Original Article

The Validity and Reliability of the Turkish Version of the Fertility Desire Scale

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Abstract

Background: Rapid fluctuations in fertility rates in the world have created a demographic change process. It is necessary to determine the trend of change in fertility rates on the basis of countries. In this direction, it is seen that there is a need for a tool that can measure fertility desire.
Objective: The purpose of this study was to determine the validity and reliability of the Turkish version of the Fertility Desire Scale, which was developed abroad to measure the desire for childbearing.
Materials and Methods: This study, which was methodologically planned for language adaptation, was conducted with 547 healthy married individuals who met the research criteria and visited the general outpatient clinic of a state hospital between July 2021 and March 2022.
Results: This scale was first translated and back-translated into Turkish to ensure language equivalence. Subsequently, expert opinions were considered and necessary corrections were made based on their suggestions. Confirmatory factor analysis and exploratory factor analysis were conducted to determine construct validity. After the exploratory factor analysis revealed the factor patterns of the scale, six items were removed from the scale (due to low factor loadings) and the remaining 13 items were grouped into two sub-dimensions. The final scale was confirmed by confirmatory factor analysis and Cronbach's alpha coefficient was 0.78. The test-retest findings also supported the reliability of the scale.
Conclusion: The Turkish version of the Fertility Desire Scale is a valid and reliable measurement tool that can assess women's desire for childbearing.

Keywords: fertility; desire; scale; reliability; adaptation; validity

Introduction

Since the second half of the twentieth century, the world has entered a process of demographic transformation, while fertility has been on a rapid downward trend globally (Erol, 2018). For example, the global fertility rate has declined from 5% in 1960 to 2.5% in 2016. In Turkey, this rate has decreased from 6.4% in 1960 to 2.1% in 2016 (World Bank, 2019). According to the 2018 Turkish Demographic and Health Survey (TDHS), the total fertility rate fell by approximately half between 1978 and 2018. This report also stated that the main reasons for this decline include easier access to modern contraceptive methods, increased acceptability of the use of these methods, the desire to delay birth, the ideal number of children and changes in marriage status and age (TDHS, 2018).

Increasing participation of women in the workforce is also perceived as a threat to the future of society in terms of decreasing fertility

(Tugrul, 2019). Specifically, since many women are worried that their career advancement will be negatively affected, they tend to postpone or avoid pregnancy, even if they are of childbearing age (Mousavi & Ghafelebashi, 2014; Keshavarz& et al., 2013; Mahdi, 2015). A related study showed that individuals with higher levels of income generally aim to increase their career levels in order to maintain a better quality of life. Hence, they prefer to postpone their fertility plans (Ilacqua et al., 2018).

While having a child is an important experience for families, it also affects many aspects of their economic and social lives (Kalantari et al., 2010; Ramezankhani et al., 2013; Mousavi et al., 2014). Meanwhile, with the social, cultural and economic developments in recent years, individuals are either postponing having children, having fewer children or avoiding pregancy altogether (Spolaore & Wacziarg, 2019). For all of these reasons, there have been significant changes in planning a family, becoming parents and having children (Alfaraj et al., 2019).

Currently, the population replacement rate, i.e. the fertility rate required for a society to maintain its population size, is 2.1 children per woman. Countries with fertility rates below this number generally have an older demographic structure and may experience a decline in population size over time. The World Bank estimates the global fertility rate to be 2.4 children per woman in 2019 (World Population Report, 2022). According to the 2018 TDHS, the total fertility rate is 2.3, while that in the TurkStat (2021) database is 1.76. This data suggests that Turkey is below the generation renewal threshold, indicating that the country will be unable to maintain its population size in the future (TurkStat, 2021).

Given the important role of knowledge and attitudes toward increasing fertility desire, it is important to apply valid and reliable scales for assessment as well as an objective measurement tool (Mousavi & Ghafelebashi, 2014). To date, there is no scale that effectively assesses the desire to have children in Turkey. Therefore, the purpose of the present study is to determine the validity and reliability of the Turkish version of the Fertility Desire Scale, which was developed abroad to measure the desire for childbearing.

Research questions

- Is the Turkish Form of the Fertility Desire Scale valid?
- Is the Turkish Form of the Fertility Desire Scale reliable?

Materials and Methods

This study, which was conducted methodologically, focused on individuals who visited the general outpatient clinic of a state hospital between July 2021 and March 2022. Based on the principle that the sample size should be between five and twenty times the number of items in validity and reliability studies, we aimed to reach 380 individuals, with a scale of 19 items (Buyukozturk, 2021). Overall, our study included men and women between the ages of 18 and 45 who visited the aforementioned general outpatient clinic, agreed to participate, could read and write, had no psychiatric illness and were married. Initially, data was collected from 20 individuals for the pre-test application of the scale, after which they were excluded from the main sample. Based on the surface and content validity analyses conducted after the pre-test application, the authors revised the scale and applied it to the main sample, which consisted of 547 individuals.

Data Collection Tools: This study employed the **Individual Diagnostic Form and the Fertility Desire Scale (FDS)**, as data collection tools. Regarding the former, it consists of nine questions, including demographic characteristics such as age, education level, occupation and place of residence. As for the latter, it was developed by Naghibi, Khazaee-Pool, and Moosazadeh (2019) and conducted with 470 individuals to develop effective interventions for increasing their fertility desire. The scale itself consists of 19 items and four sub-dimensions: positive childbearing motivation (seven items); preferences (three items); childbearing worries (four items) and social beliefs (five items). Each item is rated on

a five-point Likert scale, ranging from 1 (strongly agree) to 5 (strongly disagree). The items numbered 1, 2, 3, 4, 7, 11, 12, 14, 15 and 18 are positive items, while the items numbered 5, 6, 8, 9, 10, 13, 16, 17 and 19 are negative items that are reverse-coded.

Additional data was obtained three weeks after the study period, when 84 participants completed the survey online. Overall, the study data was analysed using Statistical Package for Social Sciences for Windows 25.0 and Analysis of Moment Structures (AMOS) 23.0 software. We also used descriptive statistical methods (e.g. number, percentage, mean and standard deviation) to evaluate the data, while exploratory factor analysis and confirmatory factor analysis were performed to determine its internal reliability and construct validity, respectively. Moreover, we employed the content validity index, Kendall's W fit coefficient, Pearson's product-moment correlation coefficient, the t-test for dependent groups, Cronbach's alpha coefficient and item-total score correlation to evaluate the data. Finally, this researcher obtained ethics approval (Date: 09.07.2021; No-57452775-044-36170) from the Sinop University Scientific Ethics Committee, the institution where the research was conducted. In order to use the scale, correspondence was made with the original authors (i.e. Naghibi et al.), after which permission was obtained via e-mail. After all of the participants were informed, the data was collected based on their voluntary written and verbal consent.

Language Validity: As for the language validity of this research, language equivalence, content validity and construct validity of the scale were performed using the method specified by Sencan (2005). The scale was translated from English into Turkish by two linguists, after which the Turkish version of the scale was created by the researchers. Back-translation of the Turkish scale was also performed in order to ensure translation validity. This was performed by 10 experts who were fluent in Turkish and English, after which the translations were combined to form the Turkish version of the FDS. Moreover, an independent linguist (who had never seen the original scale) was used to back-translate the scale from Turkish into English and compare it with the original scale. Thus, the final version of scale was created and language equivalence was ensured.

Content Validity Analysis: In order to evaluate the scope of the items and their comprehensibility in terms of Turkish language, eight faculty members (consisting of nursing specialists in obstetrics and gynaecology, and those in mental health and diseases) were asked to evaluate the measurement value of each item on a four-point scale, including 1 (not appropriate), 2 (the item needs to be adapted), 3 (appropriate, but minor changes are needed) and 4 (very appropriate). The contenty validity index items ranged from 0.81 to 1.0, with a value of 0.80 as the acceptabe criterion (Polit & Beck, 2006). The difference between the scores given by the experts to the scale items was found to be statistically insignificant (Kendall's $W = 0.243$; $p = 0.17$). Thus, it was determined that there was no difference between the experts according to their scores.

Pilot Study: In terms of the applicability and comprehensibility of the language and content validity of the scale, a pilot study was conducted with 20 participants, after which their opinions regarding the items and their comprehension were evaluated. Overall, there was no negative feedback regarding the scale items. As stated earlier, the data of these participants were not included in the final research (Tavsancil, 2018).

Results

As shown in Table 1, the mean age of the participants The mean age of the participants was 34.38 ± 6.27. When the distribution of the participants according to their ages was analysed, 59.4% were in the 30-39 age range, 75.5% were female and 58.9% were university graduates. We also found that 33.8% of the participants had been married for 5-9 years, 95.2% were from nuclear families, 26.5% lived in the Black Sea region, 25.4% were civil servants and 60.1% had incomes equivalent to their expenses.

Before the exploratory factor analysis, the Kaiser-Meyer-Olkin (KMO) test was applied to

determine whether the sample size was suitable for such analysis. It was determined that, since the KMO value was 0.761, the sampling adequacy was sufficient for conducting the factor analysis. In addition, based on the results of Bartlett's test of sphericity, the chi-square value was acceptable $\chi 2$ (78) = 1966.558, $p < 0.05$) (Table 2)

In order to reveal the factor patterns of the scale, principal component analysis was chosen as the factorisation method and varimax was selected as the rotation method. In the exploratory factor analysis, six items were removed from the scale, due to low factor loadings (DIQ2, DIQ5, DIQ14, DIQ15, DIQ16, DIQ19), while the remaining 13 items were grouped into two sub-dimensions. These factors explained 42.857% of the total variance (Table 2).

When the correlations between the variables were examined, we found that the factor loadings of the items were above 0.30 and all of the correlations were significant. According to the confirmatory factor analysis, the structural equation modelling results were significant (at the level of $p = 0.000$) and the 13 items and two sub-dimensions were related to the scale structure (Table 3).

Based on the t-statistics in Table 3, all of the items scored between 5.52 and 12, and were significant at the 0.01 level. When the factor loadings of the scale were examined, it was determined that there was no item below 0.30. Hence, the factor loadings were within the acceptable limits (i.e. between 0.32 and 0.90).

In this study, improvements were made in the model. During this process, the variables that reduced the fit were identified and new covariances were created for those with high covariance among the residual values. As shown in Table 4, the accepted values for the fit indices were achieved in the renewed fit index calculations.

As shown in Figure 1, a path diagram was created from the results of the confirmatory factor analysis of the FDS.

When the reliability of the scale and its sub-dimensions were individually evaluated, the reliability coefficients were found to be 0.758 for the first dimension, 0.718 for the second dimension and 0.781 for the overall scale, thus determining that the scale had good reliability. Moreover, Cronbach's alpha coefficients were greater than 0.6, indicating that the scale was reliable. This also shows that the internal consistency of the scale was good (Table 2).

Pearson correlation was applied to evaluate the relationship between test-retest results of the scale. Consequently, there was a statistically significant correlation before and after the scale ($p < 0.05$).

Table 1. Distribution of the participants according to their socio-demographic characteristics

Variables		n	%
Age	20–29	118	21.6
($\bar{X}$ ± SD, 34.38 ± 6.27)	30–39	325	59.4
	40 and over	104	19.0
Gender	Female	413	75.5
	Male	134	24.5
Education level	High school and below	84	15.3
	Bachelor's	322	58.9
	Master's	141	25.8
Duration of Marriage	0–4	152	27.8
	5–9	185	33.8

	10–14	120	21.9
	15–19	40	7.4
	20 and over	50	9.1
Number of Children	None	126	23.0
	One	220	40.2
	Two	171	31.3
	Three or more	30	5.5
Family Type	Nuclear	521	95.2
	Extended	26	4.8
Region	Aegean	111	20.3
	Marmara	73	13.3
	Mediterranean	49	9.0
	Black Sea	145	26.5
	Central Anatolia	88	16.1
	Eastern Anatolia	25	4.6
	Southeastern Anatolia	56	10.2
Work	Self-employment	11	2.0
	Officer	139	25.4
	Health Professional	100	18.3
	Retired	17	3.1
	Not working	91	16.6
	Academician	84	15.4
	Employee	36	6.6
	Other	69	12.6
Income status	Income less than expenses	119	21.8
	Income equals expenses	329	60.1
	Income more than expenses	99	18.1
Toplam		**547**	**100.0**

Table 2. Exploratory Factor Analysis of the Scale

	Factors		
Items	**F1: Positive Childbearing Motivations**	**F2: Childbearing Worries and Social Beliefs**	**Total Item Correlation**
FDS1	0.516		0.394
FDS3	0.678		0.502
FDS4	0.636		0.490
FDS7	0.531		0.406
FDS11	0.769		0.601
FDS12	0.783		0.617
FDS18	0.502		0.372
FDS6		0.667	0.536
FDS8		0.658	0.486
FDS9		0.586	0.452
FDS10		0.653	0.457
FDS13		0.541	0.357
FDS17		0.672	0.415
Reliability	0.758	0.718	0.781
Explained Variance(%)	26.653	22.204	48.857
KMO = 0.761; $\chi 2$ (78) = 1966.558; Bartlett's Test of Sphericity (p) = 0.000			

Table 3. Measurement Modelling Results of the FDS

Factors	Items	Factor Loadings	Standard Error	t Values	p Values
F1: Positive Childbearing Motivations	FDS1	0.337	-	-	-
	FDS3	0.376	0.151	6.320	***
	FDS4	0.452	0.193	6.470	***
	FDS7	0.357	0.130	5.786	***
	FDS11	0.879	0.247	7.734	***
	FDS12	0.909	0.276	7.735	***
	FDS18	0.328	0.146	5.524	***
F2: Childbearing Worries and Social Beliefs	FDS6	0.824	-	-	-
	FDS8	0.692	0.075	12.004	***
	FDS9	0.410	0.056	8.209	***
	FDS10	0.338	0.063	6.782	***
	FDS13	0.328	0.058	6.608	***
	FDS17	0.380	0.060	7.621	***

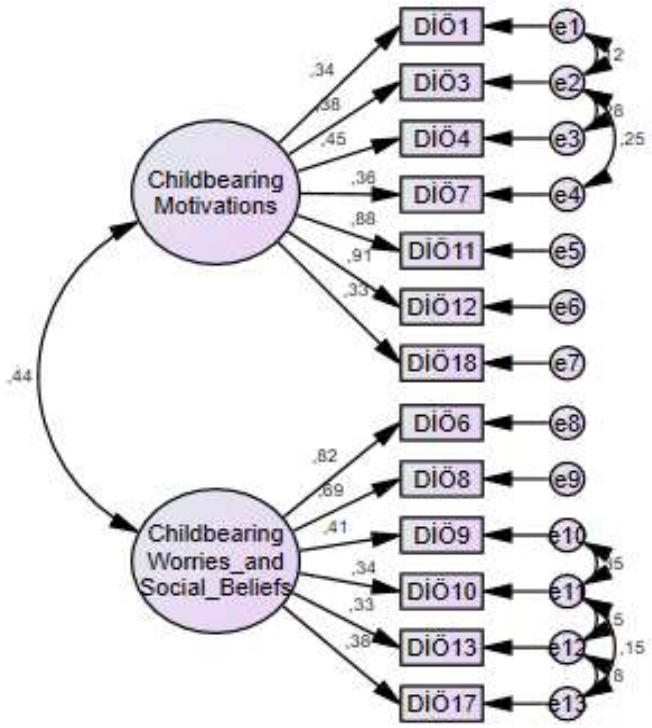
Note: *** $p < 0.05$

Table 4. Goodness of Fit Values for the Structural Model of the FDS

	Structural Model Values	Recommended Values
CMIN/DF	4.956	≤5
RMSEA	0.069	≤0.08
GFI	0.925	≥0.80
AGFI	0.881	≥0.80

CFI	0.882	≥0.80
TLI	0.838	≥0.80
IFI	0.883	≥0.80
RFI	0.805	≥0.80
NFI	0.858	≥0.80
SRMR	0.071	≤0.10

Figure 1. Model for the First-Level Multi-Factor Confirmatory Factor Analysis of the FDS



Discussion

In this study, we created the Turkish version of the FDS to assess the fertility desire of individuals, and tested its validity and reliability. In this regard, scale adaptation studies provided time-saving solutions and generalisation of the collected data, and also enabled us to investigate the commonalities and differences between the cultures measured (Capık et al., 2018).

For FDS validity, both content and construct validity were conducted. As for the former, the content validity index ranged from 0.81 to 1.0, with a value of 0.80 as the acceptable criterion (Polit & Beck, 2006). In this context, since the calculated values were higher than the minimum value, there was agreement between the experts. For construct validity, confirmatory factor analysis was applied to evaluate its conformity to the original scale structure. Since the fit indices were low, the scale was first evaluated with exploratory factor analysis. However, before this analysis, the KMO test was applied to determine whether the sample size was suitable for factor analysis. According to the results, the KMO value was 0.761, indicating that the sample was sufficient for conducting factor analysis. While KMO values between 0.5–1.0 are considered acceptable, values below 0.5 indicate that factor analysis is not suitable for the dataset in question (Altunisik et al., 2010). In addition, based on the results of Bartlett's test of sphericity, we found that the chi-square value was acceptable: $\chi 2$ (78) = 1966.558, $p < 0.05$ (Akgul, 2003; Weis & Schank, 2009). These statistically significant values ($p < 0.000$) showed that the sampling was adequate and the structure of the dataset was suitable for exploratory factor analysis.

Item analysis was also conducted to determine the discrimination of the scale items and the degree to which the items predicted the total score. In this case, the item-total score correlation method was used to determine this degree. This particular method examines the relationship between the scores of each scale item and the total score of the scale. A positive and high item-total score correlation indicates that each item of the scale is similar and the internal consistency is high. The minimum value required for the item-total score correlation to be sufficient is 0.30 (Kline, 2000).

For the factor analysis, six items were removed from the scale, due to low factor loadings (FDS2, FDS5, FDS14, FDS15, FDS16, FDS19), after which the remaining 13 items were grouped into two sub-dimensions. In this case, the item-total score correlation value of the items varied between 0.35 and 0.78, with no items below 0.30. Thus, it was determined that all of the items were related to one another. Meanwhile, the different distribution of the factor structure and the items obtained from the Turkish version, compared to the original scale (Weis & Schank 2009), was probably due to cultural differences.

Regarding the total variance in the new structure, the result was 48.85%. In multi-factor designs, it is considered sufficient that the variance is above 40% (Buyukozturk, 2021; Tavsancil, 2018). Hence, it was determined that the factor structure was good in the present study. It should be noted that since the total variance for the four-factor structure was 55.44% in the original scale (Naghibi et al., 2019), it was relatively close to our finding.

In confirmatory factor analysis, fit indices are used to evaluate whether the observed data fits the two-dimensional model (Kalaycı, 2010; Thompson, 2004; Brown, 2015). In the present study, it was found that the scale fit the two sub-dimensional model, supporting the results of the exploratory factor analysis. In order to determine whether an item is related to a sub-scale, it is necessary to check the factor loadings (Thompson, 2004). Buyukozturk defined factor loadings higher than 0.60 as high, between 0.30 and 0.59 as medium and 0.29 or less as low. The accepted limit for the factor loading values was determined to be 0.30 (Buyukozturk, 2021). In the original scale, the factor loadings ranged from 0.41 to 0.71 (Naghibi et al., 2019). In our study, the factor loadings ranged from 0.32 to 0.90, not only indicating that the items were appropriate for inclusion in the sub-dimensions, but also confirming the factor patterns.

In structural equation modelling, after the appropriate matrix is created, a path diagram can be drawn in which the variables, t-values, factor loadings, and unexplained variance of the model are included (Gatignon, 2011). If the t-value of the items is above 1.96, then it is significant at the 0.05 level, while if it is above 2.56, then it is significant at the 0.01 level (Cokluk et al., 2021). In the literature, it is stated that the absence of red arrows for t-values in the analysis indicates that all of the items are

significant (at the 0.05 level) (Secer, 2018). As a result of the path analysis performed in the present study, it was determined that all of the items were significant at the 0.05 level. Consequently, the two sub-dimensional structure of the 13-item FDS was deemed suitable for the model.

In the original scale, Cronbach's alpha coefficient was 0.84 (Naghibi et al., 2019), while this coefficient for our scale was 0.78 and those of the two sub-dimensions were.75 and.71, respectively. Since Cronbach's alpha coefficients greater than 0.6 indicate reliability of the constructs, our scale was deemed reliable. This also shows that the internal consistency of the scale was good.

Finally, the test-retest reliability refers to the ability of a measurement tool to give consistent results from application to application, and show invariance over time (Tabachnck & Fidell, 2007). In this regard, it has been recommended that the second application be conducted with at least 30 participants and that the interval between the two tests be determined within a period ranging from two weeks to one month. Moreover, related research has shown that the reliability of the scale increases when the correlation coefficient is positive and above 0.70 (Cokluk et al., 2021). In our study, the test-retest correlation value was $r = 0.93$ ($p < 0.001$) when the scale was re-administered to 84 individuals approximately three weeks after the first application. This result indicates that the Turkish version of the FDS can provide similar values in repeated measurements.

Conclusions: This study determined the validity and reliability of the Turkish version of the FDS, and was the first step in the development of a valid and reliable tool for assessing the fertility desire of individuals. While the original scale consisted of four sub-scales and 19 items, we found that it was appropriate to use the Turkish version with 13 items and two sub-scales (i.e. Childbearing motivations (1, 3, 4, 7, 11, 12, 18) and Childbearing worries and social beliefs (6, 8, 9, 10, 13, 17)). With this structure, the scale was found to be suitable for the reliability of the original form. The lowest score obtained from the entire scale was 13, whereas the highest score was 65. In this case, as the score decreases in the scale, the desire for fertility increases. Despite the findings, re-testing the scale with larger sample groups will ensure its generalizability. Moreover, although the FDS was proven to reliable, it can serve as a tool for further research on determining the factors affecting the fertility desire of individuals.

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