Reliability and validity of Champion's Health Belief Model Scale for breast cancer screening among Malaysian women

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ABSTRACT

Introduction: Breast cancer is the leading cause of cancer deaths in Malaysian women, and the use of breast self-examination (BSE), clinical breast examination (CBE) and mammography remain low in Malaysia. Therefore, there is a need to develop a valid and reliable tool to measure the beliefs that influence breast cancer screening practices. The Champion's Health Belief Model Scale (CHBMS) is a valid and reliable tool to measure beliefs about breast cancer and screening methods in the Western culture. The purpose of this study was to translate the use of CHBMS into the Malaysian context and validate the scale among Malaysian women.

Methods: A random sample of 425 women teachers was taken from 24 secondary schools in Selangor state, Malaysia. The CHBMS was translated into the Malay language, validated by an expert's panel, back translated, and pretested. Analyses included descriptive statistics of all the study variables, reliability estimates, and construct validity using factor analysis.

Results: The mean age of the respondents was 37.2 (standard deviation 7.1) years. Factor analysis yielded ten factors for BSE with eigenvalue greater than 1 (four factors more than the original): confidence 1 (ability to differentiate normal and abnormal changes in the breasts), barriers to BSE, susceptibility for breast cancer, benefits of BSE, health motivation 1 (general health), seriousness 1 (fear of breast cancer), confidence 2 (ability to detect size of lumps), seriousness 2 (fear of long-term effects of breast cancer), health motivation 2 (preventive health practice), and confidence 3 (ability to perform BSE correctly). For CBE and mammography scales, seven factors each were identified. Factors for CBE scale include susceptibility, health motivation 1, benefits of CBE, seriousness 1, barriers of CBE, seriousness 2 and health motivation 2. For mammography the scale includes benefits of mammography, susceptibility, health motivation 1, seriousness 1, barriers to mammography seriousness 2 and health motivation 2. Cronbach's alpha reliability coefficients ranged from 0.774 to 0.939 for the subscales.

Conclusion: The translated version of the CHBMS was found to be a valid and reliable tool for use with Malaysian women. It can be used easily to evaluate the health beliefs about breast cancer, BSE, CBE and mammography and for planning interventions. For greater applicability, it is recommended that this tool be tested among ethnically diverse populations.

Keywords: breast cancer, breast cancer screening, breast self-examination, Champion Health Belief Model, clinical breast examination, health belief model

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INTRODUCTION

Cancer now ranks as the third most important cause of death in Malaysia, and the primary site of cancer in Malaysian women is in the breast, representing about 31% of all female cancers.[1] In 2002, 50% of all newly-diagnosed cases of breast cancer occurred in women below the age of 50 years.[2] A better survival rate of breast cancer has been associated with early diagnosis and treatment.[3,4] Regular performance of breast self-examination (BSE), clinical breast examination (CBE) and mammography have been noted to be the most effective methods for early detection of breast cancer.[5] Based on a report from the Ministry of Health, Malaysia, among 60,000 women in all states, the rates of participation of Malaysian

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Table I. Sociodemographic characteristics of the respondents (n = 425).

Characteristics	No. (%)	Mean and SD (range)
Age (years)		37.17 ± 7.16 (23–56)
20–30	85 (20.0)	
31–40	202 (47.5)	
41–50	116 (27.3)	
> 51	22 (5.2)	
Ethnic		
Malay	357 (84.4)	
Chinese	36 (8.5)	
Indian	25 (5.9)	
Others	7 (1.2)	
Marital status		
Married	378 (88.9)	
Single	38 (8.9)	
Widow	5 (1.1)	
Divorced	4 (0.9)	
Religion		
Muslim	361 (84.9)	
Buddhism	28 (6.5)	
Hindu	23 (5.5)	
Christian	13 (3.1)	
Education		
Diploma	23 (5.4)	
Degree	376 (88.5)	
Postgraduate	18 (4.2)	
Others	8 (1.9)	
Health insurance		
Uninsured	87 (20.4)	
Government	52 (12.3)	
Private	286 (67.3)	
Teaching experience (years)		11.96 ± 6.94 (1–36)
< 10	199 (46.8)	
10–20	175 (41.2)	
21–30	51 (12.0)	
Income (RM)*		2,580 ± 760.0 (1,325–6,573)

* (USD 1 = RM 3.4)

women in breast cancer screening are low. Only one in three of women aged > 20 years had ever performed BSE and CBE, while mammography was carried out in only 3.8% of women ≥ 50 years of age. There was a significant difference in the screening rates between urban and rural areas (50.6% vs. 42.3%, respectively, $p < 0.05$).[6]

To explore the social and cultural factors involved in women health behaviours, a health belief model (HBM) was developed by Rosenstock, Hochbaum, Leventhal and Kegeles in the 1950s with four original concepts: (a) susceptibility: perceived personal vulnerability to a health condition; (b) seriousness: perceived personal harm of the condition; (c) benefits: perceived positive attributes of an action; and (d) barriers: perceived negative aspects related to an action.[7] Two other concepts were later added to the original HBM: general health motivation, defined as beliefs and behaviours related to the state of general concern about health; and confidence, defined as the belief that one can successfully execute a behaviour that will then lead to a desirable outcome.[8] This model was revised and validated by Victoria Champion,[9,10] to examine HBM constructs related to breast cancer and screening.

The revised Champion's HBM Scale (CHBMS) includes six concepts: (1) perceptions about susceptibility to breast cancer; (2) severity of the breast cancer; (3) perceived benefits for the presumed action; (4) perceived barriers for the presumed action; (5) confidence in one's ability; and (6) health motivation. According to Champion's HBM, women with perceived seriousness and susceptibility to breast cancer are more likely to participate in breast cancer screening. On the other hand, women must perceive benefits to screening and perceive few barriers. The Champion's HBM has been tested mostly in the Western cultures.[11,12] The Arabic,[13] Korean[14] and Turkish[15] language versions of the CHBMS have been evaluated and found to be a valid and reliable tool for use among women. Significant increases in breast cancer screening rates have been shown in intervention studies based on the HBM.[16,17] In addition, other studies have found positive correlations between participation in breast cancer screening and the HBM constructs.[18,19]

Understanding Malaysian women's beliefs related to breast cancer screening behaviours will help physicians and other healthcare professionals implement health education programmes with the potential to increase screening practices. A valid and reliable instrument for determining the beliefs of Malaysian women on breast cancer screening has not been reported. The purpose of this study was to test the reliability and validity of the Malay language version of the CHBMS to measure Malaysian women's beliefs about breast cancer, BSE, CBE and mammography.

METHODS

A cross-sectional study was carried out among female secondary school teachers in the state of Selangor, Malaysia, between January and April 2006. A multistage random sampling was used to select the schools. Out of nine districts in Selangor, four districts were selected randomly. Six secondary schools from all schools in each selected district were then chosen randomly (giving a total of 24 secondary schools). The participants eligible for the study met the following criteria: age between 22 and 56 years (age range of working female teachers currently in employment up to retirement), no history of breast cancer or any other cancers, not pregnant or breastfeeding. A total of 425 teachers met the inclusion criteria and gave informed consent to participate in this study. A

Table II. Rotated factor analysis of CHBMS for BSE (n = 425).

Factor	1 Confidence 1	2 Barrier	3 Susceptibility	4 Benefits	5 Health motivation 1	6 Seriousness 1	7 Confidence 2	8 Seriousness 2	9 Health motivation 2	10 Confidence 3
	CON 2 0.802	BAR 5 0.846	SUS 4 0.919	BEN 4 0.815	HM 2 0.859	SER 2 0.865	CON 6 0.880	SER 5 0.794	HM 6 0.838	CON 9 0.577
	CON 1 0.778	BAR 3 0.835	SUS 2 0.912	BEN 5 0.800	HM 1 0.845	SER 3 0.858	CON 7 0.845	SER 7 0.781	HM 7 0.832	CON 10 0.499
	CON 3 0.767	BAR 1 0.776	SUS 3 0.901	BEN 3 0.692	HM 4 0.824	SER 1 0.828	CON 5 0.615	SER 6 0.770	HM 5 0.502	
	CON 4 0.765	BAR 4 0.772	SUS 5 0.893	BEN 6 0.682	HM 3 0.745	SER 4 0.704				
	CON 11 0.647	BAR 6 0.766	SUS 1 0.841	BEN 2 0.633						
	CON 8 0.614	BAR 2 0.680		BEN 1 0.569						
Eigenvalue	4.274	4.268	4.095	3.442	3.240	2.991	2.339	2.107	2.000	1.484
Variance	10.177	10.161	9.749	8.195	7.715	7.121	5.568	5.017	4.761	3.533

questionnaire was developed to obtain information on sociodemographical variables, such as the respondent's age, ethnic group, marital status, years of education and teaching, healthcare insurance coverage, income, and their beliefs and barriers to breast cancer screening.

The modified CHBMS instrument includes 63 questions on ten subscales: susceptibility (five items), seriousness (seven items), benefits of BSE (six items), barriers to BSE (six items), confidence on BSE practice (11 items), health motivation (seven items), benefits of CBE (four items), barriers to CBE (six items), benefits of mammography (six items), and barriers to mammography (five items). The scales were measured with an ordinal scale using a five-point Likert scale, with the following given responses: "strongly agree", "agree", "undecided", "disagree" and "strongly disagree", and which were respectively awarded the marks of five, four, three, two and one. For the barriers scales, five marks were given for "strongly disagree", four for "disagree", three for "undecided", two for "agree" and one mark for "strongly agree". All subscales were positively related to breast cancer screening practices, except for barriers which were negatively associated. Permission to use the CHBMS was obtained from Victoria Champion in 2005. The scale was translated using a back-translation technique. Two bilingual linguistic experts translated the original version of the CHBMS independently from English into Malay. The experts met and reviewed the translations together for inconsistencies with the original English form. The adequacy of the Malay translation of the CHBMS was evaluated using the back-translation technique and content validity; the Malay version of CHBMS was translated back into English by a bilingual individual from a health research centre. The back-translated and original versions of the CHBMS were compared with attention given to the meaning and grammar.

Content validity was ascertained by an expert panel comprising professionals who were nursing faculty members, an oncologist, a radiologist specialising in diagnosis and screening of breast cancer, a gynaecologist and two family physicians. As the original CHBMS does not have beliefs regarding CBE, the researcher developed and added two sections to the CHBMS, i.e. "benefits of clinical breast exam" (four items) and "barriers to clinical breast exam" (six items), and tested them for validity and reliability. The Malay version of the instrument was pretested on 30 female teachers to check the clarity and ambiguity of the items. This study obtained approval from Ministry of Education, Malaysia and Ethics Committee of the Faculty of Medicine and Health Sciences, University Putra Malaysia.

Descriptive statistics were computed for the sociodemographical characteristics. Reliability was assessed by using item-total subscale correlations and Cronbach's alpha coefficients. The items for each subscale were examined for internal consistency. The desired criteria of item-total correlation were > 0.30 and alpha levels of ≥ 0.70 were considered desirable. If there was an increase of > 0.10 in the total scale reliability or a correlation of < 0.30 between an item and subscale score, these items were considered as having poor function and thus were deleted.[20] Descriptive statistics, including mean and standard deviation (SD), were computed for each subscale of the CHBMS. To test for construct validity of the scales and understand underlying factors related to women's beliefs on breast cancer and breast cancer screening methods, the items of the ten translated scales were pooled and subjected to factor analysis. A principal component analysis was used to extract the factors. Kaiser-Mayer-Olkin (KMO) > 0.6 and Bartlett's test for sphericity ($p < 0.05$) were considered adequate for sampling adequacy of factor analysis. Any factor with an eigenvalue ≥ 1 was considered significant for factor extraction. The obtained factors were rotated orthogonally using the varimax procedure. The arbitrary criterion that variables with factor loading of ≥ 0.40 be retained was applied.[19-21] The Statistical Package for Social Sciences version 13.0 (SPSS Inc, Chicago, IL, USA) was used for data analysis.

Table III. Rotated factor analysis of CHBMS for CBE among women aged 30 years and older (n = 340).

Factor	1 Susceptibility	2 Health motivation 1	3 Benefits	4 Seriousness 1	5 Barriers	6 Seriousness 2	7 Health motivation 2
	SUS 4 0.914	HM 2 0.877	BEN 1 0.861	SER 3 0.860	BAR 6 0.770	SER 7 0.796	HM 6 0.862
	SUS 2 0.910	HM 1 0.858	BEN 2 0.843	SER 2 0.856	BAR 5 0.750	SER 5 0.793	HM 7 0.811
	SUS 3 0.901	HM 4 0.802	BEN 3 0.799	SER 1 0.831	BAR 4 0.699	SER 6 0.779	HM 5 0.559
	SUS 5 0.888	HM 3 0.751	BEN 4 0.764	SRE 4 0.713	BAR 3 0.676		
	SUS 1 0.839				BAR 2 0.618		
					BAR 1 0.574		
Eigenvalue	4.061	3.163	2.961	2.957	2.903	2.100	1.961
Variance	14.004	10.906	10.212	10.196	10.012	7.240	6.763

Table IV. Rotated factor analysis of CHBMS for mammography among women aged 40 years and older (n = 138).

Factor	1 Benefits	2 Susceptibility	3 Health motivation 1	4 Seriousness 1	5 Barriers	6 Seriousness 2	7 Health motivation 2
	BEN 3 0.907	SUS 4 0.920	HM 4 0.875	SER 3 0.880	BAR 4 0.782	SER 7 0.825	HM 6 0.880
	BEN 6 0.882	SUS 2 0.912	HM 2 0.869	SER 2 0.864	BAR 5 0.773	SER 5 0.797	HM 7 0.723
	BEN 4 0.881	SUS 3 0.897	HM 1 0.863	SER 1 0.862	BAR 3 0.754	SER 6 0.733	
	BEN 2 0.845	SUS 5 0.882	HM 3 0.845	SER 1 0.862	BAR 2 0.695		
	BEN 5 0.834	SUS 1 0.803	HM 5 0.596		BAR 1 0.597		
	BEN 1 0.730						
Eigenvalue	4.671	4.026	3.621	3.167	2.725	2.213	1.903
Variance	15.571	13.421	12.070	10.557	9.082	7.376	6.342

RESULTS

The mean age of respondents was 37.17 (SD 7.16, range 23–56) years. Most of them were married, Muslim and Malay. Nearly all of them had degrees, while 20% had no medical insurance. Most of the teachers had less than 20 years of teaching experience (Table I). Only 19%, 25% and 13.6% eligible women, respectively, performed BSE, CBE and mammography on a regular basis. The most common reasons for not doing breast cancer screening practices were lack of knowledge (43%), being too busy (41%), embarrassment (35%), fear of cancer diagnosis (18%), cost (15%), and believing that it was not necessary (12%). Respondents were allowed to select more than one option.

The factor analysis for the subscales related to BSE was conducted by using 42 items of the CHBMS. KMO measure was 0.872 (chi-square 11,062.49, $p < 0.001$) which showed that the sample size was adequate. Ten significant factors were identified for BSE, four more than were originally specified. Table II shows the results of the factor analysis for BSE. The confidence (CON) scale, represented by Factors 1, 7, and 10, accounted for about 10.17%, 5% and 3% of the variance in the frequency of BSE, respectively. Factor 1 included items measuring women's confidence in the ability to differentiate between the normal and abnormal changes in the breasts, Factor 7 included items measuring confidence in detecting the lump's size, and factor 10 included items measuring the confidence in the ability to perform BSE correctly. The correlation coefficient between the three factors were moderate: between factor 1 and 7 ($r = 0.559$, $p < 0.01$), between factor 1 and 10 ($r = 0.600$, $p < 0.01$), and between factor 7 and 10 ($r = 0.466$, $p < 0.01$). Cronbach's alpha of factors 1, 7 and 10 were 0.885, 0.846 and 0.654, respectively. The low rate of Cronbach's alpha coefficient of factor 10 was due to a low number of items (only two items) in this factor. Cronbach's alpha coefficient was 0.901 when these three confidence factors were combined into one factor for the confidence scale.

The six items of the barriers (BAR) of BSE scale were loaded together as Factor 2 and accounted for 10.16% of the variance. Factor 3 accounted for about 9.74% of the variance and represented all the five items of the susceptibility (SUS) scale. Factor 4 accounted for about 8.19% of the variance and represented all the six items of the benefits (BEN) of BSE scale. Factors 5 and 9 showed items related to the motivation (MOT) scale. Factor 5 included items related to general concern about health and accounted for 7.71% of the variance. Factor 9 included items related to preventive health practices. The two factors (5 and 9) accounted for about 6.5% of the total variance. The two factors showed moderate correlations with each other ($r = 0.347$, $p < 0.01$). Cronbach's alpha of factors 5 and 9 were 0.879 and 0.716, respectively. It was 0.792 after collapsing these two factors. Therefore, the two factors were considered as one health motivation scale. Factors 6 and 8 both yielded items for seriousness (SER). Factor 6 included items related to fear of breast cancer accounting for 7.12% of the variance, and factor 8 included beliefs about long-term effects or consequences

Table V. Comparison of the Malaysian Health Beliefs Model with other studies.

	Current study		Champion[10]	Mikhail & Petro-Nustas[13]	Secginli & Nahcivan[15]
	Cronbach's alpha	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Susceptibility	0.939	2.35 ± 0.79	2.54 ± 0.81	2.74 ± 0.73	2.58 ± 0.62
Seriousness	0.860	3.44 ± 0.74	3.25 ± 0.68	3.39 ± 0.78	3.41 ± 0.74
Benefits of BSE	0.865	3.84 ± 0.56	3.88 ± 0.52	3.97 ± 0.59	3.60 ± 0.64
Barriers to BSE	0.891	3.77 ± 0.60	2.02 ± 0.60	3.77 ± 0.68	2.52 ± 0.74
Confidence of BSE	0.901	3.37 ± 0.51	3.31 ± 0.57	2.65 ± 0.73	3.16 ± 0.55
Health motivation	0.792	3.89 ± 0.52	3.78 ± 0.59	3.85 ± 0.50	3.55 ± 0.55
Benefits of mammography	0.933	3.57 ± 0.66			3.84 ± 0.56
Barriers to mammography	0.881	2.99 ± 0.59			2.74 ± 0.69
Benefits of CBE	0.875	3.95 ± 0.58			
Barriers to CBE	0.774	3.14 ± 0.63			

of breast cancer with 5.01% of the variance. These two factors had a significant moderate correlation with each other ($r = 0.517$, $p < 0.01$), Cronbach's alpha of factors 6 and 8 were 0.867 and 0.789, respectively, but it was 0.860 after collapsing these two factors. Thus, the seriousness items were considered as one scale.

The factor analysis for the subscales related to CBE was conducted by using 29 items, which were items of susceptibility and seriousness of breast cancer, health motivation from the CHBMS and items related to benefits and barriers of CBE developed by the investigators of this study. Data from 340 eligible women aged ≥ 30 years and who had CBE, were analysed (KMO = 0.833, chi-square = 6,700.933, and $p < 0.001$). This analysis resulted in 7 factors (Table III) and explained 69% of variance in CBE practice. Factors 1, 3 and 5 accounted for about 14.0%, 10.2% and 10.0% of the variance, respectively, and represented susceptibility for breast cancer, benefits from CBE and barriers to CBE items. Health motivation loaded on factors 2 and 7 accounted for about 10.9% and 6.7% of variance, respectively. The correlation coefficient between the two health motivation factors were moderate ($r = 0.347$, $p < 0.01$). Cronbach's alpha of factors 2 and 7 were 0.879 and 0.716, respectively. It was 0.792 when these two health motivation factors were collapsed, thus retaining the health motivation items in this study. Seriousness loaded on factors 4 and 6 accounted for about 10.2% and 7.2% variance, respectively. The correlation coefficient between two seriousness factors was moderate ($r = 0.517$, $p < 0.01$). Cronbach's alpha of factors 4 and 6 were 0.867 and 0.789, respectively. It was 0.860 when these two seriousness factors were collapsed, thus the seriousness items which met the criteria of reliability were retained as a scale in this study.

The factor analysis for the subscales related to mammography was conducted using 30 items of CHBMS among women, aged ≥ 40 years (n = 138). KMO was 0.761 (chi-square = 2,927.292, $p < 0.001$) which showed the adequacy of the sample size. This analysis resulted in 7 factors (Table IV). Four of them were in the original model and overall explained 74% of the variance. Factors 1, 2 and 5 accounted for about 15%, 13% and 9% of the variance, respectively, and represented all the benefits from mammography, susceptibility for breast cancer and barriers items for mammography. Health motivation loaded on factors 3 and 7 accounted for about 12% and 6% of variance, respectively. The correlation coefficient between the two health motivation factors was moderate ($r = 0.396$, $p < 0.01$). Cronbach's alpha of factors 3 and 7 were 0.894 and 0.684, respectively. Cronbach's alpha coefficient was 0.841 on collapsing these factors. Thus the health motivation items which met the criteria of reliability were retained.

Seriousness was loaded on factors 4 and 6, which accounted for about 10% and 7% variance, respectively. The correlation coefficient between the two seriousness factors was moderate ($r = 0.413$, $p < 0.01$). Cronbach's alpha of factors 4 and 6 were 0.893 and 0.810, respectively. After collapsing these two factors, the Cronbach's alpha was 0.855. Thus, all of the seriousness items which met the criteria of reliability were retained. All items met the reliability criteria and the alpha coefficient of scales ranged from 0.774 to 0.939. Item analysis showed that the lowest mean subscale score was 2.39 (SD 0.79) for susceptibility and highest mean score was 3.95 (SD 0.58) for benefits of CBE. Moreover, women's beliefs about breast cancer and screening behaviours were compared using the mean and SD values (Table V).

DISCUSSION

In this study, the investigators adapted, translated, and tested the CHBMS for measuring women's beliefs about breast cancer and breast cancer screening. The results from this study indicate that the CHBMS is a reliable and valid tool for measuring the screening behaviour of breast cancer in Malaysian women. The content validity of the instrument, which was reviewed by an expert panel, seems sufficiently high. The Cronbach's

alpha coefficients for all subscales ranged from 0.77 to 0.94, indicating good levels of internal consistency; and each scale item demonstrated acceptable corrected item correlations of > 0.30 (range 0.49–0.91).[20] The mean subscale scores obtained were very similar to previous studies.[8,13,15] The items of the BSE, CBE and mammography subscales were examined for construct validity. Ten factors were identified for BSE, seven each for CBE and mammography. All the items in each of the susceptibility, benefits-BSE and barriers-BSE subscales clustered together, as in Champion's study.[9] All these items met the loading criterion and loaded separately on each factor.

In this study, items in the confidence subscale loaded on three factors, similar to the Jordanian study,[13] but different from the American,[17] Korean[14] and Turkish[15] studies. The confidence items 9 and 10—"I am able to identify normal and abnormal breast tissue when I do breast self examination", "When looking in the mirror, I can recognise abnormal changes in my breast," respectively—had a low factor loading (0.577 and 0.499, respectively), but had an acceptable item-total subscale correlation (r = 0.47). Cultural relevance and little knowledge about breast cancer and BSE could have influenced this observation. To recognise abnormal changes in the breast, women need basic knowledge about BSE and must have routinely performed the breast examination. Findings of this study show that the breast cancer knowledge of this group of women was inadequate, the rate of performing BSE was low, and most of the women did not know how to examine their breasts correctly. Educational programmes for breast cancer and BSE are also not prevalent. The findings in the current study may underline the importance of educating women to correctly and routinely examine their breasts and giving them opportunities for supervised practice to increase confidence in their ability to perform BSE.

Consistent with previous findings, items in the health motivation subscale loaded on two factors (general concern about health and preventive health practices) in this study. The health beliefs associated with health motivation in the Malaysian, Turkish[15] and Jordanian[13] women were very similar. Three items related to preventive health practices, however, do not seem relevant to this group, similar to the Turkish study. It is not surprising that preventive practices, such as "eat well-balanced meals," "exercise at least three times weekly," and "regular health checkups," are unsatisfactory among the Malaysian people. According to the National Cancer Registry Malaysia[1] and National Health and Morbidity Survey Report,[6] Malaysian women utilise healthcare services inadequately, and the rates of having regular health checkups are low in the general population.

For Malaysian women, similar to Jordanian women,[13] it was evident that the mean barriers-BSE score was higher and the mean susceptibility score was lower than in Turkish[15] and American[11] women. According to previous studies, fatalism and belief in the role of God in illnesses were common among various Muslim women, especially those with Arab cultures.[13,22,23] Champion and Menon indicated that a fatalistic outlook would prevent women from understanding the benefits of early detection methods.[24] This may explain why Malaysian women perceive higher barriers and lower susceptibility for getting breast cancer, compared to their counterparts from other countries.

Due to the lack of breast screening programmes in developing countries, women should be aware of the availability of CBE and actively seek help from their healthcare provider. For this reason, investigators added ten items to the CHBMS related to the benefits (four items) and barriers (six items) of CBE. Overall, 29 items were clustered into seven factors. Two distinct but strongly-correlated dimensions were found for the seriousness scale (fear of breast cancer and beliefs about the long-term effects of breast cancer), while the motivation scale showed two dimensions that were only moderately correlated (general concern about health and preventive health practices). All the items met the loading criterion and loaded separately on each factor. As other studies using the CHBMS did not include beliefs on CBE, the results of this study provide a valid and reliable scale for assessing women's beliefs related to CBE. Regarding beliefs on mammography, 30 items clustered into seven factors. All the items in each of the susceptibility, benefits-mammography and barriers-mammography subscales clustered together. Like CBE, belief items related to the seriousness and health motivation were divided into two factors for each subscale, which related moderately together. Similar results were reported by Secginli and Nahcivan in their study of Turkish women.[15]

In conclusion, the Malay language version of the CHBMS appears to be a useful instrument for assessing women's beliefs related to breast cancer and breast cancer screening. It could be easily used by nurses and other healthcare providers to determine the beliefs prior to planning appropriate interventions. To decrease breast cancer mortality through early detection, physicians and healthcare providers must broaden their understanding of the factors that influence women's breast cancer

screening behaviours. Furthermore, health teams have an important task in giving women meaningful education aimed at preventive behaviours and encouraging a healthy lifestyle. They can provide continuing education about breast cancer screening and its importance, and help their clients to detect early signs of breast cancer. There is a need for strategies to minimise the perception of barriers. More refinement of the confidence and health motivation scales is recommended to identify the beliefs associated with these concepts. Testing of the instrument among culturally-diverse populations would strengthen the generalisability of the findings.

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