Reliability and Validity of the Delivery Fear Scale *

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Abstract

Background: Fear of delivery is a widespread clinical problem and it has negative effects on the experience of delivery. The Delivery Fear Scale is useful to assess fear during delivery and to approach the birthing woman appropriately. However, psychometric analyses of the DFS have not been performed in Turkey. **Objective:** The aim of this study was to test the validity and reliability of the Turkish version of the Delivery Fear Scale. **Method:** The study is a methodological one. A total of 96 women who were admitted to the delivery room of a hospital. The data were collected using a Personal Information Form, the Delivery Fear Scale and the State Anxiety Inventory. **Results:** It has been determined that the content validity index is 1.0 and that the internal consistency of the Cronbach's alpha is .90. As a result of the exploratory factor analysis, it has been concluded that a single factor structure with an Eigen value of 5.2 explained 52.3% of the total variance, and the factor loadings of the scale ranged from .63 to .83. As a result of the confirmatory factor analysis, goodness of fit index was .94, adjusted goodness of fit index was .90, non-normed fit index was 1.00, and comparative fit index was 1.00. **Conclusion:** The Turkish form of the Delivery Fear Scale is an appropriate measurement tool in terms of language and content validity and can be applied to the Turkish culture and can correctly measure fear during delivery.

Key words: Delivery Fear Scale, Fear of Delivery, Reliability, Validity.

Öz
Doğum Korkusu Ölçeği'nin Geçerlilik ve Güvenilirliği

Giriş: Doğum korkusu, doğumu olumsuz etkileyen yaygın bir klinik problemdir. Doğum Korkusu Ölçeği doğum sırasında korkuyu değerlendirmede ve kadına uygun yaklaşımın belirlenmesinde yararlıdır. Ancak DFS'nin psikometrik analizleri Türkiye'de incelenmemiştir. **Amaç:** Bu çalışmanın amacı Doğum Korkusu Ölçeği'nin Türkçe formunun geçerlilik ve güvenilirliğini test etmektir. **Yöntem:** Metodolojik çalışmadır. Bir hastanenin doğum salonunda toplam 96 kadına uygulanmıştır. Veriler kişisel bilgi formu, Doğum Korkusu Ölçeği, durumluk Anksiyete Ölçeği kullanılarak toplanmıştır. **Bulgular:** Ölçeğin Kapsam Geçerliliği Oranı 1.0, Cronbach alfa iç tutarlılık katsayısı .90 olarak belirlenmiştir. Açımlayıcı faktör analizi sonuçlarına göre; toplam varyansın %52.3'ünü açıklayan, özdeğeri 5.2 olan ve faktör yükü .63 ile .83 arasında değişen tek faktörlü bir yapıya sahiptir. Doğrulayıcı faktör analizi sonuçlarına göre; Uyum İyiliğini İndeksi (GFI) .94, Düzeltilmiş Uyum İyiliğini İndeksi (AGFI) .90, Normlaştırılmamış Uyum İndeksi (NNFI) 1.00 ve Karşılaştırmalı Uyum İndeksi (CFI) 1.00 bulunmuştur. **Sonuç:** Doğum Korkusu Ölçeği'nin Türkçe formu; doğum sırasında korkuyu doğru bir şekilde ölçebilen, Türk kültürüne uygulanabilir, dil ve içerik geçerliği açısından uygun bir ölçme aracıdır.

Anahtar kelimeler: Doğum Korkusu Ölçeği, Doğum Korkusu, Güvenilirlik, Geçerlilik.

Fear of delivery is a widespread clinical problem. It has been reported to include fear of death or damage to the baby, pain, undergoing a caesarean section, rupture, death, episiotomy, feeling helpless, having a baby with malformations, lack of trust in the health workers, sustaining injury or suffering from tears during thrusting movements, failure, being alone, becoming panicked, interventions performed and experiencing loss of control (Melender, 2002a; Rilby, Jansson, Lindblom and Martensson, 2012; Saisto and Halmesmaki, 2003; Serçekuş and Okumuş, 2009; Tsui et al., 2006).

Among the causes of these fears are negative mood, hearing others' stories related to negative outcomes of delivery, urban legends about delivery (Melender, 2002a; Melender, 2002b; Serçekuş and Okumuş, 2009; Tsui et al., 2006), lack of knowledge, having received much more information than is usually required, misbeliefs such as having bad luck (Melender, 2002b; Serçekuş and Okumuş, 2009) and negative experiences of previous deliveries among multiparous women (Melender, 2002a; Melender, 2002b).

Fear of delivery has negative effects on the experience of delivery. Fear causes women to experience more severe pain (Saisto, Kaaja and Yliorkala, 2001), longer duration of delivery (Adams, Eberhard-Gran and Eskild, 2012; Saisto, 2001) and dissatisfaction with delivery (Saisto, 2001). Fear of delivery is also associated with a negative experience of delivery (Ramvi and Tangerud, 2011), which is known to result in more severe fear in subsequent deliveries (Storksen, Garthus-Niegel, Vangen and Eberhard-Gran, 2013). Another important problem with fear of delivery is that women request a caesarean section, which in turn increases the rate of elective caesarean sections (Atan, Duran, Kavlak, Donmez and Sevil, 2013). In addition, fear may lead to instrumental delivery and emergency caesarean section (Sydsjö, Sydsjö, Gunnervik, Bladh and Josefsson, 2012).

It is known that fear of delivery has a negative influence on the postpartum period (Saisto and Halmesmaki, 2003) and can cause or worsen post-traumatic stress disorder (Ayers, 2014). Considering all of these negative effects of fear of delivery, it is important that the women experiencing fear in delivery should be identified and that midwives should provide extra support for these women so that the delivery process can be safe. In Turkey, maternity care is provided in family health centres and hospitals. Routine antenatal and postnatal care is provided by midwives, nurses and general practitioners. This routine prenatal care takes almost 15-20 minutes and consists of getting medical history, physical examination, ultrasound scan and education (Sağlık Bakanlığı [SB], 2014). Therefore there is limited time for counselling during pregnancy to women with fear

of childbirth. The implementation of a reliable and valid scale that can be quickly utilized will certainly facilitate identification of women likely to experience fear of delivery in practice. The Wijma Delivery Expectancy/Experience Questionnaire (W-DEQ) is used to measure fear of childbirth among women before (version A) and after (version B) delivery. Reliability and validity studies using this scale (version A) have been conducted in different cultures (Korukcu, Kukulu and Fırat, 2012; Takegata et al., 2013). However, it is practically impossible for the delivery room personnel to measure a woman's fears during pregnancy. In our country, the same nurse/midwife does not give care to the woman in the prenatal period, postpartum period and at the delivery room. The pregnant meet with the maternity staff for the first time at the delivery room. Therefore, in pregnancy, there is no opportunity to measure their fear of delivery. In cases where it is impossible to identify the fear during pregnancy it is a need for a tool that will allow to detect levels of fear during childbirth. The Delivery Fear Scale (DFS) is useful to assess fear during delivery and to approach the birthing woman appropriately. The scale was developed by Wijma, Alehagen and Wijma (2002) to measure fear of vaginal birth during delivery. The DFS can be implemented in a very short time, and it is a practical scale. Since the time it was developed, the scale has been implemented in Sweden (Alehagen, Wijma and Wijma, 2001; Alehagen, Wijma and Wijma, 2006; Wijma et al., 2002) and Korea (Kim et al., 2006) and has been shown to have a good psychometric quality in these cultures. However, psychometric analyses of the DFS have not been performed in Turkey. Therefore, obstetric staff need a culturally sensitive, reliable and valid instrument to be used to assess Turkish women's fears during delivery. The aim of the present study was to test the validity and reliability of a Turkish version of the DFS. We hypothesized that the adapted version of the DFS would be a valid and reliable tool to describe the fear during delivery and to approach the birthing woman appropriately. To address this hypothesis, the following considerations were explored: 1) Convergent validity; how does DFS correlate with the State Anxiety Inventory (SAI) measures? 2) What is the reliability of the DFS scale as measured by internal consistency? 3) How does internal consistency stable at different time points?

Methods

Research design

This study is a methodological one.

Sample and setting

The study sample included 96 women admitted to the delivery room at a state hospital in Niğde (Middle Anatolia Region in Turkey) between February and June 2013. Based on the recommendations of 5-10 people per item of an instrument (Tavşancıl, 2006), the sample size of 96 was considered sufficient to conduct a factor analysis of the DFS, composed of 10 items. Characteristics of the study sample:

- Planned vaginal delivery
- Having a gestational age of 36 weeks or later
- Not having a high risk of pregnancy (multifetal pregnancy, preeclampsia, placenta praevia etc.)
- Not having undergone infertility treatment
- Not having a disease that requires medical treatment
- Having a cervical dilatation of at least 3 cm
- Having regular contractions
- Not undergoing anesthesia or receiving any anesthetics

Instuments

Three forms were used to collect data: the Personal Information Form, Delivery Fear Scale (DFS) and State Anxiety Inventory (SAI).

Personal information form. The obstetric and demographic characteristics of women were determined. The form consists of four questions used to determine the age, level of education, income, and parity.

Delivery fear scale (DFS). The scale was developed by Wijma et al. (2002) to measure fear during delivery. Minor changes based on the suggestions of the original developers of the scale were made, and the language equivalency and cultural adaptation of the scale were determined. This scale is unidimensional. It is composed of 10 items. Participants were requested to respond to each item by marking a score from 1 to 10. The lowest and highest scores to be obtained from the scale were 10 and 100, respectively. Higher scores show a relatively higher degree of fear. It takes 30-90 sec to complete the scale and is thus quite practical. Five items (1, 3, 5, 7, and 10) have a positive meaning, and five items (2, 4, 6, 8, and 9) have a negative meaning. The latter group of items are scored on a 10-point scale, with 1 corresponding to completely disagree and 10 corresponding to completely agree. The former group of items is scored in the reverse order. As for reliability, the DFS demonstrated satisfactory internal consistency (α= .88, item-total correlations=.37-.76) (Wijma et al., 2002). Two other studies using the scale reported the Cronbach's alpha to be .87 and .91 (Alehagen et al., 2001; Alehagen et al., 2006).

The scale was translated into Turkish by three people with proficiency in the language to perform a language validity test in accordance with translation methodology. The obtained Turkish manuscript was then translated back into the original language (Gözüm and Aksayan, 2003). The Davis technique was used to calculate the mean values of content validity. This technique requires that each item in a scale is rated on a four-point scale by experts. Mean values of the content validity are calculated by dividing the number of experts reporting that a given item is necessary by the total number of experts (Davis, 1992). The cut-off value for mean values of the content validity is considered to be .80 (Polit and Beck, 2006). Because the mean value of content validity was 1 for all of the items in the scale, they were considered necessary and all of them were

included. There were no differences between the opinions of the experts, suggesting that the linguistic and content validity criteria of the scale in a Turkish culture were met.

State anxiety inventory (SAI). The scale was developed by Spielberger, Gorsuch and Lushene in 1970 and was called the State-Trait Anxiety Inventory. We used the State Anxiety Inventory in the present study for parallel form reliability. It is a psychological inventory and consists of 20 questions on a self-reported basis. The scale reveals instant anxiety levels. Emotions and behaviors expressed in the items of the scale are scored on a 4-point Likert scale based on their degree or severity, with 1 corresponding to none, 2 some, 3 a lot and 4 completely. High scores indicate a high level of anxiety. The validity and reliability of the adapted version of the SAI for the Turkish population were examined. Cronbach's alpha and the reliability coefficient were reported to be .94 and .96, respectively, in two previous studies (Öner and Le Compte, 1983). In the present study, Cronbach's alpha was found to be .94.

Data collection

It is recommended that women should be asked to respond to the items in the DFS that was read out loud during delivery (Wijma et al., 2002). Therefore, the scale was completed during face-to-face interviews with the women included in the study by the second researcher. It takes 30 to 90 seconds to complete the scale. Wijma, who developed the scale, suggests to filling the scale with a minimum of 3 times and a maximum of 9 times during delivery with an average interval of 1 hour, and that the average of all values should be taken as one value (Wijma et al., 2002). In this study, minimum six and maximum nine measurements was implemented (during the latent, active, and transition phases of the first stage of labor) and the average of all values were taken as a value.

Data analysis

The statistical analysis was conducted using the Statistical Package Program for Social Sciences (SPSS) 15.0 and LISREL 8.8. Descriptive data were evaluated with numbers, percentages, mean values and standard deviation. $p < .05$ was considered significant.

Language equivalence was used to test the validity of the scale, expert opinions were used to determine the content validity of the scale (Davis technique), and exploratory factor analyses and confirmatory factor analyses were used to test the construct validity of the scale. The Kaiser-Meyer-Olkin Test of Sampling Adequacy (KMO) and Bartlett's test were used to determine whether the data were appropriate for factor analyses. The items loaded with factor loads of .30 or higher found in the Confirmatory Factor Analyses and Exploratory Factor Analysis were included in the factor structure (Stevens, 1996). In addition, known-groups validity (primiparous and multiparous) was analyzed by student t test.

Cronbach's Alpha and split half tests were used to determine the reliability of the scale, and item-total correlations and the Hotelling T^2 test were used to determine the reliability of the items. The cut-off value for the item-total correlation coefficient was considered over .25 (Özdamar, 1997). For the Parallel Forms Reliability, Pearson correlation analysis was used.

Ethical considerations

Before starting the study, written permission was obtained from Klaas Wijma et al., who developed the DFS, as well as from the institution where the study was performed. Ethical approval was obtained from the ethics committee of the university where the study was conducted (Nigde University Ethics Committee, IRB number: 07.03.2013-04-01).The women participating in the study were given information about the study both verbally and in writing by the researcher. They were informed that participation in the study was on a voluntary basis, that they could withdraw from the study at any time, and that their names would be kept confidential. Written informed consent was obtained from all of the participants.

Limitations

The sample does not represent all women; therefore, no generalization could be made. In our country, normal birth rate is decreasing. For this reason, it was difficult to reach the number of pregnant women suitable for the characteristics of the sample during the period of permission for research, and the number of samples was limited to 96.

Results

Descriptive characteristics of pregnant women

Demographic characteristics of the women included in the study are presented in Table 1. The mean age of the women was 25.60 ± 5.49 years old. Of the women, 81.2% were primary school graduates and 68.8% had a moderate income. Of all of the women, 38.5% were primiparous.

Validity of DFS

For DFS validity, construct validity was analyzed.

Construct validity. Construct validity was examined using exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and known-groups validity.

Exploratory factor analysis. Sample adequacy was assessed prior to factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling was .890, and Bartlett's test of sphericity ($x^2 = 460.815$, $p < .001$) indicated that the correlation matrix was suitable for factor analysis. Principal component analysis was used for factor analyses.

Table 1. The distribution of the women by demographic characteristics

Variable	Primiparous (n = 37)	Multiparous (n = 59)	Total (n = 96)
Age *	22.89 ± 5.39	27.31 ± 4.87	25.60 ± 5.49
Education **			
Primary education	26 (70.3)	52 (88.1)	78 (81.2)
High school and University program	11 (29.7)	7 (11.9)	18 (18.8)
Income **			
Low	5 (13.5)	19 (32.2)	24 (25.0)
Moderate	32 (86.5)	34 (57.6)	66 (68.8)
High	0 (0)	6 (10.2)	6 (6.3)

*Mean values ± standard deviations were supplied.
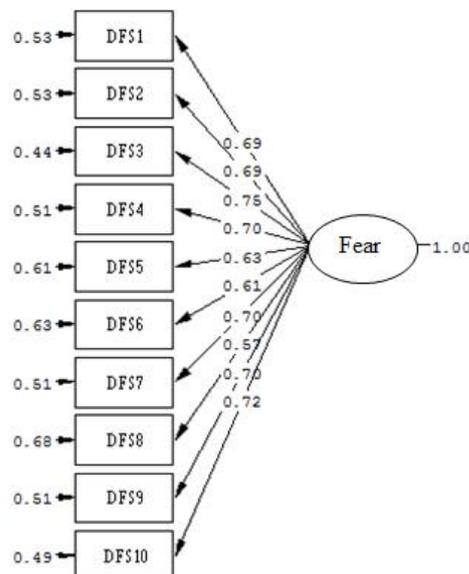** Frequencies were supplied. Values in parentheses are percentages.

Because the original scale has one subscale, analyses were made using single factor restriction without using any rotation techniques. As a result of the analysis, a single factor structure with an Eigen value of 5.2 and explaining 52.3% of the total variance was obtained. Factor loads of the items ranged from .63 to .83 (Table 2).

Table 2. Results of exploratory factor analysis of DFS

	Item	Factor loading
1	I can bear pain	.64
2	I feel rather helpless	.63
3	I feel well	.77
4	I feel that I will not go out of this room	.69
5	I can cope with this	.81
6	I do not want to continue any more	.63
7	I feel happy despite everything	.72
8	I feel as if I will give up soon	.83
9	This will last forever	.76
10	I feel calm	.72
	Eigen values	5.23
	Variance	%52.3

Confirmatory factor analysis. The factor load of the scale was found to range from .57 to .75 (Figure 1). The Chi-square value was 31.63, and *p* was .63. The root mean square error of approximation (RMSEA) was .00, the goodness of fit index (GFI) was .94, the adjusted goodness of fit index (AGFI) was .90, the comparative fit index (CFI) was 1.00, the normed fit index (NFI) was .96, and the non-normed fit index (NNFI) was 1.00.

Known-Groups Validity: The known-groups validity of the DFS was assessed using number of births of participants. The number of births was divided into two groups as primiparous and multiparous. As might be expected, the DFS scores of primiparous were significantly higher than multiparous (t=2.092, p=.040).

Chi-Square=31.63, df=35, P-value=0.63171, RMSEA=0.000

Figure 1. Confirmatory factor analysis of DFS

Reliability of DFS
The reliability of the DFS was tested with internal consistency and Parallel forms reliability. The internal consistency of the DFS was tested with item analysis and Cronbach's alpha coefficients.
Item analysis. Item analyses were conducted to evaluate contributions of the items to scores for the scale and to thus evaluate to what degree the items were associated with the whole scale, and the item-total correlation coefficient was evaluated.
Item analyses of the DFS are presented in Table 3. The mean score for all of the items was 4.52. The mean of items was 1.93 (min. 3.74-max. 5.67) (Hotelling T^2 = 90.702, F = 9.229, p = .001). The item-total correlations for 10 items ranged from .55 to .77.

Table 3. Item total score correlations and Cronbach's Alpha values of DFS

	Items	$\overline{X}$	± SD	Cronbach's Alpha if Item Deleted	Item-Total Correlation
1	I can bear pain	5.10	2.85	.89	.55
2	I feel quite helpless	4.24	3.24	.89	.55
3	I feel well	5.67	3.15	.88	.70
4	I feel as I will not go out of this room	3.82	3.35	.89	.61
5	I can cope with this	3.74	2.79	.88	.75
6	I do not want to continue any longer	5.23	3.48	.89	.55
7	I feel happy despite everything	4.49	3.53	.89	.63
8	I feel that I will give up soon	3.88	3.23	.88	.77
9	This will continue forever	3.86	3.36	.88	.68
10	I feel calm	5.17	3.44	.89	.65

$\overline{X}$ = ortalama, SD=standart deviation

Internal consistency of the DFS. The mean score for the scale was 45.20 ± 23.33 (min. 10 - max. 100). The internal consistency coefficient calculated for the reliability of the scale was .90. The split half test showed that alpha for the first half was .80 and that alpha for the second half was .82. The correlation between the two halves was .81.
Parallel forms reliability. The correlation coefficient between SAI and DFS was .80, and the p value was .001.

Discussion
This study aimed to adapt the DFS for Turkish women. The results suggested that the Turkish version of the DFS was a reliable and valid measure to assess fear of delivery.

Construct validity refers to a scale's ability to measure the target concept and/or conceptual structure. Factor analysis is a commonly used method for evaluating construct validity (Gözüm and Aksayan, 2003). In the present study, the KMO test value, a sampling adequacy test, was used to compare the magnitudes of observed correlation coefficients with those of partial correlation coefficients. A KMO value ranging from .90 to 1.00 is considered as marvelous, from .80 to .89 meritorious, from .70 to .79 middling, from .60 to .69 mediocre, from .50 to .59 miserable and from .00 to .49 not a factor (Beavers et al., 2013). In light of the above-mentioned evaluation criteria, KMO values of the DFS were marvelous. Bartlett's test provides evidence that an observed correlation matrix is significantly different from a singular matrix, which shows the presence of linear combinations (Beavers et al., 2013). Bartlett's test showed that using a factor model could be appropriate (p < .05). Because the original form of the scale is one-dimensional, no conversion technique was used for the principal component analysis. At the end of the analysis, a model with an eigenvalue of 5.2 was obtained, which accounted for 52.3% of the total variance.

The relationships between items with factors are explained by factor loads. Although there is not a cut-off value for a factor load of an item so that it can be included in a factor, it is typically reported that factor loads of .30 or .40 are acceptable (Burns and Grove, 2001; Stevens, 1996). In general, a factor load of .60 and over is considered high, while a factor load of .30 is considered moderate (Laher, 2010). We found that factor loads of the items in the DFS ranged from .63 to .83, which demonstrates the construct validity of the scale (Burn and Grove, 2001; Laher, 2010; Stevens, 1996). These results were suggestive of strong validity of items in DFS.

In our study, to determine the construct validity of the scale, confirmatory factor analysis was performed. In the literature, to evaluate the results of a confirmatory factor analysis, goodness of fit incidences, which are among the independent evaluation criteria, should be considered (Erkorkmaz, Etikan, Demir, Özdamar and Sanisoğlu, 2013). Chi-square test results help to determine if there is a significant difference between an expected covariance matrix and an observed covariance matrix. In the present study, p was found to be > .05. This shows that the expected covariance matrix and the observed covariance matrix were consistent. Chi-square test results are evaluated by the ratio of this result to degrees of freedom. A ratio lower than 3 indicates an excellent consistency, and a ratio lower than 5 indicates a moderate consistency. In this study, X2/SD (31.63/35) was .91, which reveals an excellent consistency.

RMSEA and SRMR values lower than .05 reveals excellent consistency, RMSEA and SRMR values lower than .08 reveals good consistency, and RMSEA and SRMR values of lower than .10 shows poor consistency (Harrington, 2009; Schermelleh-Engel, Moosbrugger and Muller, 2003). In the present study, because RMSEA was .00 and SRMR was .041, the scale was thought to have excellent consistency. GFI, AGFI, NNFI and CFI indices of higher than .95 and .90 reveal excellent

and good consistencies, respectively (Harrington, 2009; Schermelleh-Engel, 2003). Because GFI was .94, AGFI was .90, NNFI was 1.00 and CFI was 1.00, the scale could be considered as having excellent consistency.

In the known-groups validity; the DFS scores of primiparous were higher than multiparous. Thus, known groups validity of DFS was confirmed, indicating the scale can adequately predict fear of delivery.

The reliability of the DFS was examined with internal consistency analyses and parallel forms reliability analyses. The internal consistency of the DFS was tested with item-total correlation and Cronbach's alpha coefficients. Item-total correlations of the scale had moderate and strong values ranging from .55 to .77. Results of corrected item-total correlations were also generally consistent with those of the original version (Wijma et al., 2002). They can be considered as having an appropriate level of reliability. The internal consistency coefficient calculated for the reliability of the scale was .90. A high Cronbach's alpha coefficient indicated that the internal consistency of the DFS was good. The Cronbach's alpha coefficient of the original scale was .88 (Wijma et al., 2002). Other studies reported that the scale had Cronbach's alpha coefficients of .91 (Alehagen et al., 2006) and .72 (Kim et al., 2006). The results of this present study were similar to those reported by Wijma et al. (2002) and Alehagen et al. (2006) but different from those of Kim et al. (2006). This difference is thought to result from cross-cultural differences.

To determine the parallel forms reliability of a scale, another measurement tool with similar characteristics should be implemented in the same sample at the same time as the one under investigation and correlations between obtained values should be compared (Gözüm and Aksayan, 2003). In the present study, there was a significant, positive correlation between the SAI and DFS (r = .80, p < .001). This correlation indicates that the DFS had quite high parallel forms reliability.

Implications for Practice

Fear of delivery is a widespread problem that affects both delivery and the postpartum period. Therefore, it is important that health staff identify women experiencing fear of delivery and carry out appropriate interventions in terms of a safe course of delivery. The DFS is a tool that is practical and quick to determine the degree of fear during delivery. Based on the results of this study, it can be said to be a reliable and valid tool to be used in Turkish women and has a good psychometric quality in various cultural contexts.

In light of these results, recommendations are listed below:

* The Delivery Fear Scale can be implemented in a very short time, and it is a practical scale. It can be recommended that the DFS be used to determine the degree of fear in women in delivery rooms.
* Fear of delivery negatively affects the birth process. Fear detection at birth may allow a woman to have a better birth experience by allowing continuous supportive care (emotional, informational support, relaxation etc.) during delivery
* The Delivery Fear Scale can be used by professionals to determine the degree of fear of women in delivery rooms. Early interventions should be planned in accordance with fear of delivery.

To examine the psychometric properties of DFS by applying it to different samples such as high risk of pregnancy, medical treatment, and infertility treatment.

Conflict of interest: Authors declare that they have no conflicts of interest.

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