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Validity and reliablity of the Persian health-promoting lifestyle profile II questionnaire

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Abstract

Health promoting behaviors comprise one of the main properties aspects of health and are recognized as a factor for prevention of diseases. The purpose of this study was to determine the validity and reliability of the Health-Promoting Lifestyle Profile II (HPLP II) questionnaire using a confirmatory factor analysis (CFA). This study was conducted on 706 people above the age of 15 residing in Bandar-Abbas using the cluster sampling method. Data analysis was performed through a CFA alongside calculation of the Cronbach's alpha and the internal consistency of different domains. Results of the factor analysis showed that by eliminating three out of 52 items of the original HPLP II, the Persian version obtained a good fit with 49 items. The fit index of the CFA was calculated as 0.93. Cronbach's alpha was 0.92 for the whole questionnaire and ranged from 0.71 to 0.86 for its different domains. There was a significant correlation between the domains, ranging from 0.44 to 0.89. Based on the findings of this study, the 49-item Persian version of the HPLP II questionnaire was a credible, reliable and valid tool for measuring health-promoting behaviors among the population of the Hormozgan province, Iran.

Keywords: Health Promotion, Lifestyle, Reliability, Validity

Introduction

According to the World Health Organization's statistics, 60% of an individual's quality of life and health depends on his/her lifestyle and behaviors. Health-related high-risk behaviors are activities that influence vulnerability of an individual or heighten sensitivity to negative health outcomes. Health-promoting behaviors have positive effects on life and are instruments for enhancing the well being of individuals. Studies conducted on this topic have shown that adopting health-promoting behaviors reduce the incidence of diseases and mortality rates. Health-promoting behaviors depend on an individual's habits formed over the years [1]. Health-promoting behaviors play an important role in health and are recognized as a route for prevention of diseases. Modifying lifestyle factors can prevent coronary diseases and type II diabetes. Health-promoting behaviors and healthy lifestyles should also be considered as strategies to improve and maintain health. Social norms, culture, the media, national health policies, advertisements and physical and social environments have a significant impact on health-related behaviors. Social support affects health-promoting behaviors as well [2].

Today, increasing attention is being paid to health promotion due to its important role in the healthcare system. The high costs of healthcare demand a change of approach from the treatment of diseases to their prevention. The World Health Organization specifically emphasizes the importance of health. Measures such as encouraging people to pursue healthy lifestyles, creating health-supporting environments, reinforcing public behaviors, reforming health services and creating health policies for the entire public all contribute to the enhancement of community health. Lifestyle comprises a series of behaviors that fall within the individuals' control and include activities affecting their own health both positively or negatively, which then become a routine in their life [3]. According to Pender and Murduagh in 2002, health protecting (prevention and risk reduction) and health promoting behaviors are two components of lifestyle [3]. In young and developing societies, a healthy lifestyle has a significant impact on costs of treatment. Studies show that healthy habits during adolescence can effectively prevent or delay acute diseases in old age [4].

A highly applicable tool in lifestyle and health-promoting behaviors is the Health-Promoting Lifestyle Profile II (HPLP II). Walker et al. designed this questionnaire according to Pender's health promoting model in order to measure and assess health-promoting behaviors. This questionnaire contains 52 items comprising six distinct domains, including nutrition, physical activity, spiritual growth, health responsibility, stress management and social and interpersonal relationships [5, 6].

Assessing health-promoting behaviors requires the use of valid and reliable tools. The aforementioned questionnaire has been translated into different languages and used in different cultures. Pinar conducted a study in Turkey in order to examine the cultural adaptation of the HPLP II questionnaire and to assess its psychometrics. The factor structure of this questionnaire was examined using the factor analysis. The Cronbach's alpha for the whole questionnaire and its six domains was measured to be above 0.7. Once model constructs were examined, a 48-item version of the HPLP II was proposed with six domains [7]. Meihan and Chung-Ngok conducted a study on Taiwanese women in order to evaluate psychometric properties of the Chinese version of the HPLP II questionnaire. Reliability of HPLP II was estimated using Cronbach's alpha. Construct validity of the questionnaire was assessed using the CFA, according to which the revised version containing 51 questions with six domains had the best fit. Cronbach's alpha was reported to be between 0.71 and 0.91 for all six domains [4]. Other studies conducted on the Chinese version of this tool also yielded similar results [8, 9].

Haddad et al. investigated the validity and reliability of the Arabic version of the HPLP II questionnaire in Jordan. After its translation into Arabic, the questionnaire was examined on 950 adults using the principal component analysis. Cronbach's alpha was measured to be 0.89 for the questionnaire as a whole and varied from 0.6 to 0.85 for the six domains. According to the results obtained, the Arabic version of the HPLP had primary validity and reliability [10].

It is highly important to devise a proper tool with proven validity and reliability that is both applicable to the Iranian population and credible for measuring health-promoting behaviors of the society. The present study aimed to determine the validity, reliability and structure of the HPLP II using the CFA.

Method

The statistical population of this cross-sectional study comprised Bandar-Abbas, Iran residents over the age of 15. A total of 706 people from 40 different districts residing in Bandar Abbas were selected through the cluster sampling method. They completed the 52-item health-promoting lifestyle questionnaire known as HPLP II for assessing health-promoting behaviors. The questionnaire had six domains, including, social and interpersonal relationships,

nutrition, responsibility for health, physical activity, stress management and spiritual growth. It was originally designed in 1996 by Walker in English for the very first time [6]. This questionnaire was designed based on a 4-point Likert scale (never=1, sometimes=2, often=3, always=4).

First, the questionnaire was translated from English into Persian by a panel of health education experts fluent in English and an English language translator; its statements were then revised according to the national cultural norms of Iran and presented in the final version in the format of statements comprehensible for the general community. Moreover, the statements in Persian were translated back into English by three translators. The factor structure, reliability and validity of the Persian version of the HPLP II questionnaire were assessed using the CFA. By applying the CFA, specific factor structure was assessed for a hypothesis stated with regard to the number of factors, number of questions and the pattern of questions for each factor. The structure fit within the hypothesis was examined through the measured covariance as such [11].

The minimum sample size required for the CFA was 5 per item [12]. The questionnaire consists of 52 items; thus, the minimum sample size required was 260. The accuracy of the questionnaire's factor structure within the Iranian society was examined using the CFA, followed by the measurement of the Cronbach's alpha for the whole questionnaire and then for each domain. The CFA was conducted to examine the questionnaire constructs using EQS-6.1 (Bentler) software.

The fit of the proposed questionnaire patterns based on the chi-square index, the goodness of fit index (GFI), adjusted goodness of fit index (AGFI), the ratio of chi-square to degree of freedom index, comparative fit index (CFI), Akaike information criterion (AIC) and the root mean square error of approximation (RMSEA) were all examined. Several indices are usually used in order to assess the adequacy of model fit [13]. It should be noted that GFI and AGFI values vary between 0 and 1 with values greater than 0.9 indicating the model's fit The CFI index also varies between 0 and 1, with values closer to 1 making the model more appropriate and values in excess of 0.9 indicatingthe model's good fit[14, 15]. RMSEA valueslower than 0.05 indicate a good fit,values about 0.08 indicate a moderate fit and values higher than 0.1 indicate the model's poor fit [16]. Lower values of the Chi-square and its insignificance given the degree of freedom indicate the model's good fit. However, since achieving such criterion is rather difficult in larger questionnaires [17], it was suggested to use the ratio of Chi-square to degree of freedom as a Goodness of Fit Index, with values lower than 3 indicating the model's good fit [13, 18].

Results

In this study, 706 people over the age of 15 residing in Bandar-Abbas were examined; 352 of whom were males (49.9%) and 354 were females (50.1%). The mean age of the participants was 34.3 years with a standard deviation of 12.6 years ranging from 15 to 82 years. Of the 706 participants, 577 (81.7%) responded to all the questions in the questionnaire. For the remaining 129, blank responses and missing data were replaced using the pairwise method [19]. As it is necessary for the participants to respond to all the questions for the CFA to be performed, this method allowed the CFA to be conducted without a problem.

Considering that the normality assumption is regarded as highly important in using the parameter estimation method, we first tested this assumption for the data. Mardia's multivariate kurtosis coefficient [20] and the normalized estimation were thus used to this end. According to the results, this coefficient was found to be 263.3 with a normalized estimation of 42.2 and P-values lower than 0.0001. Given these values, the normality assumption of the data was violated, and the maximum likelihood method could not be used for the estimations. The parameter estimation was thus performed using the

Robust Generalized Least Squares method. In order to perform the CFA for the present study, the model was assessed on theoretical grounds and based on previous studies.

The examined model consisted of 52 items in six domains just as designed by Walker [6]. There were eight items in each of the domains of social and interpersonal relationships, nutrition, responsibility for health and spiritual growth, and nine items in each of the domains of physical activity and stress management. Furthermore, domains were assumed to be correlated. Table 1 presents results of the model structure evaluation.

As shown in Table 1, based on the GFI, the AGFI and the CFI, the model was not fit for the data. Furthermore, the P-value for the $\chi 2$ value with its associated degree of freedom was lower than 0.0001, which indicated poor fit; as discussed in the materials and methods section, this index was not used for determining the goodness of fit. However, the $\chi 2$/df index and the RMSEA were indicative of the model's good fit. Given the values obtained, this model cannot be considered as a good model. The original 52-question model was therefore revised following an examination of the factor loadings and the correlation pattern between questions and domains. Three questions were thus eliminated from the model given that their factor loading's significance extended to more than just one factor; including item 1,"I discuss my problems and concerns with people close to me", item 17,"I accept things that I cannot change in my life", and item 51,"when necessary, I ask for others' advice and guidance" [13]. A 49-item model was thus proposed with fitness indices as follows: GFI=0.93, AGFI=0.90, CFI=0.91, RMSEA=0.035 (95% CI: 0.033-0.037) and $\chi 2$=2066.26 with a degree of freedom=1112 (P<0.0001). According to the values obtained, this model was a good fit for the data. Furthermore, given that the AIC value for this model equals -157.74, which is lower than the value obtained for the previous model, this 49-item model seemed to be the best one (Table 1). The factor loadings for the revised 49-item model are presented in Table 2. According to the results of Table 2, the estimation of all standardized factor loadings is significant at the level of 0.05.

Table 1 *Goodness of Fit Indices for different models*

Model	χ^2	df	χ^2 / *df*	GFI	AGFI	CFI	RMSEA (95% CI)	AIC
Model 1: 52-items according to Walker	2350.6	1259	1.87	0.86	0.84	0.81	0.035 (0.033 – 0.037)	-167.4
Model 2: 49-items Persian version after revision	2066.3	1112	1.86	0.93	0.90	0.91	0.035 (0.033 – 0.037)	-157.7

Table 2: Social and Interpersonal Relationships (IR), Nutrition (N), Responsibility for Health, Physical Activity (PA), Stress Management (SM) and Spiritual Growth (SG).

The solution obtained from the CFA also correlated between factors; these results are shown in Table 3. According to the results of Table 3, all correlations were significant at the level of 0.01. These correlations were measured based on latent variables with the measurement error taken into account.

Table 4 presents results of the questionnaire's reliability and internal consistency assessment through Cronbach's alpha and Intra-class Correlation Coefficient (ICC). These results showed the domain coefficients to range from 0.714 to 0.855, which are considered good values. Also, the ICC values were measured to be over 0.7 for all the domains except for the social and interpersonal domain. Cronbach's alpha for the whole questionnaire was 0.925 with an ICC of 0.905, indicating a very good reliability and internal consistency for the Persian version of the HPLP II questionnaire.

According to the findings of the current study, the Persian version of the HPLP II questionnaire, which has 49 questions (after having eliminated three items from the original 52-item version), showed very good

Table 2 *Factor loadings for items in associated domains estimated from confirmatory factor analysis (Items 1, 17 & 51 omitted)*

Item number in Original Questionnaire by Walker et al.	IR	N	HR	PA	SM	SG
Item 13	0.649					
Item 37	0.618					
Item 31	0.595					
Item 7	0.505					
Item 25	0.501					
Item 43	0.490					
Item 19	0.479					
Item 49	0.468					
Item 20		0.694				
Item 32		0.681				
Item 26		0.563				
Item 38		0.495				
Item 2		0.483				
Item 50		0.429				
Item 44		0.481				
Item 8		0.405				
Item 14		0.383				
Item 27			0.755			
Item 3			0.702			
Item 15			0.653			
Item 39			0.637			
Item 45			0.550			
Item 33			0.517			
Item 9			0.472			
Item 21			0.415			
Item 10				0.757		
Item 28				0.744		
Item 4				0.722		
Item 16				0.681		
Item 46				0.596		
Item 40				0.577		
Item 34				0.548		
Item 22				0.534		
Item 47					0.599	
Item 11					0.586	
Item 35					0.583	
Item 5					0.548	
Item 41					0.541	
Item 29					0.530	
Item 23					0.492	
Item 12						0.700
Item 36						0.676
Item 30						0.629
Item 24						0.621
Item 6						0.593
Item 42						0.485
Item 52						0.482
Item 18						0.471
Item 48						0.404

Table 3 *Correlation between domains of HPLP II questionnaire*

domains	IR	N	HR	PA	SM
Interpersonal Relationships (IR)					
Nutrition (N)	0.636				
Health Responsibility (HR)	0.671	0.763			
Physical Activity (PA)	0.451	0.439	0.562		
Stress Management (SM)	0.823	0.654	0.643	0.771	
Spiritual Growth (SG)	0.893	0.653	0.630	0.567	0.851

Table 4 *Reliability and Intra-Class Correlation for HPLP II domains*

Domains	Cronbach alpha	ICCa	Number of items
Interpersonal Relationships (IR)	0.714	0.680	8
Nutrition (N)	0.736	0.705	9
Health Responsibility (HR)	0.799	0.774	8
Physical Activity (PA)	0.855	0.846	8
Stress Management (SM)	0.728	0.706	7
Spiritual Growth (SG)	0.744	0.726	9
Total	0.925	0.905	49

aIntra-class Correlation Coefficient

reliability and construct validity. It can be used in future studies as a credible questionnaire for assessing health-promoting behaviors.

Discussion

Results of the CFA showed that Walker's 52-item questionnaire with six domains was not appropriate. By eliminating three items with factor cross loading, the 49-item questionnaire was a good fit for the data according to the goodness of fit indices. In a study conducted by Pinar et al, in Turkey, the number of items was also reduced from 52 to 48 and was thus in line with our study. Results of the CFA showed that eliminating item 17 from Pinar's version of the questionnaire resembled the elimination of this item from our own study [7]. Reducing the number of items was also reported in a study conducted by Stockert; he found that the number of items could be reduced from 52 to 22 in six domains [21]. Meihan and Chung-Ngok in Taiwan reduced the items from 52 to 51 [4]. Cao et al. translated the Chinese version of the questionnaire in terms of its structure; its questions were then reduced to 40 in six domains. The 40-item version obtained had a good fit according to the CFA [8]. In another study by Teng et al, in Taiwan, the factor structure of the Chinese version of the 52-item HPLP-II was assessed but did not prove to be a good fit for the data; using the exploratory factor analysis, a 30-item questionnaire with six different domains was subsequently proposed and approved both statistically and in terms of compliance with Chinese culture [9]. Both these Chinese versions were in line with the current study in terms of reduction in their number of questions; however, their number of eliminated items surpassed the current study. In a similar study conducted in Iran by Mohammadi-Zaidi et al, questionnaire domains were determined once the exploratory factor analysis was performed [22]. The number of items were reduced from 52 to 49 similar to ours; When a questionnaire is originally designed in a foreign language with its own domains and then translated into a new language, it is better to assess the original pattern through a CFA for determining new domains instead of using an exploratory factor analysis first off. When there is a lack of fit even after revisions and the elimination of a number of items, the exploratory factor analysis can be performed [18]. The present study follows the same route, and given that, after the revisions and the elimination of three questions, the questionnaire deemed a good fit for the data, performing the exploratory

factor analysis was not required.

Reliability of the Persian version of the tool was also confirmed by Cronbach's alpha, which was found to be 0.92 for the whole questionnaire and varied for the different domains from 0.71 (social and interpersonal relationships) to 0.86 (physical activity). Since Cronbach's alpha was above 0.7 in all domains, the 49-item Persian version of the HPLP II questionnaire boasts a good reliability; it can be concluded that the consistency of questions within each domain is high. In the study conducted by Pinar et al, in Turkey, Cronbach's alpha was found to be 0.94 for the whole questionnaire and, for the different domains, varied from 0.7 (nutrition and stress management) to 0.83 (physical activity), all in line with the present study [7]. Mohammadi-Zaidi et al. found Cronbach's alpha to be 0.82 for the whole questionnaire, which is lower than the value in our study; their Cronbach's alpha coefficients for the different domains also varied from 0.64 (spiritual growth) to 0.91 (stress management), which was slightly different from our study [22]. In a study conducted by Stockert in the US, Cronbach's alpha was reported to be 0.91 for the whole questionnaire, while for the different domains, it varied from 0.55 (stress management) to 0.87 (spiritual growth). In a study conducted by Cao et al, in China, Cronbach's alpha was 0.91 for the modified 40-item Chinese questionnaire as a whole and varied from 0.67 to 0.88 for the six domains [8].

In the current study, correlation between the domains was examined through the CFA; a highly significant correlation was found between spiritual growth and social and interpersonal relationship domains (0.89), followed respectively by a significant correlation between stress management and spiritual growth domains (0.85) and then the stress management and the social and interpersonal relationship domains (0.82); these results were in line with the results of studies conducted by Pinar et al, and Mohammadi-Zaidi et al [7,22]. In the study conducted by Stockert, significant correlations were found between spiritual growth and social and interpersonal relationships, stress management and spiritual growth, and between stress management and social and interpersonal relationships, as in our study [21].

The study limitation was, due to poor financial resources, only the urban population of Bandar-Abbas.

Conclusion

By translating and validating one of the most well known and most frequently applied tools for the assessment of health-promoting lifestyle, the present study provides the context for the widespread application of the tool. According to the results of this study, the 49-item Persian version of the HPLP II questionnaire was confirmed to be an efficient tool for the assessment of health-promoting lifestyle and behaviors in Iran; researchers can use it as a valid and reliable tool.

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Contribution

Study design: TA, AG
Data collection and analysis: AG
Manuscript preparation: TA, AG

Conflict of Interest

"The authors declare that they have no competing interests."

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