

# Psychometric Evaluation of Persian Version of the Prenatal Health Behavior Scale

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## Research article

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# Abstract

**Background:** The precise measurement of health promoting and health impairing behavior requires a reliable scale that is specifically designed for the Prenatal behavior. The purpose of the present study was to translate and psychometrically evaluate the Prenatal Health Behavior Scale (PHBS) in Iran. **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 scale 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 SPSSV19 and LISRELV8.80 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 scale 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 kg/m<sup>2</sup>) 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 health promoting 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 scale )HPBS) That has 32 items and includes healthy lifestyles and health protective behaviors. (18, 19). The health-promoting lifestyle profile  $\pi$  (HPLP  $\pi$ ) 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 scale that has been introduced since 20 years ago and used in numerous studies(21, 22). The Scale is used to assess health-related behavior during pregnancy, including smoking, diet, vitamin intake during pregnancy, sleep and exercise. The PHBS scale examines maternal health behaviors during pregnancy by asking questions about health-promoting and their combination with questions about health-impairing behaviors.(11).Healthier behaviors in pregnancy as assessed by this single-factor scale were associated with adequate prenatal weight gain and better psychological and physical functioning (22-24). The aim of the current study was to evaluate the psychometric properties of the PHBS in a sample of women (e.g. lower risk). The main was to examine via confirmatory factor analysis the adequacy of the measure's two putative factors, health-promoting and health-impairing behavior, and to examine the internal consistency of these.

## 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 by Shahid Beheshti University of Medical Sciences using random cluster sampling. There are different views on the necessary number of samples to determine the construct validity in the factor analysis. The recommended sample size for analysis included 10-20 samples per scale term(25). Therefore, sample size was calculated to be 240 by taking into account at least 10 samples for each item

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 health impairing 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  $\alpha$  = 0.71). The 14-item health impairing 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  $\alpha$  = 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 scale to translate and evaluate reliability and validity of the scale in Iran, the original English version of the scale 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 scale. 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 scale producer, Auerbach, to qualitatively match the original version. The scale producer also confirmed the translation.

**Face and Content Validity:** The scale was given to 20 pregnant mothers to assess face validity of the Persian version of scale, 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 scale 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 scale from 4 to 1 based on Waltz and Basel content validity index(26). In the case that a question of scale 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 Investigator 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 scale 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

The internal consistency method (Cronbach's alpha coefficient for each factor and the entire questionnaire) was utilized to assess the reliability of tool in the present study. The mean and variance of each question were examined to evaluate the utility of scale. The analysis of research findings was done by of SPSS-version19 and LISREL<sub>v8.80</sub>. Descriptive statistics (mean, standard deviation, number and percentage) were calculated for demographic variables. The overall status of data was examined before analyzing data. The out-of-score data were first detected and corrected by referring to original scale. The outlier data was also examined using the Boxplot. The results indicated no outlier data. The research participants were 17 to 42 years and mean(SD) of age was  $27.91 \pm 5.74$ . Table 2 shows the frequency distribution and demographic characteristics of research units. (**Table 2**)

## Exploratory Factor Analysis

The exploratory factor analysis and the Principal Component Analysis with Varimax Rotation were utilized to Prenatal Health Behavior Scale (PHBS). 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 ( $p \leq 0.001$ ). Therefore, performing factor analysis based on the studied matrix was also acceptable. Eigenvalue, ratio of explained variance by each factor and Scree Plot were taken into account to determine whether the Prenatal Health Behavior Scale was saturated with several factors. Accordingly, two factors were extracted and they accounted for 59.57% of the total variance of test. Examination of the scree plot and total table of explained variance indicated that there was a large underlying factor (destructive health behavior) that had an eigenvalue of 7.70 and explained 32.09% of the total variance. Thereafter, 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). The smallest factor loading belongs to question 22 with a value of 0.64 and the largest factor loading belongs to question 3 with a value of 0.88. The scree plot is also presented as follows. (**Figure 1**).

## Confirmatory Factor Analysis:

The confirmatory factor analysis was also used to fit the 2-factor model of the PHBS. The fit indices including the Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), Normed Fit Index (NFI) Goodness of Fit Index (GFI) and Adjusted Goodness of Fit Index (AGFI) were used to assess the fit of model. Several values have been considered for fit indices by experts. For example,  $RMSEA \leq 0.05$ ;  $CFI$  and  $NFI \geq 0.96$ ,  $SRMR \leq 0.07$  indicated the adequate fit of model(28). On the other hand, if the  $CFI$ ,  $GFI$  and  $AGFI$  were greater than 0.9, and the  $RMSEA$  and  $SRMR$  were smaller than 0.05, then there was a very good fit; and the value of

smaller than 0.1 indicated the good fit (29). Findings indicated that most of indices confirmed the optimal data-model fit. In the model,  $\chi^2=499.11$ ,  $df=243$ , and thus  $\chi^2/df= 2.053$  (**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**).

**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.

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 health impairing behavior. As shown, the rates (alpha coefficient of prenatal health promoting and health impairing behavior) were appropriate and above 0.7 indicating high reliability of scale in the Iranian sample (30) (**Table 4**).

## Discussion

The present study 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 scale. In the original version of scale, Cronbach's alpha was 71% for prenatal health promoting behavior and 66% for health-impairing behavior (11). The scale was useful for examining behavioral patterns and predicting health behavior during pregnancy. Auerbach et al. (2017) reviewed prenatal psychometric health behavior scale during the second and third 3 months of pregnancy. Statistical analysis was performed with AMOS 22.0 software. In this study, the alcohol item was omitted due to the high severity of critical values ( $> 7.0$ ), because 95% of pregnant women did not consume alcohol. In addition, 6 other items include: lifting heavy objects, eating excessive need, napping, standing over, eating too much oily foods, were also eliminated due to failing to load on their determinant factor. The final model included 9 health promoting behaviors and 4 health impairing behaviors. But finally, obtained scale from questionnaire in the middle and late period of pregnancy showed a high correlation (0.75 for both of these cases) (10). Using Lisrel software is recommended for the tool analysis.

In a study aimed at examined health promoting behaviors of pregnant women who referred to prenatal care unit of Imam Khomeini Hospital in Saqez. To evaluate health promoting behaviors, they used the standard instrument (II-HPLP). This tool is based on the Health promoting Model to determine how well individuals are doing Health promoting behaviors (31). The questionnaire contains 52 questions and

provides a multidimensional assessment of health promoting behaviors. Validity and reliability of the Persian version of the questionnaire have been studied by Nowruzi Nia et al. In his study, Cronbach's alpha index for the whole scale was 92%, and Cronbach's alpha for six subscale of health promoting behaviors was 77% for accountability, 81% for physical activity, 74% for food habits, 73% for spiritual growth, 72% for interpersonal communication, and 75% for stress management(31).

Another study examined to investigate the relationship between health behaviors and health status in urban and rural pregnant women in Urmia. Data gathering instrument was a researcher-made questionnaire consisting of three parts personal and social characteristics, perceived health status and health behavior situation. The content validity of the questionnaire was verified through scientific texts and opinion polls from a number of faculty members and For measuring instrument reliability, Cronbach's alpha test was used, and the coefficient 70% indicated the scientific validity of the tool(32). In this study, the content validity method was used to determine the validity of the tool, but lack of related information about the way the validity of the research tool was performed is worth mentioning.

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 self-assessed 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 scale 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 scale for measuring health behaviors includes health-promoting and health-impairing behaviors, so it is not possible to report the whole alpha of the scale.

## **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 scale 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

**Ethics approval and consent to participate:** This study is the result of the approval of the research council of the research committee of Shahid Beheshti University of Medical Sciences at 72435 / p. 1397.I would like to express my special thanks of Research Committee of Students and Research Deputy of Shahid Beheshti University of Medical Sciences for sponsoring this study.

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**Availability of data and materials:** Data are available upon request through corresponding author.

**Competing interests:** The authors declare that they have no competing interests.

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**Authors' contributions:** All authors contributed in designing the study, data collection, data analysis, interpretation of findings and writing the manuscript. All authors read and approved the final manuscript.

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## Tables

**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

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

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

Model	*X <sup>2</sup>	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)

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

## Figures

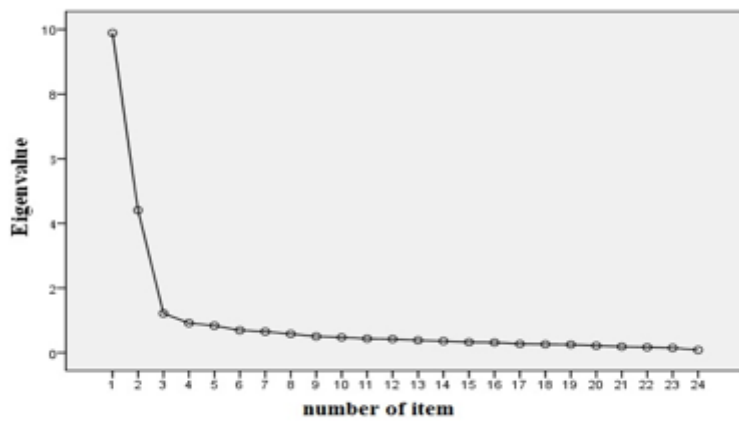


Figure 1

Scree plot for determining number of factors

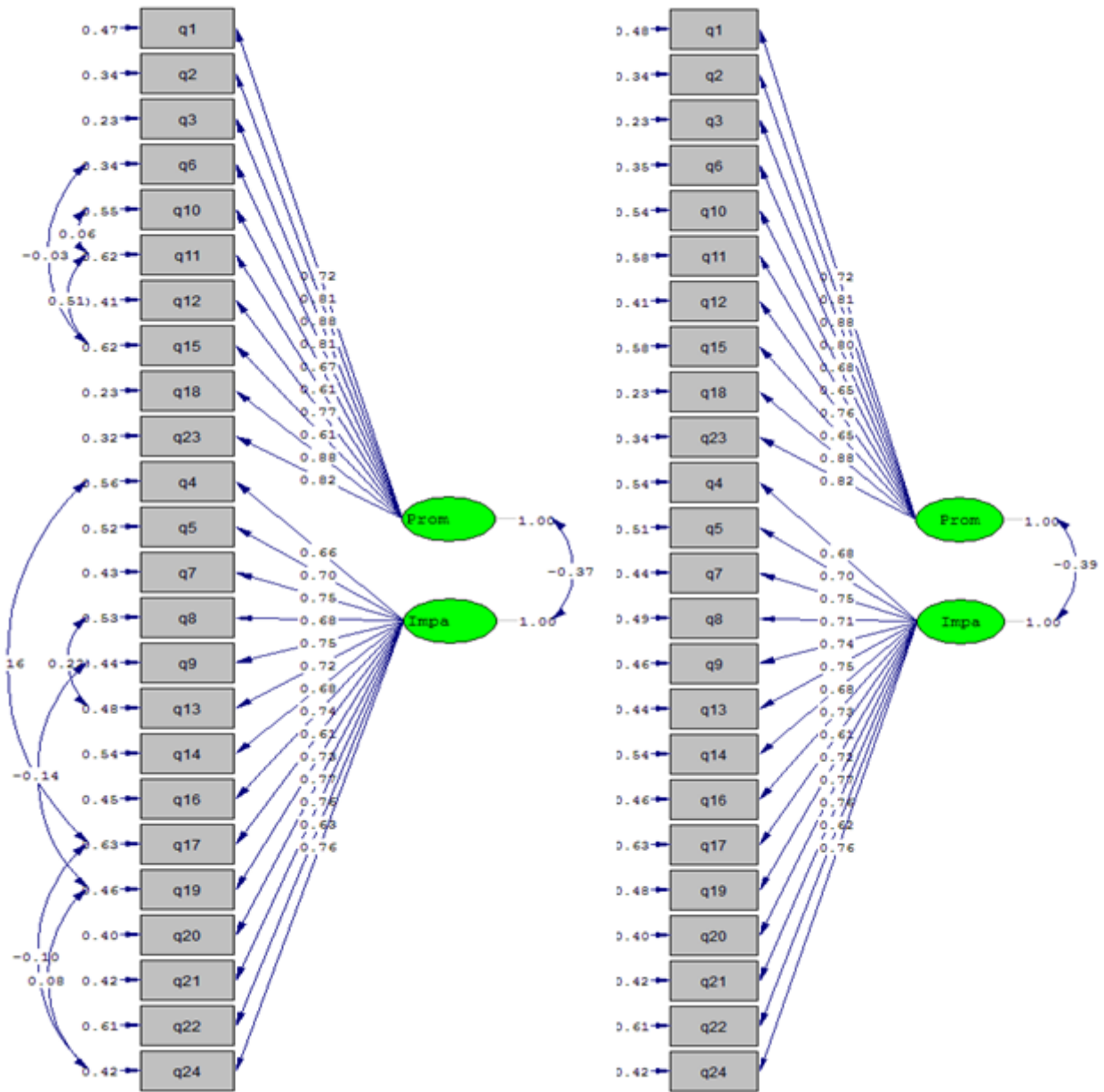


Figure 2

Primary and Modified Model of Prenatal Health Behavior Questionnaire