Psychometric properties of the Chinese version of the Menopause-Specific Quality-of-Life questionnaire

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Abstract

Objective: The Menopause-Specific Quality-of-Life (MENQOL) questionnaire was developed as a specific tool to measure the health-related quality-of-life of postmenopausal women. Thus far, the Chinese version questionnaire has not been subjected to psychometric assessment with a large sample. This study aims to evaluate the validity and reliability of the Chinese version of the MENQOL specific to postmenopausal women in China.

Methods: A total of 1,137 menopausal symptomatic and 491 menopausal asymptomatic women from eight cities in China were recruited using a convenience sampling method. Psychometric properties were evaluated by descriptive statistics, validity, and reliability. Reliability was assessed for each subscale of the MENQOL through internal consistency reliability with Cronbach's α and intersubscale correlations. Item-domain correlations, principal components analysis (PCA), and confirmatory factor analysis were performed to determine construct validity. *t* tests were used to compare the differences between the menopausal symptomatic and asymptomatic women and to evaluate the discriminate validity. Pearson correlation coefficients were calculated between MENQOL scores and the Kupperman index to assess criterion-related validity.

Results: The most common symptoms in Chinese menopausal symptomatic women were ''experiencing poor memory'' (94.4%), ''feeling tired or worn out'' (93.8%), ''aching in muscle and joints'' (89.4%), ''low backache'' (86.9%), ''decrease in physical strength'' (86.6%), ''aches in back of neck or head'' (86.2%), ''difficulty sleeping'' (83.6%), ''accomplishing less than I used to'' (83.4%), ''feeling a lack of energy'' (83.3%), ''change in your sexual desire'' (81%), and ''hot flash'' (80.7%) among others. The symptoms of ''increased facial hair'' were rarely seen (9.9%). The vasomotor domain, as well as psychosocial, physical, and sexual domains showed high reliability (Cronbach's α 0.84, 0.87, 0.89, and 0.86, respectively). Item-domain correlation analysis showed that all items correlated more strongly with their own domains than with other domains. In the PCA, after deleting the ''increased facial hair'' item, items in the vasomotor, sexual, and psychosocial subscales loaded on their respective domains by and large, and items in the physical subscale divided into two factors. The PCA revealed a latent structure of the Chinese version of MENQOL nearly identical to the original MENQOL domains. The confirmatory factor analysis demonstrated that the questionnaire fits well with a four-domain model. The MENQOL can discriminate between menopausal symptomatic women with asymptomatic women as it showed good discriminate validity. Criterion-related validity was confirmed by a significant correlation between MENQOL scores and the Kupperman index.

Conclusions: This study showed that Chinese version of MENQOL has good psychometric properties and would be suitable to measure the health-related quality-of-life of Chinese menopausal women except for item 21 (increased facial hair).

Key Words: Menopause – Menopause-Specific Quality-of-Life questionnaire – Psychometric properties – Quality of life.

Menopause is a physiological phase that is characterized by the permanent cessation of menstrual periods in women due to loss of ovarian follicular function.[1] During the menopausal transition, women experience various physical, psychological, and social symptoms such as hot flashes, night sweats, depression, irritability, disordered sleep, back pain, vaginal dryness, dyspareunia, and others.[2,3] The symptoms occur frequently and are often associated with deteriorating quality-of-life (QOL).[4,5] QOL is a subjective component of well-being and one of the indicators proposed for measuring health.[6] Evaluation of women's health is important, but menopausal women are one of the most ignored groups with fewer research studies conducted on their QOL.[7] Therefore, it is important to evaluate menopausal women's QOL with an appropriate index.

A review of the assessment of questionnaires measuring the QOL in menopausal women concluded that Menopause-Specific Quality-of-Life (MENQOL) questionnaire was the most frequently used specific tool for assessing QOL in menopausal women.[8] The MENQOL was introduced in 1996 as a tool to assess health-related quality-of-life in the menopausal period,[9] and it is widely used now and has established reliability and validity among women experiencing menopause in many countries.[10] The systematic review of the measurement of QOL for menopausal women in 2012,[11] however, concluded that the MENQOL needed further testing and evaluation of various aspects of its psychometric properties. Future research assessing its psychometric properties with cross-cultural samples may be beneficial in adapting measures to specific contexts and study populations. The MENQOL was first introduced in China by our team in 2002.[12] The translated Chinese version (see Appendix, Supplemental Digital Content 1, http://links.lww.com/MENO/A199, which is the Chinese version of MENQOL) was approved, and permission was granted to use the questionnaire. In our pilot study, 409 Chinese menopausal women were evaluated using the Chinese version of the MENQOL, which had satisfactory acceptability, reliability, and validity.[12] In 2014, the Chinese version of the MENQOL was shown to have relatively high criterion-related validity compared with the Kupperman index (KI, specific index for menopause symptoms) and the World Health Organization Quality-of-Life Brief Version (WHOQOL-BREF).[13] The MENQOL has, however, not been used extensively in China, and the cumulative sample using the Chinese version of the MENQOL is not large. Quantitative evaluations of the MENQOL obtained from a larger sample size of Chinese menopausal women would be helpful for the development of the Chinese version of the MENQOL. In China, there are 167 million menopausal women now, and it is expected that the population of menopausal women will reach 280 million in 2030.[14] An appropriate index is needed to evaluate the QOL of Chinese menopausal women objectively. This study, therefore, aimed to evaluate the psychometric properties of the Chinese version of the MENQOL and to evaluate the MENQOL as suitable for QOL evaluation for Chinese menopausal women.

MATERIALS AND METHODS

Study design

The cross-sectional survey and convenience sampling were conducted at eight clinical centers (Guangdong Provincial Hospital of Chinese Medicine [CM], FoShan Hospital of CM, Affiliated Hospital of Hubei College of Traditional Chinese Medicine [TCM], Affiliated Hospital of Chengdu University of TCM, Affiliated Hospital of WenZhou Medicine College, LongHua Hospital Affiliated to Shanghai University of TCM, JiangSu Province Hospital of CM, and Tianjin Institute of TCM) in China in 2005. The eight centers were distributed across seven different regions in China. Participants were recruited from both the community and the hospital. All participants gave informed consent.

Participants

Participants were included if the following criteria were met: women aged 41 to 60 years; at least a junior high school diploma; no use any of the following treatment for menopausal syndrome in the last 3 weeks: hormone therapy, selective estrogen receptor modulators, aromatase inhibitors, soybean extracts, acupuncture, and Chinese medicine; willing to provide informed consent.

Participants would be excluded if any of the following criteria were met: having a severe internal medical condition, such as hepatic or renal dysfunction; cerebrovascular disease; cardiovascular disease; hematologic disease; mental illness; or an uncontrolled endocrine disease, such as thyroid disease.

There is no strict definition for symptomatic or asymptomatic menopausal women, so we adopted the modified KI score of 15 points as cutoff value because the sum score ''0-14'' was considered as ''none'' category in original scale.[15] All participants completed KI, and if the total score was equal to or greater than 15, the participants were defined as symptomatic menopausal women. If the score was less than 15, the participant was defined as asymptomatic women. Therefore, it should be mentioned that the asymptomatic women in this study were menopausal women with mild or without menopause-related symptoms.

Measures

The MENQOL is a self-administered questionnaire and consists of a total of 29 items in four domains: vasomotor (items 1-3), psychosocial (items 4-10), physical (items 11-26), and sexual (items 27-29). For each item, participants were asked to indicate if they had experienced each symptom or problem within the past month and, if so, to rate how bothersome it was on a zero (not bothersome) to six (extremely bothersome) seven-point Likert scale.[9] Nonendorsement of an item was scored a ''1'' and endorsement a ''2'' along with the number of the particular rating, such that the possible score on any item ranged from one to eight. Each domain score was the average of the item scores in that domain (higher scores indicated poorer quality-of-life). If more than 10% of items (more than three items) were missed

in one questionnaire, the questionnaire was defined as invalid and excluded from statistical analysis.

The KI is the most widely used and acknowledged index in menopause research. The index includes 11 symptoms (vasomotor, paresthesia, insomnia, nervousness, melancholia, vertigo, weakness (fatigue), arthralgia and myalgia, headaches, palpitations, and formication) rated from 0 to 3 for no, slight, moderate, and severe complaints. To calculate the score, the symptoms were weighted as follows: hot flashes ($\times 4$), paresthesia ($\times 2$), insomnia ($\times 2$), nervousness ($\times 2$), and all other symptoms ($\times 1$). The KI is evaluated by doctors. Although the KI is widely used, it has its limitations.[15] It omits items of vaginal dryness and loss of libido; weighting is used without statistical justification; and most importantly, scores are summed without being based on independent factors. Psychometric analysis also showed poor fit of the KI.[16] Generally speaking, it is not an appropriate tool for evaluating QOL.

Data analysis

Data were analyzed by SPSS 13.0 and Lisrel 8.8. Any $P < 0.05$ were regarded as statistically significant. The missing data for any item was replaced with the mean of that item.

For reliability, the internal consistency reliability and split-half reliability were examined. A Cronbach's α and a split-half coefficient equal or more than 0.7 were regarded as acceptable.[17]

Construct validity, criterion validity, and discriminate validity were examined for validity. Constructive validity was tested by item-domain correlation analysis, exploring factor analysis using principal component analysis (PCA) and confirmatory factor analysis (CFA). PCA with oblique promax rotation was performed to determine whether the latent item structure mirrored the four domains specified in the instrument's construction. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity statistics were analyzed to determine whether factor analysis was appropriate for the data.[17] CFA was conducted to examine the factor structure of the MENQOL using covariance matrices and the maximum-likelihood estimation method. The goodness-of-fit model was assessed using the chi-square (χ^2), relative chi-square (χ^2/df), the goodness-of-fit index (GFI), the comparative fit index (CFI), the normed-fit index (NFI), the not-normed fit index (NNFI), and the root mean square error of approximation (RMSEA). A χ^2/df ratio of less than 3 is indicative of a good model fit; $3 < \chi^2/df < 5$ is indicative of an acceptable model fit.[18] For other goodness of fit indexes, CFI, NFI, NNFI, and GFI values of 0.90 and higher indicate good conformity.[19,20] RMSEA value of <0.05 indicated a very good fit of the model to the covariance matrix,[21] and 0.08 was considered as an acceptable fit of the model also.[22] Path coefficients obtained in the path analysis realized in a scope of CFA of 0.30 and above indicates acceptability of the scale structure.[23]

Discriminant validity was measured by the between-group comparison of menopausal symptomatic women and menopausal asymptomatic women. For the comparison of two means, a t test was used.

Criterion validity was calculated with Pearson correlation coefficients among the MENQOL and KI. Correlation values between 0.10 and 0.29 are considered weak, between 0.30 and 0.49 are considered moderate, and between 0.50 and 1.00 are considered strong.

RESULTS

Sample characteristics

A total of 1,708 menopausal women were recruited for preliminary screening from November 2005 to December 2005. Seventy women (0.04%) were excluded because of invalid questionnaires (85.7%) or not meeting the inclusion criteria (14.3%). Finally, 1,137 (69.8%) menopausal symptomatic women and 491 (30.2%) menopausal asymptomatic women were included in the data analysis. One hundred thirty-eight items (0.3%) were missed in all questionnaire data, and the response rate was 99.7%. Sample characteristics such as age, menopause age, menopause period, weight, height, and so on in two groups are shown in Table 1. For the postmenopausal women who have experienced 12 consecutive months without menstruation, the menopause age and menopause period would be recorded. Menopause age meant the last menstruation age and menopause period referred to the duration from the last menstruation to the date of investigation. The symptomatic menopausal group were characterized with older age, higher education level, more participants in the postmenopause status and longer postmenopause duration than the asymptomatic group ($P < 0.05$) (Table 1). The other baseline characteristics in

TABLE 1. *General description of participants*

Characteristics	Symptomatic women (N = 1,137)	Asymptomatic women (N = 491)	P
Menopause age[a]	47.75 ± 3.93	46.66 ± 3.90	<0.01
Age[a]	50.13 ± 4.48	49.53 ± 4.7	<0.01
Menopause period, y[a]	2.33 ± 3.35	1.50 ± 2.87	<0.01
Gravidity[a]	2.29 ± 1.27	2.20 ± 1.26	0.19
Parity[a]	1.27 ± 0.70	1.25 ± 0.62	0.48
Weight, kg[a]	58.90 ± 8.65	58.25 ± 8.20	0.15
Height, cm[a]	159.91 ± 4.67	159.43 ± 4.92	0.07
Menopause[b]			<0.01
1. Yes	46.3% (512)	28.5% (139)	
2. No	53.7% (595)	71.5% (349)	
Menopause etiology[b]			0.36
1. Nature	80.8% (409)	84.4% (114)	
2. Hysterectomy or oophorectomy	16.4% (83)	15.6% (21)	
3. Ovarian failure caused by chemotherapy	0.4% (2)	0	
4. Others	2.4% (12)	2.9% (4)	
Marital status[b]			0.19
1. Unmarried	1.1% (13)	2.4% (12)	
2. Married	92.8% (1,053)	92.9% (456)	
3. Divorced	3.1% (35)	3.1% (15)	
4. Widowed	3.0% (34)	1.6% (8)	
Education level[b]			<0.01
1. Junior high school	30.1% (341)	24.3% (119)	
2. High school	35.9% (407)	32.3 (158)	
3. University	32.8% (372)	40.5% (198)	
4. Graduate and above	1.2% (14)	2.9% (14)	

[a]Values are mean and standard deviation of mean.
[b]Values are percent and count.

TABLE 2. *Prevalence of MENQOL symptoms*

	Prevalence (%)		
Items	Symptomatic women (N = 1,137)	Asymptomatic women (N = 491)	P
1. Hot flashes	80.7	26.5	<0.01
2. Night sweats	58.7	21.6	<0.01
3. Sweating	69.6	21.2	<0.01
4. Being dissatisfied with my personal life	36.9	13.6	<0.01
5. Feeling anxious or nervous	69.2	30.1	<0.01
6. Experiencing poor memory	94.4	79.2	<0.01
7. Accomplishing less than I used to	83.4	59.7	<0.01
8. Feeling depressed, down or blue	66.1	26.7	<0.01
9. Being impatient with other people	72.7	43.8	<0.01
10. Feelings of wanting to be alone	39.0	16.5	<0.01
11. Flatulence (wind) or gas pains	71.9	47.3	<0.01
12. Aching in muscle and joints	89.4	66.6	<0.01
13. Feeling tired or worn out	93.8	69.0	<0.01
14. Difficulty sleeping	83.6	43.2	<0.01
15. Aches in back of neck or head	86.2	62.1	<0.01
16. Decrease in physical strength	86.6	65.0	<0.01
17. Decrease in stamina	60.7	26.7	<0.01
18. Feeling a lack of energy	83.3	54.5	<0.01
19. Drying skin	72.9	49.1	<0.01
20. Weight gain	44.7	37.9	<0.01
21. Increased facial hair	9.9	2.4	<0.01
22. Changes in appearance, texture, or tone of your skin	61.7	38.5	<0.01
23. Feeling bloated	50.4	24.8	<0.01
24. Low backache	86.9	65.8	<0.01
25. Frequent urination	58.5	26.1	<0.01
26. Involuntary urination when laughing or coughing	48.5	27.3	<0.01
27. Change in your sexual desire	81.0	53.8	<0.01
28. Vaginal dryness during intercourse	63.7	30.1	<0.01
29. Avoiding intimacy	57.1	25.0	<0.01

MENQOL, Menopause-Specific Quality-of-Life.

terms of weight, height, gravidity, parity, menopause etiology, and marital status did not differ significantly between the two groups ($P > 0.05$) (Table 1).

Frequency of symptoms

Table 2 shows the incidence of menopause symptoms in China. In the symptomatic women, the most common symptoms were ''experiencing poor memory'' (94.4%) ''feeling tired or worn out'' (93.8%), ''aching in muscle and joints'' (89.4%), ''low backache'' (86.9%), ''decrease in physical strength'' (86.6%), ''aches in back of neck or head'' (86.2%), ''difficulty sleeping'' (83.6%), ''accomplishing less than I used to'' (83.4%), ''feeling a lack of energy'' (83.3%), ''change in your sexual desire'' (81%), and ''hot flashes'' (80.7%) among others. The symptoms of ''increased facial hair'' were rarely seen in the two groups (9.9% in the symptomatic women and 2.4% in the asymptomatic women).

Psychometric properties of MENQOL
Acceptability

The Chinese version of the MENQOL was translated in 2002.[12] Translation of the questionnaire was presented without problems, and the back translation concurred with the original English MENQOL. The concordance rates of the meaning of the items between the two versions exceeded 95% according to experts, and the pilot testing of the MENQOL concluded that time to finish the questionnaire was 12.6 ± 1.32 minutes.[12] The Chinese version of the MENQOL

was well-accepted by the menopausal women with no difficulties in understanding the items in this study. The participants responded to all items of the questionnaire with little missing data.

Reliability

To assess the extent to which each domain of the MENQOL measured a similar construct, internal consistency reliability with Cronbach's α and split-half coefficients were computed for each domain and the whole MENQOL. All domain coefficients were greater than 0.8 (Table 3).

Validity
Construct validity

Item-domain correlation analysis showed that all items correlated more strongly with their own domains than with other domains (Table 4).

Principal components analysis

The Kaiser-Meyer-Olkin test indicated factor analysis was appropriate for the data (0.95), and Bartlett's test of sphericity was significant ($P < 0.05$), which suggested a multicollinearity. Factor analysis with varimax rotation extracted six factors and explained 60.8% of the variance (Table 5). Items were considered representative of one factor if their individual item loading was ≥0.40 on that factor. Cross-loading items were those items that loaded ≥0.40 on two or more factors. If an item loading was, however, less than 0.4 on all factors, the

TABLE 3. *Internal consistency reliability of the MENQOL*

		Domain			
	MENQOL	Vasomotor	Psychosocial	Physical	Sexual
Cronbach's α	0.93	0.84	0.87	0.89	0.86
Split-half	0.94	0.86	0.91	0.90	0.89

MENQOL, Menopause-Specific Quality-of-Life.

highest loading on one factor would be considered. Here, we report item loadings from the rotated component matrix (Table 5).

Items 1-3, correspond to the vasomotor domain and all loaded above 0.79 on a single factor (factor 5) with no identified cross-loadings. Items 27-29, correspond to sexual domain and all loaded above 0.79 on a single factor (factor 4) with no identified cross-loadings. Items 4-10, correspond to the psychosocial domain and all loaded above 0.41 on a single factor (factor 2) with the exception of item 6 ("experiencing poor memory"), which cross-loaded (0.46 and 0.41) on factor 1. According to clinical experience, we can, however, place item 6 with the psychosocial factor. Generally speaking, these three factors combined were almost the same as the original MEN-QOL structure. Items 11-26, corresponding to the physical subscale, had multiple primary loadings on three different factors. Factor 1 included items 13 ("feeling tired or worn out"), 14 ("difficulty sleeping"), 16 ("decrease in physical strength"), 17 ("decrease in stamina"), 18 ("feeling a lack of energy"), 19 ("drying skin"), and 22 ("changes in appearance, texture, or tone of your skin") all loaded above 0.48 on a single factor. Although all those items were related to physical symptoms, those items could be classified as physical feeling symptoms, which were more subjective than others physical symptoms (pain, for example). Factor 3 included seven items that loaded above 0.37. Items 11 ("flatulence or gas pains"), 12 ("aching in muscle and joints"), 15 ("aches in back of neck or head"), 23 ("feeling bloated"), and 24 ("low backache") were symptoms all related to aching. Items 25 ("frequent urination") and 26 ("involuntary urination when laughing or coughing") were symptoms related to urination. All seven items were physical symptoms that were more objective than symptoms on factor 1. Finally, items 20 ("weight gain") and 21 ("increased facial hair") comprised factor 6, which loaded above 0.69, but it is difficult to explain why those two items created one factor independently.

TABLE 4. *Item-domain correlation analysis of the Chinese version of the MENQOL (29 items, four domains)*

		Domain				
Items		Vasomotor (3 items)	Psychosocial (7 items)	Physical (16 items)	Sexual (3 items)	Total (29 items)
Vasomotor	1. Hot flashes	0.89	0.41	0.41	0.34	0.55
	2. Night sweats	0.83	0.36	0.39	0.25	0.50
	3. Sweating	0.88	0.39	0.39	0.30	0.52
Psychosocial	4. Being dissatisfied with my personal life	0.30	0.71	0.49	0.30	0.59
	5. Feeling anxious or nervous	0.34	0.77	0.52	0.30	0.63
	6. Experiencing poor memory	0.35	0.73	0.64	0.37	0.70
	7. Accomplishing less than I used to	0.37	0.77	0.65	0.38	0.72
	8. Feeling depressed, down or blue	0.32	0.82	0.58	0.29	0.67
	9. Being impatient with other people	0.34	0.72	0.52	0.27	0.61
	10. Feelings of wanting to be alone	0.32	0.68	0.49	0.27	0.58
Physical	11. Flatulence (wind) or gas pains	0.32	0.48	0.62	0.29	0.59
	12. Aching in muscle and joints	0.34	0.40	0.63	0.30	0.58
	13. Feeling tired or worn out	0.34	0.60	0.77	0.36	0.73
	14. Difficulty sleeping	0.29	0.46	0.58	0.29	0.56
	15. Aches in back of neck or head	0.32	0.47	0.68	0.29	0.63
	16. Decrease in physical strength	0.32	0.58	0.77	0.38	0.73
	17. Decrease in stamina	0.26	0.63	0.71	0.33	0.70
	18. Feeling a lack of energy	0.32	0.66	0.79	0.39	0.76
	19. Drying skin	0.27	0.49	0.67	0.38	0.63
	20. Weight gain	0.22	0.29	0.41	0.16	0.38
	21. Increased facial hair	0.21	0.28	0.37	0.16	0.36
	22. Changes in appearance, texture, or tone of your skin	0.21	0.47	0.62	0.32	0.58
	23. Feeling bloated	0.31	0.40	0.56	0.26	0.53
	24. Low backache	0.29	0.43	0.68	0.30	0.61
	25. Frequent urination	0.28	0.38	0.56	0.34	0.53
	26. Involuntary urination when laughing or coughing	0.23	0.35	0.48	0.27	0.46
Sexual	27. Change in your sexual desire	0.32	0.43	0.47	0.87	0.60
	28. Vaginal dryness during intercourse	0.31	0.33	0.41	0.87	0.53
	29. Avoiding intimacy	0.28	0.36	0.42	0.90	0.55

MENQOL, Menopause-Specific Quality-of-Life.

TABLE 5. *The six factors extracted by the factorial analysis of main factors with varimax rotation*

MENQOL subscale	Items	1. Physical feeling	2. Psychosocial	3. Physical ache	4. Sexual	5. Vasomotor	6. Physical
Vasomotor	1. Hot flashes					0.83	
	2. Night sweats					0.79	
	3. Sweating					0.82	
Psychosocial	4. Being dissatisfied with my personal life		0.66				
	5. Feeling anxious or nervous		0.74				
	6. Experiencing poor memory	0.46	0.42				
	7. Accomplishing less than I used to		0.48				
	8. Feeling depressed, down or blue		0.76				
	9. Being impatient with other people		0.63				
	10. Feelings of wanting to be alone		0.61				
Physical	11. Flatulence (wind) or gas pains			0.36			
	12. Aching in muscle and joints			0.76			
	13. Feeling tired or worn out	0.59					
	14. Difficulty sleeping	0.49					
	15. Aches in back of neck or head	0.49		0.49			
	16. Decrease in physical strength	0.71					
	17. Decrease in stamina	0.72					
	18. Feeling a lack of energy	0.76					
	19. Drying skin	0.58					
	20. Weight gain						0.71
	21. Increased facial hair						0.69
	22. Changes in appearance, texture, or tone of your skin	0.62					
	23. Feeling bloated			0.56			
	24. Low backache			0.73			
	25. Frequent urination			0.39			
	26. Involuntary urination when laughing or coughing			0.44			
Sexual	27. Change in your sexual desire				0.79		
	28. Vaginal dryness during intercourse				0.82		
	29. Avoiding intimacy				0.85		

MENQOL, Menopause-Specific Quality-of-Life.

In order to explore factor 6, we reviewed the items' frequencies and found that item 21 (''increased facial hair'') happened rarely in China. Facial hair is not a common phenomenon in Chinese women, regardless of age. To assess whether this item was important to the questionnaire or not, we analyzed the correlations between item 21 and the MEN-QOL and physical subscale. The results demonstrated that the correlation coefficients were not high (0.36 with the MEN-QOL total scale and 0.37 with the physical domain). Therefore, according to the results and Chinese culture, we decided to remove item 21 and perform the factor analysis again.

The results revealed five factors (Table 6) that explained 58.4% of the variance. The vasomotor and sexual domains were very stable (factor 4 and factor 3, respectively). Items 4-10, corresponding to the psychosocial domain, were loaded on factor 1. Items 11-26, corresponding to the physical domain, were divided into two factors. Factor 5 comprised four items that represent the urinary system symptoms and weight-related symptoms. The other symptoms were loaded on factor 2, which loaded higher than on other factors except items 17 (''decrease in stamina'') and 22 (''changes in appearance, texture or tone of your skin''). Those two items were loaded higher on psychosocial factors than on physical factors. We reflected that although these two items belong to the physical domain, they depended on how people evaluate themselves.

They could be affected by people's mood. Therefore, perhaps that is why these two items could be classed as either physical or psychosocial. Generally speaking, these results were similar to the original MENQOL structure.

Confirmatory factor analysis

In the CFA, the results of 28 items of the MENQOL (deleting item 21) were better than 29 items. Therefore, we reported the results of 4 domains and 28 items only. The CFA showed that the χ^2/df rate of the MENQOL was 4.15, the NFI value was 0.96, the NNFI value was 0.96, the CFI value was 0.97, and the GFI value was 0.86. The RMSEA value was 0.08. The path coefficients of the MENQOL were all over 0.30 (Fig. 1). The regression coefficients and the t values obtained from the regression analysis of CFA were meaningful ($P < 0.05$). The results verified the model.

Discriminate validity

Discriminate validity was assessed by comparing MENQOL scores between menopausal symptomatic women and asymptomatic women (Table 7). The symptomatic menopausal women had higher mean scores, which mean worse QOL. All the domain differences between menopausal symptomatic women and asymptomatic women were significant ($P < 0.05$).

TABLE 6. *The five factors extracted by the factor analysis of the main factor with varimax rotation (item 21 removed)*

| MENQOL subscale | Items | Factors | | | | |
		1. Psychosocial	2. Physical	3. Sexual	4. Vasomotor	5. Physical
Vasomotor	1. Hot flashes				0.82	
	2. Night sweats				0.77	
	3. Sweating				0.81	
Psychosocial	4. Being dissatisfied with my personal life	0.68				
	5. Feeling anxious or nervous	0.75				
	6. Experiencing poor memory	0.51				
	7. Accomplishing less than I used to	0.58				
	8. Feeling depressed, down or blue	0.77				
	9. Being impatient with other people	0.61				
	10. Feelings of wanting to be alone	0.56				
Physical	11. Flatulence (wind) or gas pains		0.41			
	12. Aching in muscle and joints		0.70			
	13. Feeling tired or worn out		0.69			
	14. Difficulty sleeping		0.45			
	15. Aches in back of neck or head		0.67			
	16. Decrease in physical strength		0.64			
	17. Decrease in stamina	0.66	0.44			
	18. Feeling a lack of energy		0.59			
	19. Drying skin		0.40			
	20. Weight gain					0.70
	22. Changes in appearance, texture, or tone of your skin	0.48	0.31			
	23. Feeling bloated					0.51
	24. Low backache		0.72			
	25. Frequent urination					0.38
	26. Involuntary urination when laughing or coughing					0.58
Sexual	27. Change in your sexual desire			0.79		
	28. Vaginal dryness during intercourse			0.83		
	29. Avoiding intimacy			0.85		

MENQOL, Menopause-Specific Quality-of-Life.

Criterion validity

The criterion validity of the Chinese version of the MENQOL was assessed by the correlations with the KI. All the Pearson correlation coefficients were statistically significant ($P < 0.05$) (Table 8). The correlation coefficient between the sexual subscale and KI was, however, not high (0.48). It should be noted that the KI has only one item about sex and it omits measures of vaginal dryness and loss of libido. Conversely, the MENQOL has three items on sex symptoms. Therefore, we consider the results acceptable.

DISCUSSION

It was well-known that the larger sample and different representative population would contribute to the cross-cultural adaptation and validation of a health-related QOL instrument. After being validated linguistically into the Chinese version according to documented procedures in 2002, the psychometric properties of MENQOL were evaluated with a small sample size in the pilot study.[12] In addition, the participants in this previous study were only symptomatic menopausal women.[12] To further improve the translated Chinese version of MENQOL, it was evaluated with a larger sample with menopausal symptomatic women and asymptomatic women in China in this study. This is the largest psychometric study of the Chinese version of the MENQOL to date.

This study showed that the Chinese version of the MENQOL is a valid and reliable instrument for evaluating Chinese menopausal women with relative sound psychometric properties that correspond to the original English MENQOL.

The internal consistency of the questionnaire was high. The coefficients obtained in each of the domains surpassed 0.7 (Table 3), which showed the reliability and acceptance of the Chinese version of the MENQOL.

In our research in 2002,[12] the experts judged that the Chinese version of the MENQOL corresponded to the English version. We can conclude that the content validity of the MENQOL is acceptable.

In the construct validity analysis, item-domain correlations showed that all items correlated more strongly with their own domains than with other domains (Table 4). Using a factor analysis, the study showed two factors (vasomotor and sexual) that were completely the same as the original structure. Consistently, the psychosocial factor was similar to the original questionnaire. Items corresponding to the physical domain were more spread out. In the first factor analysis (Table 5), there were three factors (1, 3, and 6) that included physical domain symptoms, but factor 6 (items 20 ''weight gain'' and 21 ''increased facial hair'') were difficult to explain. We know that QOL has been defined by the World Health Organization as the ''individual's perceptions of their position in life in the context of the cultural and value systems in which they live and in relation to their goals, expectations, standards and concerns.''[24] Due to the low incidence of item
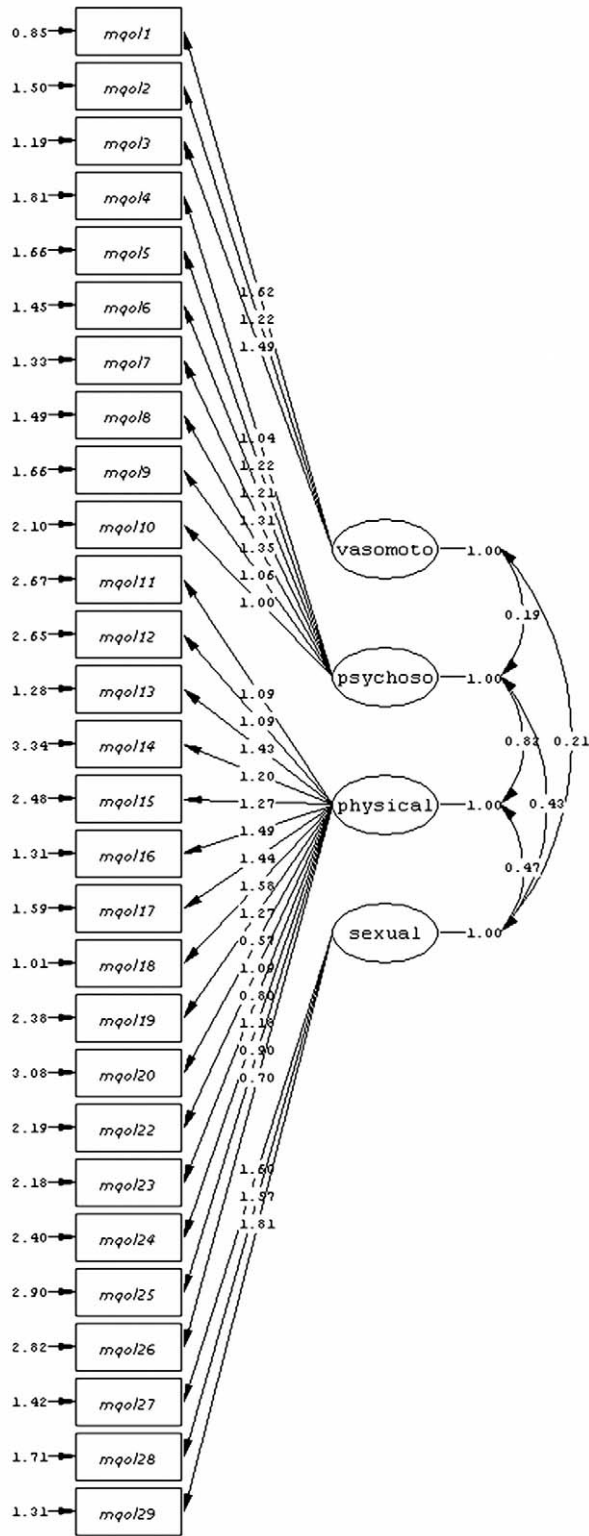
FIG. 1. The path coefficients of the Chinese version of Menopause-Specific Quality-of-Life (MENQOL).

21 (9.9% in the symptomatic women and 2.4% in the asymptomatic women) and the low correlation coefficients (0.36 with the MENQOL and 0.37 with the physical subscale), we think that item 21 is not suitable for Chinese culture.

TABLE 7. *Discriminate validity of MENQOL*

	Symptomatic women (N = 1,137) Mean ± SD	Asymptomatic women (N = 491) Mean ± SD	t	P
Vasomotor domain	3.15 ± 1.57	1.50 ± 0.80	27.99	<0.01
Psychosocial domain	3.17 ± 1.33	1.96 ± 0.86	21.83	<0.01
Physical domain	3.40 ± 1.10	2.18 ± 0.76	25.77	<0.01
Sexual domain	3.36 ± 1.90	2.02 ± 1.33	16.32	<0.01

MENQOL, Menopause-Specific Quality-of-Life

Therefore, we deleted item 21 and performed factor analysis again (Table 6). Five factors were produced, and the sexual and vasomotor factors were the same as the original questionnaire. The psychosocial factor was similar to the original questionnaire. The physical factor divided into two factors, but generally speaking, the construction of the questionnaire was almost the same as the original structure of the MENQOL. We can conclude that the construct validity was good. In this study, the CFA method determined that the MENQOL is compatible with the Chinese culture via its four domains and 28 items. The regression coefficients and the *t* values found in the regression analysis of CFA are significant ($P < 0.05$), except GFI. The value of CFI, INFI, and NNFI were all over 0.90, and the RMSEA value was 0.08. The results confirmed the acceptable model.

As for the discriminate validity, we observed that there was a significant difference between menopausal symptomatic women and menopausal asymptomatic women with the Chinese version of the MENQOL. The QOL of menopausal symptomatic women was significantly worse than the asymptomatic women. The Chinese version of the MENQOL can discriminate people of different groups, and there was a significance correlation between the MENQOL and the KI. Therefore, the criterion validity was acceptable.

There were some limitations that should be mentioned. First, the sample of this study was not representative. On the one hand, we selected a sample mostly from the eight largest cities in China instead of from the countryside. On the other hand, we selected a sample with at least a junior high school education to facilitate the study. Further evaluation of the questionnaire with a more general sample is needed. Second, although we assessed test-retest reliability in 2002, the sample size was relatively small. It is a pity that we did not assess test-retest reliability this time. Moreover, the KI, which is a flawed instrument,[15] was used as criterion and discriminant index in

TABLE 8. *Pearson's correlations between the MENQOL questionnaire and the KI*

	Pearson correlation coefficients with KI	P
MENQOL total score	0.76	<0.01
Vasomotor domain	0.61	<0.01
Psychosocial domain	0.62	<0.01
Physical domain	0.69	<0.01
Sexual domain	0.48	<0.01

KI, Kupperman index; MENQOL, Menopause-Specific Quality-of-Life.

the study, a more appropriate index would be applied in the future.

CONCLUSIONS

Our study indicates that the Chinese version of the MENQOL was well-accepted by Chinese menopausal women, and its psychometric properties (after removing item 21) were similar to those reported in validation studies of the English version.[9,10,25-27] In conclusion, the study confirmed that the Chinese version of the MENQOL is a reasonable and valid tool for determining health-related quality-of-life for menopausal women in China. Based on the limitations of our study, future research with a generally representative sample and a more suitable criterion index will be needed to afford more data to assess the psychometric properties of the MENQOL.

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