interventions succeeded in reducing the number of negative acts.[6] On the other hand, focusing on strengthening the positive sides of the workplace tends to be more effective as an improvement target. For example, intervention studies in Canada showed that improving civility reduced healthcare employees' psychological distress, increased work engagement, and even increased patients' satisfaction.[3,4] Workplace civility means a social norm of maintaining at least a minimum level of polite communication and collaboration among workers, including those who are not personal friends. Lakoff[7] explained that "if politeness (whether positive or negative) is an offering of good intentions, civility is a withholding of bad ones, a decision not to do something negative that one might have otherwise done" (p. 25). Also, according to Gill and Sypher,[8] "Civility demands that one speaks in ways that are respectful, responsible, restrained, and principled and avoid that which is offensive, rude, demeaning, and threatening" (p. 55). Thus, incivility can be described as presenting conducting something negative to others, whether with or without intentions, while civility is not presenting something negative to others.

The 6-month intervention study, known as Civility, Respect, Engagement in the Workforce [CREW], demonstrated that workplace civility could be improved via paying intentional, focused attention to norms of mutual communication between workers. Of note, improvements in civility had no significant effect on co-worker incivility levels.[4] This suggests these two constructs are not simple opposites; increasing civility is not associated with a commensurate decrease in incivility, and vice versa. As reported previously,[6] since empirical studies aiming to decrease negative acts often failed, an intervention focusing on strengthening positive sides of the workplace has the potential to improve working environments.

Although the Japanese version of the civility scale does not exist so far, several English versions of the scales measure workplace civility, e.g., the eight-item CREW Civility Scale[9] or the four-item Civility Norms Questionnaire–Brief (CNQ-B).[10] The CREW Civility Scale was developed specifically for evaluating the CREW initiative in the U.S.A's Veterans Health Administration (VHA). This scale assesses courteous and considerate behaviors within the workgroup (groups of people working together and reporting to the same supervisor); results can be aggregated across organizations. The CNQ-B was designed to measure workgroup civility climate in general, defined as "employee perceptions of norms supporting respectful treatment among workgroup members".[10] Although Walsh et al.[10] pointed out that some of the items in the CREW Civility Scale push the boundaries of the civility construct (e.g. teamwork which is akin to workgroup cohesion; also diversity acceptance and organizational tolerance of discrimination which are similar to diversity climate[11]), the CREW Civility Scale had the strongest correlations with outcomes conceptually related to civility. The CREW Civility Scale correlations with an intention to quit, general job satisfaction, satisfaction with supervision, satisfaction with coworkers, and affective organizational commitment were stronger compared to CNQ-B.[10]

Civility or politeness has been long known as a core spirit in Japanese society. It can be traced back historically to the report by Engelbert Kaempfer, a German physician attached to the embassy of the Dutch East India Company and came to Japan in 1690. His book *The History of Japan* described the Japanese society as being "as civil, as polite and curious a nation as any in the world." He stated that "behavior of the Japanese, from the meanest countryman up to the greatest Prince or Lord, is such that the whole Empire might be called a School of Civility and good manners."[12] (p. 20). Although whether or not this culture of civility still exists in the current Japanese society

is unknown, it is the case that we also have a dark side of interpersonal relationships, which can manifest itself even in the adult world through workplace mistreatment. For instance, about 6%–10% of workers have experienced bullying or harassment at the workplace in Japan.[13,14] Workplace incivility is also frequently experienced among Japanese workers.[15]

One of the possible reasons for interpersonal mistreatment issues in the historically polite and civil Japanese society is highly cohesive and hieratical Japanese working culture.[12] Cohesion has beneficial effects especially in adverse situations such as natural disasters[16] because people help each other which prevents adverse outcomes. However, cohesion sometimes reduces diversity and may enhance social exclusion, which is a so-called "dark side of social capital".[17] Although current Japan is not as collectivist as before, strong group identification continues to be appreciated.[18] In such collectivist cultures, individuals are supposed to be sensitive to the nuanced aspects of the social context and encouraged to comply with the group norm.[19] As in a Japanese proverb "the nail that sticks up, gets hammered down," a person who is slightly different or unique easily becomes a target to be bullied or excluded.[20] In this context, preventing discrimination and accepting diversity, maybe a key for preventing workplace mistreatments in Japan; thus, diversity acceptance may be an integral part of civility in Japanese settings. Nevertheless, civility research is lacking in Japan, which we believe is at least partly caused by a lack of reliable and valid civility scales. Thus, Japanese translations of validated scales are required. Since the CREW Civility Scale evaluates including diversity acceptance as aforementioned, developing the Japanese version of the CREW Civility Scale would contribute to assessing civility norms of Japanese working environments more appropriately.

The aim of the current study was to develop the Japanese version of the CREW Civility Scale[9] and investigate its reliability and validity, to boost interventions in Japanese workplaces as well as a collaboration of civility research with other countries. We also sought to assess the current status of civility in the public and private healthcare sectors in Japan by comparing the civility scores. Based on the previous studies,[4,9] we hypothesized that the scale is a one-factor model, is positively associated with supervisor support, co-worker support, and work engagement, and is negatively associated with incivility, bullying, intention to leave, and psychological distress. This is because respondents who experience workplace civility likely have higher perceptions of social support from co-workers and particularly of fair treatment by supervisors. Since healthcare workplaces have a higher prevalence of negative acts,[21] we also hypothesized healthcare workers rate civility lower than do other professionals such as administrators or engineers.

2 | METHODS

2.1 | Procedure and participants

2.1.1 | Sample 1

A cross-sectional study was conducted as the follow-up survey of a 1-year prospective cohort study for all civil servants in one city in the Kanto region, Japan.[1] This study only included the cross-sectional data since civility was measured only at follow-up. The questionnaires were distributed as a part of the Working Conditions and Stress Survey, with a letter describing the aims and procedure of the study assuring that the survey was non-mandatory and no individual would be identified in reporting the data. A total of 3242 questionnaires were distributed through eight safety and health committees and 2727 civil servants returned completed questionnaires in sealed envelopes to the first author (KT) (84.1% response rate). To encourage them to evaluate their working environments honestly, no one in their workplaces saw another person's written individual questionnaire; only the first author (KT) opened the envelopes and analyzed the data.

2.1.2 | Sample 2

A 1-year longitudinal study included all employees in a social care organization that has a hospital and a nursing home in the Kinki region, Japan. This study was a part of a three-wave (2-year) prospective cohort study and several studies using the baseline data have been published.[22,23] A total of 658 questionnaires were distributed through the human resource department at baseline, explaining the survey was non-mandatory and no individual would be identified in reporting the data. A total of 600 employees completed the baseline survey and 432 completed a 1-year follow-up (91.2% and 72.0% response rate, respectively). All questionnaires in sealed envelopes were directly collected by the researchers.

2.2 | Measurements

2.2.1 | Japanese Version of the CREW Civility Scale

The eight-item CREW Civility Scale measures workplace civility aspects through employee ratings of receiving

personal interest and respect from co-workers, observing cooperation or teamwork in the workgroup, fair conflict resolution, no tolerance for discrimination, and valuing of individual differences by co-workers and supervisors at their workplace.[9] The item examples are shown in Table 1. The original English version[9] was translated into Japanese and modified, using plain Japanese language expressions, by a group of three independent experts in job stress research (KT, AS, and KS). The first author (KT) used these materials to develop the first translated version, which was tested with four experts in occupational mental health and three human resource department staff members. Their feedback was incorporated in the revisions. The second version was then back-translated and sent to the author (KO) of the original version, who confirmed the back-translated Japanese version had exactly the same meaning as the original scale in English. This final version was used in the present study. The items were rated on a 5-point Likert scale from 1 = *strongly disagree* to 5 = *strongly agree*. The total score was calculated by averaging item scores.

2.2.2 | Worksite social support

A subscale of the Brief Job Stress Questionnaire (BJSQ)[24] was used to measure worksite social support from supervisors and co-workers. Respondents used a 4-point Likert scale from 1 = *never* to 4 = *very much* (e.g., "When you are in trouble, how much is your immediate supervisor reliable?"). In the present study, each sum-scale was used in the statistical analyses (score range: 4–16; a higher score means receiving greater support from supervisors or co-workers).

2.2.3 | Workplace incivility

The Modified Workplace Incivility Scale (MWIS)[2,3,15] has 15 items and assesses the frequency of experienced incivility at work including disrespectful, rude, or condescending behaviors from supervisors and co-workers in the previous month (e.g., "Paid little attention to your statement or showed little interest in your opinion," "Made unwanted attempts to draw you into a discussion of personal matters"). The MWIS also assesses the frequency of the same uncivil behaviors instigated by the respondent in the previous month. The items were rated on a 7-point Likert scale from 0 = *never* to 6 = *daily*. In the present study, each sum-scale was used in the statistical analyses (score range: 0–6; a higher score means experiencing more uncivil behaviors from supervisors or co-workers or conducting more uncivil behaviors toward supervisors or co-workers).

TABLE 1 Confirmatory factor analysis results for the Japanese Version of the CREW Civility Scale ($N = 2983$)

Standardized factor loadings for civility				
Item #	Observed variable	Whole sample[a]	Sample 1	Sample 2
1	People treat each other with respect	0.832	0.831	0.837
2	A spirit of cooperation and teamwork	0.831	0.833	0.822
3	Disputes or conflicts are resolved fairly	0.810	0.816	0.767
4	The people I work with take a personal interest in me	0.766	0.763	0.764
5	The people I work with can be relied on when I need help	0.776	0.779	0.748
6	This organization does not tolerate discrimination	0.717	0.727	0.652
7	Differences among individuals are respected and valued	0.820	0.824	0.792
8	Managers/supervisors/team leaders work well with employees of different backgrounds in my work group	0.758	0.765	0.709
Model fit indices				
TLI		0.925	0.929	0.892
CFI		0.946	0.949	0.923
RMSEA		0.112	0.119	0.138
SRMR		0.035	0.034	0.046
df		20	20	20
Chi square		907.412**	744.574**	219.867**

[a]Total number of Sample 1 ($n = 2457$) and Sample 2 ($n = 526$).
**$P < .01$.

2.2.4 | Workplace bullying

Workplace bullying was measured by the 22-item Negative Acts Questionnaire-Revised (NAQ-R).[14] NAQ-R assesses how often respondents have experienced various negative acts during the previous six months, which when occurring frequently might be considered as bullying (e.g., "Spreading of gossip and rumors about you", "Persistent criticism of your work and effort"). Respondents used a 5-point Likert scale from 1 = *never* to 5 = *daily*. We used a sum-scale of the NAQ-R in the correlational analyses (score range: 22–110; a higher score means experiencing more workplace bullying).

2.2.5 | Intention to leave

Intention to leave was measured by the three-item scale developed by Geurts et al.[25]; the Japanese version was developed by the author.[1] Respondents used a 5-point Likert scale from 1 = *I agree completely* to 5 = *I disagree completely* to rate the extent to which they felt leaving their organization in the last month (e.g., "I consider my decision to work for this employer as an obvious mistake"). In the current study, a sum scale was used in the analysis (score range: 3–15; a higher score means having greater intention to leave).

2.2.6 | Psychological distress

Psychological distress was measured by the K6 scale,[26] which includes six items asking how frequently respondents have experienced psychological distress symptoms in the past 30 days (e.g., "About how often did you feel so depressed that nothing could cheer you up?"). Respondents used a 5-point Likert scale from 0 = *never* to 4 = *daily* and a K6 sum scale was used for statistical analyses (score range: 0–24; a higher score means having greater psychological distress).

2.2.7 | Work engagement

Work engagement was measured by the 9-item Utrecht Work Engagement Scale (UWES-9).[27] The UWES-9 assesses three constructs: dedication, vigor, and absorption. Respondents used a 7-point Likert scale from 0 = *never* to 6 = *every day* to rate how frequently they experienced engagement with their work (e.g., "At my work, I feel bursting with energy", "I am proud of the work that I do", "I feel happy when I am working intensely"). The total scale score was calculated by averaging item scores (score range: 0–6; a higher score means having greater work engagement).

2.3 | Statistical analysis

The reliability and validity of the CREW Civility Scale were tested according to COSMIN (COnsensus-based Standards for the selection of health Measurement INstruments) reporting guidline.[28] First, we conducted confirmatory factor analysis (CFA) to test structural validity. Based on earlier research and theory, one factor was expected so that we set simple regression models with each CREW Civility scale item as a dependent, the latent variable ("Civility") as an independent, and the errors for each equation. Since the observed variables are continuous, we used maximum likelihood (ML) estimation. Model fit was assessed through a combination of fit indices: chi-square, df, Tucker Lewis Index (TLI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR), which have been reported to be relatively robust to the large sample inflation effect.[29]

To test hypotheses for construct validity and criterion-related validity, Pearson's correlation coefficients were calculated between the scale score of the CREW Civility Scale and supervisor support, co-worker support, workplace incivility, workplace bullying, intention to leave, psychological distress, and work engagement. We used only Sample 1 data in this analysis because we did not measure workplace bullying in Sample 2.

To examine internal consistency, Cronbach's alpha coefficients were calculated for all items of the Japanese version of the CREW Civility Scale. In addition, we calculated Intraclass Correlation Coefficient (ICC) (1, 1) using longitudinal data of Sample 2 to investigate 1-year test-retest reliability.

Finally, we compared mean civility scores among all employees using a *t*-test or one-way analysis of variance (ANOVA). The 0.05 (two-tailed) significance level was used. Analyses were conducted in SPSS 27.0J and Amos 27.0J for Windows.

3 | RESULTS

3.1 | Demographic description of the participants

Sample 1 included a total of 2727 civil servants who completed the survey. After eliminating those with missing values for main variables ($n = 270$), we used the data of 2457. The gender proportions were almost equal (male:

$n = 1257$, 51.2%; female: $n = 1185$, 48.2%). The mean age was 42.7 (SD = 11.8) years. In terms of education, 25% graduated high school ($n = 614$), 34.0% junior college/technical school ($n = 835$), and 40.5% college/graduate school ($n = 995$). Respondents' occupations varied, including administrator/clerk ($n = 853$, 34.7%), engineer ($n = 201$, 8.2%), field worker ($n = 313$, 12.7%), fire defence personnel ($n = 262$, 10.7%), child-minder/nursery school staff ($n = 348$, 14.2%), public health nurse/nutritionist ($n = 64$, 2.6%), physician ($n = 12$, 0.5%), hospital nurse/midwife ($n = 282$, 11.5%), medical technician ($n = 68$, 2.8%) and others ($n = 39$, 1.6%). Their job ranks also varied, including manager ($n = 46$, 1.9%), middle manager ($n = 203$, 8.3%), assistant manager ($n = 644$, 26.2%), general employee ($n = 1,157$, 47.1%), post-retirement re-employment ($n = 90$, 3.7%), part-time ($n = 282$, 11.5%), and others ($n = 21$, 0.9%).

In Sample 2, a total of 600 employees completed the baseline survey and 432 completed a 1-year follow-up. After eliminating those with missing values for main variables at baseline ($n = 74$), we used 526 records for cross-sectional analysis. For test-retest analysis, we used the longitudinal data of 356 records after additionally eliminating those with missing values for civility items at the follow-up. Mean age at baseline was 45.9 (SD = 11.6) and 18.8% of respondents graduated high school ($n = 99$), 42.2% junior college/technical school ($n = 222$), and 36.7% college/graduate school ($n = 193$). Their occupations were mostly healthcare professionals, i.e., physician ($n = 29$, 5.51%), nurse ($n = 196$, 37.3%), other paramedical ($n = 82$, 15.6%), and care worker and helper for the elderly ($n = 121$, 23.0%), but included administrator/clerk ($n = 98$, 18.8%). Given the large number of nurses and care workers, this sample was more female dominated than Sample 1 (male: $n = 118$, 22.4%; female: $n = 408$, 77.6%). We did not ask about job ranks.

3.2 | Structural validity of the CREW civility scale

The CFA for Sample 1 showed the best model fit for one-factor model (TLI = 0.929; CFI = 0.949; SRMR = 0.034; df = 20; Chi square = 744.574), although RMSEA was higher than 0.05 (Table 1).

3.3 | Construct validity of the CREW civility scale

As shown in Table 2, CREW Civility Scale scores were significantly positively correlated with supervisor support, co-worker support, and work engagement

($P < .001$). CREW Civility Scale scores were also significantly negatively correlated with incivility, workplace bullying, intention to leave, and psychological distress ($P < .001$).

3.4 | Reliability of the CREW Civility Scale

The internal consistency reliability of the CREW Civility Scale (Cronbach's alpha coefficient) was 0.93 both for Sample 1 and 2 (Table 2). ICC (1, 1) of the baseline and follow-up CREW Civility Scale score was 0.52 (95% Confidence Interval [CI]: 0.44–0.59).

3.5 | Comparison of civility scores across participants

The mean score on the Japanese version of the CREW Civility Scale was 3.91 (SD = 0.71) among all participants. Although we did not find gender differences, there were between-group differences for age, education, job rank, and occupation (Table 3). Younger employees (20–24 years old) rated their workgroup as more civil than middle-aged employees (40–44 years old) did. In terms of job rank, middle managers had a higher perception of civility than assistant managers, general employees (non-managers), and part-time employees. Among various occupations, childminders or nursery school staff reported higher civility, while hospital nurses or midwives, other paramedical staff, and care workers or helpers for the elderly reported lower civility.

4 | DISCUSSION

This study aimed to examine the reliability and validity of the Japanese version of the CREW Civility Scale. The findings suggest that the Japanese version of the CREW Civility Scale has good levels of reliability and validity for measuring workplace civility in the Japanese context. This study is the first to find moderate 1-year test-retest reliability, which shows civility is moderately stable to measure.

In this study, both TLI and CFI were close to 0.95 and SRMR was <0.09, indicating an acceptable model fit. A cut-off value close to 0.95 for TLI and CFI; 0.06 for RMSEA; and 0.08 for SRMR has been reported to result in lower Type II error rates.[30] Also, a combination with a cut-off value close to 0.95 for TLI/CFI and SRMR >0.09 resulted in the least sum of Type I and Type II error rates.[30] Although RMSEA was greater than 0.06 in this study, a

TABLE 2 Descriptive, correlations, and Cronbach's alpha coefficients ($n = 2457$, sample 1)

Variables (scale: score range)	Mean	SD	Cronbach α	1	2	3	4	5	6	7	8	9
1 Civility (CREW-CS: 1–5)	3.91	0.71	0.93									
2 Supervisor support (BJSQ: 4–16)	8.48	2.78	0.87	0.44								
3 Co-worker support (BJSQ: 4–16)	9.22	2.33	0.85	0.47	0.61							
4 Supervisor incivility (MWIS: 0–6)	0.31	0.58	0.77	−0.32	−0.29	−0.19						
5 Coworker incivility (MWIS: 0–6)	0.23	0.52	0.82	−0.32	−0.20	−0.28	0.54					
6 Instigated incivility (MWIS: 0–6)	0.26	0.44	0.74	−0.23	−0.10	−0.14	0.43	0.50				
7 Workplace bullying (NAQ-R: 22–110)	26.5	7.84	0.93	−0.41	−0.28	−0.26	0.58	0.53	0.35			
8 Intention to leave (3–15)	2.33	1.00	0.85	−0.41	−0.30	−0.33	0.26	0.23	0.21	0.36		
9 Psychological distress (K6: 0–24)	5.34	5.20	0.92	−0.33	−0.25	−0.29	0.36	0.36	0.28	0.48	0.49	
10 Work engagement (UWES: 0–6)	3.14	1.33	0.95	0.39	0.29	0.28	−0.13	−0.09	−0.11	−0.20	−0.57	−0.38

Note: All correlations are significant ($P < .001$).

Abbreviations: BJSQ, Brief Job Stress Questionnaire; CREW-CS, CREW Civility Scale; MWIS, Modified Workplace Incivility Scale; NAQ-R, Negative Acts Questionnaire-Revised; UWES, Utrecht Work Engagement Scale.

recent study reported SRMR produced more accurate tests of close fit and confidence intervals than RMSEA.[31] Overall, the results of CFA are consistent with the original English version,[9] interpreting this factor to reflect the concept of civility.

Although we found excellent internal consistency reliability for the scale (Cronbach's alpha coefficient = 0.93), 1-year test-retest reliability was moderate, possibly because test-retest was conducted with a 1-year time lag. This is relatively long because empirical studies have reported incivility experiences change over time.[32] This might affect our 1-year test-retest reliability.

High scores on the Japanese version of the CREW Civility Scale were associated with lower workgroup incivility. This is consistent with previous studies where workplace civility was inversely related to workplace incivility.[10,33] This inverse relationship is well-substantiated in previous research, even though the debate is ongoing on whether the civility construct is, or is not, the direct opposite of incivility. Considering this debate, our findings are more consistent with the argument that civility and incivility, although inversely related, are different constructs and not simply two opposite ends of the same construct.[34] In our data, a correlation between civility and supervisor or co-worker incivility was not strong ($r = -.32$). Since similar results have been reported in other studies: $r = -.36$ for incivility experiences,[10] $r = -.49$ for co-worker incivility; $r = -.35$ for supervisor incivility,[3] it suggests the importance of measuring both civility and incivility to capture workplace environments precisely.

Our findings overall supported the construct validity of this scale. For instance, high scores on the Japanese version of the CREW Civility Scale were associated with higher supervisor and co-worker support and lower workplace bullying. This is consistent with a previous study that showed a negative association between worksite social support and workplace bullying.[14] Among organizational recourses, co-worker support had the strongest correlation with civility. This is probably because three items describe co-worker support in the CREW Civility Scale: "A spirit of cooperation and teamwork exists in my workgroup (#2)," "The people I work with take a personal interest in me (#4)," and "The people I work with can be relied on when I need help (#5)." In other words, the operational definition of civility that we used in the current study emphasized the aspect of co-worker support which likely explains this finding of the strongest correlation between civility and co-worker support. As this finding suggests, enhancing supervisor and co-worker support might contribute to improving civility at the workplace.

High scores on the Japanese version of the CREW Civility Scale were also associated with lower psychological distress or lower intention to leave and with higher

TABLE 3 Comparison of civility scores among all participants in this study ($N = 2983$)[†]

	n (%)	Civility score Mean (SD)	P[§]
Gender			.742
Male	1375 (46.1)	3.89 (0.73)	
Female	1593 (53.4)	3.88 (0.71)	
Age (years)			.004
18–24	148 (4.96)	4.01 (0.72)	
25–29	309 (10.4)	4.01 (0.69)[a*]	
30–34	321 (10.8)	3.97 (0.77)	
35–39	439 (14.7)	3.88 (0.75)	
40–44	364 (12.2)	3.83 (0.73)[a*]	
45–49	311 (10.4)	3.83 (0.76)	
50–54	411 (13.8)	3.86 (0.73)	
55–59	415 (13.9)	3.86 (0.64)	
60–64	202 (6.77)	3.85 (0.67)	
over 65	21 (0.70)	3.79 (0.52)	
Education			<.001
High school graduate	713 (23.9)	3.81 (0.72)[a**]	
Junior college/technical school graduate	1057 (35.4)	3.87 (0.72)	
University/graduate school graduate	1188 (39.8)	3.95 (0.71)[a**]	
Job rank[‡]			.002
Manager	46 (1.54)	4.18 (0.47)	
Middle manager	203 (6.81)	4.09 (0.58)[b*c*d*]	
Assistant manager	644 (21.6)	3.90 (0.70)[b*]	
General employee	1157 (38.8)	3.91 (0.76)[c*]	
Post-retirement re-employment	90 (3.02)	3.93 (0.67)	
Part-time	282 (9.45)	3.85 (0.75)[d*]	
Others	21 (0.70)	3.82 (0.77)	
Occupation			<.001
Administrator/clerk	951 (31.9)	3.92 (0.75)[a**b*]	
Engineer	201 (6.74)	3.93 (0.62)[c*]	
Field worker	313 (10.5)	3.78 (0.73)[d**]	
Fire defense personnel	262 (8.78)	3.86 (0.73)[e**]	
Childminder/nursery school staff	348 (11.7)	4.15 (0.67)[a**c*d**e**f**g**h**]	
Public health nurse/nutritionist	64 (2.15)	3.97 (0.63)	
Physician	41 (1.37)	4.05 (0.66)	
Hospital nurse/midwife	478 (16.0)	3.75 (0.72)[b*f**]	
Other paramedical	150 (5.03)	3.76 (0.69)[g**]	
Care worker/helper	121 (40.6)	3.77 (0.56)[h**]	
Others	39 (1.31)	3.96 (0.76)	

Note: [abcd]*$P < .05$, **$P < .01$. Post hoc test by Tukey.

Abbreviation: SD, standard deviation.

[†]Sample 1 ($n = 2457$) and Sample 2 ($n = 526$) combined.

[§]T-test or one-way ANOVA.

[‡]Only Sample 1 ($n = 2457$).

work engagement, as expected theoretically. This is consistent with previous reports where workplace civility was correlated with reduced distress, better mental health, higher work engagement, and lower intention to leave.[4,9,10]

The overall mean civility score for our participants was 3.91, similar or relatively higher than in the previous reports using the English language scale. Previous studies reported 3.46 at pre-intervention,[9] 3.58 and 3.72 at pre-intervention,[4] and also 3.98.[10] In this study, the civility scores were similar to or even higher than the post-intervention in the previous studies. The results suggest that polite and civil culture still exists in Japanese workplaces to some extent.[12]

Our findings suggest that even within the same organizations, civility scores likely vary by occupation and status. For example, we found higher civility scores were observed in high-educated employees, managers, and childminder/nursery school staff, while high school graduates and respondents who did not graduate from high school, nurses, paramedical staff, and care workers reported lower civility. Since employees with higher positions are less likely to experience workplace mistreatment,[13] the difference in rating appears reasonable. Similarly, since negative interpersonal relationships are often observed among healthcare workers[21] or low socio-economic status employees,[13] it is not surprising such employees perceive their workplace as less civil. Although the reason why childminder or nursery school staff reported the highest civility score in this study was unknown, it is probably because our participants are civil servants and worked in public daycare or nursery schools. In Japan, the salary and working years in public day-care or nursery schools are higher/longer and the turnover rate is also lower than private (7% vs. 12%).[35] This might have contributed to higher civility norms of their workplaces.

Validated versions of the CREW Civility scale are already available in English, Portuguese,[36] and Farsi[37] and have been used to evaluate workplace interventions in these settings. As an outcome of our study, this same scale is now also available and supported for use in Japanese work settings. This allows studying workplace civility across several national cultures, including Japan, which offers potential for generating and testing multiple new hypotheses. For example, cultural norms for workplace civility, structural components of the civility construct, relationships of civility to other workplace characteristics, and so forth, can be examined in parallel for English-speaking, Portuguese-speaking, and now also Japanese-speaking workers. Given the previous research and theory regarding cultural differences in work-related values,[38,39] this potential direction of research may afford a better understanding of civility and,

more broadly, establish whether or how work-related values inherent within specific national cultures can influence workers' perceptions of the same construct, measured with the same scale. The addition of the Japanese version to the existing English, Portuguese and Farsi versions of the same scale afford studying such questions empirically. Possibilities include contrasting different national samples by country (e.g. U.S.A., U.K., Canada, Portugal, Brazil, Iran, Japan), by geography (North America, Latin America, Europe, Asia), and by Hofstede's culture value dimensions.[38,39]

Our study includes some limitations. First, test-retest was conducted with a 1-year lag, which is relatively long and working environments among participants may have changed in ways that we did not evaluate. These changes might have affected civility ratings. Of note, this limitation worked against our hypotheses, making it harder to establish the reliability of the scale. Second, although our sample included various occupations, the survey venue was one particular local government and one social care organization, which may limit the generalizability of the findings. The reliability and validity of the scale should be replicated, e.g. in additional private companies or nationally representative samples of workers in Japan.

Although there are several limitations, one of the strengths of our study is using two samples with high response rates (84.1% and 91.2%). That only researchers opened the sealed envelopes and saw the individual questionnaires may have contributed to the high response rate because generally employees tend to hesitate to evaluate their working environments honestly especially on the negative sides. In the collective and hieratical culture such as in Japan, expressing negative opinions openly is not welcomed because keeping harmony with other people is highly appriciated.[40] Future studies need to consider that careful study procedures might affect the response rate in such a culture.

5 | CONCLUSION

This study confirmed the internal consistency reliability as well as structural and construct validity of the 8-item Japanese version of the CREW Civility Scale. This scale may be a useful measure of the current status of civility which can contribute to enhancing civility norms in Japanese workplaces. Additionally, this scale can be used as part of international comparative studies that include workers across different countries and examine similarities and differences in civility norms as well as in structural characteristics of the civility construct across multinational settings.

DISCLOSURE
Approval of the research protocol: The Ethics Committees of the Graduate School of Medicine, The University of Tokyo, approved the study of Sample 1 (#2772-[2]). The Ethics Committees of the Graduate School of Medicine, the University of Tokyo (#10125-3), Ethics Committee of Medical Research, University of Occupational and Environmental Health, Japan (#H25-019), and the Ethics Committees of the School of Medicine, Wakayama Medical University (#1281) approved the study of Sample 2. _Informed Consent_: Informed consent was obtained from all participants when answering the questionnaire. _Registry and the Registration No. of the study/trial_: N/A. _Animal studies_: N/A. _Conflict of interest_: Authors declare no Conflict of Interests for this article.

AUTHOR CONTRIBUTIONS
K.T., A.S., K.O., and K.S. conceived the ideas; K.T., E.A., A.I., and S.K. collected the data; K.T. analyzed the data and wrote the first draft; and N.K. supervised the study.

DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author, K.T., upon reasonable request.

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Journal of Occupational Health WILEY

BRIEF REPORT

Suggestions for new organizational-level item pools for the national Stress Check Program from management philosophy and mission statement: A qualitative study using unsupervised learning

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Abstract

Objective: This study aimed to obtain suggestions for new organizational-level item pools that companies could utilize to accomplish management philosophy and mission statements in the context of survey and work environment improvements for the national Stress Check Program.

Methods: A qualitative study was conducted using unsupervised learning. A large amount of text data related to management philosophy and mission statements were collected, that is, management messages described on the websites of all companies listed on the Tokyo Stock Exchange. For the main analysis, topic modeling was performed on the nouns from the management messages using Latent Dirichlet Allocation (LDA) to build a model consisting of 10 latent topics, each represented by a group of the 10 most frequently reoccurring nouns. Each group of nouns was qualitatively summarized based on the topic model.

Results: In total, 22 524 nouns were extracted from the management messages of 3575 companies. A topic model consisting of 10 latent topics was constructed using the LDA. The suggestion for new item pools included new technologies, business plans/strategies, company shareholders, health/happiness/wealth, profits/sales, development of society, a sustainable society, safety and security, customer/consumer satisfaction, corporate social responsibility, fairness, transparency, and human rights.

Conclusion: The suggestions for potential item pools were derived from management philosophy and mission statement that are not covered in the existing survey. The suggestions could be useful for motivating employers to implement work environment improvement. Future studies need to make definite items and investigate whether they correlate to job stressors and mental health among workers.

KEYWORDS

item pools, LDA, management, organization, workplace

1 | INTRODUCTION

Under the current Stress Check Program in Japan, workplaces with ≥50 employees are encouraged to analyze the data from the program's survey by workgroup and implement work environment improvements based on data analysis. Work environment improvement is a primary approach to the goal of the Stress Check Program to prevent ill mental health. The effectiveness of work environment improvements has been proven to improve psychological distress and work performance among workers.[1,2]

However, many workplaces have not yet been able to improve their work environments. One reason is that the questionnaire used for the Stress Check survey cannot capture the diversity of factors potentially included in work environments. A number of workplaces have tried measuring organizational factors using the New Brief Job Stress Questionnaire,[3] which coveres job stressors (e.g., quantitative job overload), task-, workgroup-, and organizational-level resources (e.g., job control, supervisor support, procedural justice). However, additional item pools are needed to reflect diverse workplace issues. If potential item pools reflect the factors related to the work environment that motivate employers to understand the importance of work environment improvement were available in the survey, the feasibility of work environment improvement could be improved.

Management philosophy and mission statement are interesting for employers, and potentially included in survey items for work environment improvement. They are defined as the central, distinctive, and enduring concepts, beliefs, principles, and attitudes guiding business management, which are critical in the pursuit of an organizational mission.[4] In Japan, various management philosophies and mission statements were observed such as customer orientation, partner orientation, global orientation, entrepreneurship, honesty, and sales effort.[5] Interestingly, previous studies have reported that several types of management philosophy and mission statement were associated with work engagement and performance through adaptation of, identification with, and sensemaking of management philosophy and mission statement.[6-8] High levels of work engagement and performance are associated with positive mental state and well-being.[8] Thus, item pools that enable us to measure management philosophy and mission statement could motivate employers to implement work environment improvement, and could be useful for improving workers' mental health.

The objective of this study was to obtain suggestions for new organizational-level item pools that companies could utilize to management philosophy and mission statements in the context of survey and work environment improvements of the national Stress Check Program, by a qualitative study using a technique of machine learning (unsupervised learning).

2 | METHODS

2.1 | Study design and data collection

This qualitative study used unsupervised learning. To identify suggestions for the item pools, a large amount of text data related to management philosophy and mission statements was collected. Text data were collected from management messages described on the websites of each of the companies listed in the First, Second, and Mothers sections of the Tokyo Stock Exchange (TSE), and in the Standard and Growth Sections of the Japan Association of Securities Dealers Automatic Quotations (JASDAQ) as of August 8, 2019. Specifically, the data for the analysis consisted of either the "message from top management" posted on the company's home page or the complete text of the page corresponding to the company's management philosophy and mission statement. The Tokyo Stock Exchange Listed Company Information Service[9] was used to search for information on the listed companies. Management messages as management philosophy and mission statements were collected from the websites of 3575 companies

listed on the TSE and JASDAQ. This included 2124 TSE 1st Section, 469 2nd Section and 292 Mothers Section companies, and 657 JASDAQ Standard Section and 33 Growth Section companies. The companies were categorized into 11 industry types based on the Japan Standard Industrial Classification: agriculture, forestry, and fisheries (11); mining (5); construction (157); manufacturing (1431); electricity/gas (24); information and communication (436); transport (111); wholesale/ retail trade (661); finance/insurance (166); real estate (130); and service industries (443). Extraction of the text from the company web pages was outsourced to Tokyo Soteria Employment, from August 8 to December 12, 2019.[10] Ethical approval was not obtained because this study did not involve humans, but the text data.

2.2 | Analysis

First, a morphological analysis was conducted to divide the management messages into morphemes. Second, among the morphemes, only the top 1000 nouns used in at least 30% of management philosophy and mission statements were used in the main analysis. For the main analysis, topic modeling using LDA, an unsupervised machine-learning technique, was conducted. LDA can indicate latent topics represented by a series of words that appear frequently in a set of sentences.[11] When a sentence is given, LDA can also calculate the posterior probabilities for what topic a given sentence was about, using Bayesian estimation. In this study, the number of extracted latent topics was set to 10, which is a hyperparameter that should be tuned in LDA. Janome version v0.3,[12] for the morphological analysis, and Scikit-learn version 0.21.3[13] for morphological analysis and topic modeling was used, respectively. The extracted 10 topics were qualitatively summarized to make presumed company goals and suggestions for new organizational-level item pools.

3 | RESULTS

From the management messages of 3575 companies, a total of 22 524 nouns were extracted. Among the nouns, the top 1000 words that were used in at least 30% of management philosophy and mission statements were used in topic modeling. Table 1 shows the word series of the ten latent topics, presumed company goals, and suggestions for new item pools.

The top 10 reoccurring words for latent Topic 1 included *katsuyō* (utilization), *kadai* (issue), *kaiketsu* (resolution), *kanō* (potential), *ryōiki* (domain), *bunya* (field), and *gyōkai* (industry). The management messages

included in the topic referred to the goals of utilizing new technologies as they became available, and to analyze and resolve current issues in the company's industry.

The words related to latent topic 2 included *nengetsu* (years and months), *chūki* (medium-term), *senryaku* (strategy), *kiban* (fundamentals), *kyōka* (strengthening), *kakudai* (expansion), *taisei* (system), and *kabunushi* (shareholder). The management messages included in the topic refer to business plans, medium- and long-term strategies, and gratitude to company shareholders.

The words related to latent topic 3 included *hitobito* (people), *jibun* (oneself), *shiawase* (happiness), *kandō* (excitement), and *sonzai* (presence). Management messages included in the topic refer to the pursuit of happiness, making people's lives wealthier, and finding meaning in their lives.

The words related to latent topic 4 included *rieki* (profit), *uriage* (sales), *tōshi* (investment), *keizai* (economy), and *eigyō* (operations). The management messages included in the topic referred to the profits and sales of the company, and contributed to the development of society through economic activities.

The words related to latent topic 5 included *chikyū* (earth), *jizoku* (sustainability), *kanō* (potential), *enerugī* (energy), *anzen* (safety), *kihon* (fundament), *sutēku* (stake), and *horudā* (holder). The management messages included in the topic referred to trying to preserve the global environment and its resources, contributing to a sustainable society, making people feel safe and secure, and winning the trust of stakeholders.

The words related to latent topic 6 included *kokyaku* (customer), *manzoku* (satisfaction), and *doryoku* (effort). The management messages included in the topic referred to the importance of business customer satisfaction and the constant effort required to develop the company.

The words related to latent Topic 7 included "*okyaku*" "*sama*" (together these are the honorary form of 'customer', *minasama* (an honorary form of 'everyone'), *kenkō* (health), *iyakuhin* (drugs), *kanja* (patient), and *chiryō* (treatment). The management messages included in the topic referred to consumer satisfaction, contributing to society through the treatment of disease, and the promotion of better health maintenance.

The words related to latent topic 8 included *kenshō* (charter), *mondai* (problem), *tettei* (thorough), *sekinin* (responsibility), and *kōsei* (fairness). The management messages included in the topic referred to corporate social responsibility, quickly resolving problems when the company violates the charter, and the importance of fair competition in company management practices.

The words related to latent topic 9 included *mēkā* (manufacturer), *mono* (goods), and *seisan* (production). The management messages included in the topic referred

TABLE 1 Latent topic, presumed company goals, and suggestions for new item pools

No	10 most frequently occurring nouns for each latent topic (word count)	Presumed company goals	Suggestions for new item pools
1	utilization (1141), issue (1509), resolution (1025), potential (1562), domain (998), field (1810), industry (1430), variety (1024), necessity (1479), human resources (991)	- Utilization of new technologies - Resolution of domain- or industry-related issues	- The organization utilizes new technologies - Resolving issues faced by the industry is a priority for the organization
2	years and months (1482), strengthening (1538), expansion (1765), corporation (1179), fundamentals (1180), system (1133), shareholder (1705), strategy (966), medium-term (825), promotion (1404)	- Medium and long-term company growth - Stability of business operations & earnings - Maximization of shareholder value	- Medium and long-term growth are a priority for the organization - Stability of operations is a priority for the organization - Shareholder value is a priority for the organization (organizational level)
3	people (1731), that (1533), importance (1471), work (1184), many (1335), oneself (737), happiness (722), excitement (705), all (1262), presence (1259)	- People being happy and having meaningful lives	- People's happiness is a priority for the organization - People having meaningful lives is a priority for the organization
4	profit (1434), fiscal year (859), sales (598), investment (1111), housing (459), economy (1202), business operations (840), years and months (1482), consolidation (327), store (715)	- Maximize sales and profits - Maximize the company's contribution to the economy	- Company profits are a priority for the organization - Contributing to society through economic activity is a priority for the organization (organizational level)
5	earth (1213), sustainability (1316), safety (2216), fundament (1686), energy (681), holder (1101), stake (1094), potential (1562), policy (1194), making (2171)	- Preservation of the global environment and its resources - Contributing to a sustainable society - People's safety and security - Stakeholder trust	- Trying to preserve the global environment and its resources is a priority for the organization - Contributing to the sustainability of society is a priority for the organization - People's safety and security are a priority for the organization - Stakeholder trust is a priority for the organization
6	production (1381), customer (1803), satisfaction (1688), logistics (527), industry (1430), field (1810), effort (1099), making (2171), necessity (1479), manufacturer (917)	- Business customer satisfaction - Constant effort	- Business customer satisfaction is a priority for the organization - Always making an effort is a priority for the organization
7	customer (2206), health (1169), everyone (851), drugs (281), patient (261), issue (1509), finance (801), treatment (186), maintenance (1316)	- Consumer satisfaction - Contributing to the health maintenance and treatment of patients with illnesses	- Consumer satisfaction is a priority for the organization - People's health is a priority for the organization
8	safety (2216), proactivity (1587), problem (896), thorough (746), charter (276), personally (989), fairness (821), construction (266), security (1264), responsibility (1294)	- Social accountability - Fair company management practices in regard to competition - How problems that have occurred with the company are addressed	- Socially accountable behavior is a priority for the organization - Fair management practices in regard to competition are a priority for the organization - The organization is able to quickly address internal problems when they occur
9	making (2171), manufacturer (917), field (1810), car (578), parts (361), expectations (1466), goods (604), production (1381), equipment (257), domestic (913)	- Contributing to society by producing new products	- Contributing to society through making things is a priority for the organization

T A B L E 1 (Continued)

No	10 most frequently occurring nouns for each latent topic (word count)	Presumed company goals	Suggestions for new item pools
10	relationship (1508), compliance (911), laws (777), respect (1158), appropriateness (507), norms (604), fairness (821), employment (1205), workplace (666), disclosure (470)	- Fairness, transparency - Compliance with laws and norms - Respect for human rights	- Fairness and transparency are a priority for the organization - Compliance with laws and norms are a priority for the organization - Respect for human rights is a priority for the organization

to the goals of making society greater comfortable by producing new products.

The words related to latent topic 10 included *kōsei* (fairness) and *kaiji* (disclosure). *Junshu* (compliance), *hōrei* (laws), *kihan* (norms), and *sonchō* (respect). The management messages included in the topic referred to ensuring fairness and transparency of information within a company, fulfilling corporate responsibility to comply with laws and regulations, and respecting human rights.

In summary, the suggestion for new item pools included new technologies, business plans/strategies, company shareholders, health/happiness/wealth, profits/sales, development of society, a sustainable society, safety and security, customer/consumer satisfaction, corporate social responsibility, fairness, transparency, and human rights.

4 | DISCUSSION

The topic models developed in this study provide suggestions for new organizational-level item pools that could potentially be used in national stress check programs. Most of these factors are consistent with the previous report of management philosophies,[5] and not currently measured in existing scales.[3] The suggested factors could be included in the item pool from which companies could select items to use when implementing their stress check survey and work environment improvements. For example, the items would be useful whether the workplace emphasizes employees' happiness and meaningful lives, whether it contributes to a sustainable society, and whether workplace keeping emphasizes people's health. Some of these philosophies and missions may reflect social expectancies, while others may be universal. Not all suggestions can directly relate to employees' health and performance, however, some of them could be effective to improve work environments and workers' health through adaptation of the philosophies.[6-8] Further studies are needed to examine the relationship between the scores of potential item pools and mental health of workers.

The topic model developed from the management messages showed what the company considered important, thereby providing suggestions on what company goals may be. Therefore, in the job stress model, they may be treated as organizational stress-related factors. For example, the presumed goals of Topic 3 can be "people being happy and having meaningful lives," and suggestions for the Stress Check survey might include whether the workplace emphasizes employees' happiness and meaningful lives. The presumed goals from Topic 5 can be "preservation of the global environment and its resources," "contributing to a sustainable society," and "people's safety and security." Subsequently, suggestions might be made for organizational-level survey items to ask whether the workplace contributes to preserving the global environment and its resources, sustainable society, and people's safety. The presumed goals from Topic 7 can be "consumer satisfaction" and "contributing to society through the treatment of disease and the promotion of better health maintenance." Subsequently, suggestions may be made for organizational-level survey items to ask whether workplace keeping emphasizes people's health. Mental health and well-being would improve in the workplaces where these goals were important. Including item pool items for these topics could allow companies to assess factors related to their goals.

This study has several limitations. First, only one source (i.e., management messages) was used for the text data of the management philosophy and mission statements. However, a few goals may have been missed. In addition, the judgment of whether the sentences are considered management messages might be biased by people performing the data input from the company website. Finally, the setting of the hyperparameters for topic modeling (number of words to use and number of latent topics to identify), presumed company goals, and suggestions for potential item pools were also biased by the first author.

In conclusion, suggestions for potential item pools were derived from management philosophy and mission statement that are not covered in the existing survey. The suggestions could be useful for making items to measure the work environment that motivates employers to

implement work environment improvement. Future studies need to make definite items and investigate whether they correlate to job stressors and mental health among workers.

CONFLICT OF INTEREST
KW, AI, HE, NI, YO, and AT declare there is no conflict of interest for the present study.

AUTHOR CONTRIBUTIONS
KW has contributed to the research design, analysis, and writing the draft. AI, HE, NI, YO, and AT had significant contributions to the revision of the draft and all of them approved the current manuscript.

DATA AVAILABILITY STATEMENT
Data are available upon reasonable request.

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ここは押さえておきたい！①
データの分析と活用のポイント

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● はじめに

　労働者数 50 人以上の事業場を対象にストレスチェック制度が義務化されてから 6 年半が経過し、義務化の当初から本制度を実施している事業場では、現在 7 回目の実施に取り組まれていることと思います。その間、事業場によっては、本制度に独自の工夫を加え、労働者のメンタルヘルス不調の一次予防に積極的に取り組んでこられたものと思います。一方で、「労働安全衛生法に基づくストレスチェック制度実施マニュアル」[1] で推奨されている方法（以下、これを「標準的な方法」と表記します）で本制度を実施しているものの、労働者のメンタルヘルス不調の一次予防に十分に活用できていない事業場も少なくないのではないでしょうか。

　標準的な方法でストレスチェック制度を実施することも意義のある重要な取り組みではありますが、データ分析をうまく活用し、事業場の実情に合わせてカスタマイズすることで、より現場に即した一次予防の取り組みを行うことができるよう

になります。本稿では、「高ストレス者の選定」と「集団分析」の 2 つの場面におけるデータ分析の方法や活用のポイントについて説明します。

● 高ストレス者の選定

1）標準的な方法とその科学的根拠

　ストレスチェックで高ストレス者を選定する際の標準的な方法は、「職業性ストレス簡易調査票」[2] を使用し、㋐「心身のストレス反応」（B 項目）の合計点（得点範囲：29〜116 点）が 77 点以上の者、㋑「心身のストレス反応」の合計点が 63〜76 点で、かつ「仕事のストレス要因」（A 項目）＋「周囲のサポート（の不足）」（C 項目）の合計点（得点範囲：26〜104 点）が 76 点以上の者を「高ストレス者」とする方法です（図 1）。ここで示されている数値基準（カットオフ値）は、多職種からなる既存の大規模データに基づき、㋐＋㋑の割合が全受検者（全回答者）の約 10％になるように設定されたものです。

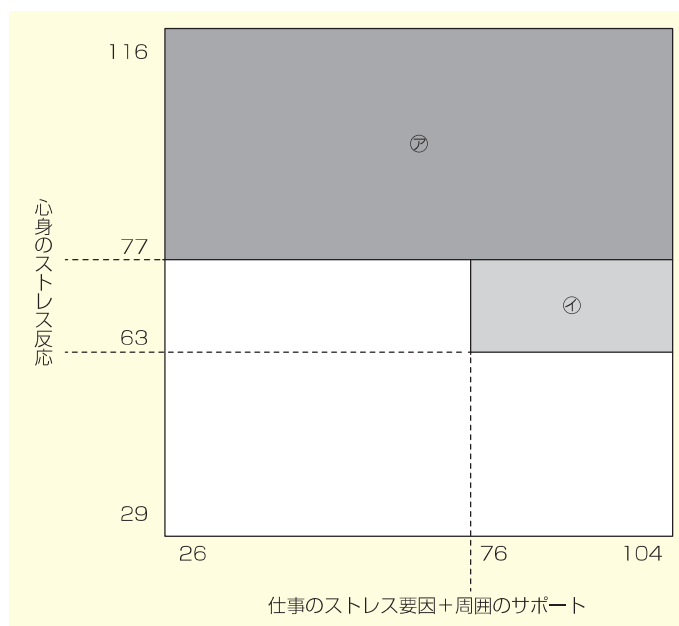　この数値基準を用いて高ストレス者と判定された労働者は、高ストレス者でないと判定された労

図1 標準的な高ストレス者の判定基準

（文献1より作成）

働者に比べて、1カ月以上の長期疾病休業に至る
リスクが男性で6.59（95％信頼区間：3.04〜
14.25）倍、女性で2.77（95％信頼区間：1.32〜
5.83）倍[3]、離職に至るリスクが男性で2.86（95
％信頼区間：1.74〜4.68）倍、女性で1.52（95％
信頼区間：1.29〜1.78）倍[4]であることが報告さ
れており、標準的な方法によって判定した「高ス
トレス」は、その後の心身の不調や離職を強く予
測することが明らかになっています。

2）選定方法のカスタマイズ：ポイントと留意点

　上記の知見を踏まえると、標準的な方法で高ス
トレス者を選定することも、科学的根拠に基づく、
意義のある選定方法であると言えます。しかしな
がら、この方法を用いた場合、事業場によっては、
高ストレス者が全受検者の10％を大幅に上回る
（あるいは、大幅に下回る）ことがあり、高スト
レス者をうまく選定できない場合も少なくありま

せん。また、高ストレス者の選定割合を全受検者
の10％程度に設定するのは、あくまでも目安に
すぎません。ストレスチェック制度の実施に際し
ては、必ずしも標準的な方法に従って高ストレス
者を選定する必要はなく、各事業場の実情に合わ
せて、独自に高ストレス者の選定割合や選定する
際の数値基準を設定することができます。

　たとえば、高ストレス者の選定割合を高めに設
定し、メンタルヘルス不調の疑いがある（あるい
は、将来的に不調に陥るリスクがある）労働者を
広く拾い上げたい場合は、前述の㋐や㋑で示した
「心身のストレス反応」や「仕事のストレス要因」
＋「周囲のサポート（の不足）」の数値基準を低
く設定することになります。逆に、高ストレス者
の選定割合を低めに設定し、メンタルヘルス不調
が強く疑われる（あるいは、将来的に不調に陥る
リスクが高い）労働者を中心に拾い上げたい場合

は、これらの数値基準を高く設定することになります。

その際に注意しなければならないのが、感度と特異度の「トレード・オフ」の関係です。メンタルヘルス不調の有無を外的基準とした場合、「感度」は「メンタルヘルス不調者を高ストレス者と判定する確率」、「特異度」は「メンタルヘルス不調でない者を高ストレス者でないと判定する確率」を指します。たとえば、数値基準を低く設定した場合、メンタルヘルス不調者は、より高い確率で高ストレス者と判定されることになるため、感度は上がりますが、同時に、メンタルヘルス不調でない者も高ストレス者と判定される確率が高くなるため、特異度は下がることになります。同様の原理で、数値基準を高く設定した場合、特異度は上がりますが、感度は下がることになります。

このように、感度と特異度は同時に上げることができないため、どのように数値基準を設定しても、高ストレス者として拾い上げられないメンタルヘルス不調者や、メンタルヘルス不調ではない（あるいは、将来的に不調に陥るリスクが低い）のに高ストレス者として拾い上げられてしまう労働者が一定数出てきてしまうことは、調査上の限界として理解しておく必要があります。その限界を踏まえた上で、感度と特異度の和が最大値になるときの得点を算出し、その得点を数値基準に設定する方法があります。このような、感度と特異度が共に低くなりすぎない「よい落としどころ」となる得点のことを「最適カットオフ値」と言います。

先行研究では、メンタルヘルス不調の有無（精神的健康度の自記式評価尺度 K6 の得点が 13 点以上かどうかで判定）[5]を外的基準とした場合、㋐「心身のストレス反応」の数値基準を 65 点、あるいは、㋑「仕事のストレス要因」＋「周囲のサポート（の不足）」の数値基準を 55 点に設定したときに、感度と特異度の和が最大値になることが報告されています。ただし、これらの数値基準を用いた場合、全受検者の約 30％が高ストレス者と判定されてしまうことも報告されているため、事業場でこれらの数値基準をそのまま適用するには注意が必要です[6]。

このように、事業場で独自に高ストレス者を選定する際の数値基準を設定する場合、過去のストレスチェックや人事データを活用して、①何を主要な（予防したい）アウトカムに設定するのか（例：うつ病の発症、長期疾病休業、離職など）、②全受検者の何％を高ストレス者に選定するのかを検討し、③設定したアウトカムを外的基準として数値基準を変化させた場合に、感度、特異度、高ストレス者の選定割合がどのように変化するのかを確認することがポイントになります。

3）医師による面接指導の申出勧奨への活用

ここまで、高ストレス者を選定する際のデータ分析の活用方法について説明しましたが、高ストレス者に対して医師による面接指導の申出を勧奨する場面でもデータ分析を活用することができます。高ストレス者が面接指導を申し出る割合は、未だ低い水準で推移していますが、高ストレス者の判定には用いられていない他の指標を組み合わせることで、高ストレス者の中から、面接指導の申出を勧奨する優先度が高い労働者を抽出することができます。

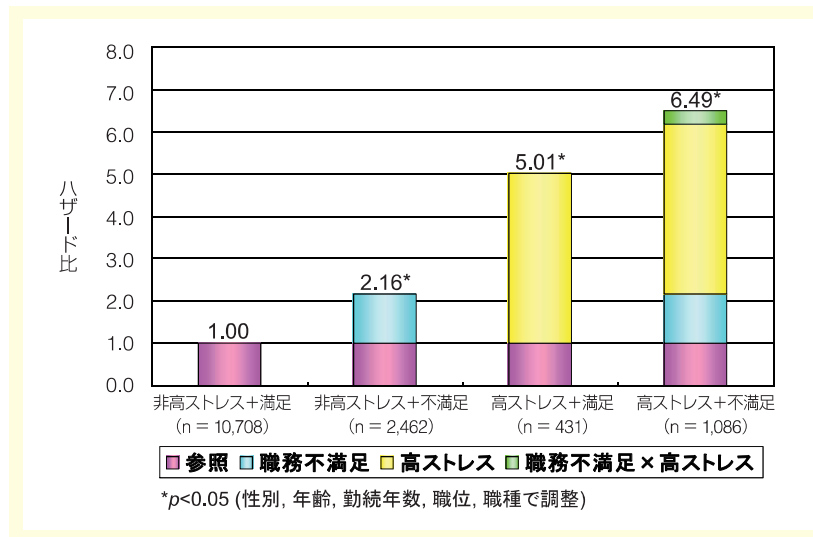そのひとつが職務満足度（職業性ストレス簡易調査票では D 項目で測定）への回答内容を活用する方法です。職務不満足がその後の疾病休業を強く予測することはよく知られていますが[7]、近年の研究では、標準的な方法で判定された「高ス

8.0
7.0
6.49*
6.0
5.0　5.01*
4.0
3.0
ハ
ザ　2.16*
ー　2.0
ド
比　1.00
1.0
0.0

非高ストレス＋満足　非高ストレス＋不満足　高ストレス＋満足　高ストレス＋不満足
（n = 10,708）　（n = 2,462）　（n = 431）　（n = 1,086）

■ 参照　■ 職務不満足　■ 高ストレス　■ 職務不満足×高ストレス

*p<0.05 (性別, 年齢, 勤続年数, 職位, 職種で調整)

図2　高ストレスと職務不満足の組み合わせによる長期疾病休業のリスク

（文献8より作成）

トレス」に職務不満足が重なることで、その後の長期疾病休業のリスクが相加的に増大することが明らかになっています（図2）[8]。高ストレス者に対して面接指導の申出を勧奨する際、職務満足度への回答内容は、より強く申出を勧奨するかどうかを判断するための有用な情報になると考えられます。ただし、図2に示されている通り、「高ストレス＋満足」群の長期疾病休業のリスクも高いことから、「仕事に満足／まあ満足」と回答している高ストレス者に対する申出の勧奨が疎かにならないよう、留意する必要があります。

今回ご紹介した活用方法はあくまでも一例ですが、職務満足度だけでなく、職業性ストレス簡易調査票以外の補足的な指標（たとえば、定期健康診断の問診票で把握している睡眠問題の有無など）[9]と「高ストレス」の判定とを組み合わせることで、その後の心身の不調をより強く予測することができる可能性があります[10]。

● 集団分析

1）標準的な方法とその科学的根拠

ここからは、ストレスチェック制度で努力義務となっている集団分析の場面におけるデータ分析の方法や活用のポイントについて説明します。

集団分析を行う際の標準的な方法は「仕事のストレス判定図」[11]を用いる方法です。すでに多くの事業場で活用されているものと思いますが、今一度おさらいをすると、職業性ストレス簡易調査票の項目のうち、
・心理的な仕事の負担（量）（A項目の1〜3）
・仕事のコントロール度（A項目の8〜10）
・上司からのサポート（C項目の1、4、7）
・同僚からのサポート（C項目の2、5、8）
の4つの指標の各平均値を判定図中にプロットし「健康リスク」を算出するものです。

健康リスクの算出に用いられている予測式は、多職種からなる大規模データに基づき、心理的ス

トレス反応、疾病休業、医療機関への受診などのさまざまな指標をアウトカムとして立てられたものですので、健康リスクは「当該集団において、種々の健康問題が発生するリスクが全国平均に比べてどれくらい高いのか（あるいは、低いのか）を科学的根拠に基づいて算出したもの」と言うことができます。

2) 集団分析のカスタマイズ：ポイントと留意点

前述の通り、仕事のストレス判定図は、対象集団における健康問題の発生リスクを具体的な数値として算出することができるため、直感的に理解しやすいというメリットがあります。一方で、分析に用いられている指標が4つに限定されているため、より包括的に対象集団の状況を把握するには、仕事のストレス判定図には用いられていない、その他の指標を分析する必要があります。

分析を行うに際し、まずは分析方法を検討する必要があります。その中で最も基本的な方法は、各指標の平均値を算出する方法です。職業性ストレス簡易調査票では、指標によって取りうる得点範囲が異なりますが、たとえば、各指標の得点範囲が1～4点になるようにそろえることによって、指標間で得点を比較できるようになり、対象集団の「強みになっている側面」や「改善していきたい側面」を把握しやすくなります。一方で、同じ平均値であっても、回答分布が大きく異なっている場合も少なくありません。その場合、標準偏差を一緒に算出するのもひとつの方法です。標準偏差を算出することで、当該指標に対して、回答者の多くが平均値に近い評価をしていたのか、回答者によって評価にバラツキがあったのかを把握することができ、改善のアプローチ方法（リスクの高い特定の小集団にアプローチするのか、集団全体にアプローチするのか）を検討する際にも有用

な情報になります。

上記のような基本統計量を算出する方法に加え、主要な（予防したい）アウトカムを設定し、各指標の得点とアウトカムの発生との関連を分析する方法もあります。たとえば、疾病休業を予防する対策を行いたい場合、ストレスチェックの結果と人事データを活用して、各指標の得点と疾病休業の発生との関連を検討し、指標間で関連の強さを比較することで、より優先的に改善すべき指標を明確にすることができます。

次に、分析単位を検討する必要があります。集団分析では、どうしても「部」や「課」といった部署単位の分析を想像しがちですが、必ずしも部署単位にとらわれる必要はありません。たとえば、年代、職位、職種、勤務形態、雇用形態など、さまざまな基本属性を分析単位とすることで、どのような属性の労働者がどのようなストレスを抱えているのかを把握することができ、より全体像をとらえやすくなります。部署単位の集団分析では、「少人数の部署では集団分析ができず、不公平感が生じやすい」「多職種からなる部署では集団分析が難しい」といった声がよく聞かれますが[12]、基本属性を分析単位とすることで、自身の回答が集団分析に用いられないことに対する不公平感の解消につながる可能性があります。また、職種そのものを分析単位とすることで、より豊富な情報を得られるかもしれません。

最後に、分析結果をどのように報告するか（見せるか）を検討する必要があります。最も一般的な方法は、図やグラフといった視覚的にわかりやすい形にまとめる方法です（仕事のストレス判定図は、その代表例であると言えます）。このような視覚化された資料は、統計の知識の多寡にかかわらず、多くの人が直感的に全体像を把握しやす

いというメリットがありますが、事業場によっては、より詳細な結果報告を求められる場合もあります。たとえば、研究開発を主な事業としている事業場では、普段から統計分析に慣れ親しんでいる労働者が多いため、基本統計量や点推定だけでなく、p値や95％信頼区間、効果量など、より厳密に分析結果を評価できる統計量の報告を求められるかもしれません。逆に、分析結果を詳細に見る余裕がない事業場では、分析結果から読み取れる重要なポイントや課題点をピックアップして報告することが求められるかもしれません。「分析結果を活用し、職場環境の改善につなげていくこと」が集団分析の目的であることを考慮すると、分析結果の報告に際し、事業場のニーズを事前に把握しておくことは極めて重要であると言えます。

　このように、集団分析を行う際には、①何をどのように、②どういう単位で分析し、③どのような形で分析結果を報告するのか、を検討しておく必要があります。その際、衛生委員会などでの調査審議に加えて、人事労務担当者や管理監督者に意見聴取を行うことで、より効率的に事業場のニーズに即した分析計画を立てることができるようになります。

● **おわりに**

　本稿では「高ストレス者の選定」と「集団分析」の2つの場面におけるデータ分析の方法や活用のポイントについて説明しましたが、今回ご紹介した方法はあくまでも一例にすぎません。読者のみなさまの中には、すでにこれ以上の取り組みをされている方も多数いらっしゃるかと思いますが、本稿を通じて、少しでも新たな気付きを得ていただけることを願うとともに、これから本格的にデータ分析を活用していきたいと考えている読者のみなさまにおかれましては、本稿の内容を何らかの形で今後の業務にお役立ていただければうれしく思います。

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Article

The Survey Measure of Psychological Safety and Its Association with Mental Health and Job Performance: A Validation Study and Cross-Sectional Analysis

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Abstract: Objectives: This study validated the Japanese version of O'Donovan et al.'s (2020) composite measure of the psychological safety scale and examined the associations of psychological safety with mental health and job-related outcomes. Methods: Online surveys were administered twice to Japanese employees in teams of more than three members. Internal consistency and test–retest reliability were tested using Cronbach's α and intra-class correlation coefficient (ICC), respectively. Structural validity was examined using confirmatory factor analysis (CFA) and exploratory factor analysis (EFA). Convergent validity was tested using Pearson's correlation coefficients. Multiple linear regression analyses were conducted to examine the relationship between psychological safety and psychological distress, work engagement, job performance, and job satisfaction. Results: Two hundred healthcare workers and 200 non-healthcare workers were analyzed. Internal consistency, test–retest reliability, and convergent validity were acceptable. CFA demonstrated poor fit, and EFA yielded a two-factor structure, with team leader as one factor and peers and team forming the second factor. The total score showed significant and expected associations with all outcomes in the adjusted model for all workers. Conclusions: The Japanese version of the measure of the psychological safety scale presented good reliability and validity. Psychological safety is important for employees' mental health and performance.

Keywords: occupational health; leadership; mental health; workplace climate; worksite

1. Introduction

Psychosocial factors at work are well-known determinants of workers' health and well-being. Psychological safety (PS) at work has received much attention as an important psychosocial factor in workers' positive mental health and other work-related outcomes, such as work engagement, satisfaction, communication, and performance [1,2]. PS describes workers' perceptions of the consequences of taking interpersonal risks in a particular context, such as a workplace [3,4]. In 1999, Edmondson defined PS as a shared belief that the team is safe for interpersonal risk-taking (i.e., doing learning behavior that may place workers at risk, including seeking feedback, sharing information, asking for help, talking about errors, and experimenting) [3].

Previous review articles have reported three streams of research on PS (i.e., individual-, team-, and organizational-level), with team-level analysis the largest and most active [1,4]. A meta-analysis has reported that individual- and team-level PS is significantly related to

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work engagement, task performance, information sharing, creativity, learning behavior, and job satisfaction [2]. Recent studies have investigated the mediating role of PS in the association of leadership with job performance and mental health [5–8]. Papers published in the 2020s have focused more on the mediating effect of PS in the relationship between, for example, supervisor–subordinate communication and employees' commitment [9], employees' positive affect and motivations [10], and cognitive stress and turnover intentions [11]. Thus, accumulating evidence suggests that PS (especially individual- and team-level PS) is important for workers' health and well-being. In Japan, the concept of PS is becoming increasingly popular, along with growing interest in health and productivity management (H&PM), and it is expected that improving PS will enhance employees' mental health and performance. Nevertheless, epidemiological research on PS has not progressed sufficiently due to the lack of a multidimensional PS scale.

Many studies have used self-reported questionnaires adapted from Edmondson's team-level measure to quantitatively assess PS at work [1]. Although several scales with fewer than 10 items can measure PS in non-healthcare workers (non-HCWs) [3,12–14], including the Japanese version of the PS scale [12] developed by Liang et al. [15], multidimensional measurement of the individual and team levels of PS is unavailable. O'Donovan et al. (2020) presented a 19-item composite measure of PS (i.e., observation and survey component) containing three subsections (i.e., team leader, peers, and team) for use by healthcare teams, which they co-developed with healthcare professionals based on six measures and the PS literature [16]. The 19 items were identified as the corresponding comprehensive behaviors relevant to PS [16]. The three sections (i.e., team leader, peers, and team) were based on the real voices of professionals in the clinical settings, which revealed that the difficulty of taking actions related to PS was different for superiors or peers. The three sections that assess the individual and team levels of PS could provide detailed information about PS. A systematic review suggested that scales with a few items could not fully capture the state of PS at work; therefore, holistic, objective measuring instruments are needed [17]. A multidimensional and scalable measure could thus be used to investigate the association of these three components with employees' mental health and performance and to develop an effective intervention plan, among the variety of the workers, including HCW and non-HCW groups.

The associations of the individual and team levels of PS with mental health and work-related outcomes have not been investigated yet in HCW and non-HCW groups. A previous systematic review presented possible pathways from job resources (e.g., supportive leadership behavior) to positive and negative work outcomes (e.g., stress, conflict, and performance) through PS in the integrative theoretical framework of PS [1]. Some previous studies have suggested that PS reduced the risk of poor mental health outcomes, such as burnout, stress, and diminished well-being, by increasing social support for HCW and non-HCW [18,19]. However, the effect of PS on mental health has not been empirically examined. In addition, the effect may be different in HCWs and non-HCWs because the clinical settings offer different working conditions. Further study is needed to investigate the association of PS at work with mental health in both groups of workers using well-developed measures of PS.

The objectives of this study were: (i) to develop the Japanese version of the survey measure of PS introduced by O'Donovan et al. (2020) [16] and examine internal consistency, test–retest reliability, structural validity, and convergent validity of the scale in HCWs and non-HCWs; and (ii) to examine the associations of PS with psychological distress, work engagement, job performance, and job satisfaction.

2. Method

2.1. Scale Information and Participants

Although the measures developed by O'Donovan et al. (2020) were tailored to healthcare settings, the survey measure of PS could also be useful for measuring PS in non-HCWs. We obtained permission from O'Donovan, the developer of the original scale, to translate the measures into Japanese and validate them in HCWs and non-HCWs. The scale has