

**ORIGINAL****Validation of the Japanese version of the 8-item Chronic Pain Acceptance Questionnaire (CPAQ-8)**Takaki Fukumori<sup>1</sup>, Kengo Fujishima<sup>1†</sup>, Kazunori Iwasa<sup>2</sup>, Yumiko Takao<sup>3</sup>, Yukino Kobayashi<sup>4</sup>, and Hiroyuki Nishie<sup>5</sup><sup>1</sup>Graduate School of Integrated Arts and Sciences, Tokushima University, Tokushima, Japan, <sup>2</sup>Graduate School of Humanities and Sustainable System Sciences, Osaka Prefecture University, Osaka, Japan, <sup>3</sup>Department of Pain Medicine, Hyogo Medical University Hospital, Hyogo, Japan, <sup>4</sup>Department of Hygiene, Public Health and Preventive Medicine, Showa University School of Medicine, Tokyo, Japan, <sup>5</sup>Department of Anesthesiology and Intensive Care 2, Kawasaki Medical School, Okayama, Japan, <sup>†</sup>Current affiliation : Otsuka Warehouse Co., Ltd., Japan

**Abstract :** This study aimed to examine the reliability and validity of the Japanese version of the Chronic Pain Acceptance Questionnaire (CPAQ-8J). A total of 108 outpatients with chronic pain completed the CPAQ-8 questionnaire, along with the Acceptance and Action Questionnaire-II, Hospital Anxiety and Depression Scale, Pain Disability Assessment Scale, Numerical Rating Scale, and EuroQol 5 dimensions 5-level. Confirmatory factor analyses examined the factor structure. Results indicated that the CPAQ-8J comprised a two-component factor structure. Correlations between the CPAQ-8J and each variable were as expected, except between the “pain willingness” subscale and other scales ; thus, the CPAQ-8J had a certain degree of convergent validity. Internal consistency and test-retest reliability suggest that the CPAQ-8J is reliable. The psychometric properties of the CPAQ-8J meet a certain standard ; meanwhile, some issues must be addressed for its practical application. Further research should consider the influence of cultural characteristics in practical application. *J. Med. Invest.* 70 :88-93, February, 2023

**Keywords :** chronic pain acceptance questionnaire, CPAQ-8, chronic pain, acceptance, psychometric properties

**INTRODUCTION**

Chronic pain, a major public health concern, has a worldwide prevalence of 20% (1), with similar prevalence rates in Japan (2, 3). In the United States, the combined medical and economic costs due to chronic pain are estimated to be \$640 billion per year (4). Chronic pain is a serious health issue causing distress not only to patients but also to those around them, ultimately leading to social loss.

Recently, chronic pain-related psychosocial factors (5, 6) and psychosocial interventions, such as cognitive behavioral therapy, have attracted much attention. Such interventions emphasize chronic pain acceptance, which involves acknowledging the continued existence of pain, abandoning unproductive attempts to control pain, and making efforts to lead a satisfying life despite the pain (7, 8). Chronic pain acceptance is a core concept of the psychological flexibility model of chronic pain (9, 10), which emphasizes valuable life support and improved functioning despite chronic pain and distress. Studies suggest that chronic pain acceptance provokes adaptive outcomes in chronic pain treatment, such as reduced depression and anxiety, and improved physical, psychological, and social functioning (11-15). Psychotherapy can lead to beneficial effects for individuals with chronic pain (16-18).

The Chronic Pain Acceptance Questionnaire (CPAQ) is a highly accepted measure of chronic pain acceptance based on its psychometric properties (19). The CPAQ-20 (8), a widely used version, comprises 20 items with two subscales : activity engagement (AE) and pain willingness (PW). AE represents the pursuit of activities of daily living regardless of pain, whereas

PW represents the belief that pain avoidance and control are not useful in adjusting to chronic pain (8). A shortened, 8-item version of the CPAQ-20, the CPAQ-8, aims to reduce the burden on respondents and increase convenience in research and clinical settings. The CPAQ-8 is reliable, valid, and psychometrically homogeneous with the CPAQ-20 (20, 21), translated into many languages (9, 22-25), and used extensively in research and clinical practice. However, in Japan, no equivalent scale has been developed yet. Therefore, this study developed a Japanese version of the CPAQ-8, the CPAQ-8J, and examined its reliability and validity. The current version aims to contribute to the accumulation of knowledge on chronic pain acceptance in Japan, the development of tailored interventions, and to future comparative studies.

The structural validity of the questionnaire was examined through confirmatory factor analysis (CFA), assuming the same two-factor structure as the original version (21). For convergent validity, the relationship between the CPAQ-8J and other scales was examined. This study examined acceptance, anxiety and depression, pain intensity, and pain-related life disability, similar to the original version (20, 21). Additionally, health-related quality of life (QoL) was used due to its association with chronic pain acceptance (24, 26, 27).

Specifically, the following associations were hypothesized : CPAQ-8J was expected to show moderate correlations with the Acceptance and Action Questionnaire-II (AAQ-II), which measures the tendency to accept undesirable thoughts and feelings ; moderate to strong negative correlations with the Hospital Anxiety and Depression Scale (HADS), which measures anxiety and depression ; weak to moderate negative correlations with the Numerical Rating Scale (NRS), which measures pain intensity ; moderate negative correlations with the Pain Disability Assessment Scale (PDAS), which measures pain-related life disability ; and weak to moderate positive correlations with the EuroQol 5 dimensions 5-level (EQ-5D-5L), which measures health-related QoL.

Received for publication June 2, 2022 ; accepted October 23, 2022.

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## MATERIALS AND METHODS

### Procedure

The questionnaires were administered twice at a two-week interval. The first survey was distributed to the patients through their attending physicians at each facility. Written consent was obtained from each participant. The second survey followed the same procedure, wherein the patients responded to the CPAQ-8J. To identify person-specific data and for data matching, each participant received a six-digit number when responding to both surveys. This study was conducted with approval of the ethical review board of the institutions to which the first author belonged and of all the medical facilities where the survey was conducted.

### Participants

The participants included 108 outpatients (44 men and 64 women, mean age 63.57 years,  $SD = 12.70$ ) at the pain clinic of three medical facilities in Japan, Kobe University Hospital, Tokyo Metropolitan Ebara Hospital, and Kawasaki Medical School Hospital. Eide *et al.* (9) recommend a minimum sample size of 90 patients for the CPAQ-8; in the COSMIN Risk of Bias checklist (28), the required sample size for structural validity is seven times the number of items in the scale and 100 or more patients. Therefore, all the above criteria for the survey were met.

### Measures

**Sociodemographic data and pain information** : Information regarding participants' age, sex, location of pain (free description, multiple answers possible), and duration of pain onset (months) was recorded.

**Pain acceptance** : The CPAQ-8J, developed using the below-mentioned procedures, was used to assess pain acceptance. The original CPAQ-8 (21) had two subscales : "Activity Engagement" (AE : four items) and "Pain Willingness" (PW : four items), for a total of eight items, with all four PW items being reversed. Participants rated items from 0 (never true) to 6 (always true), with total scores ranging from 0–24 for each subscale. Higher scores indicate greater AE and PW.

The CPAQ-8J was prepared according to Wild *et al.*'s (29) translation procedure. The permission of Dr. Rosemary A. Fish, the original version's author (21), was obtained. First, two bilingual individuals (English and Japanese)—one who knew the study's purpose (A : second author) and the other who did not—independently translated the original version into Japanese. Second, a university faculty member specializing in chronic pain research (B : first author) and a bilingual university faculty member were consulted to integrate each Japanese translation. Third, a native English-speaking university faculty member (C) and a bilingual university faculty member (D), who were not involved in the translation procedure, independently back-translated the Japanese version. Fourth, Dr. Fish, the developer of the original version, examined the equivalence between the two back-translated versions and the original version and commented on the back-translated versions. Fifth, A, B, C, and D consulted with each other to integrate the back-translated versions based on Dr. Fish's comments and revised the Japanese translation accordingly. Finally, after Dr. Fish confirmed no deviation from the original version in all item expressions, the CPAQ-8J was completed (Appendix 1).

**Acceptance** : This study used the Japanese version of the AAQ-II scale (30), which measures acceptance of undesirable experiences, experiential avoidance, and psychological inflexibility (31). Each item is scored from 1–7, with total scores ranging from 7–49. Lower scores indicate greater acceptance. The Japanese version of the AAQ-II demonstrated good psychometric

properties (30).

**Anxiety and depression** : The HADS (32) measures the severity of anxiety and depression in persons with physical illnesses, with two subscales : "Anxiety" (7 items) and "Depression" (7 items). Each item is scored from 0–3, with total scores ranging from 0–21 for each subscale. Higher scores indicate greater anxiety and depression. This study employed the Japanese version of the HADS, which has demonstrated good psychometric properties (33).

**Pain intensity** : The NRS was used to measure the intensity of pain. Participants rated their current pain intensity on a scale of 0 (no pain) to 10 (worst pain imaginable) (34). Higher scores indicate more severe pain.

**Pain disability** : The 20-item PDAS (35) measures the degree of pain-related disability in daily life; each item is scored from 0 to 3, with total scores ranging from 0 to 60. Higher scores indicate a higher degree of pain-related disability. This study used the Japanese version of the PDAS, which has demonstrated good psychometric properties (35, 36).

**Health-related QoL** : For health-related QoL, this study used the Japanese version of the EQ-5D-5L (37), which consists of five items, each rated on a five-point scale. Responses were scored from 0–1 using a conversion table, with higher scores indicating higher health-related QoL. The scoring system of the tool has demonstrated good psychometric properties (37).

### Data Analysis

For item analysis, the mean and standard deviation of all items and the item-total correlation (ITC) values corrected for duplicates for each item were calculated using data with a list-wise deletion because of missing values in the CPAQ-8J items to calculate ITC using only observed values. The data after the completion of missing values were used for subsequent analyses. The 51 missing values in total, with a missing rate of 0.93%, were complemented using multiple imputations.

Assuming the original version's two-factor structure, a CFA was conducted to evaluate the goodness of fit. The cut-off values were :  $CFI \geq .95$  ;  $TLI \geq .95$  ;  $RMSEA < .07$  for acceptable fit and  $< .06$  for good fit ;  $SRMR < .08$  for acceptable fit and  $< .05$  for good fit ; with the  $\chi^2$  test results being insignificant at the .05 threshold (38). Descriptive statistics for subscale and total scale scores on the CPAQ-8J were calculated, and the Shapiro-Wilk test was conducted to confirm normality. To confirm internal consistency, Cronbach's alpha for each subscale and total CPAQ-8J were calculated. For convergent validity, Spearman's rank correlation between the CPAQ-8J and the AAQ-II, HADS, NRS, PDAS, and EQ-5D-5L were calculated based on the results of the Shapiro-Wilk test. The correlation criteria were  $.10 \leq |r| \leq .30$  as weak,  $.30 \leq |r| \leq .50$  as moderate, and  $|r| \geq .50$  as strong (39). Finally, intra-class correlation coefficients (ICC) between the two surveys were calculated to examine test-retest reliability. All statistical analyses used two-tailed tests and p-values less than .05 were considered significant. R ver.4.10 was used for data analysis.

## RESULTS

### Participants' Data on Chronic Pain

The participants had chronic pain mainly in the lumbar, neck, shoulder, and lower limbs. The mean time since chronic pain onset ( $n = 106$ ) was 111.92 months ( $SD = 105.38$ ) ; the median was 79.50 months, with 42.45% of participants reporting more than 10 years (120 months) of chronic pain. The mean of subjective pain intensity ( $n = 101$ ) was 6.58 ( $SD = 2.10$ ).

Item Analysis for the CPAQ-8J

The results of the item analysis ( $n = 105$ ) are presented in Table 1. Three items (items 1, 2, and 3) had mean  $\pm 1SD$  values below 0 or above 6, indicating a ceiling/floor effect. The ITC values corrected for overlap in each item ranged from .18–.39.

Table 1. Item Statistics for the CPAQ-8J.

Item	M	SD	ITC		
			Total	AE	PW
1 I am getting on with the business of living no matter what my level of pain is	4.72	1.33	.360	.616	
2 Keeping my pain level under control takes first priority whenever I am doing something	1.56	1.61	.213		.587
3 Although things have changed, I am living a normal life despite my chronic pain	4.89	1.40	.184	.460	
4 Before I can make any serious plans, I have to get some control over my pain	1.90	1.73	.232		.501
5 I lead a full life even though I have chronic pain	3.85	1.67	.350	.636	
6 When my pain increases, I can still take care of my responsibilities	3.70	1.74	.393	.616	
7 I avoid putting myself in situations where my pain might increase	2.05	1.71	.228		.491
8 My worries and fears about what pain will do to me are true	2.24	1.46	.344		.308

Abbreviations : CPAQ-8J, Japanese version of the Chronic Pain Acceptance Questionnaire-8 ; ITC, item-total correlations ; AE, activity engagement subscale ; PW, pain willingness subscale

CFA of the CPAQ-8J

Since the original CPAQ-8 has a two-factor structure (21), a CFA assuming the same structure was conducted for the CPAQ-8J. A covariation between the errors of items 5 and 6 was assumed, where the expected change in the parameter was greater than 1.0, based on the modification indices after the two authors confirmed a commonality in the item contents other than the factor. All items showed factor loadings of .30 or higher, indicating sufficient loadings for each assumed factor (Table 2). The goodness of fit indices for the model were  $\chi^2 (18) = 15.549$  ( $p = .624$ ), CFI = 1.000, TLI = 1.018, RMSEA = 0.000, and SRMR = 0.061. All values met the criteria of Hooper *et al.* (38). Thus, it can be inferred that the new scale had the same factor structure as the original version, and each subscale score and the total score were used in the subsequent analyses.

Descriptive Statistics

Descriptive statistics (40) for the CPAQ-8J revealed that the AE subscale had a mean of 17.10 ( $SD = 4.84$ ), kurtosis 0.60, skewness -0.94 ; the PW scale had a mean of 7.94 ( $SD = 4.96$ ), kurtosis

Table 2. Factor Loadings of the CPAQ-8J Items.

Item	AE	PW
Item 1	.898	
Item 2		.838
Item 3	.659	
Item 4		.690
Item 5	.543	
Item 6	.524	
Item 7		.591
Item 8		.390

Abbreviations : CPAQ-8J, Japanese version of the Chronic Pain Acceptance Questionnaire-8 ; AE, activity engagement subscale ; PW, pain willingness subscale.

0.73, skewness 0.75 ; and the total score had a mean of 25.04 ( $SD = 6.48$ ), kurtosis 1.75, skewness -0.55. The Shapiro-Wilk test revealed that the assumption of normal distribution of AE, PW, and total score were all rejected (in the same order :  $p < .01$  ;  $p = .004$  ;  $p = .004$ ). Therefore, Spearman's rank correlation coefficient was used in the subsequent construct validity study.

Internal Consistency

Cronbach's alpha for the AE and PW subscale and total CPAQ-8J were .78, .73, and .59, respectively. Although Cronbach's alpha for each subscale was above .70, the total CPAQ-8J was below .60.

Convergent Validity

The Spearman's rank correlation analyses results are presented in Table 3. AE had weak to moderate negative correlations with AAQ-II, the HADS subscale, and total scores, NRS, and PDAS. It had a moderate positive correlation with the EQ-5D-5L. PW had weak to moderate negative correlations with AAQ-II, NRS, and PDAS, and a weak positive correlation with the EQ-5D-5L. However, no significant correlations were found between PW and HADS subscale and total scores. Finally, the CPAQ-8J total score had moderate negative correlations with AAQ-II, HADS subscale and total scores, NRS, and PDAS, and a moderate positive correlation with the EQ-5D-5L. No significant correlations were found between the CPAQ-8J subscales.

These results indicate that the hypotheses for AE and CPAQ-8J total scores were generally supported, although the correlations with the AAQ-II were slightly lower than predicted. Meanwhile, the hypothesis for PW was only partially supported because its correlation with the AAQ-II was slightly lower than predicted, and it showed no relationship with the HADS as expected.

Test-Retest Reliability

For test-retest reliability, the ICC between the two surveys for the CPAQ-8J subscales and total score were calculated using data from 99 participants (excluding nine participants with missing data in either survey). The results showed that ICC (2,1) = .78, 95%CI = [.69,.84] for AE ; ICC (2,1) = .66, 95%CI = [.53,.76] for PW ; and ICC (2,1) = .87, 95%CI = [.82,.91] for the CPAQ-8J total scores. Regarding the test-retest reliability criteria, Mokkink *et al.* (41) suggest .70 or higher as desirable. Here, the PW ICC was slightly below the standard but met the standard of "good" (.60-74) per Cicchetti (42). Thus, the results were judged to be acceptable.

**Table 3.** Spearman's Rank Correlation Between the CPAQ-8J and the AAQ-II, HADS, NRS, PDAS, and EQ-5D-5L.

Measures	Scales/Subscales	CPAQ-8J		
		AE	PW	Total
AAQ-II	Total	-.254 **	-.269 **	-.378 ***
HADS	Anxiety	-.330 ***	-.092	-.308 **
	Depression	-.437 ***	-.110	-.404 ***
	Total	-.425 ***	-.126	-.406 ***
NRS	Total	-.209 *	-.212 *	-.315 **
PDAS	Total	-.396 ***	-.344 ***	-.528 ***
EQ-5D-5L	Total	.360 ***	.206 *	.395 ***

Abbreviations : CPAQ-8J, Japanese version of the Chronic Pain Acceptance Questionnaire-8 ; AE, activity engagement subscale ; PW, pain willingness subscale ; AAQ-II, Acceptance and Action Questionnaire-II ; HADS, Hospital Anxiety and Depression Scale ; NRS, Numerical Rating Scale ; PDAS, Pain Disability Assessment Scale ; EQ-5D-5L, EuroQol 5 dimensions 5-level.

\*\*\* $p < .001$  ; \*\* $p < .01$  ; \* $p < .05$ .

## DISCUSSION

This study aimed to examine the psychometric properties of the CPAQ-8J. Regarding structural validity, the CFA results revealed a two-factor structure similar to the original version (21) and other translated versions in various languages (9, 22-25). Regarding convergent validity, the correlation coefficients between the CPAQ-8J and each scale were approximated as predicted for the AE and CPAQ-8J total. However, no significant correlations were found between PW and HADS. The correlation coefficients between PW and HADS were relatively low compared to AE in many studies (20, 21, 23-25). Thus, the current results are not completely inconsistent with prior research, and thus, the CPAQ-8J has a certain validity, although the use of PW requires caution.

For internal consistency and test-retest reliability, the alpha coefficients of each subscale were .78 for AE, .70 for PW, and .56 for the CPAQ-8J total. The slightly lower alpha coefficient for the CPAQ-8J total is possibly because there was no significant correlation between the two subscales, implying that two groups of items were mixed in this scale. While many studies have found correlations between CPAQ-8 subscales (20-23), the two factors were independent in this study sample, suggesting that engaging in a worthwhile activity while experiencing pain is distinct from abandoning the effort to control pain.

Additionally, this correlation may be influenced by the cultural characteristics of Japan. Nearly 70% of chronic pain patients in Japan believe in enduring pain (43), and not floundering in painful situations is a natural behavior for many Japanese people. This tendency is seen as separate from engaging in worthwhile activities. Additionally, all four PW items are reversed ; however, the use of reversal items to measure pain acceptance may lead to a misunderstanding of the phenomenon or a false correlation with a specific outcome (44). Currently, no major issues have been reported in other language versions of the CPAQ ; however, such problems may have become apparent in the process of Japanese translation. For test-retest reliability, the ICC values of each subscale were within the acceptable range. Overall, the CPAQ-8J scale has sufficient reliability for future use for each subscale, although the handling of the total score requires attention.

Although this study reveals important findings, it has some limitations. First, although this study confirmed structural and convergent validity, it did not consider other validity issues

including discriminant validity. Future studies must examine the relationship between both theoretically similar and distinct concepts. Second, regarding the study sample's expansion, the distribution of CPAQ-8J scores obtained was skewed, possibly because participants were limited to outpatients. Therefore, to expand the scope of application of this scale, examining the reliability and validity of the scale by including inpatients and patients undergoing home treatment is crucial. Finally, issues related to handling the PW subscale need to be further addressed, since this subscale has a slightly different relationship pattern with other scales and the AE subscale compared to other translated versions, possibly due to the influence of cultural characteristics.

Nevertheless, this study makes a novel contribution to research since it is the first study to examine the reliability and validity of the CPAQ-8 in chronic pain patients in Japan. Future studies should further investigate the CPAQ-8J for the advancement of chronic pain treatment in Japan and other countries.

## CONFLICT OF INTEREST

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## ACKNOWLEDGEMENTS

We would like to thank Dr. Rosemary A. Fish and Dr. Steve Fukuda for their support in the questionnaire translation procedure, Professor Hitoshi Mera for his support in conducting the survey, and thank everyone who participated in this study.

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Appendix 1. Japanese version of the 8-item Chronic Pain Acceptance Questionnaire (CPAQ-8J)

以下にさまざまな文があります。それぞれの文について、あなたにもっともよくあてはまる数字を○で囲み、お答えください。

(例えば、“いつもあてはまる”と思った場合、文の隣にある数字の6を○で囲みます。)

	全くあてはまらない	ほとんどあてはまらない	あまりあてはまらない	ときどきあてはまる	たびたびあてはまる	たいていあてはまる	いつもあてはまる
1. 痛みの強さがどのようなものであれ、私は生活を何とかこなしている	0	1	2	3	4	5	6
2. どんなことをしていても、痛みをコントロールし続けることがもっとも優先される	0	1	2	3	4	5	6
3. いろいろなことが変わってしまったけれども、慢性的な痛みの中で日常生活を送っている	0	1	2	3	4	5	6
4. 重要な計画を立てられるようになるまでに、私はある程度自身の痛みをコントロールできなければならない	0	1	2	3	4	5	6
5. 慢性的な痛みがあるとしても、私は充実した生活を送っている	0	1	2	3	4	5	6
6. 痛みが強くなった際にも、私は自身の責任を果たすことができる	0	1	2	3	4	5	6
7. 私は痛みが強くなる恐れのある状況を避ける	0	1	2	3	4	5	6
8. 痛みが私に影響を及ぼすであろうという心配や恐れは、きっと現実のものとなる	0	1	2	3	4	5	6

採点方法 :

pain willingness (痛みへの許容的態度) scale = 項目 2, 4, 7, 8 (すべて逆転項目)

activity engagement (活動への従事) scale = 項目 1, 3, 5, 6

合計点 = pain willingness + activity engagement

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