ORIGINAL ARTICLE

Validation of the Japanese version of the Dutch Boredom Scale

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Abstract
Objectives: The current study aimed to validate the Japanese version of the Dutch Boredom Scale (DUBS-J), a new boredom scale that comprehensively assesses employees' emotional, cognitive, and behavioral responses to low-stimulus work situations.
Methods: The translated and back-translated DUBS was administered *via* an internet survey to 1358 Japanese employees from various occupations. Confirmatory factor analysis (CFA) was conducted to evaluate factorial validity. In order to evaluate discriminant validity with other work-related, well-being constructs, CFA was conducted, and the square root of average variance extracted (AVE) for the DUBS-J and the square of the inter-construct correlations were compared. Construct validity was evaluated based on the correlation coefficients between boredom at work on the one hand and potential antecedents and consequences on the other hand.
Results: Confirmatory factor analysis supported the expected one-factor model. CFA and AVE supported the discriminant validity of DUBS-J with work engagement, workaholism, and job satisfaction. Construct validity was generally supported by expected correlations of boredom at work with possible antecedents and consequences. Internal consistency was confirmed with Cronbach's alpha coefficient = .88, and the results of principal component analysis (PCA). Test–retest reliability was confirmed with intraclass correlation coefficients = .62.
Conclusion: The current study confirmed that DUBS-J is an adequate measure of boredom at work that can be used in the Japanese context.

KEYWORDS
boredom at work, Japanese, job demands, job performance, work engagement, workaholism

1 | INTRODUCTION

Boredom at work is widespread, being experienced at least some of the time by most employees at all occupational levels across various countries.[1–3] Empirical research on boredom at work has been conducted mainly in Europe and the United States.(e.g.,[4,5]) In contrast, occupational health research in Japan has focused more on prevention and intervention for working long hours and overload (the causes and consequences of burnout, work engagement,

and workaholism) and has neglected the problem of underload or not working hard enough.[1,3,6] However, while short-time work systems and work sharing have reduced the problem of work overload, some people may still suffer from work underload. In addition, with technological progress, jobs are being replaced by machines that, for instance, use artificial intelligence. These technological innovations and changes in work styles may lead to more work underload and under-stimulation. Since there is no established procedure for assessing boredom at work in Japan, it is very important to quantify the level of boredom of employees and examine its impact on their well-being and the means to provide necessary support. Therefore, the current study aimed to translate the "Dutch Boredom Scale (DUBS)"[6] into Japanese and validate the Japanese version (DUBS-J).

1.1 | Boredom at work

Boredom has been defined as "a state of relatively low arousal and dissatisfaction, which is attributed to an inadequately stimulating situation."[7(p.3)] In other words, boredom at work can be described as the state within the context of work, where the employee feels under-challenged or under-stimulated in his or her work.[4] Although boredom is mainly an affective response, several studies have suggested that it includes cognitive aspects, such as inattention and daydreaming,[8] and behavioral aspects, such as doing nonwork-related tasks or chatting.[9] Based on these research results, Reijseger et al.[6] developed the "Dutch Boredom Scale (DUBS)," which is a comprehensive questionnaire that taps employees' affective, cognitive, and behavioral responses to low-stimulus work situations. DUBS measures the experience and manifestation of boredom at work, rather than the features of the job that may cause boredom.[6] It is designed to describe feelings, thoughts, and behaviors (or lack of behaviors) that are prevalent when boredom is experienced at work: the perception of time passing slowly and feeling bored,[10] task-unrelated thoughts,[8] and engaging in non-work-related activities.[9]

DUBS showed a one-factor structure consisting of six items and an acceptable reliability with Cronbach's alpha coefficient of .80.[6] In addition, confirmatory factor analysis (CFA) supported the discriminant validity of DUBS with work engagement and burnout.[6] The DUBS has been proven reliable and valid in South Africa[11] and Iran.[12]

1.2 | Relationship with other well-being

Boredom is located in an unpleasant-deactivation quadrant on Russel's[13] circumplex model of affect. Bakker and

Oerlemans'[14] used Russel's model for their taxonomy of work-related subjective well-being, in which boredom is supposed to be located in the *un*pleasant-low activation quadrant. Furthermore, in this model, workaholism is located in the unpleasant-high activation quadrant, whereas work engagement is located in the pleasant-high activation quadrant, and job satisfaction is finally located in the pleasant-low activation quadrant. Reijseger et al.[6] confirmed the discriminant validity of DUBS among boredom, work engagement, and burnout. Based on these studies, we hypothesize that boredom at work can be distinguished theoretically and empirically from workaholism, work engagement, and job satisfaction (Hypothesis 1).

1.3 | Potential antecedents and consequences

Schaufeli and Salanova[15] summarized the antecedents of boredom as low job demands (monotonous, repetitive work, and mental underload) and low job resources (poor skill utilization, behavioral constraints, such as bureaucratization and standardization, and absence of meaning) based on a prior literature review.[4,16] In the DUBS development process, boredom was found to be negatively related to job demands (workload and mental demands) and job resources (support and autonomy).[6] Based on these studies, we hypothesize that job demands (quantitative and qualitative) and job resources (supervisor support, coworker support, and job control) are negatively associated with boredom at work (Hypothesis 2).

Regarding potential consequences, when boredom at work lasts, bored employees become dissatisfied with their work, which in turn reduces their commitment to the organization and increases their willingness to leave their jobs.[6,11,17] In addition, bored employees usually experience various negative consequences, such as psychological distress, sickness absence, work ineffectiveness, withdrawal, and counterproductive work behaviors.[(e.g.,3,5,18)] Based on these results, we hypothesize that boredom at work is negatively associated with job performance and positively related to ill-health (psychological distress and physical complaints) (Hypothesis 3).

2 | METHODS

2.1 | Translation

First, the English version of DUBS was translated into Japanese by the current study authors (MK and AS) and then back-translated into English by an English and

Japanese bilingual specialist who had not read the original items. The back-translated version was confirmed by the author of the original version (WS). We compared the original English and the back-translated versions of DUBS and harmonized them. Furthermore, we conducted cognitive interviews with employees. In the interview, the comprehensibility of each item was proven, but the following two points were debriefed; (1) difference in expression of "at work", (2) the intent of the particle in the item of "At my work, there is not so much to do".

1. In the original study, there are expressions "at" and "during" for prepositions and "work," "my job," "my work time," and "my work" for work, which were translated accordingly. The interviewees commented that they were not aware of the difference.

2. In the translation of "At my work, there is not so much to do", we used a particle to clarify that there is nothing to do "in spite of" work. The interviewee captured this intention (it is normal to have things to do during work. However, this item asks whether there is nothing to do at work).

We discussed these two comments and checked with the original author; (1) there is no clear difference in the various wording of "at work" in the original study, and the focus was on natural English. (2) In the original, "at work" is used at the beginning of the sentence to express the intent of "in spite of". This intent is also correctly expressed in the translation. Therefore, the preliminary version was fixed with no additional corrections. DUBS-J is provided in the Appendix S1.

2.2 | Participants

The current study was conducted as part of the multi-wave longitudinal research project. All surveys for this project were conducted using full-time worker panelists from an internet survey company. In the first survey, the questionnaires were distributed, starting in June 2020. When the number of respondents met the target, the numbers were stratified across eight cells by gender (male and female) and age (20–29, 30–39, 40–49, and 50–59). The panelists who consented to participate in the survey accessed the designated website and responded to the questionnaires; they had the option of not responding or declining at any point in the survey. A total of 1600 workers who met the inclusion criteria (living in Japan, full-time workers, and aged 20–59 years) responded to the first survey.

Participants in the first survey were followed up and surveyed every 3 months. The current study used data from the third (from December 8 to December 17, 2020)

TABLE 1 Demographic characteristics of the study participants ($N = 1358$)

	n (%)	Mean (SD)
Age (year)		41.1 (10.4)
Gender		
Male	692 (51.0)	
Female	666 (49.0)	
Marriage		
Yes (including co-habitant)	686 (50.5)	
No	672 (49.5)	
Education		
College or lower	570 (42.0)	
University or higher	788 (58.0)	
Occupation		
White collar	1151 (85.0)	
Blue collar	154 (11.0)	
Other	53 (4.0)	
Shift work		
No	1216 (89.5)	
Yes	142 (10.5)	
Working hours/week		39.1 (16.0)

and fourth (from March 8 to March 20, 2020) survey because we started to measure boredom from the third survey onward. In the third survey, 1385 participants responded (response rate: 86.6%). Data from 1358 respondents were used in the analyses, whereby 27 respondents who were on leave from work or who had missing answers were excluded. Table 1 shows the characteristics of the participants. The mean age of the participants used in the analyses was 41.1 years (SD = 10.4). Of the participants, 51.0% were male, 50.5% were married, and 85.0% were white-collar workers, 11% were blue-collar workers, 4% were others, and 89.5% were not shift workers. The average working hours per week was 39.1 hours (SD = 16.0). In the fourth survey, 1345 participants responded (response rate: 84.1%). The percentages of white-collar and non-shift workers in this study were larger than those of the working population in Japan (about 67% and 77%, respectively).[19,20] To confirm test–retest reliability, we used data from 1229 respondents who responded to both the third and fourth surveys.

The study aims and protocol were approved by the ethics review board of the Public Health Research Center in 2020 before starting the study (Public Health Research Center Ethics Committee Approval, ID = 20E0004). Informed consent was obtained through the website at the time the data were collected. Participants had the option of not responding to any part of the questionnaire at any time and to discontinue the survey at any point.

2.3 | Measures

Boredom was assessed using a preliminary version of DUBS-J, which resulted from translation, back-translation, and cognitive interviews. DUBS-J includes six items measuring five common feelings, thoughts, or behaviors of feeling bored at work: (1) perception of time passage, (2) feeling bored, (3) feelings of restlessness and not knowing what to do, (4) engaging in task-unrelated thoughts, and (5) tendencies to do task-unrelated things. These items are listed in Table 2. All items were scored on a seven-point Likert scale ranging from 0 (never) to 6 (always). Responses were summed and averaged.

Job demands were assessed using the corresponding subscales of the Brief Job Stress Questionnaire (BJSQ[21]). This study used the subscales for quantitative job demands (three items; e.g., "I have plenty of work to do") and qualitative job demands (three items; e.g., "My work is difficult because it requires a high level of knowledge and skills"). All items were scored on a four-point Likert scale ranging from 1 (disagree) to 4 (agree). Alpha coefficients for the current study were .82 for quantitative job demands and .78 for qualitative job demands. Responses were summed and averaged.

Job resources were assessed using the corresponding subscales of BJSQ.[21] This study used the subscales for job control (three items; e.g., "I have the freedom to decide the order and way of my work"), supervisor support (three items; e.g., "How freely can you talk with your supervisor?"), and coworker support (three items; e.g., "How freely can you talk with your coworkers?"). All items were scored on a four-point Likert scale ranging from 1 (disagree) to 4 (agree). Alpha coefficients for the current study were .77 for job control, .86 for supervisor support, and .84 for coworker support. Responses were summed and averaged.

Work engagement was assessed using the short form of the Utrecht Work Engagement Scale,[22] which has been validated in Japan.[23] The scale includes three subscales:

vigor (three items; e.g., "At my job, I feel strong and vigorous"), dedication (three items; e.g., "I am enthusiastic about my job"), and absorption (three items; e.g., "I am immersed in my work"). All items were scored on a seven-point Likert scale ranging from 0 (never) to 6 (always). Alpha coefficients for the current study were .92 for vigor, .94 for dedication, and .92 for absorption. The responses were summed and averaged for each subscale.

Workaholism was assessed using the Japanese version of the Dutch Workaholic Scale,[24] which includes two subscales: working excessively (five items; e.g., "I seem to be in a hurry and racing against the clock") and working compulsively (five items; e.g., "I feel obliged to work hard, even when it's not enjoyable"). Alpha coefficients for the current study were .85 for working excessively and .90 for working compulsively. All items were scored on a four-point Likert scale ranging from 1 (almost never) to 4 (almost always). The responses were summed and averaged for each subscale.

Job satisfaction was assessed using a single item from BJSQ,[21] that is, whether the participant was satisfied with his/her job. It has been argued that a global index of overall job satisfaction (single item measure) is an inclusive and valid measure of general job satisfaction.[25] The job satisfaction item was scored on a four-point Likert scale ranging from 1 (dissatisfied) to 4 (satisfied).

Job performance was assessed using a single item from the World Health Organization Health and Work Performance Questionnaire (HPQ).[26] The reliability and validity are unclear if we only use a single item from the HPQ. However, due to the limited space of the questionnaire, one item was used. Respondents were asked to rate their overall work performance during the past 4 weeks on a 0–10 self-anchoring scale, in which 0 is defined as the "worst possible work performance a person could have on this job" and 10 is defined as the "top work performance" on the job.

Psychological distress was assessed using the Japanese version of the Kessler Psychological Distress Scale (K6).[27,28] K6 is a six-item, self-report measure of psychological

TABLE 2 Fit of models that specify the relationship between boredom at work, work engagement, workaholism, and job satisfaction

Model	χ^2	df	P	CFI	RMSEA	SRMR	TLI		$\Delta\chi^2$	Δdf	P
Model 1.[a] One-factor model	5962.58	27	<.001	0.24	0.37	0.29	−0.27				
Model 2.[b] Two-factor model (positive: WE, JS/ negative: BD, WH)	1553.00	26	<.001	0.80	0.19	0.14	0.66	M1 vs M2	4409.57	1	<.001
Model 3.[c] Four-factor model	337.45	22	<.001	0.96	0.10	0.05	0.92	M1 vs M3	5625.13	5	<.001
								M2 vs M3	1215.56	4	<.001

Abbreviations: BD, boredom; CFI, comparative fit index; JS, job satisfaction; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; TLI, Tucker−Lewis index; WE, work engagement; WH, workaholism; $\Delta\chi^2$, chi-square difference.

[a]Model 1 assumed one underlying general well-being factor.

[b]Model 2 assumed that WE and JS load on one factor and BD and WH load on the other.

[c]Model 3 assumed that WH, WE, JS, and BD load on four distinct but correlated factors.

distress intended to be used as a quick tool to assess the risk of serious mental illness in the general population. Participants indicated how often they had experienced six different feelings or experiences during the past 30 days using a five-point Likert scale ranging from 0 (never) to 4 (all the time). The total score of the six items was used (α = .94).

Physical complaints were assessed using four items adopted from BJSQ[21]: e.g., "I have a pain in the back." Each item was scored on a four-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). The responses of the four items were summed and averaged (α = .82).

2.4 | Data analyses

In evaluating factorial validity, we conducted confirmatory factor analysis (CFA) of a one-factor model since "boredom at work" was assumed to constitute a one-dimensional factor in the original study.[6]

To evaluate discriminant validity, we conducted CFA to test the following three models: (1) a one-factor model (M1), which assumes all subscales/parcels/item measuring the four construct (i.e., boredom, workaholism, work engagement, and job satisfaction) load on one general well-being factor; (2) a two-factor model (M2), which assumes that boredom parcels and workaholism subscales load on one negative well-being factor, and work engagement subscales and job satisfaction item load on another correlated positive well-being factor; (3) a four-factor model (M3), which assumes that all subscales/parcels/item load on four distinct but correlated factors (Figure 1). To reduce bias in structural parameters when examining whether the unidimensional construct of boredom could be distinguished from the multidimensional constructs of work engagement and workaholism, as with the original DUBS,[6] the six boredom items were randomly assigned to three parcels of two items each.[29] The fit of the model to the data was examined using the χ^2 goodness-of-fit statistic, the root mean square error of approximation (RMSEA), the standardized root mean square residual (SRMR), the Tucker–Lewis index (TLI), and the comparative fit index (CFI). Generally, models with TLI and CFI > 0.90 and RMSEA and SRMR < 0.08 represent a close fit between the hypothesized model and the data.[30–32] In addition, we also calculated the average variance extracted (AVE) for the external discriminant validity of the DUBS-J concerning work engagement and workaholism and job satisfaction. In the current study, the square root of AVE for the DUBS-J should be greater than the square of inter-construct correlations with work engagement, workaholism, and job satisfaction.

To evaluate construct validity, we investigated the relationship between boredom at work and theoretically possible antecedents (i.e., quantitative job demands, qualitative job demands, job control, supervisor support, and coworker support) and boredom at work and consequences (i.e., job performance, psychological distress, and physical complaints).

Cronbach's alpha coefficients were calculated to evaluate internal consistency, and the intraclass correlation coefficient was calculated to evaluate test–retest reliability by using a two-way random-effects model.

We used IBM SPSS Statistics for Windows, version 26, Amos 24 software, and R 4.1.3 for Windows to analyze all the above analyses.

3 | RESULTS

3.1 | Factorial validity (one-dimensional concept)

Because according to the original DUBS, a one-dimensional construct was assumed, a one-factor CFA model with six items was tested. The fit indices revealed acceptable fit to the data ($\Delta\chi^2$ [9] = 271.38, p < .001; CFI = 0.94; TLI = 0.89; SRMR = 0.04) except for RMSEA (0.14). The path coefficients for the six items were sufficiently high, ranging from 0.62 to 0.79.

3.2 | Discriminant validity: Hypothesis 1 (Tables 2 and 3)

Table 2 shows the results of CFA. The one-factor model (M1) fitted poorly to the data, with none of the fit indices meeting its criterion for acceptable fit. Although the two-factor model (M2) fitted the data significantly better than M1, $\Delta\chi^2$ (1) = 4409.57; p < .001, it still showed a poor fit. The four-factor model (M3) fitted the data significantly better than M1 and M2, that is, M1, $\Delta\chi^2$ (5) = 5625.13, p < .001; M2, $\Delta\chi^2$ (4) = 1215.56, p < .001. In addition, the fit indices, except for RMSEA, showed an acceptable fit to the data. Therefore, we adopted M3 as the final model; see Figure 1. However, one standardized coefficient was above 1.0 (the coefficient from workaholism to working compulsively). The reason may be due to the relatively high correlation between workaholism and absorption of work engagement. A strong association between the two has been found in previous studies as well.[33,34] In addition, Table 3 shows the results of external discriminant validity. The square root of AVE for the DUBS-J (0.81) was greater than the square of inter-construct correlations with work engagement (0.01), workaholism (0.01), and
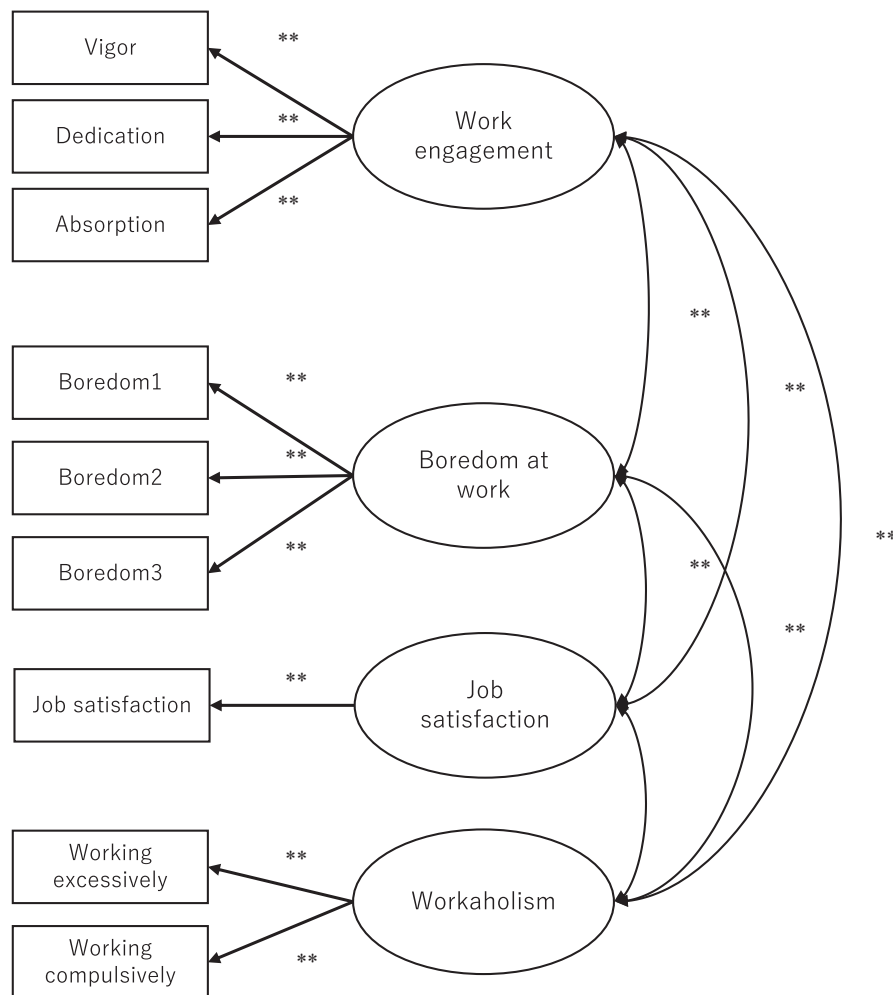
FIGURE 1 Final four-factor model in confirmatory factor analyses. Note: **P < .01

TABLE 3 Square root of average variance extracted (AVE) for the DUBS-J and the square of inter-construct correlations with work engagement, workaholism, and job satisfaction

Item	The square root of AVE	The square of inter-construct correlations		
		Work engagement	Workaholism	Job satisfaction
Work engagement	0.93			
Workaholism	0.88	0.04		
Job satisfaction	0.61	0.38	0.00	
DUBS-J	0.81	0.01	0.01	0.03

job satisfaction (0.03). These results indicate that DUBS-J can be discriminated from work engagement and workaholism and job satisfaction, in line with Hypothesis 1.

3.3 | Construct validity (association of boredom at work with potential antecedents and consequences): Hypotheses 2 and 3 (Table 4)

Table 4 shows the correlations between all study variables, including boredom at work, potential antecedents,

and consequences of boredom at work. In relation to potential antecedents, quantitative job demands and qualitative job demands were each negatively associated with boredom ($r = -.21$, $p < .01$; $r = -.19$, $p < .01$), in line with Hypothesis 2. Similarly, supervisor support and coworker support were each negatively associated with boredom ($r = -.09$, $p < .01$; $r = -.13$, $p < .01$), in line with Hypothesis 2. Meanwhile, job control and boredom were not significantly correlated, which is not in line with Hypothesis 2. In relation to potential consequences, boredom was negatively associated with job performance ($r = -.19$, $p < .01$) and positively associated with ill-health (psychological

TABLE 4 Means, standard deviations, correlations, and internal consistencies (Cronbach's α on the diagonal) of the variables used in the study ($N = 1358$)

Measures	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1 Boredom	1.84	1.06	(0.88)														
Other well-being																	
2 Job satisfaction	2.55	0.82	−0.15**	(n.a.)													
Work engagement																	
3 Vigor	2.22	1.16	−0.56**	0.55**	(0.92)												
4 Dedication	2.51	1.23	−0.15**	0.56**	0.87**	(0.94)											
5 Absorption	2.22	1.23	−0.09**	0.49**	0.85**	0.86**	(0.92)										
Workaholism																	
6 Working excessively	1.70	0.56	0.00	−0.05	0.08**	0.11**	0.16**	(0.85)									
7 Working compulsively	2.03	0.64	0.08**	0.00	0.17**	0.18**	0.24**	0.75**	(0.90)								
Possible antecedents																	
8 Quantitative job demands	2.65	0.76	−0.21**	−0.06*	0.05	0.11**	0.13**	0.53**	0.36**	(0.82)							
9 Qualitative job demands	2.70	0.70	−0.19**	0.02	0.10**	0.20**	0.18**	0.39**	0.30**	0.70**	(0.78)						
10 Job control	2.62	0.69	−0.04	0.36**	0.32**	0.31**	0.32**	−0.10**	−0.06*	−0.08**	−0.05	(0.77)					
11 Supervisor support	2.34	0.71	−0.09**	0.42**	0.36**	0.37**	0.32**	0.00	0.05	−0.03	0.03	0.34**	(0.86)				
12 Coworker support	2.46	0.69	−0.13**	0.39**	0.37**	0.37**	0.31**	0.05	0.06*	0.02	0.06*	0.29**	0.75**	(0.84)			
Possible consequences																	
13 Job performance	6.08	1.79	−0.19**	0.44**	0.36**	0.41**	0.34**	−0.10**	−0.07**	−0.05	0.01	0.29**	0.27**	0.26**	(n.a.)		
14 Psychological distress	6.57	5.90	0.32**	−0.30**	−0.19**	−0.21**	−0.14**	0.39**	0.42**	0.19**	0.16**	−0.17**	−0.19**	−0.21**	−0.33**	(0.94)	
15 Physical complaints	2.43	0.81	0.11**	−0.19**	−0.15**	−0.10**	−0.08**	0.35**	0.29**	0.26**	0.23**	−0.10**	−0.12**	−0.11**	−0.12**	0.46**	(0.82)

Note: **$P < .01$, *$P < .05$. Cronbach's α coefficients are displayed in parentheses.

TABLE 5 Results of principal component analysis of DUBS-J (*N* = 1358)

No.	Items	Loadings	Mean (SD)
1	At work, time goes by very slowly	.77	2.03 (1.29)
2	I feel bored at my job	.80	2.09 (1.34)
3	During work time I daydream	.82	1.82 (1.33)
4	It seems as if my working day never ends	.69	1.91 (1.42)
5	I tend to do other things during my work	.84	1.69 (1.34)
6	At my work, there is not so much to do	.82	1.52 (1.36)
	Eigenvalue	3.76	
	% of variance	62.72	

distress; $r = .32$, $p < .01$, physical complaints; $r = .11$, $p < .01$), in line with Hypothesis 3.

3.4 | Reliability

The Cronbach's alpha coefficient was .88. Table 5 shows that PCA explained 62.72% for variance of the first principal component (51.0% in the original DUBS). As the robustness of factor analysis also depends on sample size, the Kaiser–Meyer–Olkin (KMO) measure was used to assess the adequacy of the sample size for the analysis. The KMO of the overall scale was 0.87, thus satisfying the requirement that KMO values should exceed 0.50.[35] As for the test–retest reliability, the intraclass correlation coefficient (ICC$_{agreement}$) with an interval of 3 months was 0.62 ($p < .01$), and the standard error of measurement (SEM$_{agreement}$) was 0.66, which was calculated by the square root of the error variance.[36]

4 | DISCUSSION

4.1 | Main results

This study aimed to validate the DUBS-J in a sample of Japanese employees from various occupations. The CFA results approximately showed that the same one-factor structure emerged, as with the original DUBS. Although RMSEA was greater than 0.08, a recent study reported that the SRMR produced more accurate tests of close fit and confidence intervals than RMSEA.[37] The SRMR in this study was 0.04, which is lower than 0.08. Therefore, DUBS-J is assumed to be usable as a one-factor measure.

Regarding discriminant validity, CFA confirmed the four quadrants of Bakker and Oerlemans'[14] work-related subjective well-being typology. Boredom had little correlation with workaholism on the opposite side of the activation axis but a weak negative relationship with job satisfaction on the opposite side of the pleasure axis. In addition, for external discriminant validity, the square root of AVE for the DUBS-J was greater than their respective squared correlations with work engagement, workaholism, and job satisfaction. Through examining the differences and relationships between boredom and other types of employee well-being, DUBS-J is a first step to systematically study the unpleasant state of "boredom" caused by low stimulation at work, which has received little attention in occupational health psychology in Japan. However, there are various approaches to the typology of employee well-being, away from Bakker and Oerlemans,[14] who classify it as pleasure and activation. For example, the cognitive approach focuses on the balance between skills and challenges,[38] while the affective-cognitive approach distinguishes between energy and identification.[39] In the cognitive approach, boredom is placed at an intermediate skill level and a lower challenge level.[38] In the affective–cognitive approach, boredom is considered to be located at a lower energy level and a lower identification level. Furthermore, in a cluster analysis that attempted to integrate multiple approaches using energy, pleasure, challenge, skills, and identification as dimensions, four clusters (i.e., 9-to-5 or relaxed, work engaged or enthusiastic, workaholic or tense, and burned-out or fatigued) were identified.[40] In these clusters, boredom can be close to the 9-to-5 type (characterized by low scores on challenge, energy, and identification, and high scores on pleasure and skills). Therefore, further research is needed to examine boredom at work from various viewpoints.

In relation to the potential antecedents, both quantitative and qualitative job demands were negatively associated with boredom, which is in line with Hypothesis 2. However, we should note that the two job demands were also negatively related to psychological distress. According to Bakker and Oerlemans'[14] work-related subjective well-being model, boredom can be characterized by unpleasant and *low* activation, whereas psychological distress, which is conceptually closely related to burnout, can be characterized by unpleasant and *high* activation. This suggests that job demands may have a curvilinear relationship with well-being variables, whereby low job demands can lead to boredom at work, whereas high job demands can lead to psychological distress (burnout). This speculation is supported by Warr's[41] vitamin model. Indeed, based on the model, de Jonge and Schaufeli[42] confirmed the *U*-shaped relationships between job demands and job-related anxiety and job demands and emotional exhaustion, as well as an inverted *U*-shaped relationship between job demands and job satisfaction. Thus, a certain amount of job demands may prevent

boredom by maintaining employees' attention and motivation.[4,6] Further research is needed on the optimal level of job demands, as well as around too much (burnout) or too little demand (boredom) for employee well-being.

In terms of job resources, supervisor and coworker support were both negatively associated with boredom, which is in line with Hypothesis 2. The finding that unsupportive supervisors or coworkers were associated with boredom is consistent with the finding that having unfriendly and uncommunicative coworkers can cause feelings of boredom.[1] In contrast, supportive supervisors and coworkers mean that employees are more likely to interact with others and avoid the boredom of having nothing to do. At the same time, it makes it easier for the supervisor to monitor the employee's workload and prevent inappropriate underload, which can lead to less boredom.

However, contrary to our expectations, job control was not associated with boredom. This result differed from that of the original DUBS[6] and previous studies.[43,44] This unexpected finding suggests that job control has a complex relationship with boredom. One possible explanation refers to the individual's preference for control; job control allows employees to exercise more flexibility and autonomy and is, therefore, typically beneficial. However, executing job control also requires responsibility and decision-making for accomplishing the task, which can result in higher psychological distress.[45] Therefore, an individual's preference or need for control may have some effects on the association between job control and boredom. Future research is needed to clarify these unknown mechanisms.

In relation to potential consequences, boredom was negatively associated with job performance. Bored employees engage in unproductive behaviors, such as daydreaming[8] and non-work related activities.[9] They also engage in counterproductive behaviors, such as those affecting other people (abuse), purposely doing the job incorrectly (production deviance), destroying the physical environment (sabotage), avoiding work through being absent or late (withdrawal), and theft.[5] Furthermore, boredom at work can lead to a decline in knowledge, skills, and abilities over time.[46] If boredom is associated with reduced opportunities to improve competence through work, it may lead to both short- and long-term poor performance.

The positive association between boredom and psychological distress may be due to restlessness and no sense of accomplishment. Restlessness caused by boredom may be a way of compensating for the external low stimulus of work underload.[15] A lack of achievement means less opportunity to achieve goals, which may lead to underestimation of oneself.

Regarding the positive association between boredom and physical complaints, psychological distress may have partially mediated the relationship between them, given the correlations among boredom at work, psychological distress, and physical complaints: $r = .32$ between boredom and psychological distress, $r = .11$ between boredom and physical complaints, and $r = .46$ between psychological distress and physical complaints. Further investigation is needed to clarify the detailed underlying mechanisms of boredom and physical complaints.

4.2 | Limitations and future directions

This study had several limitations. First, our findings were based on a cross-sectional design, which prevented causal inferences. Longitudinal research and qualitative studies that interview employees who experience boredom at work are required to reveal causal order. Second, findings were based on survey data using self-reported measures. Self-report bias (e.g., due to negative affection, common method variance) may have affected the results, implying that the true association between variables may be weaker than observed in this study. Our findings should be replicated with objective measures (e.g., peer ratings of boredom and job performance) in the future. Third, data were collected through an internet survey; therefore, our findings may not be generalizable to employees with limited internet access or literacy. Fourth, the majority of the participants in this study were white-collared and were not involved in shift work. Therefore, future research should examine whether our findings can be generalized to blue-collar and shift-workers. Fifth, due to the space limitation of the questionnaire, we used one item from HPQ to measure the job performance in line with previous empirical studies.[(e.g.,47)] However, the HPQ short form questions and scoring manual[48] as well as the recent validation study[49] of HPQ recommend using three items to obtain accurate information. Future research should use these three items and examine their relationship with boredom at work. Sixth, in the CFA for factorial validity, the SRMR was less than 0.08, but the RMSEA was greater than 0.10. Therefore, the possibility may exit of residuals that cannot be explained by the assumed single factor model. Hence, both RMSEA and SRMR should be examined in another sample in the future. Finally, the survey period was during the COVID-19 pandemic, and the telecommuting level (e.g., frequency and duration) may have influenced the results. Future research should examine whether our findings can be generalized to findings obtained subsequent to the COVID-19 pandemic.

5 | CONCLUSION

This study confirmed that DUBS-J is an adequate measure of boredom at work for use in the Japanese context.

AUTHOR CONTRIBUTIONS

MK was responsible for the statistical analyses and writing of the manuscript. AS planned the research design as a principal investigator of the project and contributed to the writing of the manuscript. MT and DM were responsible for data collection. WS was involved in the original conceptualization of the work and reviewed the manuscript. All authors read and approved the final manuscript prior to submission for publication.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared. We cannot publicly provide individual data due to participant privacy in accordance with ethical guidelines. Additionally, the written informed consent from study participants does not include a provision for publicly sharing data.

DISCLOSURE

Approval of the research protocol: The study aims and protocol were approved by the ethics review board of the Public Health Research Center in 2020 before starting the study (Public Health Research Center Ethics Committee Approval, ID = 20E0004). *Informed Consent:* Informed consent was obtained through the website at the time the data were collected. Participants had the option of not responding to any part of the questionnaire at any time and discontinue the survey at any point. *Registry and the Registration No. of the study/trial:* The protocol was registered in the UMIN Clinical Trials Registry (UMIN-CTR, ID = UMIN000040683). *Animal studies:* N/A.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.