PUBLIC HEALTH RESEARCH

Validity and Reliability of Malay Version Physical Activity (BPA) Questionnaire among Nurses

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ABSTRACT

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Introduction Physical activity reduces risk of non-communicable diseases. Physical activity prevalence is low due to barriers to physical activity. This study was conducted to translate the Barrier to Physical Activity (BPA) questionnaire into Malay and assess the reliability and validity of the translated version among nurses.

Methods The Malay version of BPA was developed after translating the English version of BPA through back to back translation process. The Malay BPA was distributed among 306 volunteered nurses from 5 government hospitals in Selangor state. Factor analysis, Cronbach's alpha test and test – retest reliability was conducted to determine psychometric properties of BPA.

Results Chronbach's alpha coefficient was 0.79 for perceived benefits items and 0.51 for perceived barrier items (overall was 0.73). The ICC was 0.88 (95% CI: 0.78-0.93) for test-retest testing after 7 days. Two factors components were yielded through exploratory factor analysis with eigenvalues of 3.9 and 2.0 respectively. Both the factors accounts for 31.4 % of the variance. Factor 1 included 14 items and explained 19.9% of the variance. Factor 2 consisted of 5 items and explained 11.5% of variance. CFA yielded two factor structures with acceptable goodness of fit indices [x^2/df = 23.99; GFI = 0.82, SRMR = 0.09; PNFI = 0.49 and RMSEA = 0.10 (90%CI = 0.09-0.11)].

Conclusions The Malay version of BPA had demonstrated satisfactory level of validity and reliability to assess barriers to physical activity. Therefore, this questionnaire is valid in assessing barriers to physical activity among working population.

Keywords Barriers to Physical Activity - validity and reliability - nurses - physical activity.

INTRODUCTION

Studies had shown that physical activity reduces the risk of getting cardiovascular diseases[1], diabetes mellitus[2], hypertension[3] and metabolic syndrome[4]. In addition, community based physical activities interventions were found to be effective in reducing the risk of NCD as well as cost effective[5]. Physical activities between the range of 500 to 1000 MET – minutes per week were sufficient for substantial reduction in diseases occurrence[6].

However, convincing a person to undertake physical activity for health benefits is a difficult task. The global prevalence of physical inactivity is 17%[7] and for Malaysian adults is up to 60%[8]. There are numerous reasons that influence a person to decide either to be physically active or otherwise. Study tools such as questionnaires are commonly used to assess these barriers to physical activity. These study tools are developed and tailored to accommodate their suitability in assessing the barriers to physical activity in the respective communities or target groups that it was intended. Even thou there are some general barriers to physical activities reported such as lack of time[9-11], feeling too tired[9,10], lack of money[9,11] and no motivation and lack of company[9,10]; there are barriers that are associated with local community customs and traditions. These barriers are frequently not addressed in the standardized questionnaires. Addressing these barriers is pivotal in communities that are strongly influenced by traditions and customs especially like Malaysia; which consists of multiracial community that adheres strongly to customs and traditional values. Failure to address these barriers will lead to incomplete representation of barriers to physical activity in a given community.

As such, due to lack of published data determining the barriers for physical activity by incorporating the local culture and beliefs, this study was conducted to translate the barriers to physical activity (BPA) questionnaire into Malay and subsequently determine the reliability and validity among female government hospital nurses in Selangor state as they form the pillars for disseminating and promoting the health benefits of physical activities to the patients and the general population.

This BPA questionnaire was compiled by incorporating the common barriers that were published and taking into consideration of local culture and beliefs. It consists of 4 components with a total of 19 items. The 4 components are individual (9 items), social (4 items), environment (2 items) and work (4 items). There were a total of 26 items chosen from the various sources to assess the barriers to physical activity. A study was conducted among nurses in a university hospital to assess the validity and reliability of these 26 items. As an end result, these 26 items were reduced to 19 items after fulfilling satisfactorily the validity and reliability.

METHODS

Participants

This study is a part of an ongoing study that is trying to determine the association between works related fatigue and metabolic syndrome among nurses and involves 9 government hospitals in Selangor state. For this study, 306 nurses out of 350 volunteered to take part from 5 government hospitals and all of them were above 40 years who had undergone yearly screening at the respective hospitals from January 2012 till December 2013. Prior to questionnaire distribution, verbal consent was obtained from the participants. This study had obtained ethical approval from the Medical Research and Ethics Committee (MREC) with approval no 1087-12404.

Instrument

For this study, barriers to physical activity (BPA) questionnaire was used. This questionnaire consists of 4 components with a total of 19 items. The 4 components are individual (9 items), social (4 items), environment (2 items) and work (4 items). These items are available in English. Each of the items was assigned a Likert scale ranging from strongly disagrees to strongly agree. 14 of the items are perceived benefits for physical activity (coded 1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree and 5 = strongly agree) while 5 items are perceived barriers for physical activity (coded 1 = strongly agree. 2 = agree, 3 = uncertain, 4 = disagree and 5 = strongly disagree). Once the individual item score had been calculated, a total score was derived by summing up all the items score. The total score ranges from 19 to 95. An individual was considered more prone to be active in physical activity if the scores were high while lower scores demonstrated that an individual was less prone to be active in physical activity.

Translation

Language expert translated the English version of BPA into Malay language and another expert translated the Malay version back to English language. Comparison was made between the translated English versions to the original English BPA version. Grammatical errors and language errors of the Malay version were done. These processes were repeated till a satisfied Malay version of BPA was derived. Pre-testing of the final Malay version was conducted among 35 nurses from a university hospital and final correction to grammatical errors or language errors were made. All the language experts did not have prior knowledge of the English version of BPA during the translation process.

Data collection

In all the participating hospitals, a corresponding nurse was assigned and the questionnaires were distributed to the respondents through the corresponding person. Coding was used to maintain their privacy. The objectives of the study were informed to the respondents and verbal consent was obtained from the respondents prior to questionnaire distribution. Privacy and confidentiality of their data was assured to all the respondents. A test – retest was conducted after 7 days by redistributing the questionnaires to 40 nurses from the initial study.

Statistical Analysis

SPSS version 19 was used for data analysis. Demographic data were described by using descriptive statistics. An exploratory factor analysis was conducted and the values of Kaiser- Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) and Bartlett's test of sphericity were observed. Principal component analysis and varimax rotation were used to assess the factor structure.

For measuring the goodness of fit of 2 construct of the questionnaire, confirmatory factor analysis with the maximum likelihood (ML) estimation method was used with fit indices such as Goodness of Fit Index (GFI) ≥ 0.90, Standard Root Mean Square Residual (SRMR) ≤ 0.10, Root Mean Square Error of Approximation (RMSEA) ≤ 0.08[12] and Parsimonious Normed Fit Index (PNFI) [13]. Chronbach's alpha coefficient was measured to determine the internal consistency of the Malay version questionnaire. Intraclass correlation coefficient was used to determine the test - retest reliability.

RESULTS

Socio-demographic characteristics

There were 306 respondents with mean (SD) of age was 46.7 (5.6). Majority were Malays (83.7%) followed by Chinese (8.2%), Indian (6.2%) and others (2%). Most of the respondents were married; 286 (93.5%), 17 (5.5%) were single and 3 (1%) were widowed. Majority of them were working in a mixed environment (36.6%), followed by office work (33.3%), and shift work (30.1%). The mean (SD) of working experience was 22 (5.7) years. Table 1 (above) describes the demographic of the respondents. The mean (SD) score for barriers for physical activity was 60.4 (8.1).

Table 1 Respondents' socio-demographic characteristics (n=306)

Variable	Total (n)	Percentage (%)
Age		
40 – 44	136	44.4
45 – 49	69	22.5
50 – 54	58	19.0
55 – 59	43	14.1
Ethnicity		
Malay	256	83.7
Chinese	25	8.2
Indian	19	6.2
Others	6	2.0
Marital status		
Married	286	93.5
Single	17	5.5
Widow	3	1.0
Work routine		
Office work	102	33.3
Shift	92	30.1
Mixed	112	36.6
Working experience (years)		
10 – 19	128	41.8
20 – 29	136	44.4
30 – 39	42	13.8

Table 2 Retest reliability of BPA components for 40 respondents

	Day 1		Day 7			
	Mean	SD	Mean	SD	ICC	CI
Personal	30.3	3.8	30.0	4.0	0.72*	0.53 – 0.84
Social	13.4	2.4	13.5	2.6	0.80*	0.66 – 0.89
Environment	5.7	1.6	5.7	1.5	0.86*	0.75 – 0.92
Work	11.1	2.7	11.3	2.7	0.86*	075 – 0.92
Perceived benefit	46.5	7.2	46.0	7.1	0.81*	0.67 – 0.90
Perceived barrier	14.3	2.8	14.3	3.2	0.77*	0.60 – 0.87
Total	60.4	8.1	60.5	8.3	0.88*	0.78 – 0.93

SD = Standard deviation
ICC = Intraclass correlation coefficient
CI = Confidence interval
* = $p < 0.001$

Reliability testing

For the reliability testing, the Chronbach's alpha coefficient was 0.79 for perceived benefits for physical activity items and 0.51 for perceived barriers for physical activity items. The total alpha value was 0.73. The intraclass correlation coefficient (ICC) for the total BPA questionnaire was 0.88 (95% CI: 0.78-0.93) for test-retest testing after 7 days. For the BPA components, the ICC value ranges from 0.72 till 0.86 and all the correlations were significant ($p < 0.001$). Table 2 shows the ICC for the components of BPA questionnaire.

Factor analysis

The prerequisites to conduct EFA were fulfilled since this study had adequate sample size to conduct EFA (KMO measure of sampling = 0.74 and Bartlett's test of sphericity X^2 (171) = 1295.20, $p < 0.001$). Exploratory factor analysis with varimax rotation yielded 2 factors components with total variance of 31.4%. Factor 1 included 14 items and explained 19.9% of the variance while factor 2 consisted of 5 items with 11.5% of variance. The eigenvalues for both the components were 3.9 and 2.0 respectively. The factor loading of the items were between 0.30 till 0.69. Item 10 had 2 factor loading values. The fit indices for CFA showed two factor structures with the following indices: x^2/df = 3.99; GFI = 0.82; SRMR = 0.09; PNFI = 0.49 and RMSEA = 0.10 (90%CI = 0.09–0.11). These fit indices showed an acceptable rather than a good fit of the model. The standardized factor loading of CFA ranges from 0.23 to 0.73 as shown in table 5.

Table 3 Mean score, standard deviation, Cronbach's alpha and Factor loadings of Malay version BPA

Items/ Scales	Mean	SD	Item total correlation	α	Factor Loadings[a]
Perceived Benefit	49.02	6.40		0.79	
BPA 1	4.14	0.72	0.24		0.23
BPA 2	3.94	0.61	0.34		0.37
BPA 6	3.79	0.82	0.30		0.30
BPA 7	2.84	1.01	0.45		0.48
BPA 8	3.22	0.94	0.36		0.37
BPA 10	3.86	0.75	0.39		0.52
BPA 11	3.70	0.73	0.54		0.66
BPA 12	2.95	0.96	0.53		0.61
BPA 13	3.54	0.85	0.22		0.24
BPA 14	2.79	1.05	0.55		0.60
BPA 15	3.19	0.87	0.45		0.49
BPA 16	2.90	1.01	0.41		0.45
BPA 17	3.47	0.83	0.54		0.66
BPA 19	3.31	0.94	0.36	0.51	0.41
Perceived Barrier	14.24	2.97			
BPA 3	2.69	1.08	0.42		0.73
BPA 4	3.38	0.98	0.23		0.26
BPA 5	3.07	1.02	0.34		0.38
BPA 9	2.77	1.03	0.18	0.73	0.26

BPA 18	2.33	0.99	0.25	0.45
BPA 19 total				

a = Factor loading from confirmatory factor analysis
α = Cronbach's alphas

DISCUSSION

The objective of this study was to determine the reliability and validity of the Malay version of BPA questionnaire in the nursing population. The reliability of the questionnaire was considered satisfactory as the overall Cronbach's alpha was 0.73 and for the components it ranges from 0.51 to 0.79. The lowest Cronbach's alpha value was for the perceived barriers to physical activity component. Attempts to yield higher alpha values by deleting the low loading items did not yield a better alpha value. The possibility of low alpha value may be due to the low number of questions representing this component[14].

Intraclass correlation coefficient (ICC) was performed to analyze test – retest reliability testing conducted after 7 days with 40 nurses and the ICC of the total score was satisfactory and significant. Correlations between the perceived benefit and the perceived barrier were also significant, implying that this questionnaire is reliable in assessing the barriers to physical activity of respondents after 1 week. Likewise, the correlations between the individual, social, environment and work factors were also significant.

For the construct validity, exploratory factor analysis yielded 2 factor components and these components accounted for 31.4% of the variance. Item 10 had 2 loading values and this may be due to the poor wording of the item or misunderstanding of the question by the respondents. There were 5 items with loading values less than 0.40. However, the minimum acceptable factor loading can range from 0.30 and above[15]. Therefore the values of the factor loadings are in acceptable range. Even thou the CFA showed a two structure model for the Malay version BPA; the fit indices were not a perfect fit. This may be due to inadequate sample size. However, parsimony of the model is maintained since the PNFI value is within the 0.5 cut off value range[13]. In addition, the concurrent validity was not performed in this study as the authors fail to retrieve any standardized barriers to physical activity questionnaire in Malay language to be compared with the Malay version of BPA.

Limitation of the study

By using only the female nurses for this study, the generalization of study findings to the general working population is limited. Furthermore, future studies should incorporate concurrent validity.

CONCLUSION

This study shows that the psychometric properties are valid and the Malay version of BPA is acceptable for determining the perceived benefit and perceived barriers for physical activity among the nurses.

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