Development and Verification of Validity and Reliability of the WHOQOL-BREF Taiwan Version

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Background and Purpose: The World Health Organization (WHO) initiated a cross-cultural project to develop the World Health Organization Quality of Life (WHOQOL) questionnaire. This paper describes how the brief version of this questionnaire was adapted for use in Taiwan and the results of validity and reliability testing.
Subjects and Methods: Data were collected from 1,068 subjects randomly sampled from 17 hospitals throughout Taiwan. According to the psychometric criteria of the WHO, two (culturally relevant) national items were selected, each from a culture-specific facet that was proposed for Taiwan in a previous study. Psychometric properties (factor structures and various types of reliability and validity) were assessed for this brief questionnaire.
Results: Exploratory and confirmatory factor analyses revealed a four-factor (physical, psychological, social, and environmental) model. The internal consistency (Cronbach's α) coefficients ranged from 0.70 to 0.77 for the four domains. The test–retest reliability coefficients with intervals of 2 to 4 weeks ranged from 0.41 to 0.79 at item/facet level and 0.76 to 0.80 at domain level (all $p < 0.01$). Content validity coefficients were in the range of 0.53 to 0.78 for item–domain correlations and 0.51 to 0.64 for inter-domain correlations (all $p < 0.01$). The four domains of the brief form can explain 88% of the variance of the total QOL score and 60% of the variance of the Facet G score (measuring overall quality of life and general health).
Conclusions: This culture-specific study shows that this adaptation of the brief form is a good alternative to the long form of the WHOQOL questionnaire for use in Taiwan.

In the last 20 years, both health care providers and researchers have agreed that the efficacy of treatment intervention should be evaluated by its impact on both length of survival and health-related quality of life (QOL) [1, 2]. Although people have been measuring QOL for many years, we still face the difficulty of not having a consensus definition and measurement of QOL suitable for different diseases and cultures [3–5]. As a result, the World Health Organization (WHO) initiated the cross-cultural project to develop the long form of the WHOQOL questionnaire (WHOQOL-100) for generic use in 1991 and finished the field tests in 1995 [6–13]. The project defined 'quality of life' as:

"... individuals' perceptions of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns. It is a broad-ranging concept, incorporating in a complex way the persons' physical health, psychological state, level of independence, social relationships, personal beliefs, and relationship to salient features of the environment".[7, 9, 10, 12, 14–16].

This definition highlights the view that QOL refers to a subjective evaluation, which includes both positive and negative dimensions, and which is embedded in a cultural, social, and environmental context. The WHOQOL-100 contains 24 facets organized into six

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broad domains: physical, psychological, level of independence, social relationships, environment, and spirituality/religion/personal beliefs. Each facet contains four items. To facilitate cross-cultural comparison, it allows each culture to add culture-specific questions, called national items, so that the questionnaire can also reflect cultural attributes.

Because the WHOQOL-100 is too long for practical purposes such as clinical evaluation or epidemiologic surveys, the WHOQOL Group later simplified the standard WHOQOL-100 to a short form called the WHOQOL-BREF. To maintain the comprehensiveness of the questionnaire, the WHOQOL-BREF contains 26 items, one item from each of the 24 facets and two general items (G1 and G4) from Facet-G (namely, overall QOL and general health). Psychometric criteria were applied to select the items [8, 13–15], which included: proportions of the explained variance for individual domain; Facet-G; total WHOQOL-100; construct validity verified by confirmatory factor analysis (CFA); and discriminative validity verified with subjects who are ill versus well. If more than one item satisfied the criteria in a facet, the final decision of the best item was made by a panel [14, 15]. The BREF questionnaire is simplified from the original six domains to four domains [14, 15]: the physical domain and the level of independence are merged to form the physical health domain, while the psychological domain and the spirituality/religion/personal beliefs domain are merged to form the new psychological domain. As with the WHOQOL-100, national items are added into the BREF version using the same psychometric criteria to select items from the national item pool.

The purpose of this paper was to summarize the development of the WHOQOL questionnaire, especially the brief form of the questionnaire, for Taiwanese subjects. Since the brief form of the questionnaire is abstracted from the long form, we will briefly summarize the development process of the long form, focusing on the cultural adaptation of this questionnaire to Taiwan. We will then report our findings on the reliability and validity of the brief Taiwan version.

Subjects and Methods

Development of the WHOQOL long form for Taiwan

The WHOQOL-Taiwan group members included professionals with backgrounds in medicine, nursing science, pharmacology, physical therapy, occupational therapy, health behavior, health anthropology, psychology, epidemiology, biostatistics, and public health. This group began to develop the WHOQOL long form for Taiwan in 1997 and finished it in 1999 [17]. To develop the long form for Taiwan, the group followed the WHO recommendations on the translation procedures of health status instruments, and designed and selected the more appropriate culture-related items using the WHOQOL protocol [12, 18, 19]. Each item uses a ive-point Likert-type response scale. Four types of scale descriptors (capacity, frequency, intensity, and evaluation) for Taiwan were specially selected [20]. A field test was administered to 1,077 subjects randomly selected from 17 hospitals throughout Taiwan according to a predetermined sampling plan [21], which largely followed the guidelines recommended by WHOQOL [12, 13, 16]. Namely, the subjects included inpatients and outpatients, with approximately equal numbers of males and females who were either older than or younger than 45 years, in a ratio of 1:5 healthy to unhealthy subjects. Taiwan was stratified into four different regions for the purposes of the study. At least four hospitals were selected in each region including public and private medical centers and community hospitals [17]. Each hospital was requested to contribute about 48 patients and 12 healthy volunteers. A total of 17 hospitals and 1,068 subjects completed the questionnaire (Table 1). Patients with a definite diagnosis of disease were classified as unhealthy subjects, while patients' family or volunteers without any symptoms or signs were considered healthy. A total of 214 healthy subjects and 854 unhealthy subjects, including 138 patients with a diagnosis of cardiovascular disease, 39 with diabetes mellitus, 63 with cancer, 139 with gastrointestinal disorders, 83 with musculoskeletal disorders, and 87 with respiratory disorders, were enrolled. The educational level of these subjects was higher than the general population, because the questionnaire was originally designed for self-administration. Senior citizens with poor vision or illiteracy were replaced by those able to complete the questionnaire without assistance. The scale administration and scoring procedures for the questionnaire were as described previously [17]. Individual facet scores, domain scores, and total QOL score can be calculated through straightforward summative scaling. A higher score indicates a better QOL.

For the cultural adaptation of the questionnaire to Taiwan, 12 items and two new facets were proposed by patient and expert focus groups after qualitative analysis of the recorded content. Each new facet contained four valid national items. The two new facets were: being respected/accepted and eating/food. Based on psychometric analyses, the two new facets were classified into social relationships and environment domains, respectively.

WHOQOL-BREF Taiwan version

As with the standard WHOQOL-BREF questionnaires,

Table 1. Demographic data of 1,068 subjects

	Unhealthy subjects n (%)	Healthy subjects n (%)	All subjects
Gender			
Male	434 (50.82)	96 (44.86)	530
Female	414 (48.48)	116 (54.21)	530
Age (yr), mean ± SD	42.57 ± 15.22	37.62 ± 12.42	41.57 ± 14.83
Education			
Illiterate & primary	128 (14.98)	10 (4.67)	138
Middle high	111 (13.00)	29 (13.55)	140
High school	289 (33.84)	63 (29.44)	352
College & graduate	311 (36.42)	107 (50.00)	418
Marital status			
Single	195 (22.83)	61 (28.50)	256
Married /Living together	572 (66.98)	141 (65.89)	713
Divorced /Separated	34 (3.98)	9 (4.21)	43
Widowed	21 (2.46)	2 (0.93)	23
Current health status (5-point Likert scale)			
Very bad	65 (7.61)	1 (0.47)	66
Bad	144 (16.86)	6 (2.80)	150
Not bad/Not good	341 (39.93)	50 (23.36)	391
Good	248 (29.04)	117 (54.67)	365
Very good	37 (4.33)	39 (18.22)	76
Interview method			
Self-administered	732 (85.71)	210 (98.13)	942
Interviewer-assisted	71 (8.31)	3 (1.40)	74
Interviewer-administered	36 (4.22)	0 (0.0)	36

SD = standard deviation. Total percentages for each category did not reach 100% because some values were missing.

the WHOQOL-BREF Taiwan version was simplified from the WHOQOL long form for Taiwan. For the purpose of cross-cultural comparison, the first 26 items were the same as the standard WHOQOL-BREF, which was developed from global studies. In addition to the 26 items, we applied the psychometric criteria proposed by the WHOQOL Group to select two more items from each of the two new facets to form the WHOQOL-BREF Taiwan version using data from the same 1,068 subjects. The selection process used for national items is described in the Results section. Thus, the WHOQOL-BREF Taiwan version contains 28 items classified into the same four domains as the standard WHOQOL-BREF. The scale administration and scoring procedures are the same as for the WHOQOL long form except that the facet score is based on only one item.

We evaluated internal consistency (Cronbach's α coefficients) and test–retest reliability (Pearson's correlation). Content validity and criterion-related validity were evaluated by calculating Pearson's correlation coefficients between variables, namely, between item/facet and its domain and among all domains. To obtain discriminant validity, t-tests were performed to compare healthy and unhealthy subjects for each item/facet, domain, and overall-QOL score. Moreover, four

multiple regression analyses were conducted to predict total QOL, Facet-G, G1, and G4 scores using the four domain scores. Both exploratory factor analysis (EFA) and CFA were conducted to test construct validity.

Results

National item selection

The selection of national items was based on the psychometric criteria described [8, 13–15]. Since each facet contains only one item in the short form, only one national item was selected from each of the two new facets. Three regression analyses were conducted using the four items in the same new facet as the predictor variables and total QOL score, Facet G score, and domain score that the facet belongs to as the criterion variables, respectively. The four items were also correlated to the three criterion variables individually. The two new selected items were "Do you feel respected by others?", which was included in the being respected/accepted facet, and "Are you usually able to get the things you like to eat?", which was included in the eating/food facet, and

were denoted as items 27 and 28. The items of the WHOQOL-BREF Taiwan version are listed in the Appendix.

Reliability

In the short version of the questionnaire, item score is equivalent to facet score, but domain score is the average of the facet scores in the same domain multiplied by four, so that the range of the score can be between 4 and 20, as for the long form. The internal consistency (Cronbach's α) coefficients were 0.70 to 0.77 at domain level and 0.91 for the whole questionnaire. Since it was too difficult to trace all previous 1,068 subjects for test–retest reliability, the same sampling plan was followed and 142 subjects were selected from four hospitals throughout Taiwan for use in the test–retest reliability study. The demographic data of the 142 subjects were similar to the previous sample. The test–retest reliability coefficients with an interval of 2 to 4 weeks were 0.41 to 0.79 at item/facet level and 0.76 to 0.80 at domain level (all $p < 0.01$). Table 2 compares our findings with the results from the global and Hong Kong studies [8, 15].

Validity

A questionnaire with good content validity indicates that the content of an item/facet and domain is consistent with the rest of the questionnaire. For the WHOQOL-BREF Taiwan version, the range of the correlations between item/facet and its domain was 0.53 to 0.78, and for inter-domain was 0.51 to 0.64 (all $p < 0.01$). A questionnaire with good criterion-related validity indicates that an item/facet and domain is highly correlated with a good

Table 2. Test–retest and internal consistency* (in [ ]) reliability for the WHOQOL-BREF

Domain	Item	Taiwan (n = 142)	Global (n = 391)	Hong Kong (n = 134)
Overall	1	0.58	0.68	0.62
	2	0.64	0.71	0.72
Physical health	3	0.41	0.59	0.47
	4	0.63	0.81	0.65
	10	0.60	0.66	0.61
	15	0.72	0.72	0.73
	16	0.68	0.69	0.71
	17	0.54	0.61	0.51
	18	0.63	0.63	0.64
Psychological	5	0.62	0.66	0.49
	6	0.69	0.64	0.83
	7	0.76	0.57	0.62
	11	0.61	0.73	0.64
	19	0.73	0.65	0.63
	26	0.75	0.59	0.58
Social relationships	20	0.61	0.65	0.66
	21	0.79	0.74	0.69
	22	0.65	0.65	0.62
	27[†]	0.65	–	–
Environment	8	0.66	0.56	0.68
	9	0.67	0.69	0.52
	12	0.71	0.84	0.70
	13	0.61	0.65	0.58
	14	0.71	0.68	0.68
	23	0.74	0.69	0.72
	24	0.54	0.67	0.49
	25	0.46	0.78	0.55
	28[†]	0.58	–	–
D1. Physical		0.80 [0.76]	0.66 [0.80]	– [0.76]
D2. Psychological		0.76 [0.70]	0.72 [0.76]	– [0.80]
D3. Social[‡]		0.75 [0.68]	0.76 [0.66]	– [0.67]
D3. Social (TW)[°±]		0.78 [0.72]	–	–
D4. Environment[‡]		0.80 [0.75]	0.87 [0.80]	– [0.78]
D4. Environment (TW)[°±]		0.80 [0.77]	–	–

*sample size used to calculate internal consistency: Taiwan (n = 1017), Global (n = 2369), Hong Kong (n = 848); [†]national items; [‡]domain excluding national items; [°±]domain including national items.

external criterion. The range of the correlations between the items and Facet G was 0.32 to 0.78. The range of the correlations between the four domains and G1 was 0.45 to 0.58 and between the four domains and G4 was 0.36 to 0.60. Discriminant validity analysis showed that healthy and unhealthy subjects could be distinguished on most of the items/facets and domains and on overall-QOL scores (all $p < 0.05$).

Regression analysis showed that total QOL and Facet-G scores were well predicted by the four domain scores (all $p < 0.01$), with explained variances of 88% and 60%, respectively. Moreover, around 40% of the total variances of G1 and G4 could be explained by the four domain scores. Physical score was the best predictor variable of total QOL and G4, while environment score was the best predictor variable of Facet G and G1.

For EFA, Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were initially conducted. They showed that the data were appropriate for factoring (KMO = 0.935; Bartlett's test = 6322, $p < 0.001$). The iterative principal axis factoring method with promax rotation was then applied to the 26 items of the WHOQOL-BREF Taiwan version excluding the two items measuring general QOL and health (G1 and G4). An eigenvalue greater than 1 was the criterion for determining the number of factors extracted. As a result, four factors (psychosocial, physical health, resource environment, and physical environment) were extracted (Table 3). About 73% of the total variance was explained by the four factors. The EFA result was slightly different from those of the standard WHOQOL-BREF, in which the four factors were physical health, psychological status, social relationships, and environment. The two culture-related items had relatively larger factor loadings on the first factor, indicating that item 27, which was originally in the social relationship domain, was correctly categorized. However, item 28, which was originally in the environment domain, could not be correctly classified. In other words, item 28 had a higher correlation with psychosocial factors than with the environment domain. However, when item 28 was correlated with the originally designed four domains from the standard short form and

Table 3. Exploratory factor analysis: iterative principal axis factoring method plus promax rotation

Item	Facet	Factor 1: Psychosocial	Factor 2: Physical	Factor 3: Resource environment	Factor 4: Physical environment
20	F13. Personal relationship	0.74	−0.08	−0.03	0.07
22	F14. Social support	0.64	−0.17	0.09	0.08
17	F10. Activities of daily living	0.51	0.26	0.15	−0.10
19	F6. Self-esteem	0.51	0.16	0.01	0.17
21	F15. Sex	0.51	0.10	−0.09	0.10
18	F12. Work	0.50	0.34	−0.02	−0.18
11	F7. Body image	0.49	0.13	−0.05	0.07
28*	F26. Eating	0.48	−0.06	0.14	0.16
6	F24. Spirit	0.35	0.11	0.17	0.01
7	F5. Thinking	0.29	0.15	0.15	−0.01
27*	F25. Being respected	0.27	0.11	0.20	0.07
4	F11. Medication dependent	0.05	0.61	−0.17	0.03
10	F2. Energy	0.02	0.53	0.15	0.14
16	F3. Sleep	−0.10	0.48	0.14	0.15
15	F9. Mobility	0.24	0.44	0.13	−0.22
3	F1. Pain	−0.05	0.43	−0.02	0.08
13	F20. Information	0.11	−0.12	0.67	−0.07
14	F21. Leisure	−0.05	0.08	0.62	0.03
12	F18. Financial	0.01	0.01	0.51	0.10
5	F4. Positive feeling	−0.02	0.10	0.42	0.03
24	F19. Social care	0.20	−0.11	0.34	0.11
9	F22. Physical environment	0.01	−0.02	−0.02	0.59
25	F23. Transportation	0.08	0.02	0.05	0.45
23	F17. Home environment	0.16	0.06	0.21	0.37
8	F16. Physical safe	0.14	0.19	0.04	0.36
26	F8. Negative feeling	0.16	0.12	0.06	0.22

*National items. Shaded areas indicate higher factor loadings for extracted factors.

the six domains from the standard long form individually, the environmental domain was found to have the highest correlation in both forms.

To determine whether the four original factors fit the data, four first-order item-domain structures were studied. CFA was initially conducted on each of the factors with their corresponding items as the indicators, excluding the general items G1 and G4. For example, CFA was conducted on the physical health factor with seven indicators, the psychological factor with six indicators, the social relationship factor with four indicators, and the environment factor with nine indicators. The four model-fit indices (CFI = 0.91–1.00) suggest that each of the four factors is appropriate. Moreover, a second-order factor structure was also studied. CFA was conducted on the four factors using their corresponding indicators as a whole QOL model. The model-fit index (CFI = 0.89) indicates that this model is appropriate to the data (Figure). In other words, the CFA results suggest that the original four factors of the standard WHOQOL-BREF are also appropriate. The CFA results are similar to the global [15] and Hong Kong [8] studies. Table 4 summarizes the results of the psychometric analyses of reliability and validity.

To determine whether the WHOQOL short form (WHOQOL-BREF) for Taiwan could replace the long form, correlations were calculated between the 28 items of the short form and their corresponding facet scores in the WHOQOL long form, in which each facet contains four items. Table 5 shows that the correlations ranged from 0.60 to 0.90. In other words, 36 to 81% of facet variances in the long form could be explained by the corresponding items in the short form. Moreover,
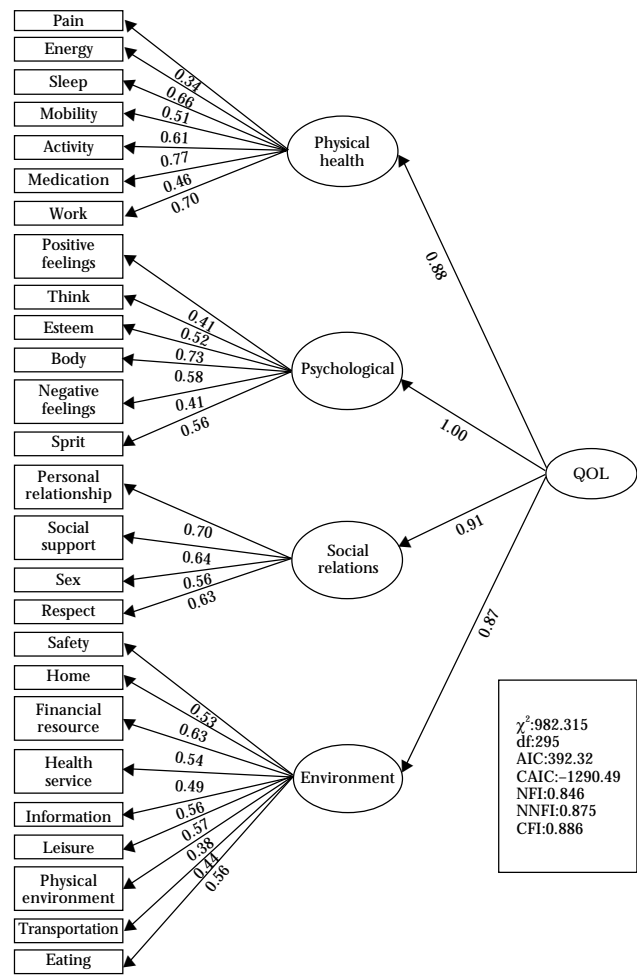

Figure. *Confirmatory factor analyses on the second-order factor structure.*

Table 4. Summary of the psychometric properties of the WHOQOL-BREF Taiwan version

Reliability	Internal consistency	Domain level: 0.70–0.77
		Whole questionnaire: 0.91
	Test–retest reliability	Item/facet level: 0.41–0.79
	(all $p < 0.01$)	Domain level: 0.76–0.80
Validity	Content validity	Item/facet & hypothesized domain: 0.53–0.78
	(all $p < 0.01$)	Inter-domain: 0.51–0.64
	Criterion-related validity	Item/facet & Facet G: 0.32–0.78
	(all $p < 0.01$)	Domain & G1: 0.45–0.58
		Domain & G4: 0.36–0.60
	Discriminant validity	Significant differences were found between healthy and unhealthy subjects on most of items/facets, domains, and total QOL score.
	Prediction validity	88% of total QOL, 60% of Facet-G, 43% of G1, and 37% of G4 score variances were explained by the four domain scores
	Construct validity	EFA: four factors were extracted, 73% total variance was explained
		CFA: four-factor model is the most plausible: CFI = 0.89

the six domain scores of the long form were highly correlated with the four domain scores of the short form. The physical domain in the short form could explain 67% and 75% of the variance of the physical and independence domains in the long form. The psychological domain in the short form could explain 78% of the variance of the psychological domain and 66% of the variance of the spiritual/religion/personal belief domain in the long form. The corresponding domains in the short form could explain 74% of the variance in the social domain and 86% of the variance in the environment domain. These findings are in agreement with the Hong Kong study [8].

Discussion

To develop a cultural adaptation of the WHOQOL-BREF, two national items were selected from two proposed new facets, being respected/accepted and eating/food. The Cronbach's α for the four domains were all greater than 0.70 and for the whole questionnaire was more than 0.90. The coefficients of the test–retest reliability of the four domains were all more than 0.75. These results indicated good internal consistency and test–retest reliability of the WHOQOL-BREF Taiwan version. These psychometric values were in agreement with those of the Hong Kong [8] and global studies [15]. The content validity, criterion-related validity, and discriminant validity were also good. The 28 items as well as the four domains of the short form had higher correlations with Facet G than with G1 and G4. Moreover, the four domains of the short form had better ability to predict total QOL and Facet G than G1 and G4. The percentages of variables explained are 88% for total QOL and 60% for Facet G. All of the four domains are significant predictors (all $p < 0.01$). Physical health was the best predictor of total QOL, followed by psychological, environment, and social. This result is in agreement with the Hong Kong study [8]. Moreover, environment was the best predictor of Facet G, physical health and psychological were the next two, and social was the worst. The results of reliability and validity testing (Tables 2 and 5) indicate that the two national items do not add much additional information to the original 26 items, suggesting that the original 26 items sufficiently explained total QOL variance. However, we recommend inclusion of these two national items when using the BREF questionnaire, as the WHO encourages all countries to add national items for cross-cultural and within-cultural comparisons. Moreover, answering two more items does not place much additional burden on the interviewee but may provide useful culture-related information.

Although Facet-G variance explained in our study was similar to previous global studies, there was a different prediction order in terms of importance. The prediction order in the global studies was physical, psychological, environment, and social, whereas in our study the order was environment, physical, psychological, and social. This discrepancy in prediction order between our study and global studies may be attributable to cultural differences. Total QOL score is based on many items (24 facets/96 items) from the long form and the four domain scores are based on fewer items (26 items) from the short form of the questionnaire. The very high proportion (88%) of total QOL variance explained by the four domains of the short form indicates that the short form is a good alternative to the long form.

The psychometric analyses on the WHOQOL-BREF Taiwan version indicate that this questionnaire is reliable and valid. Moreover, most results are similar to a previous study in Hong Kong [8] as well as to global studies [15]. The four factors extracted by EFA are slightly different from the original standard WHOQOL-BREF. Additionally, in the EFA, item 28 was classified as a psychosocial factor and not as an environment factor, as was originally designed. Our interpretations of this inconsistency are as follows. First, each facet in the long form consists of four items but in the short form consists of only one item. Consequently, some information may be lost from the short form. Second, the first 26 items from the short form of the Taiwan version were selected according to the WHOQOL Group global studies, but the two culture-related items were selected using our own study methods. As a result, the 26 items may not be a completely accurate fit to Taiwanese culture. Moreover, our EFA result combines psychological and social factors to form one factor and separates environment into two factors. This may lead to a higher factor loading of item 28 on the first factor but lower on the two environment factors. As a result, item 28 was not classified to either one of the two environment factors but to the psychosocial factor. To clarify this confusion, we correlated item 28 to the six domain scores of the long form and the four domain scores of the short form. A higher correlation was found with the environment domain rather than with the other domains in both the long and the short forms. This finding implies that item 28 should still be classified into the environment domain. In addition, CFA supports the originally designed four-factor structure. Since our EFA results cannot determine whether item 28 should be classified into psychological or social factors, we suggest that this item should be classified into the environment domain as expected.

In order to determine whether the short form can be a good alternative to the long form, correlations were calculated between the items in the short form with the corresponding facets in the long form, and

Table 5. Correlations between the item scores of the WHOQOL-BREF Taiwan version and the corresponding facet scores of the WHOQOL long Taiwan version

Domains	Item No. in short form	Corresponding facets in long form		Correlation	% Variance explained
	1	FG.	Overall QOL	0.78	61
	2	FG.	Overall health	0.68	47
D1. Physical	3	F1.	Pain and discomfort	0.79	62
	10	F2.	Energy and fatigue	0.75	57
	16	F3.	Sleep and rest	0.85	72
	15	F9.	Mobility	0.76	57
	17	F10.	Activities of daily living	0.72	51
	4	F11.	Dependence on medical substances and medical aids	0.90	81
	18	F12.	Work capacity	0.84	71
D2. Psychological	5	F4.	Positive feelings	0.67	45
	7	F5.	Thinking, learning, memory, and concentration	0.72	52
	19	F6.	Self-esteem	0.79	62
	11	F7.	Bodily image and appearance	0.79	63
	26	F8.	Negative feelings	0.60	36
	6	F24.	Spirituality/religion/personal beliefs	0.73	53
D3. Social	20	F13.	Personal relationships	0.73	53
	22	F14.	Practical social support	0.76	58
	21	F15.	Sexual activity	0.88	77
	27*	F25.	Being respected/accepted	0.85	72
D4. Environment	8	F16.	Freedom, physical safety, and security	0.82	67
	23	F17.	Home environment	0.80	65
	12	F18.	Financial resources	0.82	68
	24	F19.	Health and social care: accessibility and quality	0.78	60
	13	F20.	Opportunities for acquiring new information and skills	0.80	63
	14	F21.	Participation in and opportunities for recreation/leisure activities	0.80	64
	9	F22.	Physical environment: (pollution/noise/traffic/climate)	0.76	57
	25	F23.	Transport	0.69	47
	28*	F26.	Eating/food	0.89	80

All correlations are $p < 0.01$. *National items.

between the corresponding domains from both forms. The results confirm our expectation that the short form can replace the long form. In general, environment domain is the best predictor to the corresponding domain in the long form. In contrast, physical and psychological domains are worse predictors to the corresponding domains in the long form. Similar results were found in the Hong Kong study [8].

In summary, the originally designed four-factor model is applicable to the other analyses (such as correlation analysis and CFA). The simplified four-factor QOL model agrees with the original study design according to the WHO definition of QOL. Without losing much information, the short form can replace the long form of the questionnaire. Moreover, both generic and national items can be included in the same questionnaire. We have published the user's manual for the questionnaire [22].

This questionnaire is available to those who would like to use it in their research or clinical evaluation without any charge. The only requirement is that the user signs the consent form and follows the rules for using the questionnaire. We encourage users to carefully read the manual on the development of the instrument, on how to administer the questionnaire, and on how to score the items. Further information can be obtained from the following website: http://ha.mc.ntu.edu.tw/~cfyu/

Appendix. Items of the WHOQOL-BREF Taiwan version.

Domain	Facet	Item No. in short form	Scale type	Item content
Overall	FG. Overall QOL and general health	1	Eva	How would you rate your quality of life?
	FG. Overall QOL and general health	2	Eva	How satisfied are you with your health?
D1. Physical	F1. Pain and discomfort	3	Int	To what extent do you feel that (physical) pain prevents you from doing what you need to do?
	F2. Energy and fatigue	10	Cap	Do you have enough energy for everyday life?
	F3. Sleep and rest	16	Eva	How satisfied are you with your sleep?
	F9. Mobility	15	Int	How well are you able to get around?
	F10. Activities of daily living	17	Eva	How satisfied are you with your ability to perform your daily living activities?
	F11. Dependence on medical substances and medical aids	4	Int	How much do you need any medical treatment to function in your daily life?
	F12. Work capacity	18	Eva	How satisfied are you with your capacity for work?
D2. Psychological	F4. Positive feelings	5	Int	How much do you enjoy life?
	F5. Thinking, learning, memory, and concentration	7	Int	How well are you able to concentrate?
	F6. Self-esteem	19	Eva	How satisfied are you with yourself?
	F7. Bodily image and appearance	11	Cap	Are you able to accept your bodily appearance?
	F8. Negative feelings	26	Fre	How often do you have negative feelings, such as blue mood, despair, anxiety, depression?
	F24. Spirituality/religion/personal beliefs	6	Int	To what extent do you feel your life to be meaningful?
D3. Social relations	F13. Personal relationships	20	Eva	How satisfied are you with your personal relationships?
	F14. Practical social support	22	Eva	How satisfied are you with the support you get from your friends?
	F15. Sexual activity	21	Eva	How satisfied are you with your sex life?
	F25. Being respected/accepted*	27*	Int	Do you feel respected by others?
D4. Environment	F16. Freedom, physical safety, and security	8	Int	How safe do you feel in your daily life?
	F17. Home environment	23	Eva	How satisfied are you with the conditions of your living place?
	F18. Financial resources	12	Cap	Have you enough money to meet your needs?
	F19. Health and social care: accessibility and quality	24	Eva	How satisfied are you with your access to health services?
	F20. Opportunities for acquiring new information and skills	13	Cap	How available to you is the information that you need in your day-to-day life?
	F21. Participation in and opportunities for recreation/leisure activities	14	Cap	To what extent do you have the opportunity for leisure activities?
	F22. Physical environment: (pollution/noise/traffic/climate)	9	Int	How healthy is your physical environment?
	F23. Transport	25	Eva	How satisfied are you with your transport?
	F26. Eating/food*	28*	Fre	Are you usually able to get the things you like to eat?

*National items. Cap = capacity; Fre = frequency; Int = intensity; Eva = evaluation.

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