The psychometric properties test of the Malay version of the endometriosis health profile-30

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ABSTRACT

الأهداف: التحقق من صحة وتحديد الخصائص السيكومترية للنسخة الماليزية لملف صحة بطانة الرحم 30 (EHP-30) عن طريق تحليل العوامل التأكيدية.

المنهجية: أجريت دراسة مقطعية في المدينة الرئيسية في ماليزيا في مستشفى تعليمي ثالثي خلال الفترة من يناير إلى أبريل 2021م. واشتملت الدراسة على مجموعه 218 امرأة مشخصين بأعراض التهاب بطانة الرحم وأجري الطريقة الشاملة لاختيار عينات الدراسة للإجابة على الاستبيان.

النتائج: أظهرت النسخة الماليزية المنقحة من EHP-30 التي تحتوي على 28 عنصرًا أن عامل تحميل العناصر الـ 28 كان له نطاق قيمة مقبول بين 0.60-0.90. كانت ملاءمة النموذج مقبولاً بعد إدراج 28 عنصرًا من الأخطاء المرتبطة بجذر متوسط لمربع تقريب الخطأ: 0.072، فاصل الثقة 90%: [0.065-0.080]، مؤشر التوافق المقارن (0.939)، مؤشر تاكر لويس (0.932)، ومربع كاي/درجات الحرية (2.135). تراوح مؤشر ألفا كرونباخ من 0.89 إلى 0.97. تراوحت الصلاحية المتزامنة للثبات المركب بين 0.88-0.96، في حين تراوح متوسط التباين المستخرج بين 0.65-0.74.

الخلاصة: النسخة الماليزية المنقحة لملف صحة بطانة الرحم EHP-30 أداة موثوقة وصالحة للاستخدام في الدراسة القادمة.

Objectives: To validate and determine the psychometric properties of the Malay version of the endometriosis health profile-30 (EHP-30) by confirmatory factor analysis.

Methods: A cross-sectional study was carried out in the main city of Malaysia at a tertiary teaching hospital between January to April 2021. A total of 218 women diagnosed with endometriosis symptoms were recruited using the universal sampling method to answer the questionnaire.

Results: The revised Malay version of the EHP-30 with 28 items demonstrated that the factor loading of the 28 items had an acceptable value range between 0.60-0.90. The model fit was acceptable after the inclusion of 28 items correlated errors of the root mean square of error approximation: 0.072, 90% confidence interval: [0.065-0.080], comparative fit index (0.939), Tucker-Lewis index (0.932), and Chi-square/degrees of Freedom (2.135). The Cronbach's alpha ranged from 0.89-0.97. Concurrent validity for the composite reliability was between 0.88-0.96, while the average variance extracted was between 0.65-0.74.

Conclusion: This revised Malay version of the EHP-30 is a reliable and valid tool that can be used for the next study.

Keywords: psychometric properties, endometriosis, EHP-30, confirmatory factor analysis, validation

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Endometriosis is a chronic disease that became a significant health issue, particularly among those women in reproductive age. Endometriosis occurs due to chronic inflammation at the endometrium, which triggers during menses and impacts the quality of life.[1] The disease causes chronic adverse health effects such as pelvic pain, menorrhagia, infertility, migraine, fibromyalgia, dysmenorrhea, and deep dyspareunia.[2-7] Most women with endometriosis face symptoms that impact the reproductive system and cause infertility.[5,8] Its condition results in a poor quality of life and has significant psychological impacts, such as anxiety, distress, and depression.[5,8,9] Currently, endometriosis

affects women worldwide, with each country annually reporting, and also increasing the issue during the COVID-19 pandemic.[10] The statistic of endometriosis diagnosed in women in Brazil was high, at 15% compared to the rate in Asian countries such as Bangladesh, with 10%, Japan with 6.8%, Thailand with 19.3%, China with 14.71%, and India with 14.71%.[1,11-14]

Worldwide, various tools have been developed to measure and investigate the impact of endometriosis among women such as the endometriosis impact questionnaire (EIQ), the World Health Organization quality of life assessment-BREF (WHOQOL-BREF), and the quality of life questionnaire (SF-36).[15-17] These tools may have different concepts and perspectives compared to the tool in this study. Jones et al[18] developed this tool and started in the United States of America with reported validity and reliability.[19] This user-friendly self-reporting questionnaire, enables the overall impact of the disease to be determined.[20] Therefore, researchers worldwide often prefer to use the endometriosis health profile-30 (EHP-30), translating it into and validating it in other languages such as Portuguese, Dutch, Swedish, Portuguese, Persian, Norwegian, Chinese, and Turkish.[21-28] Overall, the reliability results were good, and the items were highly acceptable for each domain in the EHP-30.[23,29] Thus, the EHP-30 is a valuable and validated tool used worldwide for measuring the quality of life. It was used clinically and in the community based in previous model studies.[20,23]

Women's quality of life is impacted if they are diagnosed with endometriosis.[30] It has been acknowledged that the EHP-30 is one of the most comprehensive health questionnaires for measuring the quality of life. However, confirmatory factor analysis (CFA) for latent constructs with graphics is limited. It means assessing the validity with used psychometric properties test for measurement model. Furthermore, validating the Malay version is complicated due to the cultural differences in different regions and the limitations in the analyses undertaken in previous studies. Hence, this study aimed to evaluate the psychometric properties test in the Malay version of the EHP-30 for the validation and reliability of the items.

Methods. A cross-sectional study, involved women with endometriosis in the Gynecology Clinic at a tertiary teaching hospital in Kuala Lumpur, Malaysia. The study was carried out between January and April 2021. The inclusion criteria were: I) Malaysian; II) an assessment carried out by a physician and a diagnosis of endometriosis based on an abdomen ultrasound; III) the subjects also had to be a pre-laparoscopy procedure; IV) be aged over 18 years old; V) have no psychosis symptoms; and VI) be able to read and give consent to participate in this study.

The researcher calculated the sample size needed to obtain the minimum sample size required for confirmatory factor analysis. Based on the recommendation, the sample size needed more than 200 participants; thus, 218 respondents were selected for this study.[31] The sampling was sufficient based on the Kaiser-Meyer-Olkin (KMO) results, which measures the sampling adequacy (p=0.90).[32] A convenience sampling method was applied to recruit respondents.

The Malay version of the EHP-30 was obtained from and with the permission of Oxford University Innovation Ltd., Oxford, United Kingdom. In the validation period prior to this study, a minor adjustment was proposed in the Malay version of the EHP-30 and implemented by 6 experts in obstetrics and gynecology. The face validation carried out, which invited 30 women with endometriosis to answer the Malay version of EHP-30 and to assess the clarity and representatives of the questionnaire items. This study used the EHP-30 questionnaire to measure the validity with used psychometric properties test in Malay version. Part A referred to the participants' sociodemographic data, including age, race, religion, education, status, occupation, income per month, and smoking habits. Part B was the revised Malay version of the EHP-30. It was composed of 30 items across 5 domains. The questionnaires were deemed valid for further studies based on their reliability, the value was between 0.87-0.96 for Cronbach's alpha. A likert scale with 5 point used, with scores ranging from 0-100 and a scale featuring: never (0); rarely (1); sometimes (2); often (3); and always (4). The formula for scoring each dimension was based on the formula of: 'total of the scores for all items and divided by 4 multiplied by the number of items in the dimension'.[18] This indicated that high scores meant a poor quality of life and low scores meant a good quality of life.[18,19,26,33]

The study protocol was approved by University Malaya Medical Centre (MRECID.NO: 2020525-8672). The revised Malay version of the EHP-30 questionnaire form was answered among women who registered at the admission centre of the gynecology

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outpatient department at a tertiary teaching hospital. Using the 'participant information sheet'. The researcher explained the study to the respondents who fulfilled the inclusion criteria and gave written consent before the form collection. Respondents answered the questionnaire within 10-15 minutes.

Statistical analysis. The data were analyzed using The Statistical Package for the Social Sciences (SPSS), version 26.0 (IBM Corp., Armonk, NY, USA) and IBM SPSS Amos, version 24 software. To determine the domain compatibility was carried out with CFA tests for each domain. The loading factor value of ≥0.50 was the main criterion for deciding the compatibility.[32] The other criteria proposed for this fit was the fitness index (p≥0.05), the root mean square of error approximation ([RMSEA] values of ≤0.08), the comparative fit index (CFI), and Tucker-Lewis index (TLI) (values of ≥0.90).[34] The Chi-square/degrees of freedom (Chisq/df) (values of ≤3.0) was used.

The convergent validity in this study ran for average variance extracted (AVE) and constructed validity measurements to test the validity assessment. The required AVE value for the convergent validity measurement was of ≥0.5, and the criterion for the reliability measurement value was of ≥0.7.[32] The descriptive statistics was used to analyzed sociodemographic data. The measurement of the model for Malay version of the EHP-30 for a latent construct used factor analysis for all items. This was measured based on the assessment, including the unidimensionality, validity, and reliability. Unidimensionality measures items for factor loading, whereby the value for each item should be 0.6 or higher.[32] Then, validity was measured for the latent construct types: convergent validity, construct validity, and discriminant validity.[35] This included the Cronbach's alpha with a value of >0.7, composite reliability (CR) with a value of ≥0.6, and AVE with a value of ≥0.5.[32,35]

Results. A total of 218 women with endometriosis were enrolled to answer the questionnaire in this study. The sociodemographic characteristics among respondents are presented in Table 1. The results revealed the mean age of the participants (37.31 years), the majority were Malay (73.4%, n=160), and Muslim (74.3%, n=162). Of the participants, 40.4% (n=88) had first-degree education, and 60.1% (n=131) were married. The participants generally reported working women (81.7%, n=178); the mean monthly income was USD 729.14. Only 1.8% (n=4) of women reported smoking.

The psychometric properties for construct validity and reliability showed acceptable value. Figure 1 shows the final path diagram for the revised Malay version of the EHP-30 with 5 construct domains and 28 items after deleting 2 items (no.: 12 & 13). The following domains remained, according to the items in the Malay version of the EHP-30: domain 1: items 1-11; domain 2: items 14-17; domain 3: items 18-23; domain 4: items 24-27; and domain 5: items 28-30. The factor loading of the 28 items had an acceptable value range between 0.60-0.90, so the factor loading for all the items was highly acceptable. Domain 1 ranged from 0.79-0.90; domain 2 ranged between 0.78-0.90; the third domain ranged from 0.69-0.86; the fourth domain ranged from 0.84-0.89; and the last domain between 0.78-0.89. The model revealed that was acceptable based on the fitness of RMSEA= 0.072 (90% CI: [0.065-0.080]); CFI=0.939; TLI=0.932; and Chisq/df=2.135.

Table 2 shows the factor loading for each item and Cronbach's alpha, CR, and AVE for each domain

Table 1 - Sociodemographic characteristics of the participants (N=218).

Variables	n (%)
Age (years), mean±SD	37.31±9.981
Race	
Malay	160 (73.4)
Chinese	31 (14.2)
Indian	23 (10.6)
Others	4 (1.8)
Religion	
Muslim	162 (74.3)
Buddhist	23 (10.6)
Hindu	21 (9.6)
Christian	11 (5.0)
Others	1 (0.5)
Level of education	
First degree or higher	88 (40.4)
Certificate and diploma	72 (33.0)
Secondary school	56 (25.7)
Below secondary school	2 (0.9)
Marital status of women	
Married	131 (60.0)
Single/divorced	87 (40.0)
Occupation	
Working	178 (81.7)
Not working	27 (12.4)
Student	10 (4.6)
Pensioner	3 (1.4)
Household income per month, mean±SD (USD)	729.14±682
Smoking status	
No	214 (98.2)
Yes	4 (1.8)

Values are presented as numbers and precentages (%). SD: standard deviation, USD: United States dollars

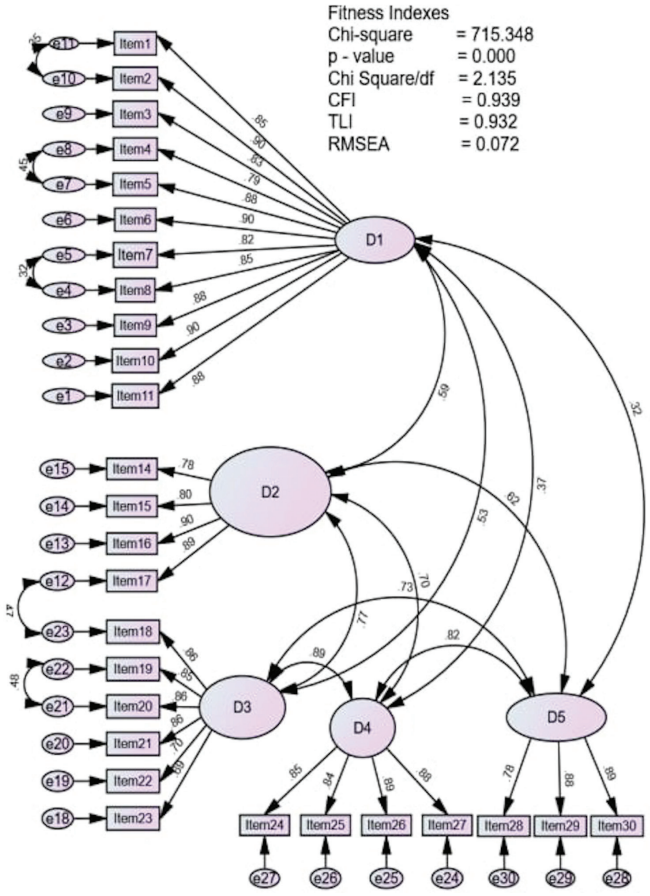

Figure 1 - Path diagram of the revised Malay version showing the 5 domains featuring the 28 items in the EHP-30.

in the Malay version of the EHP-30. It was revealed that Cronbach's alpha values for each domain ranged between 0.89-0.97, indicating a highly acceptable range. The overall Cronbach's alpha value of the Malay version of the EHP-30 was 0.963, showing good internal consistency for the 28 items. The CR values ranged between 0.88-0.96, which was highly acceptable. Meanwhile, the AVE values for the 28 items were acceptable for domain 1: 0.74, domain 2: 0.71, domain 3: 0.65, domain 4: 0.74, and domain 5: 0.72. The overall reliability results showed that the items and domains of the EHP-30 in the Malay version were acceptable to highly acceptable.

Discussion. This study tested the validity and psychometric properties of the Malay version of EHP-30 questionnaire. This tool was used for the measurement of the quality of life among women with endometriosis in Malaysia. The results demonstrate that the Malay version of EHP-30 is validated and reliable in measuring the quality of life among women with endometriosis in our country. An intended latent construct used the method of psychometric properties analysis to identify reliability to produce a more accurate and advanced method.[32] Therefore, for the reliability of each item in the Malay version of the EHP-30, the authors employed internal reliability, composite reliability, and average extracted. Previous studies have reported factor analyses of the EHP-30 in table form only.[19,23,27,29] However, our results are shown in a path of diagram, a more advanced form than others have used. This approach also enabled accurate values of reliability to create an acceptable measurement model.[32,36] Identifying the reliability of the items in the Malay version of the EHP-30 would facilitate the development of novel treatments and may improve results for use in future studies.

In this study, the results shown in the path diagram of the Malay version of the EHP-30 revealed the graphic

Table 2 - Reliability characteristics of the revised Malay version, 5 domains of the 28 items endometriosis health profile-30 (N=218).

Domains	Items	Cronbach's alpha	CR	AVE
Domain 1: Pain	1. Been unable to go to social events because of the pain? 2. Been unable to do jobs around the home because of the pain? 3. Found it difficult to stand because of the pain? 4. Found it difficult to sit because of the pain? 5. Found it difficult to walk because of the pain? 6. Found it difficult to exercise or perform the leisure activities you would like to because of the pain? 7. Lost your appetite or been unable to eat because of the pain? 8. Been unable to sleep properly because of the pain? 9. Had to go to bed/lie down because of the pain? 10. Been unable to do the things you want to do because of the pain? 11. Felt unable to cope with the pain?	0.97	0.96	0.74
Domain 2: Control & Powerlessness	14. Felt frustrated because you are unable to control your symptoms? 15. Felt unable to forget your symptoms? 16. Felt as though your symptoms are ruling your life? 17. Felt your symptoms are taking away your life?	0.91	0.90	0.71
Domain 3: Emotional well-being	18. Felt depressed? 19. Felt weepy/ tearful? 20. Felt miserable? 21. Had mood swings? 22. Felt bad-tempered or short-tempered? 23. Felt violent or aggressive?	0.92	0.91	0.65
Domain 4: Social support	24. Felt unable to tell people how you feel? 25. Felt that others do not understand what you are going through? 26. Felt as though others think you are moaning? 27. Felt alone?	0.92	0.92	0.74
Domain 5: Self-image	28. Felt frustrated as you cannot always wear the clothes you would choose to wear? 29. Felt your appearance has been affected? 30. Lacked confidence?	0.89	0.88	0.72
		Total: 0.963		

CR: composite reliability, AVE: average variance extracted

latent construct and values of factor loading for the 28 items across the 5 domains retained. Items 12 and 13 were removed because the modification indices (MI) were over 15; adjustment procedures were completed.[32] It was revealed that the factor loading values for the 28 items were acceptable to highly acceptable (≥0.65 and above). The fitness values for the measurement model including the absolute fit, incremental fit, and parsimonious fit were also revealed to be acceptable based on the index.[32] Based on these results, the simple 5-domain model showed satisfactory factor loading and satisfied all the confirmatory factors for the goodness of fit criteria, namely RMSEA, CFI, TLI, and Chisq/df, for the last reduction model. The values were acceptable according to the indication for each index.[32] Therefore, the current results produced a fitness measurement model that could be used and referred to by others. Previous studies demonstrated that the results of factor loading were measured and analyzed using IBM-SPSS software for the EHP-30.[19,23,27,29] These studies revealed better values for factor loading. Based on the initial measurements of the EHP-30 items, the factor analysis values were of ≥0.50 and above.[19] However, using a similar analysis method, the Chinese version of the EHP-30 items had a factor loading range from 0.608-0.887, and 5 domains were maintained.[27] Meanwhile, Western studies reported that the psychometric evaluation analysis using IBM SPSS statistics software for the factor analysis of the EHP-30 items revealed factor loading ranging from 0.41-0.83 and from 0.432-0.856.[23,29] Based on the results, some items were low in value. However, 5 domains were still maintained in the EHP-30. Different results are presented in this study, with values of factor loading that were more accurate and produced items with higher acceptance.

The internal consistency of the items in the Malay version of the EHP-30 was measured by Cronbach's alpha, which revealed that the value of the EHP-30 for 28 items overall was acceptable and highly acceptable. These results correspond to the first EHP-30 reliability analysis, which reported that internal reliability was highly acceptable for each domain.[18] Consistent with

other studies, the internal reliability of the EHP-30 was highly acceptable, even across different versions, including the English version with a range from 0.80-0.96; the Chinese version with a range between 0.89-0.97; the Portuguese version with a range between 0.876-0.981; the Swedish version with a range between 0.83-0.96; and the Spanish version ranging from 0.85-0.97.[19,23,24,27,29] This means the reliability of the EHP-30 is acceptable worldwide for use in the field.

The Malay version of the EHP-30 showed that the composite reliability showed that indicated the reliability of each domain, thus achieving composite reliability for a construct model. The method can be extended to the measurement model and successfully measure an intended latent construct.[32] Thus, the Malay version of the EHP-30 was proven more concise and reliable to used. Previous studies analyzed the EHP-30 items for factor analysis using only SPSS.[26,29] However, one study revealed that the value was significant for convergent validity between the EHP-30 and other scales which was different compared to other studies that analyzed the EHP-30 with additional tools for construct validity and convergent validity.[29] While, a study in China revealed that the convergent validity value was good and accepted for all the EHP-30 items.[27] A study in Norway revealed that the value was good correlation for convergent validity of Norwegian version of the EHP-30 and SF-36.[26] In contrast, a study in Sweden reported that the other results concerning the reliability of the EHP-30 items involved the score distribution, floor, and ceiling effects of the items by domain.

Study limitations. The population was limited to one city in Malaysia only. Further studies should investigate a larger cohort that includes all towns in Malaysia. Also, suggest using the Malay version of the EHP-30 when measuring the quality of life among subjects in the community or the clinical field. These findings emphasize the crucial results of the validity and reliability of EHP-30.

In conclusion, the revised Malay version of the EHP-30 retained 28 items and 5 domains based on the high factor loading values. The model for psychometric properties analysis showed that the model was acceptable with the fitness of RMSEA. While internal consistency, CR, and AVE for each domain revealed highly acceptable values. This EHP-30 questionnaire showed that it was validated, reliable, and acceptable in Malay. Thus, it is valid for subsequent studies to measure and investigate the impact of life for those with endometriosis in Malaysia. This questionnaire is essential to identifying the quality of life among those women with endometriosis current and future.

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