**Original Article**

# Labor Evaluation Information Scale (LEIS): Development, Validity and Reliability

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**Abstract**

**Background:** It is important to evaluate the students with valid and reliable methods after their birth education and to measure the effectiveness in determining their level of knowledge.
**Aim:** The present study was carried out to complete the validity and reliability of the Labor Evolution Information Scale (LEIS).
**Materials and Methods:** The study data were collected online between June 1 and September 10, 2021, through the social media accounts of midwifery students with the purposeful sampling method.
**Results:** LEIS consists of two sub-dimensions with 25 items. It was determined that the reliability coefficient (Cronbach Alpha) of the scale was 0.87, the Kaiser-Meyer-Olkin (KMO) coefficient was 0.890, and the Bartlett Test of Sphericity was significant ($\chi 2(231) = 1898{,}073$ p= 0.000).
**Conclusion:** As a result of the analyses, the Labor Evaluation Information Scale (LEIS) was found to be valid and reliable as a measurement tool for undergraduate midwifery students in Turkey. It has been determined that the scale can be used in studies.

**Keywords:** labor scale, birth information, stages of birth, midwifery education, scale

## Introduction

Labor is a natural physiological process that includes psychological and cultural processes. Although cesarean section rates are physiological, they continue to increase worldwide (World Health Organization, 2021). Although the cesarean section is life-saving for mother and baby when necessary, it carries many risks. Maternal and newborn morbidity, delayed recovery, and placental problems in subsequent pregnancies are only a few examples. According to the literature, advanced maternal age, an increase in the number of previous cesarean sections, physicians' fear of malpractice, women's fear of childbirth, excessive intervention, the low number of centers with midwife care, the inability to correctly diagnose birth, and the inability to correctly evaluate the progress of labor and fetal well-being are all factors contributing to the rise in cesarean section rates. It is stated that there are a variety of causes (Brown *et al.*, 2013; Davey *et al.*, 2013; Schifrin and Cohen, 2013; Caughey *et al.*, 2014; Chen *et al.*, 2018; Clark *et al.*, 2018; Nelson, McIntire and Leveno, 2020; Rouse *et al.*, 2020; World Health Organization, 2021). In this respect, knowing the physiology of labor is of great importance in making the correct diagnosis of birth, determining the disruptions in labor progression, and making an accurate risk assessment. Thus, many methods are being developed to understand better labor and physiology by students and those in the field. These methods can be listed as simulation

training, virtual reality, 3D imaging, or video-assisted training (Bogossian *et al.*, 2012; Cooper *et al.*, 2012; Williams, Jones and Walker, 2018; Hazar and Gultekin, 2019). These techniques are used effectively in many areas of midwifery education (Hazar and Gultekin, 2019). Effectively transferring and evaluating birth information, a large part of midwifery education, is crucial in minimizing clinical practice errors. In addition, midwives have a vital role in preventing unnecessary interventions and reducing cesarean section rates when they graduate and practice their profession (Lien *et al.*, 2005; Bogossian *et al.*, 2012; Cooper *et al.*, 2012; DeStephano *et al.*, 2015; Lindsay Miller *et al.*, 2015; Williams, Jones and Walker, 2018; Hazar and Gultekin, 2019). Hence, it is necessary to evaluate the students with valid and reliable methods after their birth education and measure the effectiveness to determine their level of knowledge. When the literature was examined, no useful and dependable tool was found for evaluations after birth education training. This study aims to develop the Labor Evolution Information Scale (LEIS), which can measure the knowledge level of midwifery students who have taken a birth course.

## Method

### Type of Research

The current study was planned methodologically to develop a valid and reliable measurement tool that objectively evaluates midwifery students' knowledge of labor and mechanism. Research data were collected online between June 1 and September 10, 2021. Before the data were collected, approval was obtained from the Health Sciences University, Hamidiye Scientific Research Ethics Committee (Date: 31.03.2021 Decision No: 24286).

### Working Group/Sample

The universe of the present study consisted of midwifery students who continued to study in 57 midwifery departments in Turkey.

In scale development studies, the universe required for the generalization universe, the universe of the related concept, appears as the difference (range) between the two extreme values. For this reason, it is necessary to sample the participant who can represent the universe of the related concept instead of the universe of individuals in scale development trials (Erkus, 2014). Therefore, the purposive sampling method was used in this study to reach a sample representing the range of the measured feature in the study group. Two different sample groups performed the study's exploratory and confirmatory factor analysis. The exploratory factor analysis study group consisted of 327 midwifery students who took the natural birth course. After examining the postulates of the exploratory factor analysis, 301 observations remained. When the literature is reviewed, it has been taken into account that the necessary and sufficient minimum number of participants in explaining the structure is 300. It has been decided that the size of the study group is adequate (Tabachnick and Fidell, 2020).

**Data Collection Tools:** The data were collected with a four-item Socio-Demographic Characteristics Diagnosis Form consisting of questions including age, class, region of residence, previous birth knowledge, and the Labor Evaluation Information Scale (LEIS), which the researchers prepared after the relevant literature was reviewed and prepared by taking the opinions of seven experts.

### The Process of Creating the Scale

**Establishment of the Item Pool:** Before preparing the items for the measurement tool, the relevant literature, the Higher Education Council (YÖK) midwifery core curriculum was examined by the researchers, and interviews were conducted with three instructors who teach Obstetrics Education. Afterward, 98 items were created on maternal-fetal anatomy, the characteristics, and the mechanism of labor, which are thought to reveal the level of knowledge about delivery.

### Submission of the Item Pool for Expert Opinion and Content Validity Index (CVI):

The items were presented to the opinion of seven experts to seek evidence for the scale's content validity. Experts were asked to examine and evaluate the items' measurement of the structure to be measured, their scientific accuracy, grammar and spelling rules, and their suitability for the developmental characteristics of the participants, and their suggestions, if any. As a result of the evaluations made by the experts, the Content Validity Ratio (CVR) specific to each item and the Content Validity Index (CVI) for the entire test were calculated. Through the findings obtained from the evaluations, an item was removed by negotiating with the experts again. A

total of 97 items remained, and 25 minor corrections were made in language and expression. After expert opinions, the Content Validity Index of the scale was found to be 0.83. Since this value is higher than the accepted criterion of 0.80, it has been concluded that the content validity is appropriate (Yurdugul, 2005).

Accordingly, a 97-item Labor Evaluation Information Scale was created. Participants were asked to evaluate each statement as 'true,' 'false,' or 'I don't know".

**Analysis of Data**

Exploratory and confirmatory factor analysis was used to test the construct validity in data analysis. Basic assumptions (outliers, normality, multicollinearity) in multivariate statistics were tested before exploratory factor analysis (EFA). SPSS for Windows 20.0 software (Statistical Package for Social Sciences) was used in data analysis. Descriptive statistics (number, percentage, mean, standard deviation) were used to evaluate the data.The study data were obtained through the online form, and there was no missing data. One item (Item 71) was removed during the analysis phase due to typos while the researchers transferred the data to the online form. In the multivariate outliers examination, it was observed that 26 participants had multivariate outliers ($\chi^2_{96,\ 0,001}$>105,97411) due to the Mahalanobis distance analysis of 327 participants. Hence, the data obtained from these participants were excluded from the study. The following process was performed with the data obtained from 301 participants. With tolerance and variance increase factor (VIF) levels, the occurrence of multicollinearity concerns between the items was investigated (tolerance values above 0.20 and VIF values less than 5). Following the assessment, it was discovered that 33 things were outside of these parameters. These items were reviewed by the researchers and two experts simultaneously and were ruled out of the study. Durbin-Watson statistics were used to assess error independence, and the value of autocorrelation (1,963) was within acceptable bounds. As a result, the reliability and validity of 63 items were examined. The Kaiser-Meyer-Olkin (KMO) coefficient, Bartlett's Sphericity test, and anti-image correlation matrix were used to assess the data's eligibility for factor analysis. Each item's common variance was 0.50, the factor load was 0.30, and the difference between the factor loads supplied to both factors was more significant than 0.10 (Buyukozturk, 2011; Tabachnick and Fidell, 2020). The diagonal values in the anti-image correlation matrix are more than 0.50; three items (6, 63, and 77) were removed from the study since they fell below the cutoff. Cronbach's alpha coefficient was used to assess scale reliability (Ural and Kilic, 2005). The factor number of the structure was determined using a slope graph (Figure 1) and Horn's parallel analysis (Table 1).

Another study group investigated the structure's confirmation by performing confirmatory factor analysis on the format established in the exploratory factor analysis. As a result, evidence for scale validity was found.

**Results**

The students in the exploratory factor analysis had an average age of 22.22±1.64, with 59.4 percent being third-year students and 40.6 percent being fourth-year students. When the regions of the schools where the students are educated are examined (23.3 percent Black Sea Region, 22.3 percent Marmara Region, 22.3 percent Central Anatolia Region, 11.4 percent Mediterranean Region, 9.4 percent Southeastern Anatolia Region, 5%), it was observed that 9 of them received education in the Eastern Anatolia Region and 5.4 percent in the Aegean Region. All of the students had previously studied the act of birth and its mechanisms as part of their schooling. The data obtained from 200 individual students on the final version of the scale was subjected to Confirmatory Factor Analysis (CFA).

**Validity Studies**

The results of exploratory and confirmatory factor analysis for construct validity are reported in this section.

***EFA Findings***

The chi-square test for the appropriateness of the data collected from the 25-item form for factor analysis was determined to be significant ($\chi^2$= 1234,224 p<0,01), and the KMO value was 0.887, according to the results of the Bartlett sphericity test for the suitability of the data for factor analysis. The sample size is "good enough" for factor analysis, according to the KMO value. In light of this finding, the scale's factor structure was investigated using Principal Components Analysis and Varimax rotation and explanatory factor analysis. The common factor variances were found to range between 0.347 to

0.678 due to the investigation. A two-factor structure with an eigenvalue greater than 1.00 emerged from the research, and it was determined that these components contributed 32 percent of the overall variance (Table 2). The sloping graph of the factor eigenvalues is shown in Figure 1.

When looking at Figure 1, it can be observed that the eigenvalues decline with the first factor, continue to decrease with the second factor for a time, and then proceed horizontally. In addition, Horn's parallel analysis was used to determine the number of components with greater objectivity (Glorfeld, 1995). Table 1 shows the eigenvalues obtained from both actual and simulated data.

According to Horn's parallel analysis, the point when the eigenvalues obtained from simulated data are more significant than the eigenvalues acquired from accurate data is a criterion used to calculate the number of factors (O'Connor, 2000; Watkins, 2005). The simulative eigenvalues begin to drop from the second step onwards, as shown in Table 1. Based on the slope graph and Horn's parallel analysis, the structure should be viewed as two elements.

Table 2 shows the minimum/maximum values, Cronbach alpha values, and factor analysis results for the Labor Evolution Information Scale items and total.

The item factor loads and common variance values were investigated, and all items had significant factor loads (Table 2). Cronbach's alpha was 0.84 for factor 1, 0.70 for factor 2, and 0.87 for the whole scale (Table 2). The designed scale has a good level of reliability (Bayram, 2009).

Table 3 shows the results of the independent group t-test and item-total correlation showing the discrimination of all items. Correlations between items and totals ranged from 0.286 to 0.615. The entire correlation statistics have demonstrated that all items are related. Table 3 shows the raw scores, illustrating how different the items are. The mean scores of the 27 percent lower and upper groups were compared using an independent group t-test, and a significant difference was found. This result demonstrated that the scale is unique in measuring the desired quality.

### *CFA Findings*

Figure 2 shows the results of confirmatory factor analysis (CFA) and standardized regression weights of the scale generated as a consequence of EFA analysis on a different study group (N=200).

The Confirmatory Factor Analysis determined that the scale's structural equation modeling results were significant (p=0.000) and related to the scale's 25 items and the scale structure with two factors (Table 4). The model has been tweaked in some ways. Table 4 shows the fit indices before and after improvement.

The fit indices of the "Labor Evaluation Information Scale"; RMSEA=0,019; GFI=0,901; CFI=0,981, $\chi^2$ (293.124) /sd (274) value was calculated as significant ($p<0.01$) and $\chi^2/sd=1,070$, and it was determined that the measurement model showed a perfect fit (p=0.000) according to the results of the first level multi-factor analysis. (Figure 2, Table 4) (Cokluk, Sekercioglu and Buyukozturk, 2010).

### *Reliability Findings*

The full scale's Cronbach's alpha reliability coefficient (internal consistency) was 0.87, 0.84 in the "Bone Pelvis and Fetus" sub-dimension, and 0.70 in the "Delivery Act and Mechanism" sub-dimension. The confirmatory factor analysis data yielded a CR of 0.855, estimated using the combinatorial reliability coefficient (CR). These results indicate that the measurements taken using the designed scale are accurate.

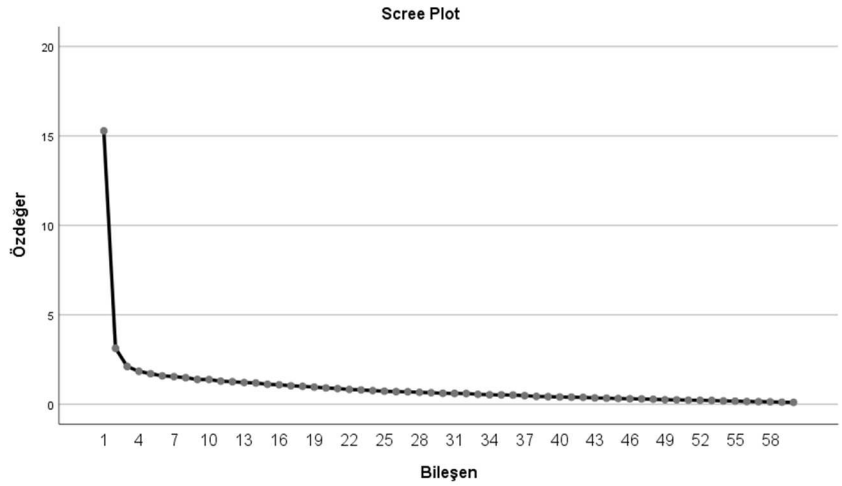


**Figure 1:** Factor eigenvalues slope graph

**Table 1:** Findings on Horn's parallel analysis

| Factor | True Eigenvalue | Eigenvalue produced (95 percent) |
|---|---|---|
| **1** | **15.282** | 2.273 |
| 2 | 3.132 | 2.148 |
| 3 | 1.846 | 2.059 |
| 4 | 0.167 | 1.980 |

**Table 2:** Descriptive Statistics and Factor Analysis Results of the Labor Evaluation Information Scale

| Factor items | *F1 | *F2 | *$\bar{X}$ | *SD | Min | Max | Total Cronbach α |
|---|---|---|---|---|---|---|---|
| **Factor 1** ($\alpha$=: 0.84) | | | | | | | |
| Item 1 | 0.9 | | 0.84 | 0.36 | 0 | 1 | |
| Item 2 | 0.37 | | 0.84 | 0.36 | 0 | 1 | |
| Item 3 | 0.54 | | 0.86 | 0.35 | 0 | 1 | |
| Item 4 | 0.34 | | 0.76 | 0.42 | 0 | 1 | |
| Item 5 | 0.57 | | 0.86 | 0.35 | 0 | 1 | |
| Item 6 | 0.42 | | 0.68 | 0.46 | 0 | 1 | |
| Item 7 | 0.62 | | 0.86 | 0.35 | 0 | 1 | |
| Item 8 | 0.58 | | 0.89 | 0.31 | 0 | 1 | 0.87 |
| Item 9 | 0.67 | | 0.86 | 0.35 | 0 | 1 | |
| Item 10 | 0.53 | | 0.87 | 0.33 | 0 | 1 | |
| Item 11 | 0.47 | | 0.82 | 0.38 | 0 | 1 | |
| Item 12 | 0.58 | | 0.86 | 0.35 | 0 | 1 | |
| Item 13 | 0.60 | | 0.87 | 0.34 | 0 | 1 | |
| Item 14 | 0.50 | | 0.77 | 0.42 | 0 | 1 | |
| Item 15 | 0.53 | | 0.83 | 0.37 | 0 | 1 | |
| Item 16 | 0.51 | | 0.89 | 0.31 | 0 | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Factor 2** ($\alpha$=: 0.70) | | | | | | |
| Item 17 | | 0.49 | 0.93 | 0.26 | 0 | 1 |
| Item 18 | | 0.66 | 0.91 | 0.28 | 0 | 1 |
| Item 19 | | 0.35 | 0.81 | 0.39 | 0 | 1 |
| Item 20 | | 0.52 | 0.93 | 0.26 | 0 | 1 |
| Item 21 | | 0.56 | 0.80 | 0.40 | 0 | 1 |
| Item 22 | | 0.45 | 0.51 | 0.50 | 0 | 1 |
| Item 23 | | 0.44 | 0.85 | 0.35 | 0 | 1 |
| Item 24 | | 0.51 | 0.86 | 0.34 | 0 | 1 |
| Item 25 | | 0.66 | 0.90 | 0.30 | 0 | 1 |
| **Eigenvalue:** | 6.637 | 1.439 | | **Total score:** | | 25 |
| **Variance (%)** | 19.430 | 12.873 | | | | |
| **Cumulative Variance (%)** | 19.430 | 32.303 | | | | |
| **KMO** =0.887; $\chi$2(300) =1234.224; **Bartlett Test of Sphericity (p)** = 0.000 | | | | | | |

*F1: Bone Pelvis and Fetus (Factor 1), F2: Labor and Labor Mechanisms (Factor 2) SD: standard deviation, *$\bar{x}$: mean

**Table 3:** Item analysis results for the items of the Labor Evaluation Information Scale

| **Items** | | **Item Total Score Correlation** | **t (Under % 27**-Upper %27**)** | **p-value (Under % 27**-Upper %27**)** | **Cronbach Alpha Coefficients** |
|---|---|---|---|---|---|
| Item 1 | The promontory is the protrusion of the front surface of the sacrum bone's first vertebra towards the pelvic. | 0.286 | -4.275 | 0.000*** | 0.871 |
| Item 2 | The pelvic inlet, the pelvic cavity-cavity, and the pelvis exit make up the genuine pelvis. | 0.366 | -4.777 | 0.000 *** | 0.869 |
| Item 3 | The distance between the conjugate diagonal promontories and the lower end of the symphysis pubis is located at the pelvic inlet. | 0.518 | -5.436 | 0.000*** | 0.865 |
| Item 4 | Cephalopelvic mismatch is indicated by a distance of 12.5 cm below the diagonal conjugate. | 0.313 | -4.773 | 0.000 *** | 0.871 |
| Item 5 | The transverse pole, which runs between the ischial spinal cords, is the narrowest part of the pelvic cavity. | 0.403 | -6.003 | 0.000*** | 0.868 |
| Item 6 | The anterior anterior-posterior this outflow is the longest. | 0.410 | -7.528 | 0.000 *** | 0.868 |
| Item 7 | Between the two parietal bones and the occipital bone is the lumbar suture. | 0.577 | -7.873 | 0.000*** | 0.863 |
| Item 8 | The sagittal and coronal sutures join to form the anterior fontanelle (bregma). | 0.585 | -5.848 | 0.000 *** | 0.863 |
| Item 9 | The sinciput is the areae fareal bone and in front of the larger fontanel. | 0.615 | -9.318 | 0.000 *** | 0.862 |
| Item 10 | The vertex is the area between the anterior and posterior fontanelles. | 0.425 | -5.040 | 0.000*** | 0.867 |
| Item 11 | The distance between the parietal bones is known as the biparietal box. | 0.459 | -6.320 | 0.000*** | 0.866 |
| Item 12 | The occipito-mental pole is the fetal head's most extended pole. | 0.546 | -6.594 | 0.000*** | 0.864 |
| Item 13 | The gap between the lower jaw's articulation with | 0.608 | -9.354 | 0.000*** | 0.862 |

| | | | | | |
|---|---|---|---|---|---|
| | the neck and the bregma is the submentobregmatic pole. | | | | |
| Item 14 | The presenting part is the insipidus if the fetal head enters the pelvis through the occipitofrontal box. | 0.450 | -7.038 | 0.000*** | 0.867 |
| Item 15 | The presenting component is the vertex if the fetal head has entered the pelvis via the suboccipitobregmatic box. | 0.468 | -7.990 | 0.000 *** | 0.866 |
| Item 16 | The head is somewhat deflected if the presenting area is the forehead. | 0.414 | -4.639 | 0.000*** | 0.868 |
| Item 17 | Birth consists of 4 stages | 0.381 | -4.419 | 0.000 *** | 0.869 |
| Item 18 | When cervical dilation reaches 4 cm, the active phase begins and ends when it reaches 8 cm. | 0.366 | -4.801 | 0.000*** | 0.869 |
| Item 19 | The process by which the presenting part of the fetus progresses down the birth canal with passive motions and is born is known as the mechanism of labor. | 0.321 | -5.095 | 0.000 *** | 0.870 |
| Item 20 | Performs the actions of engagement, stroke, flexion, internal rotation, extension, external rotation, and expulsion as the fetus travels through the birth canal during labor. | 0.572 | -5.873 | 0.000*** | 0.865 |
| Item 21 | The fetus is usually involved in the pelvic inlet with an occiput anterior presentation. | 0.323 | -4.112 | 0.000 *** | 0.871 |
| Item 22 | It takes a value of -3 when the presenting component is in the pelvis. | 0.304 | -4.593 | 0.000 *** | 0.873 |
| Item 23 | The fetal head has completed internal rotation when it reaches the pelvic outlet. | 0.411 | -4.676 | 0.000*** | 0.868 |
| Item 24 | The extension is the rearward movement of the head to exit the perineum. | 0.460 | -4.055 | 0.000*** | 0.866 |
| Item 25 | The baby’s external rotation movement occurs when the head exits the perineum, and the 45-degree angle returns to the right or left occiput anterior. | 0.476 | -4.568 | 0.000*** | 0.866 |
| N=301, n1=n2: 81 | | | | | |

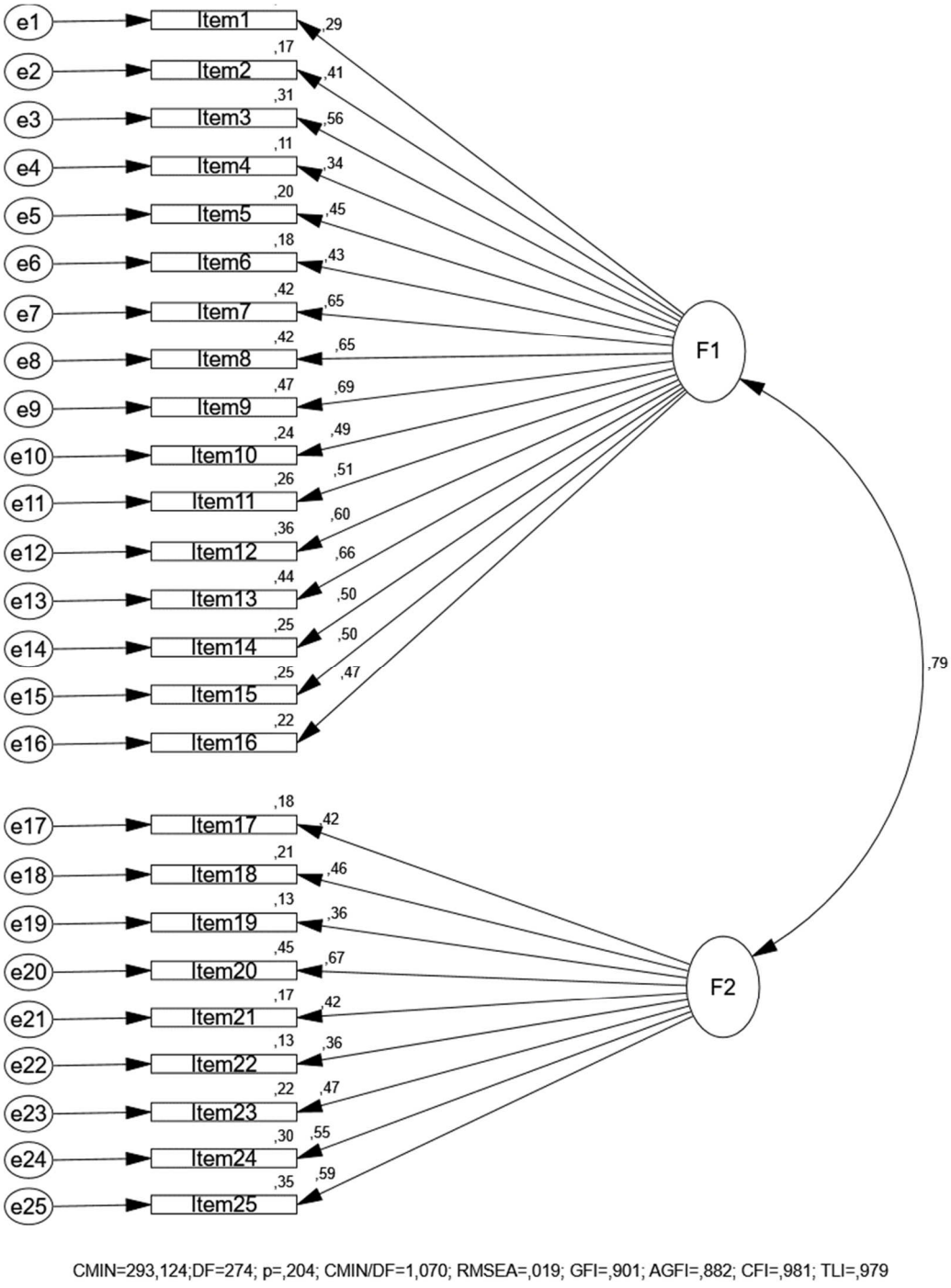


**Figure 2:** Model for First Level Multi-Factor Confirmatory Factor Analysis of the Labor Evaluation Information Scale: Standardized Regression Weights

**Table 4:** Labor Evaluation Information Scale First Level Multi-Factor Model Confirmatory Factor Analysis Fit Indices

| Goodness of Fit Measures | Perfect Fit Criteria | Acceptable Compliance Criteria | Before Modification | After modification |
|---|---|---|---|---|
| **CMIN/Df** | $0 \leq \chi^2/df \leq 3$ | $3 \leq \chi^2/df \leq 5$ | 3.209 | 1.071 |
| **GFI** | 0.90≤GFI | 0.80≤GFI | 0.640 | 0.901 |
| **AGFI** | 0.90≤AGFI | 0.80≤AGFI | 0.616 | 0.882 |
| **CFI** | 0.95≤CFI | 0.85≤CFI | 0.580 | 0.981 |
| **RMSEA** | 0.0≤RMSEA≤0.05 | 0.06≤RMSEA≤1.0 | 0.089 | 0.019 |
| **NFI** | 0.95≤NFI | 0.80≤NFI | 0.487 | 0.793 |
| **TLI** | 0.90≤TLI | 0.80≤TLI | 0.566 | 0.979 |
| **IFI** | 0.95≤IFI | 0.85≤IFI | 0.583 | 0.981 |

## Conclusion and Recommendations

The current study aims to create a scale that will aid in determining a student's level of understanding about the act of birth and its process. There are 25 items on the scale, with two sub-dimensions: "Bone Pelvis and Fetus (first 16 items)" and "Delivery Action and Mechanism (items 17-25)." The scale does not have a reverse function. "True", "false", and "I don't know" are the scale responses. Those who provide accurate answers receive 1 point, while those who do not know and provide incorrect responses receive 0 points. The scale has a maximum score of 25 points and a minimum of 0 points. As the scale's score rises, the level of understanding about labor has also increased.

The "Labor Evaluation Information Scale (LEIS)" has been proved to meet the scientifically required parameters in the scale development study. The appropriate literature review was conducted to construct the item pool and provided expert opinion during the scale creation process. Expert opinions were used to achieve reliability and validity analyses of the labor evaluation information scale draft. It was determined that the scale can be utilized in studies and can be applied to all midwifery and nursing students who take birth courses. The scale is also expected to add to the field.

***Suggestions:***

- This developed scale can be used in studies conducted to examine students' knowledge levels who take labor knowledge courses.
- It can be used to assess the impact of various strategies in research investigating the outcomes of various educational techniques for imparting birth information.
- Different measurement instruments created for labor evaluation can be used in midwifery research. It can assist in identifying the need for information updates and planning in-service training.

## References


Bayram, N. (2009) 'Data analysis with SPSS in social sciences (2. Edition)', *Bursa: Ezgi Publishing* .

Bogossian F., McKenna L., Higgins M., Benefer C., Brady S., Fox-Young S., Cooper S. (2012) 'Simulation based learning in Australian midwifery curricula: results of a national electronic survey', *Women and Birth: Journal of the Australian College of Midwives*, 25(2), pp. 86–97. doi:10.1016/j.wombi.2011.02.001.

Brown H.C., Paranjothy S., Dowswell T., Thomas J. (2013) 'Package of care for active management in labour for reducing caesarean section rates in low-risk women', *Cochrane Database of Systematic Reviews* , (9). doi:10.1002/14651858.CD004907.pub3.

Buyukozturk, S. (2011) Data Analysis Handbook for Social Sciences - Statistics, Research Design, Spss Applications and Interpretation. 15th ed. Ankara: Pegem Academy.

Caughey A.B., Cahill A.G., Guise J.M., Rouse D.J. (2014) 'Safe prevention of the primary cesarean delivery', *American Journal of Obstetrics & Gynecology*, 210(3), pp. 179–193. doi:10.1016/j.ajog.2014.01.026.

Chen I., Opiyo N., Tavender E., Mortazhejri S., Rader T., Petkovic J., Yogasingam S., Taljaard M., Agarwal S., Laopaiboon M., Wasiak J., Khunpradit S., Lumbiganon P., Gruen R.L., Betran A.P. (2018) 'Non-clinical interventions for reducing unnecessary caesarean section', *Cochrane Database of Systematic Reviews* , (9). doi:10.1002/14651858.CD005528.pub3.

Clark, S.L., Garite, T.J., Hamilton, E.F., Belfort, M.A., Hankins, G.D. (2018) "Doing something" about the cesarean delivery rate', *American Journal of Obstetrics & Gynecology*, 219(3), pp. 267–271. doi:10.1016/j.ajog.2018.04.044.

Cokluk, O., Sekercioglu, G., Buyukozturk, S. (2010) Applications of Multivariate Statistical SPSS and LISREL for Social Sciences. Ankara: Pegem Academy.

Cooper S., Cant R., Porter J., Bogossian F., McKenna L., Brady S., Fox-Young S. (2012) 'Simulation based learning in midwifery education: a systematic review', *Women and Birth: Journal of the Australian College of Midwives*, 25(2), pp. 64–78. doi:10.1016/j.wombi.2011.03.004.

Davey M.A., McLachlan H.L., Forster D., Flood M. (2013) 'Influence of timing of admission in labour and management of labour on method of birth: Results from a randomised controlled trial of caseload midwifery (COSMOS trial)', *Midwifery*, 29(12), pp. 1297–1302. doi:10.1016/j.midw.2013.05.014.

DeStephano, C.C., Chou, B., Patel, S., Slattery, R., Hueppchen, N. (2015) 'A randomized controlled trial of birth simulation for medical students', *American Journal of Obstetrics and Gynecology*, 213(1), p. 91.e1-91.e7. doi:10.1016/j.ajog.2015.03.024.

Erkus, A. (2014) Measurement and scale development-I basic concepts and procedures in psychology. 2nd edn. Ankara: Pegem Academy.

Glorfeld, L.W. (1995). An improvement on Horn's parallel analysis methodology for selecting the correct number of factors to retain. *Educational and psychological measurement*, 55(3), 377-393. doi:10.1177/0013164495055003002.

Hazar, H.U., Gultekin, S. (2019) 'The Use of Simulation in Midwifery Education', Life Sciences, 14(3), pp. 74–83.

Lien K.C., Morgan D.M., Delancey J.O., Ashton-Miller J.A. (2005) 'Pudendal nerve stretch during vaginal birth: A 3D computer simulation', *American Journal of Obstetrics and Gynecology*, 192(5), pp. 1669–1676. doi:10.1016/j.ajog.2005.01.032.

Lindsay Miller, J., Avery, M.D., Larson, K., Woll, A., VonAchen, A., Mortenson, A. (2015) 'Emergency Birth Hybrid Simulation with Standardized Patients in Midwifery Education: Implementation and Evaluation', *Journal of Midwifery & Women's Health*, 60(3), pp. 298–303. doi:10.1111/jmwh.12276.

Nelson, D.B., McIntire, D.D. and Leveno, K.J. (2020) 'Second-stage labor: consensus versus science', *American Journal of Obstetrics & Gynecology*, 222(2), pp. 144–149. doi:10.1016/j.ajog.2019.08.044.

O'Connor, B.P. (2000) 'SPSS and SAS programs for determining the number of components using parallel analysis and velicer's MAP test', *Behavior Research Methods, Instruments, & Computers: A Journal of the Psychonomic Society, Inc*, 32(3), pp. 396–402. doi:10.3758/bf03200807.

Rouse, D.J., Caughey, A.B., Cahill, A.G., Grobman, W.A. (2020) 'Regarding "Second-stage labor: consensus versus science"', *American Journal of Obstetrics & Gynecology*, 223(3), p. 464. doi:10.1016/j.ajog.2020.03.036.

Schifrin, B.S. and Cohen, W.R. (2013) 'The effect of malpractice claims on the use of caesarean section', *Best Practice & Research Clinical Obstetrics & Gynaecology*, 27(2), pp. 269–283. doi:10.1016/j.bpobgyn.2012.10.004.

Tabachnick, B.G. and Fidell, L.S. (2020) Use of Multivariate Statistics. 6th ed. Edited by M. Baloglu. Translated by B. Bıçak et al. Ankara: *Nobel Academic Publishing*.

Ural, A. and Kilic, I. (2005) 'Scientific research process and data analysis with SPSS'.

Watkins, M. (2005) 'Determining Parallel Analysis Criteria', *Journal of Modern Applied Statistical Methods*, 5, pp. 344–346. doi:10.22237/jmasm/1162354020.

Williams, J., Jones, D. and Walker, R. (2018) 'Consideration of using virtual reality for teaching neonatal resuscitation to midwifery students',

*Nurse Education in Practice*, 31, pp. 126–129. doi:10.1016/j.nepr.2018.05.016.

World Health Organization (2021) *Caesarean section rates continue to rise, amid growing inequalities in access*. Available at: https://www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access (Accessed: 8 November 2021).

Yurdugul, H. (2005) 'Using content validity indices for content validity in scale development studies', *XIV. National Educational Sciences Congress*, 1, pp. 771–774.