Psychometric Evaluation of Persian Version of the Prenatal Health Behavior Scale

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Abstract

Objective Prenatal behavior, including nutrition, exercise, drug use and smoking, affects health of a pregnant woman and her fetus. Psychometric evaluation of the Prenatal Health Behavior Scale (PHBS) is important for developing research on measurement of such this behavior during pregnancy. Methods The present descriptive study was conducted in 2018. The original version was in English, and was then translated into Persian after obtaining permission from tool designer and using Backward-Forward translation. The final Persian version included 240 pregnant mothers who were selected using random cluster sampling from hospitals affiliated to Shahid Beheshti University of Medical Sciences in Tehran. The factor analysis methods (exploratory and confirmatory), Pearson correlation, and Cronbach's alpha coefficient by SPSS V19 and LISREL V8.80 were used to analyze research findings. Results Content validity and face validity were assessed by survey of 10 experts and 20 pregnant mothers. In general, the CVI was 94%. The confirmatory factor analysis indicated that all factor loadings were appropriate and significant in the initial model. Furthermore, coefficient alpha was 0.932 for prenatal health promoting behavior and 0.935 for Health-impairing behaviors. The values were acceptable and indicated the high validity of tool in the Iranian sample. Conclusion The research findings indicated that the Prenatal Health Behavior Scale (PHBS) had acceptable psychometric properties among Iranian pregnant women and could be used as a valid tool for assessing prenatal health behavior in Iran.

Introduction

The most important dimension of World Health Organization's goals and strategies in the plan of "health for all" is emphasizing "Health promotion"(1, 2). Health promoting behaviors are one of the key determinants of health and play an important role in preventing diseases(3, 4). Pregnancy is a major situation in which healthy behavior is particularly important, and it changes women's health behavior and lifestyles (5). Lifestyle and unhealthy behavior are two leading causes of death in the world, and the philosophy of providing health services has shifted from disease treatment to health prevention and promotion (6). The importance of health promoting behavior has played an important role in the healthcare system (7, 8). The prenatal health promoting behavior, including proper physical activity, sleep, and a nutritious diet, contribute to better delivery, while behaviors such as maternal smoking, consuming other substances, and poor nutrition, are risk factors for adverse outcomes such as low birth weight(9, 10). There is ample evidence that caffeine consumption is harmful during pregnancy. Despite the fact that pregnant women usually have health-promoting behavior and reduce unhealthy behavior such as caffeine use during pregnancy, nearly half of all smokers continue to smoke during pregnancy. The alcohol use by pregnant women is from 5 and 15 percent in the United States. Despite the evidence under which exercise is associated with healthier birth outcomes in most pregnant women, the exercise activity is generally lower during pregnancy (10). Inactivity during pregnancy reduces muscle endurance and reduces the proper functioning of circulatory system(11). Healthy behaviors of pregnant women affect their pregnancy outcomes. Pregnant women who are overweight or obese (body mass index $>26 \text{ kg/m}^2$) or women with higher weight gains during pregnancy are at a higher risk for unfavorable birth outcomes,

such as pregnancy hypertension, high-birth-weight baby, preeclampsia, and emergency cesarean delivery. Studies show that intake of supplements and eating fresh vegetables daily were risk factors for spontaneous abortion during pregnancy(12). Thus, pregnant women are advised to refrain from healthimpairing behaviors like smoking and to increase healthpromoting behaviors like eating a balanced diet. During pregnancy, most women maintain or improve their healthpromoting behaviors compared to pre-pregnancy(11).

There is evidence that healthy and unhealthy behavior in pregnancy is associated with socio-demographic factors such as age, education, and income. Education plays an important role in changing nutritional behavior in pregnant women (13, 14). Further studies should be conducted to investigate reasons for changing health behavior by some women, and not changing by others, but preliminary findings from a recent survey suggest that sociological variables such as training may play significant role in changing diet (15). Some investigators have measured health related behaviors that focus on quality of life or protective for instance ,Crispin's 1993 Short Form 36 (SF-36)(16). Tran DV created the International Physical Activity Questionnaire (IPAQ), a standardized instrument for physical activity monitoring among older adults(17). The health protective behavior(HPB) That has 32 items and includes healthy lifestyles and health protective behaviors. (18, 19). The health-promoting lifestyle profile n (HPLP n) questionnaire was based on the Pender model to assess the health-promoting behaviors. This questionnaire contained 52 items and 6 dimensions(6). All these questionnaires examines health-promoting behaviors in adults and is not specific to pregnancy. Various studies have also used this questionnaire to measure health promoting behaviors in elderly and non-pregnant women(20, 21).

The Prenatal Health Behavior Scale (PHBS) is a self-report tool that has been introduced since 20 years ago and used in numerous studies(21, 22). The questionnaire is used to assess health-related behavior during pregnancy, including smoking, diet, vitamin intake during pregnancy, sleep and exercise. The PHBS examines the maternal health behavior during pregnancy by adding questions about non-health behavior and their combination with healthy cases (11). The prenatal health behavior, which is assessed by this tool, is along with higher prenatal weight and better mental and physical functions (22-24). According to the above-mentioned cases, the present study aimed to translate the Prenatal Health Behavior Scale to identify the health status of pregnant women in order to implement necessary recommendations and interventions in a timely manner. Therefore, it is important to investigate health behavior during pregnancy and develop research tools in the present research.

Materials And Methods

The present study was a descriptive study and its statistical population consisted of pregnant mothers in Tehran and they were randomly included in the study. Four out of 7 hospitals with pregnancy ward were selected from Shahid Beheshti University of Medical Sciences using random cluster sampling. In an exploratory factor analysis, sample size is determined by number of items based on some studies, so that 10 or 20 samples are selected for each item (25). Therefore, sample size was calculated to be 240 by taking into account at least 10 samples for each variable and according to the Prenatal Health Behavior

Scale. The Prenatal Health Behavior Scale (PHBS) contains 24 items on maternal health behavior and has 2 domains on health promoting behavior (exercise, rest) and destructive health behavior (smoking, drinking alcohol) in the last 2 weeks. Responses are rated on 5 scales from zero (never) to 4 (very often), and the score range was 0-96. The 10-item health-promoting behavior subscale in the current study included the following items: eat dairy products, take vitamins, exercise, get enough sleep, eat enough food, high fiber foods, drink enough fluids, and eat a balanced diet and was internally consistent (Cronbach's α 0.71). The 14-item healthimpairing behavior subscale included smoke cigarettes, skip meals, eat snack foods, stand on feet, drink caffeine, lift heavy objects, and overstretch and it exhibited moderately good internal consistency (Cronbach's α 0.66).

The scale consisted of 2 domains:

Domains	Items	Score range
Health promoting behaviors	3-18-2-6-23-12-1-10-15-11	0-40
Health-impairing behaviors	24-21-20-16-19-79-13-14-5-4-8-17-22	0-56

Translation method: After obtaining permission from designers of the questionnaire to translate and evaluate reliability and validity of the questionnaire in Iran, the original English version of the questionnaire was simultaneously translated into Persian by two independent translators, and then the translations were further reviewed and finally a Persian version was prepared in sessions with translators and professors who had sufficient knowledge about English and the psychometric evaluation of questionnaire. Thereafter, the version was separately translated into English by two other translators. Again, a final English version was prepared from both versions by the above method, and then sent to the tool producer, Auerbach, to qualitatively match the original version. The questionnaire producer also confirmed the translation.

Face and Content Validity: The questionnaire was given to 20 pregnant mothers to assess face validity of the Persian version of tool, and then the corrections were made on the clarity and comprehensibility of items. The content validity index was used by Waltz and Bausell. method Then the mean of content validity index of the tool was calculated based on mean score of content validity index of all items. For this purpose, 10 experts were asked to rate the instrument and were asked to determine the relevance, clarity and fluency of each item in the tool from 4 to 1 based on Waltz and Basel content validity index(26). In the case that a question of questionnaire received score of 79% and above(27), it would be approved. In general, the CVI was 94%.

Ethical considerations: The present study was reviewed by the Ethics Committee of Shahid Beheshti University of Medical Sciences and was approved with a Code of Ethics (IR.SBMU.RETECH.1397.1227). The researcher referred to selected hospitals of Shahid Beheshti University of Medical Sciences after obtaining necessary permissions and letters of recommendation from university. The hospitals were selected by the cluster sampling method. The questionnaires were provided for pregnant women, who

were willing to participate in the study after giving general explanations about the research purpose, confidentiality of information, and obtaining their informed consent.

Findings

Factor analysis methods (exploratory and confirmatory) by the help of SPSS_{V19} and LISREL_{V8.80} were utilized to analyze research findings. The overall status of data was examined before performing relevant analyses. The out of range data was initially identified and modified by referring to original questionnaires, and then the outlier data was examined using a boxplot. The results indicated that there was no outlier data among data. The sample group of study was in the age range of 17 to 42 years. The mean±standard deviation of the sample group was 27.91±5.74. Results of analyses are presented below after reviewing the assumptions.

Table 1: Frequency distribution of demographic characteristics(N=240)

Variable		Number	Percentage
Education	Under the diploma	82	34.2
	diploma	98	40.8
	Up the diploma	9	3.8
	Bachelor	32	13.3
	Master	19	7.9
Pregnancy week	First trimesters	17	7.1
	Second trimesters	91	37.9
	Third trimesters	132	55.0
Parity	1	122	51.3
	2	60	25.4
	3	38	15.8
	4	16	6.7
	6	1	.4
	7	1	.4

Exploratory Factor Analysis

Exploratory factor analysis and varimax rotation were used to determine psychometric properties of the Prenatal Health Behavior Scale. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and value of Bartlett's test of sphericity were calculated before performing the factor analysis. In this analysis, value of KMO was equivalent to 0.92; and value of Bartlett's test of sphericity was 4001.341 that was significant with a degree of freedom of 276 ($p \leq 0.001$). Accordingly, two factors were extracted. the health promoting behavior was obtained with an eigenvalue value of 6.60 and explained variance of 59.58. Table 1 summarizes factor loadings of the PHBS. According to the table above, all factor loadings are appropriate (above 0.3). Scree plot is presented as follows(Figure 1).

Table 2: Factor loads of questionnaire of prenatal health behaviors (n = 230)

Item number	health-impairing	health-promoting
24	0.79	-
21	0.78	-
20	0.77	-
16	0.77	-
19	0.75	-
7	0.74	-
9	0.73	-
13	0.72	-
14	0.72	-
5	0.71	-
4	0.69	-
8	0.67	-
17	0.64	-
22	0.64	-
3	-	0.88
18	-	0.85
2	-	0.82
6	-	0.81
23	-	0.80
12	-	0.76
1	-	0.74
10	-	0.73
15	-	0.72
11	-	0.71

Confirmatory Factor Analysis:

The confirmatory factor analysis was also used to fit the 2-factor model of the PHBS. Fit indices of final form of the PHBS were assessed. Findings indicated that most of indices confirmed the optimal data-model fit. In the model, $X^2=499.11$, $df=243$, and thus $x^2/df= 2.053$ (Figure 2).

Confirmatory factor analysis results indicated that all factor loadings were appropriate and significant in the initial model, but the model did not have good fit indices; hence, covariance paths were established between some items based on LISREL recommendations for model correction until the final model was obtained with optimal fit indices. The following table presents the 2-factor model fit indices for the initial and modified model(**Table 3**).

Table 3: Fit-fit indices of factor 2 model of pregnancy health behaviors questionnaire

Model	* X^2	CFI	IFI	NFI	RMSEA	RMR	SRMR	GFI	AGFI
basic model	909.24	0.84	0.84	0.79	0.048	0.66	0.066	0.77	0.73
Modified model	499.11	0.98	0.98	0.95	0.068	0.040	0.059	0.85	0.81

* Chi-square by the maximum likelihood estimation (MLE)

Reliability analysis: Reliability of the PHBS was calculated using internal consistency and Cronbach's alpha coefficient. The following table presents mean, standard deviation and alpha coefficient for each component of the PHBS and total score.

Table 4: Mean, standard deviation, correlation and alpha coefficient for the prenatal health promoting and impairing behaviors questionnaire.

Variable	Mean	Standard deviation	Alpha coefficient
health-promoting	26.06	6/65	0.93
health-impairing	8.20	8/09	0.93

The table above presents results of mean and standard deviation of each variable. Another column of table reports results of the reliability analysis by Cronbach's alpha method. The results indicated alpha coefficient was 0.93 for the prenatal health promoting behavior, and 0.93 for the adverse prenatal behavior. As shown, the rates were appropriate and above 0.7 indicating high reliability of tool in the Iranian sample (Table 4).

Discussion

The present study first performed the psychometric evaluation of the Prenatal Health Behavior Scale (PHBS) in Iran. The results supported high reliability and validity of the Persian version of PHBS; and alpha coefficient was 0.93 for the parental health promoting behavior and 0.93 for the health-impairing behavior respectively indicating the internal consistency of the Persian version of this scale and it was consistent with results of the original version of tool. In the original version of tool, Cronbach's alpha was 71% for prenatal health promoting behavior and 66% for health-impairing behavior (11). The tool was useful for examining behavioral patterns and predicting health behavior during pregnancy.

Many studies used the Health Promoting Lifestyle Profile II (HPLP-II) questionnaire to examine the health promoting behavior of pregnant mothers, females, undergraduate students, Women with Polycystic Ovary Syndrome(PCOS) and postmenopausal women (8, 21, 28-31). This tool is used in Iran and Cronbach's alpha index and Intra Class Correlation(ICC) Calculated in order 0.9 and 0.89(32).The limitations of questionnaire included its non-specificity during pregnancy and non-evaluation of impairing behavior during pregnancy.

In another study aimed at psychometrically Health protective behavior scale Development and psychometric evaluation. The questionnaire has 32 items and includes healthy lifestyles and health protective behaviors. 454 subjects were recruited evaluate the psychometric properties of the health protective behavior)HPBS(.Limitations of this questionnaire include: using cross-sectional design to evaluate the HPBS, which does not allow examination of its discriminant validity. Second, Because one of the factors in this questionnaire is genetic behavior, different ethnicities must participate in the study for generalizability of the findings. (19).

The results of another study indicates the importance of health promoting behaviors in pregnancy. Results substantiate the value of distinguishing health-promoting and health impairing behaviors in pregnancy and provide preliminary evidence that a stable, self-relevant disposition, self-esteem, is associated with the practice of prenatal healthful behaviors whereas pregnancy-specific stress, a situationally-evoked factor, is associated with the practice of unhealthful behaviors.Prior research indicates that when people have a stronger positive perception of the self, they are motivated to demonstrate their abilities(11). The concept of self-efficacy is receiving increasing recognition as a predictor of health behavior change and maintenance When individuals are selfassessed as having high self-efficacy, they will enthusiastically participate in health behaviors or lifestyles and thus improve their ability to have healthy behaviors(33). Predicting health behaviors is crucial during pregnancy, because its

consequences are direct and relatively rapid and can affect the health and survival of growing fetus. To this end, the researchers and physicians need to use a proper specific questionnaire for this period to assess and predict this behavior and implement interventions to promote better health behavior during pregnancy

Strengths And Limitations

As strengths for our study, Psychometric of Persian Version of the Prenatal Health Behavior which is specificity during pregnancy and evaluation of impairing behavior during pregnancy. As a limitation of the study, the questionnaire for measuring health behaviors includes health-promoting and health-impairing behaviors, so it is not possible to report the whole alpha of the tool.

Conclusion

The research findings indicated that the Prenatal Health Behavior Scale (PHBS) had acceptable psychometric properties among Iranian pregnant women and could be used as a valid tool for assessing prenatal health behavior in Iran.

Abbreviations

PHBS: Prenatal Health Behavior Scale; HPLP-II: Health Promoting Lifestyle Profile II; ICC: Intra Class Correlation; HPB: health protective behavior, IPAQ: International Physical Activity Questionnaire.

Declarations

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Figures

Figure 1

Scree plot for determining number of factors

Figure 2

Primary and Modified Model of Prenatal Health Behavior Questionnaire