



## Original Article

# Validation of the Thai Version of a Work-related Quality of Life Scale in the Nursing Profession



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## ABSTRACT

**Background:** Currently available questionnaires for evaluating the quality of worklife do not fully examine every factor related to worklife in all cultures. A tool in Thai is therefore needed for the direct evaluation of the quality of worklife. Our aim was to translate the Work-related Quality of Life Scale-2 (WRQLS-2) into Thai, to assess the validity and reliability of the Thai-translated version, and to examine the tool's accuracy *vis-à-vis* nursing in Thailand.

**Methods:** This was a descriptive correlation study. Forward and backward translations were performed to develop a Thai version of the WRQLS. Six nursing experts participated in assessing content validity and 374 registered nurses (RNs) participated in its testing. After a 2-week interval, 67 RNs were retested. Structural validity was examined using principal components analysis. The Cronbach's alpha values were calculated. The respective independent sample *t* test and intraclass correlation coefficient were used to analyze known-group validity and test–retest reliability. Multistate sampling was used to select 374 RNs from the In- and Outpatient Department of Srinagarind Hospital of the Khon Kaen University (Khon Kaen, Thailand).

**Results:** The content validity index of the scale was 0.97. Principal components analysis resulted in a seven-factor model, which explains 59% of the total variance. The overall Cronbach's alpha value was 0.925, whereas the subscales ranged between 0.67 and 0.82. In the assessment results, the known-group validity was established for the difference between civil servants and university employees [*F* (7.982, 0.005) and *t* (3.351; *p* < 0.05)]. Civil servants apparently had a better quality worklife, compared to university employees. Good test–retest reliability was observed (*r* = 0.892, *p* < 0.05).

**Conclusion:** The Thai version of a WRQLS appears to be well validated and practicable for determining the quality of the work-life among nurses in Thailand.

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## 1. Introduction

The assessment of the quality of nurses' worklife in a hospital working environment is comparable to the assessment process used in and for industry. In each hospital department, the health of workers is potentially at risk from the work itself (e.g., stressors); the environmental factors (e.g., pathogens, hazardous chemicals, ventilation inefficiency, and radiation); and the manner or timing of work (e.g., musculoskeletal disorders resulting from standing and

sitting, shift work, and relatively long hours) [1–4]. The quality of medical care will be affected as nurses face these risks and obstacles [5,6]. A tool for evaluating the specific quality of worklife among nurses would help to pinpoint problems that need to be addressed, thereby reducing the health and occupational risks, improving the quality of nursing, and increasing the efficiency of health care services.

Quality of life instruments are typically used in countries in which there is no tool for evaluating the quality of worklife. For

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example, tools assessing the quality of life of patients receiving treatment are frequently used [7–10], but these tools do not fully examine all factors involved in the worklife. They are also limited when used to investigate the quality of life. For example, the quality of life scale used to assess the quality of life in patients with coronary artery disease that affect the brain has only one item in the subscale on health status; its reliability consequently cannot be tested [8]. The Thai version of the 36-question Short Form Health Survey (SF-36) questionnaire for evaluating the quality of life among patients with multiple sclerosis has an internal consistency (i.e., Cronbach's alpha coefficient of 0.7), except for questions about society [10]. The test properties of the Thai SF-36 questionnaire (second translation) can be used to measure the quality of life in a population of interest because of its strong reliability, except in the dimensions of vitality and role-emotional; thus, caution is required when interpreting the results [11].

Translated and widely used tools for assessing the quality of life in Thai people include the World Health Organization Quality of Life-BREF (WHOQOL-BREF), the SF-36, the Short Form Health Survey (12 questions; SF-12), and the Euro Quality of Life-5D (EQ-5D) [12]. Which tool is used depends on the purpose of the research. However, none of these questionnaires can be used to directly assess the quality of worklife. In many countries, including Thailand, there are in fact no standard tools for measuring the quality of worklife. There are instead tools for the comprehensive assessment of specific dimensions of the worklife (e.g., physical, psychological, social relations, and environment) and comparisons thereof [3,5,13,14].

The Work-related Quality of Life Scale (WRQLS) was first developed in England; its validity (i.e., Cronbach's  $\alpha$  of 0.91) and reliability (i.e., Cronbach's  $\alpha$  of 0.75–0.86) were verified among medical personnel in the United Kingdom [15]. In Singapore, where English is the official language, the WRQLS is a proven reliable tool for assessing the quality of the worklife of nurses; the researchers who tested it there suggested applying it to other medical personnel in Asia, after translating it into Asian languages [16]. The tool was then translated into Chinese [as the Work-related Quality of Life Scale-2 (WRQLS-2)] and further developed for assessing the quality of worklife [17]. The WRQLS-2 has seven subscales with 34 items, and it included 12 new items. The new subscale is "employee engagement". The overall scale uses a five-point Likert scale in which 1 point is "strongly disagree"; 2 points, "disagree"; 3 points, "neutral"; 4 points, "agree"; and 5 points, "strongly agree". The possible total scores ranged from 34 points to 170 points. The study found that the reliability (Cronbach's of 0.71–0.88) and validity (Cronbach's of 0.94) of the Chinese version of the tool was sufficient to assess the quality of worklife among nurses in China [17].

Thus, the objectives of the current research were to develop specific tools that are suitable for the Thai society and culture that can be used to assess the quality of work life and to create a Thai language-specific tool that may be adapted for assessing the worklife in non-health care careers in the future. Our related aims were to translate the WRQLS-2 into Thai, to assess the validity and reliability of our Thai-translated version of a quality of worklife evaluation tool, and to examine the accuracy of the tool *vis-à-vis* nursing in Thailand.

## 2. Materials and Methods

### 2.1. Translation of the Thai version of the WRQLS

Our translation primarily used the Guidelines of the Process of Cross-culture Adaptation of Self-report Measures, as proposed by Beaton and colleagues [18]. Four translators took part in the translation. Their backgrounds included translation, nursing,

medicine, pharmacy, and teaching. All were fluent in English and Thai, some were professional translators, and some had studied overseas. Two translators were responsible for forward translation of the WRQLS-2 from English into Thai. The translations were performed independently and any discrepancies were resolved later by consensus. After the forward translation, 20 registered nurses (RNs) took a pretest to expose any errors, which were corrected. The forward translation was then redone. The backward translation was performed by translators who had never seen the original English version of the WRQLS or WRQLS-2. They were similarly advised to translate the Thai manuscript into English independently, and then to resolve any discrepancies by consensus. The translated script and a report of the original English version were sent (via electronic mail) to the developer (Professor Darren Van Laar) in the United Kingdom to ensure semantic and conceptual equivalence. A bilingual Thai doctorate student of Professor Van Laar was invited to examine all translated outcomes (i.e., the translation into Thai and the back-translation into English). The researcher coordinated all communications.

Because of potential differences in the quality of working life (QWL) parameters between British and Thai nurses, it was necessary to assess the content validity of the translated Thai version WRQLS-2 to ensure that the items were not unfamiliar to Thai nurses and their occupational reality. Six nursing experts were therefore invited to assist. All experts possessed professional titles and had extensive experience in nursing and management. The experts were asked to rate the degree of relevance of each item using a four-point scale (1 point was "not relevant"; 2 points, "somewhat relevant"; 3 points, "relevant but needs minor revision", and 4 points, "very relevant") and to comment on item clarity, simplicity, and/or ambiguity. After content evaluation, 20 RNs were asked to retake the pretest.

### 2.2. Participants and data collection

The research was conducted at Srinagarind Hospital, the Faculty of Medicine at the Khon Kaen University (Khon Kaen, Thailand). This is a supratertiary care hospital providing health care services to the residents of the 20 provinces of the northeastern region of Thailand.

Between March 10, 2012 and April 11, 2012, data were collected for construct validity. Between April 22, 2012 and May 1, 2012, test-retest reliability was conducted. Prior to data collection, a brief introduction about the research was provided to the head nurse and/or to nurses assigned by the head nurse. These individuals disseminated the information within the hospital. Full-time RNs with at least 1 year of experience were eligible. After applying the inclusion/exclusion criteria, 1,024 RNs were eligible and subdivided into groups. Only 400 RNs were selected through multistage sampling. In brief, 1,024 RNs were initially divided into two groups: (1) inpatient department (IPD) RNs and (2) outpatient department (OPD) RNs. Four hundred RNs were then selected: 70% were IPD RNs and 30% were OPD RNs. Cluster sampling was used to select 280 IPD RNs from 16 IPD wards and 120 OPD RNs from 10 OPD wards.

Along with the Thai version of the WRQLS-2, a demographic questionnaire was distributed by the head nurse. The respondents sealed their completed questionnaires in an envelope prior to returning them to the head nurse, who then hand-delivered them to the researcher. After excluding incomplete questionnaires, 374 completed questionnaires remained for analysis. Two weeks later, 100 of the 374 respondents were again selected by multistage sampling for a retest. Briefly, as was performed previously, 100 RNs were selected from among the initial 374 respondents (70% from among the IPD RNs and 30% from among the OPD RNs). Seven

clusters were obtained from the IPD RNs versus three clusters from the OPD RNs. Of these, 67 RNs returned completed questionnaires. Using the code number and signatures on the written consent form, the test–retest questionnaires were matched for data entry.

### 2.3. Data analysis

The content validity index (CVI)—the rating agreement (3 or 4) among the content experts—was determined for each item. The average item-CVI indicated the CVI scale level [19]. Principal component analysis (PCA) with varimax rotation was used to analyze the construct validity of the scale. The eigenvalue rule was followed: the value had to be greater than 1 to determine the number of items per factor. A factor loading of more than 0.3 determined the assignment of items in the factors [20]. Cronbach's alpha values were calculated for testing the internal consistency, which had to be greater than 0.7 [21]. However, a value greater than 0.6 was also acceptable because the number of items in some dimensions was less than in other dimensions [22,23]. Test–retest reliability was measured using the intraclass correlation coefficient, thereby showing the association between the test and retest scores.

After the negative items (i.e., item numbers 7, 9, 18, 22, 30, and 31) were recoded, the total scores and subscale scores were calculated by using the raw scores. To obtain the known-group validity, an independent sample *t* test was used to compare the scores of the participants who were government employees or who were university employees. The statistics software SPSS version 19 for Windows (license by Khon Kaen University, Khon Kaen, Thailand) was used to perform the data analysis.

### 2.4. Ethical consideration

This research was reviewed and approved by the Ethics Committee for Human Research of the Khon Kaen University. An information sheet was included with the questionnaires to introduce the objectives of the research and the rights of the participants. Each of the respondents provided written, informed consent. The data collection process was conducted under the supervision of the Office of the Hospital Director.

## 3. Results

### 3.1. Translation and content validity of the translated Thai WRQLS-2

The translation of the scale was overall straight forward because the original was written in standard English, as opposed to vernacular English. However, one item (number 31) was problematic. The original sentence “I have unrealistic time pressures” was back-translated as “I have pressure on my impossible working hours I get.” Professor Van Laar requested that this be retranslated; this resulted in the acceptable back-translation “I have inappropriate time work pressures”.

In item numbers 5, 8, 13, and 32, the word “employer” in Thai mean “boss” or “head”, but this was incorrectly back-translated as “commander.” The experts and pretest participants suggested this should be corrected to something more in line with the Thai culture. In item number 26, the word “employee” should be translated as “personnel” in the Thai WRQLS-2 to reflect the Thai cultural context of nursing. The scale developer and content experts agreed with the modifications.

The result of the content validity assessment was strongly positive. The calculated CVI was 1.00 for 28 of 34 items with a full positive rating from all six experts. The remaining six items had a CVI of 0.83 with five positive ratings from the experts. Using the

criteria by Lynn [19], all 34 items in the translated scale were acceptable: the overall CVI for the scale was 0.97.

### 3.2. Characteristics of the participants

The median age of the participants was 35 years [range, 21–59 years; mean  $\pm$  standard deviation (SD), 35.5  $\pm$  10.2 years]. Most (44.7%) participants were between 20 years and 30 years. The median work experience was 8.5 years (range, 1–37 years; mean  $\pm$  SD, 11.9  $\pm$  9.8 years). Of the 374 participants, 349 (93.3%) participants were female, 162 (43.4%) participants were married, and 143 (82.3%) participants had children at home. Most (78.3%) participants worked shifts and 52.7% of participants were university employees. A large proportion (89.3%) of participants had a bachelor degree and most (51.3%) participants had a monthly income between 20,001 bahts and 30,000 bahts [approximately 637 United States dollars (USD) and 956 USD, respectively] (Table 1).

### 3.3. Structural validity and internal consistency of the Thai translation of the WRQLS-2

The Kaiser-Meyer-Olkin value was 0.926 and the Chi-square value for the Bartlett test of sphericity was 5516.419 ( $p < 0.001$ ). The lowest value of communality among the 34 items was 0.3224, with most values greater than 0.5. The initial PCA displayed a seven-factor outcome, thereby accounting for 59% of variance. The respective four-, five-, six-, seven-, and eight-factor models were meanwhile examined using the same method. After making the comparisons, the seven-factor model was accepted as the optimal solution.

Among the seven factors, the first factor accounted for 31.9% of variance with an initial eigenvalue of 10.858, and the seventh factor

**Table 1**  
Characteristics of the participants

Characteristic	Frequency (n = 374)	%	
Gender	Male	25	6.7
	Female	349	93.3
Age (y)	20–30	167	44.7
	31–40	84	22.5
	41–50	90	24.1
	51–60	33	8.8
Marital status	Single	200	53.5
	Married	162	43.3
	Divorced/separated	9	2.4
	Widowed	3	0.8
Children	None	31	17.8
	1 child	53	30.5
	2 children	77	44.3
	3 children	13	7.5
Education	Bachelor degree	334	89.3
	Master degree	40	10.7
Years of work	8.5 (1–37); 11.9 $\pm$ 9.8		
Position	Head nurse	27	7.2
	OPD nurse	82	21.9
	IPD nurse	265	70.9
Employment type	Civil servant	177	47.3
	University employee	197	52.7
Professional rank	Staff nurse	214	57.2
	Junior nurse	97	25.9
	Senior nurse	60	16.0
	Expert nurse	3	0.8
Income (THB)	10,001–20,000	63	16.8
	20,001–30,000	192	51.3
	30,001–40,000	62	16.6
	40,001–50,000	35	9.4
	>50,000	22	5.9

The values are presented as the number, the median (range), or the mean  $\pm$  standard deviation.

IPD, inpatient department; OPD, outpatient department; THB, Thai baht.

accounted for 3.1% of variance with an initial eigenvalue of 1.038. Factor 1 included eight items: “employee engagement” and “job and career satisfaction”; Factor 2, five items: “control at work”, “working conditions”, and “job and career satisfaction”; Factor 3, five items: “home–work interface” and “general well-being”; Factor 4, seven items: “general well-being”, “stress at work”, and “job and career satisfaction”; Factor 5, two items: “job and career satisfaction”; Factor 6, three items: “working conditions”; and Factor 7, four items: “stress at work”. Compared to the PCA by Shike et al [17], the format for loading the 34 original items of the Chinese WRQLS-2 was consistent (e.g., item numbers 18, 22, 30, and 31 for Factor 7). This is notable because Factor 7 (“stress at work”) in the Thai version comprises the same items as the Chinese version. Table 2 presents the detailed outcomes from the PCA.

The seven-factor model generated from the PCA was overall conformable to the hypothesized construct of the WRQLS-2. With regard to the representative items in each factor and the foregoing PCA research on the WRQLS [15–17], the seven factors were: (1) employee engagement; (2) control at work; (3) home–work interface; (4) general well-being; (5) job and career satisfaction; (6) working conditions; and (7) stress at work. The internal consistency of the overall scale and subscale based on this model were satisfactory. The calculated Cronbach’s alpha value for the seven subscales ranged between 0.67 and 0.82, and the overall scale was 0.93 (Table 3).

**Table 2**  
Factor analysis of the Thai Work-related Quality of Life Scale

Items	Factor	Factor	Factor	Factor	Factor	Factor	
	1	2	3	4	5	6	7
27. I am proud to tell others that I am part of this organization.	0.625						
29. I feel success/accomplishment from my work.	0.625						
19. I am satisfied with the training I have received to perform my current work.	0.599						
28. I will suggest to others that this organization is good to work with.	0.562						
25. I am inspired to do my best at work.	0.478						
23. My work is as interesting and as varied as I want.	0.456						
17. I am satisfied with the career opportunities available for me here.	0.499						
26. My organization communicates well with employees.	0.312						
13. My employer provides me with what I need to do my job effectively.		0.705					
8. My employer will give me a compliment when I do a good job.		0.681					
32. I have enough opportunity to consult my boss about the changes at work.		0.662					
12. I am involved in decisions that affect me in my work.		0.649					
2. I am able to provide my opinions and able to change things at my work place.		0.433					
14. In most ways my life is similar to ideal.			0.683				
16. In general, things work out well for me.			0.612				
24. I am able to keep a balance between my work life and my family life.			0.588				
6. My current working hours or patterns are well suited to my personal circumstances.			0.542				
5. My employer provides equipment and is flexible enough in helping me adjust my work to fit with my family life.			0.369				
9. I have recently felt unhappy and depressed.				0.731			
7. I feel under pressure at work.				0.644			
20. I currently feel reasonably happy overall.				0.448			
10. I am satisfied with my life.				0.423			
4. I am feeling good in this moment.				0.443			
11. I am encouraged to develop new skills.				0.349			
34. I am satisfied with the overall quality of my working life.				0.306			
3. I have an opportunity to use my abilities at work.					0.751		
1. I have a clear set of goals and purposes in doing my job.					0.689		
33. I am happy with the physical environment of my work place.						0.667	
15. I work in a safe environment.						0.628	
21. The working conditions are satisfactory.						0.464	
30. I feel under pressure to increase my working hours.							0.723
22. There are things that I cannot finish according to schedule.							0.707
31. I have inappropriate time work pressures.							0.702
18. I always feel overstressed in my work.							0.346

Factor loading of the seven-factor solution and total amount of variance explained, percent of variance explained by each factor of the scale.

### 3.4. Known-group validity

There are two possible types of employees within university hospitals in Thailand: national civil servants and university employees. Civil servants generally have a stronger sense of job security, more opportunities to engage in decision-making, and more organizational and government benefits [24]. Therefore, in this study it was hypothesized that nurses working as civil servants would have better QWL scores, compared to nurses working as university employees. In this study, 177 of the 374 individuals were civil servants and 197 of the 374 individuals were university employees (Table 1). If differences were confirmed in the QWL between the civil servants and university employees, the known-group validity regarding the translated Thai WRQLS-2 could be established. The mean  $\pm$  SD total score on the scale for the civil servants was  $117.82 \pm 15.89$  points versus  $112.77 \pm 12.96$  points for university employees ( $t = 3.351$ ,  $p < 0.05$ ). The civil employees had a slightly higher mean score for each domain, compared to the university employees; this possibly confirms the positive known-group validity of the translated Thai WRQLS (Table 4). However, the  $p$  values for the statistical test of difference in the mean values between the two groups for each domain showed no statistical difference in “control at work” or “stress at work” because the job characteristics for civil and university employees were the same. By contrast, the other five domains—“employee engagement”,

**Table 3**  
Internal consistency and test–retest reliability of the Thai Work-related Quality of Life Scale

Domain	Number of items	Possible score	Obtained score ( <i>n</i> = 374)		Cronbach's alpha ( <i>n</i> = 374)	ICC ( <i>n</i> = 67)
			Range	Mean ± SD		
Employee engagement	8	8–40	16–40	28.98 ± 3.79	0.822	0.768
Control at work	5	5–25	6–25	17.36 ± 2.76	0.763	0.780
Home–work interface	5	5–25	6–24	16.07 ± 3.09	0.772	0.721
General well-being	7	7–35	10–35	23.75 ± 3.96	0.821	0.746
Job and career satisfaction	2	2–10	3–10	8.32 ± 1.05	0.668	0.697
Working condition	3	3–15	3–15	9.66 ± 2.12	0.698	0.747
Stress at work	4	4–20	5–20	11.02 ± 2.64	0.689	0.649
Overall	34	34–170	68–159	115.16 ± 14.62	0.925	0.892

The values are presented as the number, the range, or the mean ± standard deviation (SD). IC, intraclass correlation coefficient.

“home–work interface”, “general well-being”, “job and career satisfaction”, and “working condition”—involved external factors such as personal life, home life, and personal satisfaction. Table 4 presents the detailed outcomes (i.e., mean scores and *p* values) for civil servants and university employees.

### 3.5. Test–retest reliability of the translated Thai WRQLS

Among the 67 participants in the retest group, the median age was 35 years (range, 22–54 years) and the median number of working years was 10 years (range, 1–35 years). According to the questionnaires, none of the participants indicated any abnormal fluctuation in the QWL during the 2-week interval (as assessed by the score on the WHOQOL-BREF). The results therefore showed a strong relationship between the test and the retest ( $r = 0.892$ ,  $p < 0.05$ ), which was similar to the findings of the WRQLS-2 in China [17]. The seven subscales moreover demonstrated strong reproducibility ( $0.65 < r < 0.78$ ;  $p < 0.05$ ). However, the “stress at work” subscale displayed a comparatively weak relationship (possibly because of the stress associated with the workload and shifts) and therefore likely varied more in the short term in comparison to the other dimensions (Table 3).

## 4. Discussion

The original version of the WRQLS is in English. Linguistic and/or cultural biases or restrictions would consequently limit its utility without translation. We therefore translated the scale by using the forward–backward Brislin's translation model [25] and by following the Guidelines for the Process of Cross-cultural Adaptation of Self-report Measures by Beaton et al [18]. Our research demonstrated that the translation processes were performed competently and that the final version is reliable. Other

questionnaires that use Likert-type scales (e.g., the Thai SF-36 questionnaire [11,26] and the Thai Karasek job content [27,28]) successfully underwent similar testing for validity and internal consistency.

Test validity is extremely important in the development of any tool because it confirms or denies the usefulness and effectiveness of each component of the scale. In general, the first step is exploratory factor analysis, which includes an assessment of the ratio between the sample size and the number of items. A ratio of 10:1 is considered appropriate. We found that the seven components used in our scale were appropriate because exploratory factor analysis was able to correctly subdivide the questions according to the dimensional work theory and the WRQLS-2 (i.e., the Chinese translation and the original English) [17,29]. The internal consistency of the subscale was also favorable. When naming features in the Thai version, all seven dimensions were used—employee engagement, control at work, home–work interface, general well-being, job and career satisfaction, working conditions, and stress at work—so that comparisons between countries and cultures were possible.

The dimension with the most items on the Thai version was employee engagement and its subdimensions general well-being, control at work, and home–work interface. Two questions (i.e., job and career satisfaction) had only moderate internal consistency, even though the Thai translation was considered acceptable.

Some questions in the Thai version did not always have perfect alignment with the original English dimensions. For example, in the original version, item number 17 (“I am satisfied with the career opportunities available for me here”), item number 19 (“I am satisfied with the training I have received to perform my current work”), and item number 23 (“My work is interesting and as varied as I want”) were classified in “job and career satisfaction”; however, in our study, it was classified in “employee engagement”, perhaps because of differences in language, society, and culture. Future

**Table 4**  
The mean scores and *p* values for the seven domains, based on the type of employment (i.e., civil servant vs. university employee)\*

Domain	Possible score	Civil servants ( <i>n</i> = 177)		University employees ( <i>n</i> = 197)		<i>p</i>
		Range	Mean ± SD	Range	Mean ± SD	
Employee engagement	8–40	19–40	29.60 ± 3.78	16–37	28.43 ± 3.72	0.002 <sup>†</sup>
Control at work	5–25	6–25	17.52 ± 3.07	9–23	17.21 ± 2.44	0.141
Home–work interface	5–25	7–24	16.62 ± 3.25	6–21	15.57 ± 2.84	0.001 <sup>†</sup>
General well-being	7–35	13–35	24.25 ± 4.20	10–31	23.06 ± 3.60	0.000 <sup>†</sup>
Job and career satisfaction	2–10	6–10	8.62 ± 0.90	3–10	8.05 ± 1.11	0.000 <sup>†</sup>
Working condition	3–15	4–15	9.90 ± 2.21	3–13	9.44 ± 2.02	0.018 <sup>†</sup>
Stress at work	4–20	5–20	11.04 ± 3.10	6–18	11.00 ± 2.16	0.451
Overall	34–170	78–159	117.82 ± 15.89	68–144	112.77 ± 12.96	0.001 <sup>†</sup>

The values are presented as number, range, or mean ± standard deviation (SD).

\* A civil servant is defined as a person employed in the civil service and a university employee is defined as a person employed in the university service.

<sup>†</sup> Indicates a statistically significant difference ( $p < 0.05$ ).

studies should employ a confirmatory factor analysis (CFA) to determine whether classifications of the questions in the Thai version persist.

In addition to the meaning of words and sentences for each question influencing responses, the sequences of the questions were important and apparently influenced the responses. If the questions were sequenced near other questions with a similar meaning, the participants responded with the same answer. The questions with a similar meaning were therefore classified in the same dimension, but this classification must be retested to confirm its validity.

The design of items in the Thai WRQLS was proven effective, based on known-group validity and test–retest reliability. The known-group validity demonstrated that the Thai WRQLS exhibits the ability to correctly detect potential differences in the QWL among nurses, whereas the test–retest reliability shows that the scale is able to capture legitimate variations in the QWL in longitudinal research.

The Thai WRQLS was adapted to a Thai organization's cultural context. It had appropriate psychometric properties, as evidenced by content validity, construct validity, internal consistency, known-group validity, and test–retest reliability. The Thai WRQLS can therefore be introduced to nursing organizations in Thailand for evaluating the QWL.

In the future, the Thai WRQLS may also be introduced to other occupations; however, it should be retested for its psychometric properties for each occupation. The current version of the WRQLS was tested with workers within a hierarchical organizational structure; therefore, it may not be appropriate for workers in less-structured working environments. Notwithstanding potential limitations, the validity and reliability evidence from the original English WRQLS-2 and the current Thai version suggest that the Thai WRQLS will be helpful for developing future applications.

### Conflicts of interest

The authors have no competing interests to report. This article is original and has not been submitted for consideration elsewhere. The authors all participated in the design of the study, data collection, data analysis, and writing of the manuscript.

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