Clinical and Experimental Health Sciences

# Development and the Validity and Reliability Study of the Birth Health Belief Scale

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**ABSTRACT**

**Objective:** This study aims to develop a measurement tool based on the Health Belief Model to assess pregnant women's attitudes and beliefs about the mode of delivery.

**Methods:** A 65-item draft scale consisting of five sub-scales was used for the development of the Birth Health Belief Scale (BHBS). The draft scale was administered to 336 pregnant women. Data were analyzed using SPSS 18.0. Analyses included Kendall's W test, Cronbach's alpha, Kaiser Meyer Olkin (KMO) Test, Bartlett's Test, and Exploratory Factor analysis (Principal component analysis).

**Results:** Analysis results showed that the 5-point Likert scale consisted of 34 items and five factors. Cronbach's alpha coefficient was calculated as 0.974. Item analysis results revealed that the item-total and item-remainder correlations were significant ($p<0.001$).

**Conclusion:** The Birth Health Belief Scale was determined to be a valid and reliable measurement tool.

**Keywords:** Attitude, Birth, Belief, Health Belief Model, Scale.

## 1. INTRODUCTION

Preferred mode of delivery is one of the factors that play a role in the early diagnosis of risks for the woman and her baby and ensure a healthy outcome by performing appropriate interventions during pregnancy. Considering the mother's and baby's health, vaginal delivery should be preferred primarily (1). Cesarean delivery is preferred when the mortality and morbidity risk for the mother and/or baby is high in spontaneous vaginal delivery, when certain complications arise, or when spontaneous vaginal delivery is impossible (1-3). Since 1985, the World Health Organization (WHO) has stated that the optimum cesarean rate in all deliveries is 10-15% and reported that maternal and neonatal mortality and morbidity do not decrease if the cesarean rate is higher than this value. On the other hand, the frequency of cesarean delivery is rapidly increasing worldwide making it the most commonly performed major abdominal operation (1-6).

Although it is difficult to indicate a certain cause for the increase in cesarean section rates, medical, institutional, legal, psychological, and sociodemographic factors are known to contribute (7-9). On the other hand, the mother's desire is one of the main factors that contribute to the increase in cesarean section rates (8). For this reason, it is important to determine the common underlying reasons behind women's wanting or preferring cesarean section without the presence of medical reasons (10). The Health Beliefs Model is one of the most frequently used concepts for determining health-related individual factors, leading to positive health behaviors, and planning health trainings (11). The Health Belief Model, which is a motivation theory, has focused on understanding what motivates individuals for doing or not doing health-related actions (12,13). According to this model, behavioral changes require changing individuals' perceptions (14). Perceptions that have effects on health behaviors in the model include susceptibility perception, seriousness perception, benefits perception, barriers perception, and health motivation and self-efficacy perception. Susceptibility perception is the threat or risk perceived by the individual in her health condition; seriousness perception refers to how seriousness is perceived by the individual according to the outcomes of a disease; benefit perception refers to the perceived benefit for decreasing catching the diseases; barrier perception refers to perceived individual barriers for realizing the recommended health behaviors, and



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self-efficacy perception refers to the individual belief, efficacy, determinism, and self-confidence for realizing the health behavior to reach expected outcomes (13-16).

The Health Belief Model is frequently used in obstetrics and gynecology to help individuals acquire behaviors to protect and improve health. Today, the model has started to be used to determine women's mode of delivery preferences and the factors affecting these preferences (16-18). The literature includes no measurement tools based on the Health Belief Model on this issue. The purpose of this study is to develop a measurement tool based on the Health Belief Model for evaluating beliefs and attitudes of pregnant women about mode of delivery and to conduct a validity and reliability study of the measurement tool.

## 2. METHODS

### *2.1. Study Design*

This methodological study was designed to develop a measurement tool based on the Health Belief Model in order to assess the attitudes and beliefs of pregnant women about mode of delivery. The study was carried out in two phases. While the first phase included the development of the draft form of the Birth Health Belief Scale (BHBS), the second phase included the evaluation of the psychometric properties.

### *2.2. Development of the Birth Health Belief Scale*

The steps for developing a Likert-type attitude scale, which are listed below, were followed to prepare the scale.

#### *2.2.1. Creating an Item Pool*

After reviewing the pertinent literature, the researchers wrote positively keyed, negatively keyed, and neutral items to evaluate the attitudes and beliefs of pregnant women about mode of delivery considering the cognitive, affective and behavioral dimensions (2,8,12,15-19). Special attention was paid to ensure that the scale had the features representing the sub-scales of the Health Belief Model, that the statements were clear and understandable, and that they did not mean differently. Then a pool consisting of 65 items was created.

#### *2.2.2. Receiving Expert Opinions*

The items created by the researchers were presented to 10 professors in Obstetrics and Gynecology Nursing. Experts were requested to evaluate the statements presented to them and then rate them as 1=not relevant, 2=somewhat relevant (needs major changes), 3= quite relevant (needs minor changes), and 4=highly relevant. The content validity index (CVI) was found high as $\geq .932$ $p < .05$ and items with this feature were added in the pre-trial form. The responses given to the items in the perceived benefit, perceived barriers, perceived caring/severity, perceived self-efficacy and motivation, and perceived sensitivity sub-scales are rated from 1 to 5. The perceived disability and perceived sensitivity sub-scales of the 65-item draft scale are reverse scored.

#### *2.2.3. Pre-Trial of the Scale*

The questionnaire was pilot tested with 50 nulliparous pregnant women, independent of the study, by using the face-to-face interview technique to find out whether the questions were comprehensible and how long it takes to complete it. No changes were made in the questionnaires after the pre-trial.

#### *2.2.4. Item Analysis*

The item-total score correlations of each sub-scale of the draft scale were examined. Eight items (3,13,27,28,35,52,55,63) with item-total score correlations below 0.30 were removed from the scale, and the number of items was reduced to 57.

#### *2.2.5. Target Population and the Sample*

All pregnant women who applied to the Pregnancy Outpatient Clinic of Sivas Numune Hospital between August 2019 and January 2020 formed the target population of the study. In methodological studies, the sample size should be between five and ten times more than the number of items in the scale (19). The sample size was determined as 325 in the present study. The sample included 336 primigravida pregnant women who were literate and agreed to participate in the study.

### *2.3. Psychometric Evaluation of the Birth Health Belief Scale*

The data were analyzed using the SPSS 18.0. The Kendall's W test was used for the content validity of the scale. The reliability of the scale was assessed using Cronbach's alpha, and item total score correlations were assessed for item reliability. Kaiser Meyer Olkin Test, Bartlett's Test and Exploratory Factor analysis were used to determine the construct validity of the scale.

### *2.4. Ethical Issues*

Ethical approval was obtained from Sivas Cumhuriyet University Non-Invasive Clinical Research Ethics Committee (04.07.2019; 2019-07/35), and written permission was obtained from Sivas Provincial Health Directorate.

## 3. RESULTS

The mean age of pregnant women was 25.6 years. Of all the participating women, 40.8% had a bachelor's degree, 92% had a nuclear family, 52.1% did not work and 65.8% perceived their income level as moderate, 73.2% had planned pregnancy, 86.6% had no miscarriages previously, and 72% preferred vaginal delivery (Table 1).

***Table 1.*** *Sociodemographic characteristics of the participating pregnant women*

| N=336 | |
|---|---|
| | **n (%)** |
| **Education** | |
| Primary school | 3 (0.9) |
| Junior High School | 20 (6.0) |
| Senior High school | 100 (29.8) |
| Associate's Degree | 55 (16.4) |
| Bachelor's Degree | 137 (40.8) |
| Master's Degree / Doctorate | 21 (6.2) |
| **Family type** | |
| Nuclear family | 309 (92.0) |
| Extended family | 27 (8.0) |
| **Employment status** | |
| Employed | 161 (47.9) |
| Not employed | 175 (52.1) |
| **Economic status** | |
| Income less than expenses | 40 (11.9) |
| Income equal to expenses | 221 (65.8) |
| Income more than expenses | 75 (22.3) |
| **Is the pregnancy a planned one?** | |
| Unplanned and unwanted | 10 (3.0) |
| Unplanned but wanted | 80 (23.8) |
| Planned and wanted | 246 (73.2) |
| **History of miscarriage** | |
| Yes | 45 (13.4) |
| No | 291 (86.6) |
| **Preferred mode of delivery** | |
| Normal (Natural / Vaginal) | 242 (72.0) |
| Cesarean section | 94 (28.0) |
| **Mean age/year** | 25.6±2.35 |

### *3.1. Construct Validity*

The adequacy of the sampling and the suitability of the correlation matrix were tested before the factor analysis was performed. The result of Kaiser-Meyer-Olkin sampling adequacy test was .915. Bartlett's sphericity test result was $X^2$=31966.840, which is considered highly significant (p<.001). Exploratory factor analysis was performed to determine the construct validity of the scale. The varimax rotation method was conducted for the factor analysis.

Exploratory factor analysis of the scale items showed that the factor loads ranged between.63 and .85. The factors presented in the table are as follows: factor 1: perceived self-efficacy and motivation, factor 2: perceived benefits, factor 3: perceived sensitivity, factor 4: perceived caring / severity, and factor 5: perceived barriers.

According to the exploratory factor analysis results, confirmatory factor analysis (CFA) was performed to determine the compatibility of the five-factor structure with the predicted theoretical structure. Path diagram and goodness of fit criteria were examined for the evaluation of the CFA. Multiple fit indices were used for CFA. Evaluations included the goodness of fit index (GFI), the adjusted goodness of fit index (AGFI), comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the root mean square residual (RMR). Analysis results indicated that the fit statistics calculated using the confirmatory factor analysis were at an acceptable level (Table 2).

***Table 2.*** *Fit indices and acceptable index values of the final scale*

| Index | Normal Value | Acceptable value | The scale's value |
|---|---|---|---|
| $\chi^2$/SD | <2 | <5 | 3.54 |
| GFI | >0.95 | >0.90 | .90 |
| AGFI | >0.95 | >0.90 | .91 |
| CFI | >0.95 | >0.90 | .90 |
| RMSEA | <0.05 | <0.08 | .59 |
| RMR | <0.05 | <0.08 | .71 |

*$\chi^2$/SD: Chi Square/Standart Deviation; GFI: Goodness of Fit Index; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error of Approximation; RMR: Root Mean Square Residual*

Figure 1 shows the path diagram of the Birth Health Belief Scale. Fit indices of the scale were found as $\chi^2$/SD value= 3.54, GFI= .90, AGFI= .91, CFI= .90, RMSEA= .59 and RMR= .71. CFA indicated that all the fit indices of the Birth Health Belief Scale were adequate.

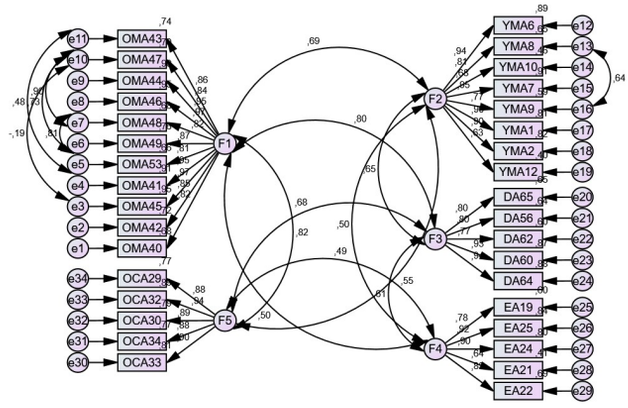


***Figure 1.*** *Path diagram of the birth health belief scale*

*OMA: Perceived Self-Efficacy and Motivation; OCA: Caring / Severity; YMA: Perceived Benefits; DA: Perceived Sensitivity; EA: Perceived Barriers*

Regression coefficients among the sub-scale items created as a result of factor analysis were calculated by examining the item total score reliability coefficients. The analysis of the standardized coefficients revealed that the factor loads were high, standard error values were low, t values were significant (p <.001), and $R^2$ values were high.

### *3.2. Reliability Analysis*

#### *3.2.1. Cronbach's alpha internal consistency coefficient*

Cronbach's alpha coefficient of the scale was calculated as .974. Cronbach's alpha value for each sub-scale was >.50 and thus reliability was sufficient. The internal consistency coefficient analysis results showed that the Birth Health Belief Scale was a highly reliable scale (Table 3).

***Table 3.*** *Cronbach's alpha internal consistency values*

| Sub-scales of the Birth Health Belief Scale | The number of the items | Cronbach's Alfa Value |
|---|---|---|
| Perceived self-efficacy and motivation | 11 | .977 |
| Perceived benefits | 8 | .946 |
| Perceived sensitivity | 5 | .932 |
| Perceived caring / severity | 5 | .953 |
| Perceived barriers | 5 | .909 |
| Birth Health Belief Scale total | 34 | .974 |

***Table 4.*** *Test-retest results*

| Groups | Lower %27 | Upper %27 | p | Test | Re-Test | p |
|---|---|---|---|---|---|---|
| | Mean±SD | Mean±SD | | Mean±SD | Mean±SD | |
| Perceived Self Efficacy and Motivation | 1.72±0.95 | 4.78±0.16 | **.000** | 3.77±1.47 | 3.81±1.46 | .420 |
| Perceived Benefits | 3.41±1.22 | 4.87±0.16 | **.000** | 4.41±0.96 | 4.46±1.05 | .350 |
| Perceived Sensitivity | 1.65±0.74 | 4.56±0.69 | **.000** | 3.63±1.57 | 3.68±1.56 | .180 |
| Perceived Caring / Severity | 1.43±0.75 | 4.97±0.12 | **.000** | 3.39±1.65 | 3.42±1.70 | .501 |
| Perceived Barriers | 1.80±1.30 | 4.75±0.34 | **.000** | 2.81±1.45 | 2.89±1.54 | .102 |
| Birth Health Belief Scale | 2.08±0.68 | 4.79±0.12 | **.000** | 3.70±1.20 | 3.69±1.24 | .820 |

*SD: Standart Deviation*

T-test conducted within the scope of the item analysis showed that the differences were statistically significant for all the groups (p<.001). These results demonstrated that the measurements done with this scale were sensitive enough to distinguish the differences. The test-retest method was used to measure time invariance of the scale and its sub-scales. This method is carried out by administering the scale to the same group twice at a 2-week interval. Test-retest was carried out with 40 participants. Test-retest analysis results indicated that the scale expressions were consistent (p>.05) (Table 4).

## 4. DISCUSSION

The basic step of the scale development is the conceptual and theoretical definition of the feature to be measured (20). The first phase of the scale development included reviewing the pertinent literature, which states that preparing 3 or 4 times more than the number of items required or if possible, even a higher number of items is useful for item analysis (20,21). Taking this into consideration, a 65-item draft of the scale was developed. In the second phase, experts were consulted to test the language and content validity of the 65-item draft scale. According to Özdamar (2016), the language and content validity is the feature of a scale to inspect the objectives determined concerning the subject. At least three experts are recommended to be consulted to confirm the content validity of the scale (22). In this study, the opinions of 10 experts were obtained considering the recommendations reported in the literature. Content validity evaluations performed using the statistical techniques consist of the stages of content validity ratio (CVR) and content validity index (CVI) (20). For the 10 experts, the CVR was.80 (22). Hence, as no items were below the minimum value of.80, no items were removed from the scale. The CVI obtained by calculating the average of the calculated CVR values of the 65 items was .932. This finding shows that the Content Validity of the remaining 65 items of the scale was statistically significant as CVI was greater than CVR. Statistically significant chi-square value of the Bartlett's test (p<.001) shows that data were suitable for factor analysis.

Load values of the items in the factor should be high. If the factor load of each item is less than.30 or the difference of the factor loads of the item in two different factors is less than.10, the item is removed from the scale and the analysis process is continued (23). Therefore, in order to ensure that the scale is more reliable, the minimum value of the factor load was determined as .45, and the items with a factor load below .45 were excluded from the analysis. Consequently, 23 items were excluded from the scale. Exploratory factor analysis of the scale items showed that factor loads ranged between.63 and.85 and were collected under 5 factors with a variance of 83.056%. These factors were determined as the sub-scales of the Health Belief Model: perceived self-efficacy and motivation, perceived benefits, perceived sensitivity, perceived caring/severity, and perceived barriers. The higher the variance ratio is, the stronger the factor structure of the scale is. The perceived self-efficacy and motivation sub-scale which consists of eleven items (1-11) assesses the pregnant woman's belief in spontaneous vaginal delivery. The perceived benefits sub-scale consisting of eight items (12-19) assesses to what extent the pregnant woman is aware of the benefits of the spontaneous vaginal delivery in terms of her health. The perceived sensitivity sub-scale consisting of five items (20-24) assesses to what extent the pregnant woman is at risk in terms of not having vaginal delivery and wanting to have cesarean delivery. The perceived caring/severity sub-scale consisting of five items (25-29) assesses the individual threat causing the person not to have spontaneous vaginal delivery. The perceived barriers sub-scale consisting of five items (30-34) assesses the perceived barriers to a healthy and successful spontaneous vaginal delivery. There are a limited number of studies in the literature evaluating the effect of women's mode of delivery preferences using the Health Belief Model. Loke et al. (2015) reported that action cues, utility, and perception of seriousness from Health Belief Model components affect women's decision about the mode of delivery (17). Hassani et al. (2016) determined that the Health Belief Model based the education program positively affected women's awareness and perception of choosing the safest mode of delivery (24).

If a scale is accepted as valid, then it should be tested for its reliability (23). The scale is considered not reliable if Cronbach's alpha value is 0.00<0.40, has low reliability if it is 0.40<0.60, reliable if it is 0.60<0.80, and highly reliable if it is 0.80<1.00 (21). The Cronbach's Alpha value of this scale we developed is 0.974, which indicates that the scale has high reliability.

After the Pearson moments correlation coefficients conducted to test the item validity were calculated for the item residual and item total analyses, all the items in the scale were considered to have a significant relationship at the level of 0.00 with the total score. In the process of item distinctiveness, the difference between the item average scores of the lower group (lower 27%) and the upper group (upper 27%) determined according to the total scores of the test was compared using the independent samples t-test, and the item discrimination indices of each item yielded statistically significant results at the level of 0.005. Item total analysis showed that the correlations of all the items were positively significant.

The second approach in determining the consistency of the measurements is the calculation of the correlation between two measurements performed by giving a test to the same individuals under the same conditions at a certain time interval. This method is called the test – retest method (23). The Pearson correlation coefficient between the scores obtained from these two tests is calculated. The correlation coefficient should not be below.70 (21). Pearson correlation analysis performed to calculate the test – retest (external consistency) values indicated significant relationships between the two administrations of all the items. This finding shows that the scale is reliable.

## 5. CONCLUSION

In conclusion, it was determined that the Birth Health Belief Scale was a valid and reliable measurement tool. The BHBS was developed for nulliparous pregnant women who had never given birth. In line with these results, it is recommended that the scale be used as a reliable tool in determining the level of belief and tendency towards vaginal birth in all nulliparous pregnant women.

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