

Original Article

Turkish Validity and Reliability of the Infertility-Related Stress Scale: A Methodological Study Infertility-Related Stress Scale

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Abstract

Objectives: Assessing anxiety and stress in infertile individuals/couples is an important part of the care and there are limited valid scales that evaluate the infertility-related stress in Turkish. Therefore, this study was conducted to evaluate validity and reliability of Turkish version of the Infertility-Related Stress Scale (IRSS).

Methods: This study was designed as a methodological study. Reliability was evaluated using Cronbach's alpha coefficients and item-total subscale correlations. The stability of the measures was examined through test-retest reliability assessment. A total of 240 including 120 female and 120 male participants were included in this study between June-December 2019. The re-test was administered to 37 participants two weeks after the first data collection.

Results: The Cronbach's alpha coefficient value for the scale was 0.91, and the test-retest reliability coefficient value was 0.78. Our results showed an acceptable two-factor model for the IRSS. The factor loads of the scale items range between 0.562 and 0.827.

Conclusion: Infertility-Related Stress Scale is a valid and reliable instrument to evaluate the effect of infertility on the intrapersonal and interpersonal domains of life. This 12-item scale is a short and simple tool that can be used effectively in clinical practice.

Keywords: Infertility, stress, scale, validation.

Introduction

Infertility is a significant health problem affecting individuals, and the number of affected individuals/couples is growing daily.

World Health Organization (WHO) reported that infertility affects 15% of couples who are reproductive age worldwide ("Infertility," n.d.). This rate includes approximately 48

million couples, or 186 million, who are infertile (CDC, 2023). Infertility rates vary among different countries, the rate in the United States is roughly 9% ("FastStats - Infertility," n.d.), while it is about 25% ("Infertility," n.d.) in developing countries. In some parts of the world, particularly in Southern Asia, the prevalence of infertility can exceed 30% in Sub-Saharan Africa, Central and Eastern Europe, Middle East, North Africa, and Central Asia (Vander Borgh & Wyns, 2018). In Turkey, it is estimated that there are approximately two million couples with infertility problems (Yilmaz & Kavak, 2019).

Infertility is a common problem with significant impact on couples' life in different ways including psychological, economic, social, and medical consequences (Chehreh, Ozgoli, Abolmaali, Nasiri, & Mazaheri, 2019; Cui, Wang, & Wang, 2021). Although, in many countries, women face to societal pressure to have children, couples are significantly impacted by infertility (Aflakseir & Zarei, 2013). Couples with infertility problem do not communicate their sentiments, problems, and fears with close circles due to increased pressures (Rooney & Domar, 2018) which compound the negative effects of involuntary childlessness.

According to studies, infertile women face a loss of control in their lives, social isolation, loneliness, sexual dysfunction, low self-esteem, and fertility stress (Casu & Gremigni, 2016; Chehreh et al., 2019; Cui et al., 2021; Yusuf, 2016). In addition to these unfavourable outcomes, with problems in natural reproductive ability and its psychosocial consequences, infertility causes anxiety, depression, and psychosomatic disorders among couples (Aflakseir & Zarei, 2013; Yusuf, 2016).

Many studies have investigated the anxiety and stress experienced by infertile individuals/couples (Aflakseir & Zarei, 2013; Gana & Jakubowska, 2016; Gdanska et al., 2017; Jahromi & Ramezanli, 2015; Yassa, Arslan, & Gulbahar, 2019). Recent research show high levels of anxiety and stress in infertile individuals/couples (Cui et al., 2021; Yusuf, 2016). Most studies on the anxiety and stress levels of infertile individuals/couples

used self-report or general population stress rating tools to assess stress and anxiety levels (A. Karaca, Yavuzcan, Batmaz, Cangur, & Caliskan, 2019; Wiweko, Anggraheni, Elvira, & Lubis, 2017; Yassa et al., 2019; Yilmaz & Kavak, 2019; Yusuf, 2016). Specific to infertile individuals/couples, there are available scales including, the Fertility Problem Inventory (46-item) to evaluate the effect of infertility on the individual's sociologic, marital status, sexuality and parenthood (Sherrard, 1999), Fertility Quality of Life Tool (36-item) to evaluate the effect of fertility issues, and treatment on life quality (Boivin, Takefman, & Braverman, n.d.), and Coping Strategy Scale (19-item) to assess the infertility stress and the coping methods, Coping Scale for Infertility-Women (CSI-W) (28-item) (Kim & Ko, 2020) and Coping Scale for Infertile Women (CSIW) (50-item) to determine the strategies were used by women to cope with the problems of infertility (Karaca Ay, et al., 2018) and the Copenhagen Multi-Center Psychosocial Infertility (COMPI) (Abbey et al., 1991), Fertility Problem Stress Scale (Schmidt, Christensen, & Holstein, 2005). Although these scales can assess infertile individuals/couples, brief and simply applied instruments are required. In this regard, the infertility stress scale (12-item) developed by Casu and Gremigni (2016) is a time-saving scale that may be utilized in clinical practice to evaluate the stress levels of infertile individuals/couples due to its short and straightforward administration.

During the first session of couples who experiencing involuntary childlessness, screening couples who have opted to use assisted reproductive techniques to determine their infertility-specific stress levels may help to identify individuals who require support during infertility treatment (Casu & Gremigni, 2016; Rooney & Domar, 2018). As a result, it was decided that this study would conduct a Turkish validity and reliability assessment of the Infertility-Related Stress Scale, which we believe is more practical than other measurement instruments.

The primary aim of the current study was to assess the psychometric properties of Infertility-Related Stress Scale. The

secondary aim was to determine the associations between some socio-demographic, infertility related characteristics, anxiety, and infertility stress.

Methods

Design and Sample

This study was designed as a methodological study. Participants were recruited from an infertility clinic in an education and research hospital in Ankara in Türkiye between the dates January and December, 2019. The sample size was calculated based on suggestions for confirmatory factor analysis (CFA), requiring at least 10-20 samples for each freely estimated model parameter (Kline 2016). The scale consists of 12 items which are rated on a 7-point scale. Therefore, 240 participants (120 women and 120 men) were included in this study. Inclusion criteria were being 18 years or older, seeking healthcare for assisted reproductive care services, applying to the obstetrics and gynecology outpatient clinic with a desire to conceive, and being able to speak Turkish.

Instruments

Descriptive characteristics form: The form consists of 19 questions. In the form, there are questions assessing the participants' socio-demographic characteristics (such as age, gender, educational status, monthly income, and employment status) as well as infertility-related characteristics (such as how long they could not have children, the cause of infertility, and how long they had received treatment).

Infertility-Related Stress Scale (IRSS): The IRSS consists of 12 items rated on a 7-point scale (1 point indicates (no stress at all) and 7 points indicates (a great amount of stress)) to evaluate the effect of infertility on the intrapersonal and interpersonal life domains (Casu & Gremigni, 2016). Four items related to marital satisfaction, sexual satisfaction, and physical and mental well-being were established while developing the scale items (Abbey, Andrews, & Halman, 1991; Schmidt et al., 2005) based on data received from focus group interviews and research conducted by Abbey et al. (1991) and Schmidt et al. (2005). Four items about relatives, spouses family, friends, and colleagues were inspired by the study of Schmidt et al. (2005)(21). The final four items were created as new items in

response to group suggestions gathered during focus group interviews. The final four categories are overall life satisfaction, leisure/enjoyment, neighbors, and work/housework performance. In the IRSS, the six items related to perceived mental and physical health, sexual pleasure, marital satisfaction, leisure/enjoyment, and global life satisfaction were presented in the intrapersonal domain, and the six items related to work performance, and the relational concepts of relatives/family of origin, in-laws, friends, colleagues/acquaintances, and neighbors were presented in the interpersonal domain (Casu & Gremigni, 2016).

Spielberger State-Trait Anxiety Scale

(STAI): The 20-item State-Trait Anxiety Scale (STAI) was used to evaluate participants' anxiety levels (Spielberger, Gorsuch, & Lushen, 1970). Each question on the scale is rated from 1 to 4 and is evaluated using terms such as "not at all", "a little", "a lot", and "totally". The highest score is 80, and the lowest score is 20. As the score increases, the individual's level of anxiety increases. In the Turkish validity study of the scale, the Cronbach's alpha value was 0.83 (Öner & Le Compte, 1993), while in this study, it was 0.81.

Ethical considerations: Permission to adapt the IRSS scale to Turkish was received via e-mail from the scale's creators, Casu and Gremigni. Ethical approval was obtained from the University of Health Sciences Turkey, Gulhane Education and Research Hospital Ethics Committee (Numbered 18/266, dated October 30th, 2018). All participants agreed to participate in the study voluntarily after researchers informed them about the aim and method of the study. Volunteering participants signed the written informed consent before participating the study. All participants agreed to participate in the study voluntarily after researchers informed them about the aim and method of the study. Volunteering participants signed the written informed consent before participating the study.

Data collection: Women who applied to the hospital's obstetrics and gynecology outpatient clinic with pregnancy intentions, had infertility treatment and met the inclusion

criteria were included in the study. A sample of 255 individuals with infertility problems was invited to participate in the study by the researchers. Six women and two men declined to participate in the study due to lack of time, and seven women were excluded from the study due to the cancellation of ART treatment. Study data were collected through face-to-face interviews through a survey, which took about 15 minutes to complete. Data from a total of 240 infertile individuals were analyzed.

Statistical Analysis

Confirmative Factor Analysis(CFA): CFA was used on the IRSS to evaluate the validity of our proposed two-factor model of infertility-related stress and to get the IRSS construct validity evidence. The following indices were used to evaluate model fit: The comparative fit index (CFI) is ≥ 0.90 , the goodness of fit index (GFI) is ≥ 0.90 , the root means square approximation error (RMSEA) is < 0.08 , the standardized root mean square residual (SRMR) is < 0.08 , and the ratio χ^2 statistical test / degrees of freedom (χ^2/df) is less than two or three. Internal consistency reliability was evaluated by calculating Cronbach's Alpha (cut-off ≥ 0.70 ; Nunnally, 1978) and corrected item-total correlations (cut-off ≥ 0.30) (Streiner & Norman, 2008). Test-retest reliability over time was evaluated by calculating the intra-class correlation coefficient (ICC) with a two-way random effects (absolute agreement) model (cut-off ≥ 0.70) (Streiner & Norman, 2008) in a subsample of 40 patients. CFAs were performed using LISREL 8.80 (Scientific Software International, Lincolnwood, IL, USA), and all other data such as means, percentages and intergroup comparisons analyzed using IBM SPSS 20 (SPSS Inc., Chicago, IL, USA).

Face validity: The face validity was done using cognitive assessment to determine how participants understood the items (Tourangeau & Rasinski, 1988). Face validity was established with four women and four men. Using the verbal probe method, one of the physicians in the research team collected comments about the items. No changes were made in line with this evaluation.

Content Validity: The content validity of IRSS was evaluated by four experts' opinions (obstetrician, embryologist, methodologist, and linguist).

Construct Validity: In the analysis performed to evaluate whether the study's sample size was adequate for factor analysis, the KMO and Bartlett's test values of IRSS were found to be 0.79 and $p < 0.001$, respectively. The original version of the scale was grouped under two factors (Casu & Gremigni, 2016). The exploratory factor analysis results revealed two components with eigenvalues greater than one and a total variance explaining 60.36% in the current investigation. The factor loadings of the items were found to be higher than 0.562.

Results

According to the Table 1 the mean age of the women was 30.35(5.22) and men was 32.87 (4.81) and there was statistically significant difference between the ages of men and women ($p < 0.001$). There were no statistically significant differences between men and women regarding the educational levels and causes of infertility ($p > 0.05$). We found a statistically significant difference between the employment status of men and women ($p < 0.001$) (Table 1).

The measurement model developed to validate the structure, including 12 questions and two factors, was examined. The analysis revealed that the model did not fit well enough; hence model improvement studies were conducted. First, the modification indices table was used to assess Chi-square reduction values ("M.I." values) for potential model adjustments. The three most appropriate alterations to improve the model were made using the modification indices. As a result, the model was validated with three modifications.

The results of the confirmatory factor analysis of the scale show that the model fit coefficients before the adjustment were only compatible with the SRMR coefficient. In contrast, the other model fit coefficients were not within acceptable ranges. Following the adjustment, all the fit coefficients are within the bounds of good or acceptable fit. As a result, the model was considered valid (Table 2).

Confirmatory factor analysis yielded the factor loading values for each item in Table 3. Factor loads in both the first and final stages were found to be greater than 0.500.

The measurement model in Figure 1 shows the items of the measurement model, which consists of 12 items and 2 factors, and the standardized regression coefficients of the routes on the one-way arrows, or factor loads. There was no factor load below 0.500.

Cronbach's Alpha coefficients for the scale and subdimensions ranged from 0.841 to 0.912. The scale was reapplied to 37 of the 240 individuals two weeks later to assess its stability. There was a high agreement between the retest and the first test (ICC=0.786). Accordingly, there was no time-dependent

change in the scale and sub-dimensions (Table 4).

When Table 5 was analysed, the item-total correlations of the scale items are greater than 0.30. Furthermore, no item on the scale was discovered to be detrimental to reliability (Table 5).

Table 6 showed a statistically significant low-level positive association ($p=0.01$) between participants' anxiety scores and factors 1, 2, and scale total scores (Table 6).

Table 7 showed a statistically significant low-level positive association between anxiety ratings of men and women, as well as factor 2 and total scale scores ($p<0.05$) (Table 7).

Table 1. Socio-demographic Characteristics of Participants

	Women		Men		Test*	p
Age (Mean,SD)	30.35	5.22	32.87	4.81	-3.893	<0.001
	n	%	n	%		
Level of Education						
Primary	9	7.8	8	7.1	1.531	0.675
Secondary	18	15.7	12	10.7		
High School	49	42.6	48	42.9		
University	39	33.9	44	39.3		
Employment Status						
Unemployed	40	33.8	112	93.3	93.01	<0.001
Employed	80	66.7	8	6.7		
Cause of Infertility						
Female Factor	21	17.5	20	16.7	-	-
Male Factor	27	22.5	35	29.2		
Female And male factors	11	9.2	15	12.5		
Unexplained	58	48.3	49	40.8		
Other	3	2.5	1	0.8		

*X²: Pearson chi-square test

Table 2. Fit Index Values and Acceptable Fit Values of the Measurement Model

	Initial State Fit Index Values	Values of the Compliance Index Following Modification	Good Fit Values (Acceptable Fit)
χ^2/sd	5.366	2.811	≤ 3 (4-5)
GFI	0.829	0.915	≥ 0.90 (0.89-0.85)
AGFI	0.748	0.867	≥ 0.90 (0.89-0.85)
IFI	0.858	0.944	≥ 0.95 (0.94-0.90)
TLI (NNFI)	0.822	0.926	≥ 0.95 (0.94-0.90)
CFI	0.857	0.954	≥ 0.97 (0.95)
RMSEA	0.135	0.078	≤ 0.05 (0.06-0.08)
SRMR	0.073	0.044	≤ 0.05 (0.06-0.10)

Table 3. Factor Loading Values of Scale Items According to Confirmatory Factor Analysis

Item	Initial Version	After Modification
Factor 1		
Item 1	0.668	0.660
Item 4	0.775	0.740
Item 5	0.815	0.788
Item 6	0.759	0.764
Item 9	0.728	0.735
Item 12	0.812	0.827
Factor 2		
Item 2	0.648	0.562
Item 3	0.674	0.591
Item 7	0.611	0.673
Item 8	0.787	0.791
Item 10	0.689	0.703
Item 11	0.727	0.739

Table 4. Reliability for Scales and their Sub-Dimensions and Concordance between Test-Retest for Scale and Sub-Dimensions

IRSS	Number of Items	Cronbach Alfa
Factor 1 (Intrapersonal domain)	6	0.883
Factor 2 (Interpersonal domain)	6	0.841
Scale Total	12	0.912
Compatibility between Test and Retest		
	In-Class Correlation (ICC)	%95 Confidence Interval
Factor 1 (Intrapersonal domain)	0.806	(0.560-0.915)
Factor 2 (Interpersonal domain)	0.644	(0.192-0.843)
Scale Total	0.786	(0.514-0.906)

Table 5. Cronbach's Alpha Values and Item-Total Correlations with Item Subtraction

Items	Item-Total Correlations	Cronbach Alfa. When an Item is Deleted
IISD1	0.618	0.906
IISD2	0.542	0.910
IISD3	0.571	0.909
IISD4	0.703	0.902
IISD5	0.706	0.902
IISD6	0.666	0.904
IISD7	0.607	0.907
IISD8	0.724	0.901
IISD9	0.645	0.905
IISD10	0.615	0.906
IISD11	0.659	0.904
IISD12	0.733	0.901

Table 6. An investigation of the relationships between the scale and its sub-dimensions and anxiety

N=240		Factor 1	Factor 2	Total Scale
Anxiety	r	0.209**	0.335**	0.292**
	p	0.001	<0.001	<0.001

r: Pearson Correlation Coefficient **:p<0.01

Table 7. Investigation of the Correlations between IRSS Sub-Dimensions, Total IRSS Scores, and Anxiety Scores among Participants Based on Gender

Gender			Factor 1	Factor 2	Total Scale
Female	Anxiety	r	0.140	0.267**	0.220*
		p	0.127	0.003	0.016
		N	120	120	120
Male	Anxiety	r	0.155	0.288**	0.236**
		p	0.092	0.001	0.009
		N	120	120	120

r: Pearson Correlation Coefficient

Figure 1. Path Diagram for Confirmatory Factor Analysis of the Scale

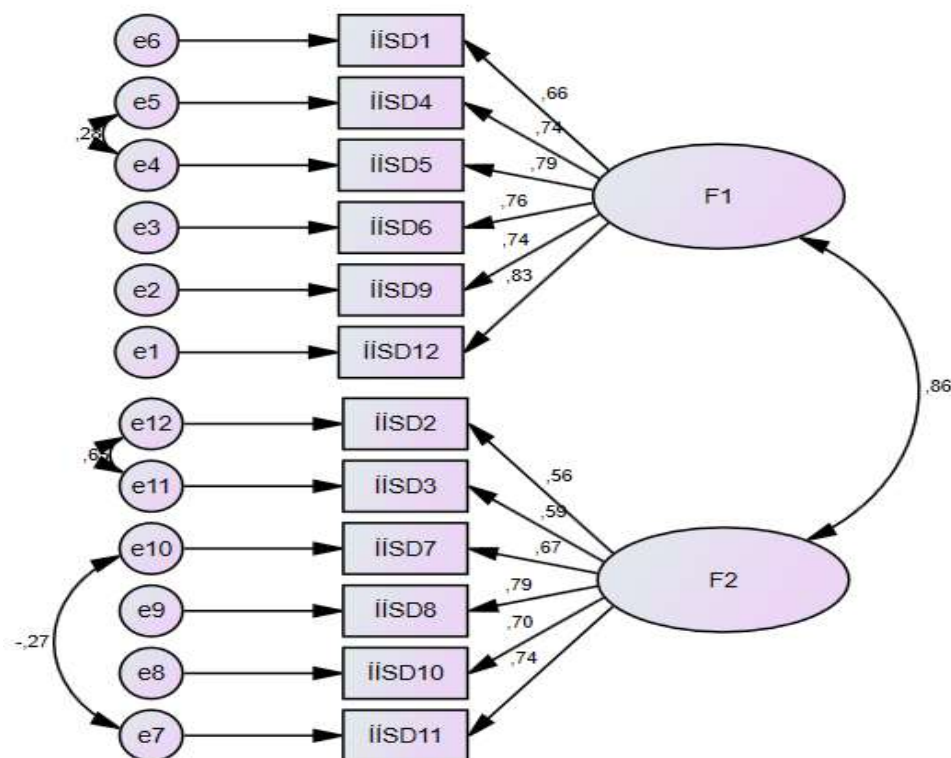


Figure 1: Confirmatory factor analysis of the measurement model, which consists of 12 items and 2 factors. All factor loads are above 0.500.

Discussion

The present study aimed to determine the Turkish validity and reliability of the IRSS, a self-report measure assessing the effect of infertility on the intrapersonal and interpersonal domains of life. Results obtained from the SRMR showed that acceptable two-factor model for the IRSS scale. As a result, model enhancements were made, and the model was verified with three changes. The test-retest analysis of IRSS showed good temporal stability.

The two factors had adequate internal consistency and high test-retest correlation coefficients, indicating the reliability of the IRSS scale. The Cronbach's alpha value of the IRSS scale was found to be 0.91, while the Cronbach's alpha values of the sub-factors were 0.88 for factor 1 and 0.84 for factor 2. Accordingly, the reliability of the Turkish version of the IRSS scale is high. Similar to our findings, the total IRSS Cronbach's alpha was 0.91 in the original validation research, 0.89 in the intrapersonal domain, and 0.87 in the interpersonal sub-dimension (Casu & Gremigni, 2016). High reliability values were also found in the Chinese and Brazilian-Portuguese versions of the scale (Casu et al., 2022; Yuxi, Xiangfeng, Yu, et al., 2017). According to the literature, Cronbach's alpha coefficients range from 0.0 to 1.0, with values above 0.80 indicating that the scale is very dependable (Akgul, 2003). As a result, Cronbach's alpha value of the IRSS in Turkish is highly reliable. The high Cronbach's alpha values obtained in IRSS adaptation studies may indicate the scale's cross-cultural solid adaptability. These data can be used to improve the scale's adaptability to different languages.

The factor structure of the scale with two sub-dimensions, intrapersonal and interpersonal, was confirmed in our investigation. Similarly, two sub-dimensions were discovered in the initial research of the scale and in the Chinese, Brazilian, and Portuguese versions (Casu & Gremigni, 2016; Casu et al., 2022; Yuxi et al., 2017). Unlike our study and earlier studies (Casu & Gremigni, 2016; Casu et al., 2022), the scale subgroups in the Chinese validity study were classified as personal and social domains (Yuxi et al., 2017). Confirmation of

the factor structure may not only provide greater confidence in the validity of the reported results, but it will also increase the comprehensibility of the concept of infertility stress, namely by helping to define what issues should be addressed when referring to this construct.

In our study, the coefficient obtained from GFI, AGFI being over 0.90, and IFI and TLI (NNFI) index values being above 0.95 indicate a good level of fit. An RMSEA value of less than 0.10 and a χ^2/df of less than 3.0 indicate a good fit (Akgul, 2003; Erkorkmaz, Etikan, Demir, Ozdamar, & Sanisoğlu, 2013). Based on our findings (2/df=2.81, GFI=0.91, AGFI=0.86, IFI=0.94, TLI=0.92, CFI=0.95, RMSEA=0.07, SRMR=0.44), we may conclude that the Turkish version of the IRSS is compatible with the original model.

In our study, confirmatory factor analysis revealed that the factor load of all scale items was greater than 0.500. The scale items' factor loads ranged from 0.562 to 0.827, and the factor loads of 11 of the scale items were deemed to be acceptable. The stability of the scale over time was assessed with the test-retest analysis. In our study, test-retest reliability intraclass coefficients were found for the intrapersonal domain as 0.80, for the interpersonal domain as 0.64, and 0.78 for total IRSS. According to the literature, intraclass coefficients less than 0.5 suggest weak reliability, values between 0.5 and 0.75 refer moderate reliability, values between 0.75 and 0.9 refer strong reliability and values greater than 0.90 refer very good reliability (Koo & Li, 2016). In this regard, the IRSS's test-retest reliability was moderate to good.

The concepts of stress and anxiety are commonly investigated among infertile couples/individuals. Studies have found that psychological stress can cause anxiety and depression (Haimovici et al., 2018; Peng et al., 2021). Since stress and anxiety are linked concepts, the association between the participants' stress levels and their anxiety levels was examined in this study. Accordingly, it was found that as the infertility-related stress levels of the participants increased, their anxiety levels increased. It has been concluded that the result produced from our investigation is consistent

with the data found in the literature (Haimovici et al., 2018; Peng et al., 2021), confirming the suitability of IRSS as a measurement technique.

In this study that when both female and male participants' anxiety levels increased, so did their stress levels in the interpersonal domain. In the literature, studies conducted with infertile couples revealed conflicting outcomes on the effects of sex on anxiety and stress levels. In the Peng et al. study no difference was found between male and female participants' anxiety and stress levels (Peng et al., 2021); however, in other studies, women's stress and anxiety levels were higher than men's (Chehreh et al., 2019; El Kissi et al., 2013; Haimovici et al., 2018; Maroufizadeh et al., 2018). These conflicting findings in the literature might reflect that the studies were conducted in different populations with different backgrounds.

Study Limitations: This study was done in a university hospital in the city centre with participants who had a higher education level. Therefore, this should be considered when interpreting the results. Additionally, we found a statistically significant difference between the women and men regarding their ages and employment. In our country, men are mostly employed and older than women in the marriage. It could be considered as a traditional prosperity of Turkish population.

Conclusions: Adapting the scales to different cultures is critical for assessing the stress levels faced by various groups of people dealing with infertility issues. The Turkish version of the IRSS is a valid and reliable tool to evaluate the effect of infertility on the intrapersonal and interpersonal domains of life. To the best of our knowledge, this is the first study that assessed the validation of the Turkish version of IRSS. IRSS can be used effectively in clinical practice as a short and simple tool. Further research with use of different scales is needed to assess IRSS methodological performance in different groups of Turkish people with infertility problem. It is suggested that the scale be tested, particularly in people with low socioeconomic positions, limited financial resources for infertility treatment, residing in

remote locations, and having a low education level.

The IRSS can be used clinically to identify the stress levels experienced by infertile couples and to create appropriate interventions for couples. Interventions aiming to reduce stress levels may increase infertility treatment's success. Thus, future studies developing and testing the impact of stress reduction interventions in infertile couples using validated scales such as IRSS should be planned.

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