

[ ORIGINAL ARTICLE ]

## Translation, Cultural Adaptation, and Validation of the Mini-Z 2.0 Survey among Japanese Physicians and Residents

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### Abstract:

**Objective** The Mini-Z 2.0 is a new, simple, and nonproprietary tool for assessing physician well-being and burnout. To date, a non-English version of the Mini-Z 2.0 survey has not been validated. Therefore, we aimed to develop a Japanese version of the Mini-Z 2.0 and to evaluate its validity and reliability using survey data from physicians affiliated with an internal medicine academic society.

**Methods** The Mini-Z 2.0 survey was translated into Japanese using a forward-backward translation method. The participants belonged to the American College of Physicians' Japan Chapter. The translated version of the Mini-Z 2.0 survey was distributed to participants using an electronic mailing list. Convergent validity was assessed between burnout and other items using Pearson's product-moment statistic. Structural validity was evaluated using an exploratory factor analysis and confirmatory factor analysis, and reliability was assessed using internal consistency.

**Results** Of the 1,255 physicians and medical residents contacted, 283 responded (22.5%). Burnout was present in 34.6% of the participants, with 48.8% reporting high stress levels. Convergent validity was demonstrated, with satisfactory correlations between burnout and satisfaction, value alignment, work control, and stress. An exploratory factor analysis identified two factors (i.e., Well-Being and Relationships and Work-Related Stressors); however, the three models evaluated using the confirmatory factor analysis revealed a poor fit. Cronbach's alpha for the sample was 0.80.

**Conclusion** The Japanese version of the Mini-Z 2.0 demonstrated good internal consistency and convergent validity. Despite its inadequate structural validity, it can be used to measure physician well-being and related workplace conditions in Japan.

**Key words:** Mini-Z 2.0 survey, physician burnout, physician well-being, work-related stress, translation, cultural adaptation

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### Introduction

Physician burnout is a significant healthcare concern worldwide (1). It is essential to assess physician burnout, as

it can negatively impact physician well-being and is associated with experiencing depressive symptoms and providing suboptimal patient care (2, 3). The causes of this widespread problem are primarily rooted in healthcare organizations and systems and are due to excessive workloads, inefficient work

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processes, documentation burden, poor organizational support, and negative leadership culture (3, 4).

The Maslach Burnout Inventory (MBI) is considered to be the standard assessment for burnout; however, its length and licensing fees can limit its use (5, 6). In contrast, the Mini-Z is a new, simple, nonproprietary tool for assessing physician burnout, comprising single-item questions evaluating levels of satisfaction, stress, and burnout, and seven common workplace stressors for assessing healthcare organizations and systems (7). Recently, its second version, the Mini-Z 2.0, was developed and has been widely used to guide interventions to improve physician well-being. However, the original Mini-Z and Mini-Z 2.0 were developed in English and, thus far, no translated versions exist in any other languages, including Japanese, that have been assessed for their reliability and validity.

In recent years, interest in physician burnout has increased in Japan (8-10). The Japan Chapter of the American College of Physicians' (ACP) Physician Well-Being Committee (PWC) was established in June 2019 to address the issue of physician burnout in Japan. The committee includes Japanese physicians from various specialties, such as internal medicine, general medicine, emergency medicine, medical education, and psychiatry. To disseminate the concept of physician burnout and brief measures to assess the current state of the crisis in Japan, the PWC translated the Mini-Z 2.0 survey into Japanese. The translation of this questionnaire is expected to provide more detailed information on physician well-being and burnout in Japan. Physician well-being in Japan's super-aging society may already be different from that in other countries (11), and data relating to this may be a useful basis for interventions in other countries that will have to deal with aging populations in the future.

In this study, we aimed to develop a Japanese version of the Mini-Z 2.0 and to use it to evaluate physician well-being among members of the ACP's Japan Chapter. This study had two objectives: to translate the Mini-Z 2.0 and adapt it to the Japanese cultural context, and to validate the Japanese version of the Mini-Z 2.0 using data on burnout and well-being among physicians and residents in Japan.

## Materials and Methods

### Original Mini-Z 2.0 survey

The Mini-Z 2.0 survey is a new tool that can measure burnout and workplace conditions among physicians (7). It consists of 10 items rated using a 5-point Likert scale. The survey evaluates three wellness-related outcomes (burnout, stress, and satisfaction) and seven drivers of burnout [work control, chaos, value alignment with leaders, teamwork, home electronic medical records (EMR) use, documentation time pressure, and EMR proficiency]. High and low scores on each scale are defined in Supplementary material 1 for the Mini-Z 2.0 survey (7). The preliminary validation study

of the Mini-Z demonstrated high internal consistency and convergent validity, and a confirmatory factor analysis (CFA) was used to determine two subscales: "Teamwork and Values" (satisfaction, burnout, value alignment with leaders, and teamwork) and "Stress and EMR" (stress, documentation time pressure, home EMR use, and EMR proficiency) (12). The single-item burnout scale correlated very well with the emotional exhaustion scale of the MBI (13).

### Translation and cultural adaptation procedure

The standard forward-backward translation method was used to translate the Mini-Z 2.0 into Japanese (14, 15). Two physicians (K.N. and T.M.) independently translated the items into Japanese, and all committee members discussed the two versions and created one synthesized translation via consensus. During this process, we changed the expression of Item 8 from the original "The amount of time spent on EMR *at home* is" to "The amount of time spent on EMR *after working hours* is," to reflect standard clinical practice in Japan. A backward translation was conducted by a professional native translator who had no knowledge of the original version of the survey. We contacted the development team of the Mini-Z 2.0, who reviewed the conceptual equivalence between the back-translated Mini-Z 2.0 Japanese version and the original version. We also asked them to evaluate the change made to Item 8. After two review processes, the development team officially approved the Japanese version for use. In addition, we conducted a cognitive debriefing with 10 participants (residents and physicians) and made minor modifications to the expressions to improve clarity and comprehensibility (see Supplementary material 1 for the Mini-Z 2.0 Survey Japanese Version).

### Data collection

In January 2020, we approached members (n=1,255) of the ACP's Japan Chapter by sending an e-mail to each member using the chapter's mailing list. The members comprised physicians, including fellows and medical residents. Participants were asked to answer the Japanese version of the Mini-Z 2.0, and the data were collected through an online platform. We also collected demographic and occupational data, including gender, race/ethnicity, type of practice, and years in practice. We sent reminder e-mails four times during the survey period. The target sample size was based on 10-20 samples per item, as has been proposed for validation studies (16).

### Convergent validity

The convergent validity between single-item burnout and other items was assessed using the Pearson product-moment statistic (Pearson's correlation coefficient= $r$ ), where  $r=0.40$  or above was considered satisfactory (17). Correlations were considered significant at the 0.01 level (two-tailed). Burnout was expected to correlate with other items on the questionnaire, as assumed from conceptual models in previous studies (12, 18). We also expected there to be no cultural differ-

**Table 1. Participant Demographics and Mini-Z 2.0 Survey Results.**

		n=283
Demographics		
Provider Type	Residents	25 (8.8%)
	Physicians	258 (91.2%)
Experience	0-5 years	22 (7.8%)
	6-15 years	75 (26.5%)
	16-25 years	71 (25.1%)
	26-35 years	84 (29.7%)
	35+ years	31 (11.0%)
Gender	Male	240 (84.8%)
	Female	39 (13.8%)
	Non-binary	0 (0.0%)
	No response	4 (1.4%)
Japanese	Yes	281 (99.3%)
	No response	2 (0.7%)
The Mini-Z 2.0 survey (Japanese Version)		
Overall satisfaction with job (agree, strongly agree)		225 (79.5%)
Symptoms of burnout (beginning, always, completely)		98 (34.6%)
Professional values aligned with leaders (agree, strongly agree)		161 (56.9%)
Degree team works efficiently (satisfactory, good, optimal)		221 (78.1%)
Control over my workload (satisfactory, good, optimal)		194 (68.6%)
Great deal of stress because of my job (agree, strongly agree)		138 (48.8%)
Time available for documentation (satisfactory, good, optimal)		181 (64.0%)
Time spent on EMR after working hours (often, very often)		86 (30.4%)
Proficient with EMR use (satisfactory, good, optimal)		209 (73.9%)
Work atmosphere (busy, very busy)		57 (20.1%)

EMR: electronic medical record

ences in the conceptual models.

### Structural validity

The structural validity was primarily assessed through an exploratory factor analysis (EFA) by performing a principal component analysis using an oblique factor solution (promax rotation). A scree plot was used to determine the number of factors. Furthermore, Cronbach's alpha was assessed for the resulting items in each factor. We also performed a CFA. We evaluated three models: the one-factor model including all items (model A), the original two-factor model (model B) (12), and the two-factor model specified by EFA (model C). Structural equation modeling with a maximum likelihood analysis was also conducted. Goodness-of-fit indices were used to assess the survey's structural validity. We used the following criteria to determine good fit: a comparative fit index (CFI) and Tucker-Lewis index (TLI) >0.90, and a standardized root mean square residual (SRMR) and root mean squared error approximation (RMSEA) <0.08 (19, 20).

### Reliability

The internal consistency was assessed using Cronbach's alpha coefficient to examine reliability. If the alpha was  $\geq 0.70$ , reliability was considered satisfactory (21).

### Data analyses

The results were analyzed using data from all respondents. All analyses were performed using the STATA software program, version 15 (STATA, College Station, USA).

### Ethical considerations

The study was approved by the institutional review board of Mito Kyodo General Hospital. All procedures were followed in accordance with the Declaration of Helsinki. Respondents received written information about the study and were considered to have consented to participation by submitting the survey. The survey was conducted anonymously.

## Results

### Descriptive findings

The survey was completed by 283 of the 1,255 physicians and residents, reflecting a response rate of 22.5%. There were no missing data. A summary of participant demographics and survey responses is presented in Table 1. The majority of respondents were physicians, men, and Japanese. Overall, 98 physicians reported symptoms indicating burnout; however, the majority of respondents were highly satisfied with their jobs, with more than half reporting that their

**Table 2. The Convergent Validity of the Japanese Version of the Mini-Z 2.0 Survey.**

	SA	BO	VL	TW	WC	ST	DT	EA	EP	AT
SA	1									
BO	0.537 0.001	1								
VL	0.600 <0.001	0.436 <0.001	1							
TW	0.451 <0.001	0.332 <0.001	0.440 <0.001	1						
WC	0.358 <0.001	0.422 <0.001	0.362 <0.001	0.339 <0.001	1					
ST	0.392 <0.001	0.571 <0.001	0.338 <0.001	0.303 <0.001	0.480 <0.001	1				
DT	0.207 <0.001	0.318 <0.001	0.181 <0.001	0.190 0.001	0.397 <0.001	0.357 <0.001	1			
EA	0.142 0.017	0.261 <0.001	0.185 0.002	0.098 0.099	0.345 <0.001	0.315 <0.001	0.632 <0.001	1		
EP	0.070 0.243	0.121 0.042	0.012 0.843	0.028 0.633	0.165 0.005	0.163 0.006	0.132 0.026	0.183 0.002	1	
AT	0.398 <0.001	0.391 <0.001	0.346 <0.001	0.347 <0.001	0.395 <0.001	0.377 <0.001	0.396 <0.001	0.425 <0.001	0.108 0.070	1

r: 0.40 or above was considered satisfactory. Correlations were considered significant at the 0.01 level (two-tailed). SA: satisfaction, BO: burnout, VL: value alignment with leaders, TW: teamwork, WC: work control, ST: stress, DT: documentation time, EA: electronic medical record use after work, EP: proficiency with electronic medical records, AT: atmosphere

**Table 3. Exploratory Factor Analysis of the Japanese Version of the Mini-Z 2.0 Survey.**

	Factor 1	Factor 2	Uniqueness
<b>Items</b>			
Satisfaction	<b>0.884</b>	-0.1409	0.3474
Value	<b>0.8524</b>	-0.1595	0.4495
Teamwork	<b>0.7854</b>	-0.1826	0.6597
Burnout	<b>0.6425</b>	0.184	0.3175
Stress	<b>0.4512</b>	0.3713	0.4534
EMR after work	-0.1988	<b>0.9209</b>	0.6006
EMR time	-0.0897	<b>0.856</b>	0.9347
EMR proficiency	-0.2192	<b>0.5104</b>	0.2543
Atmosphere	0.3664	<b>0.4372</b>	0.4466
Work control	0.3898	<b>0.426</b>	0.599

Items with factor loadings up to 0.4 were retained (bold). EMR: electronic medical record

values aligned with those of their leaders, and many stating they were satisfied with team efficiency. In addition, almost half of the respondents reported feeling intense stress at work, although stress related to EMR was generally low. Some reported that their workplace was busy and chaotic, but many more reported having good control over their work. Detailed results of the Mini-Z 2.0 survey are presented in Supplementary material 2.

### Convergent validity

Convergent validity was assessed by comparing burnout

with other items (Table 2). Positive correlations were demonstrated between burnout and satisfaction, aligned values, work control, and stress. Weak correlations were found between burnout and teamwork, documentation time, EMR after work, and atmosphere. EMR proficiency did not show a statistically significant correlation with burnout.

### Structural validity

We performed an EFA and identified two factors using a scree plot (Supplementary material 3). These two factors explained 54.3% of the total variance. The results are shown in Table 3. All items loaded on two different factors: “Well-being and Relationships” and “Work-Related Stressors.” The alpha coefficients were 0.79 and 0.70 for “Well-being and Relationships” and “Work-Related Stressors,” respectively. We then performed a CFA for the three models, and the goodness-of-fit results are shown in Table 4. In this study, all models were associated with a poor data fit. The stepwise removal of items in models B and C was implemented; however, the models did not improve to reach an acceptable goodness of fit.

### Reliability

The results were satisfactory, with an alpha coefficient for the entire sample of 0.80, which remained the same for both physicians and residents.

**Table 4. Confirmatory Factor Analysis of the Japanese Version of the Mini-Z 2.0 Survey.**

	Model A	Model B	Model C
Chi-square statistic	229.49	136.26	160.80
df	35	19	34
p value	<0.001	<0.001	<0.001
CFI	0.773	0.839	0.851
TLI	0.708	0.762	0.803
SRMA	0.089	0.102	0.084
RMSEA	0.140	0.148	0.115

The criteria to determine good fit: CFI and TLI greater than 0.90, and SRMR, RMSEA less than 0.08. CFI: comparative fit index, TLI: Tucker-Lewis index, SRMR: standardized root mean square residual, RMSEA: root mean squared error approximation

## Discussion

The Mini-Z 2.0 is a newly developed simple survey and has been recognized as a powerful tool for assessing physician burnout and related workplace stressors. Our Japanese version is the first translated version of the Mini-Z 2.0 that used a back-translation method and was officially approved by the original development team of the Mini-Z. Furthermore, we assessed the validity and reliability of the Japanese version of the Mini-Z 2.0 in this study.

The Japanese version of the Mini-Z is expected to play an important role in assessing physician well-being and burnout in Japan. Physician burnout is common and widespread in Japan, and routine evaluations are necessary to prevent it (22). The MBI is the gold standard for assessing physician burnout (2, 6); however, the Japanese version of the Mini-Z has several advantages over the MBI. First, the MBI-Human Services Survey is a lengthy questionnaire that includes 22 items; the Mini-Z, by contrast, has 10 items and is easy to use. Second, the MBI is a fee-based questionnaire that is costly to use frequently and extensively; the Mini-Z is a nonproprietary questionnaire that is free to use. Finally, the MBI only assesses burnout; the Mini-Z can also assess other outcomes of well-being (satisfaction and stress) and workplace stressors. Evaluating such stressors will help guide interventions to improve physician well-being in healthcare facilities (6, 22).

The process of translation and cultural adaptation used in this study followed the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) guidelines and applied a rigorous approach, including forward translation, backward translation, and cognitive debriefing (15). During the process, changes were made to Item 8 to reflect differences in clinical practice between Japan and the United States regarding the use of EMR. Cognitive debriefing was conducted to ensure that the scale's translation and cultural adaptation were appropriate. Regarding validity, content validity was assessed by a group of experts, and convergent and structural validity were assessed using data from a wide

range of Japanese physicians and residents in the academic society. Convergent validity was adequate, with burnout being associated with most other items. An assessment using Cronbach's alpha determined that the reliability was adequate. However, the validity assessment failed to demonstrate structural validity. Structural validity was tested using a CFA on the factor models in the original scale and those based on this study's data; however, neither model showed a good data fit.

One possible reason the Japanese version of the Mini-Z 2.0 survey did not demonstrate adequate structural validity in the present study is that the survey, by its nature, may not be suitable for the evaluation of structural validity based on classical test theory. While classical test theory assumes that each question item contributes equally to the total score (21), the Mini-Z survey deals with items of differing natures-well-being outcomes and stressors-within the same scale, and its total score does not represent one particular property or characteristic. Therefore, it is possible that for this scale, the assumptions of classical test theory do not hold; thus, structural validity was not demonstrated. Future studies should use content validity, hypothesis testing, and criterion-related validity to assess the scale's validity.

Several limitations associated with the present study warrant mention. First, criterion-related validity was not assessed in this study. The evaluation of burnout with the Mini-Z 2.0 relies solely on a single-item measure of burnout. The original single item was measured concurrently with the MBI and showed criterion-related validity (13), and a similar assessment is necessary to enhance the validity of the Japanese version of the single-item measure of burnout as well. However, the MBI was not measured in this study; therefore, evaluating the validity of the Japanese version of the single-item measure on the Mini-Z 2.0 was not possible. The data from this study showed a burnout rate of 34.6%, which was comparable to that in several previous burnout studies of primary care physicians, internists, and postgraduate residents in Japan (8-10), suggesting sufficient criterion-related validity. However, additional studies using the MBI are needed to improve the validity of the Japanese version of the Mini-Z 2.0 survey. Second, our sample was limited to physicians and residents. The burnout rate in this study was, however, similar to that of other specialties in Japan: 42% among psychiatrists (23), 41.1% among neurologists and neurosurgeons (24), and 20-30% among palliative-care physicians and oncologists (25). Further studies are needed to determine whether the Mini-Z 2.0 can be used by doctors in other specialties to ensure representativeness of all Japanese physicians. Third, our study might have been susceptible to selection biases with respect to several aspects. Physicians in the Japan Chapter of ACP are interested in medical care and education outside of Japan and may not represent all Japanese physicians, which also lessens the external validity. In addition, the use of a web-based survey and subsequent low response rate may have resulted in selection bias. In a meta-analysis of response rates to web-based surveys, the average



response rate for 68 studies was 39.6% (26). However, studies using web-based surveys on burnout without incentives have shown the response rates to be 25.3-32% (24, 27, 28), which is lower than the rates of response to surveys for other purposes. Since burnout is a sensitive topic, the response rate is expected to be low. In a pilot study examining whether or not the measurement of burnout could obtain a reasonable response rate, a response rate of 30% or higher was considered acceptable (29). Thus, the response rate in this study was similar to or slightly lower than those in similar studies. We recognize the possibility of non-responder bias, as consistent with other questionnaire surveys. It is possible that participants with high levels of stress and/or burnout did not participate, thus resulting in lower burnout and stress rates than the actual situation among physicians in Japan.

In conclusion, this study developed and validated the Japanese version of the Mini-Z 2.0 and showed sufficient content and convergent validity. Although further validation studies are needed, this new questionnaire is simpler and less costly than the conventional MBI and allows for the broader and more frequent assessment of physician well-being in Japan.

**The authors state that they have no Conflict of Interest (COI).**

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