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ARAŞTIRMA / RESEARCH

Development of the Attitudes toward Infertility Scale (ATIS): validity and reliability study

İnfertiliteye Yönelik Tutum Ölçeğinin geliştirilmesi: geçerlik ve güvenirlik çalışması

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Abstract

Purpose: The purpose of the study was to develop both a valid and reliable scale to determine the attitudes of university students towards infertility.

Materials and Methods: This study was conducted in two phases, Study 1 (n = 443) and Study 2 (n = 309), with university students. Item analysis, exploratory factor analysis, discriminant validity, and internal reliability were calculated in Study 1. Confirmatory factor analysis and internal reliability were calculated in Study 2.

Results: The result of exploratory factor analysis showed that the scale has a single factor structure with 12 items and confirmatory factor analysis indicated a good fit of the model for Attitudes Toward Infertility Scale. Cronbach's alpha coefficients were .85 and .83 for two studies.

Conclusion: The findings of this study demonstrate that the Attitudes toward Infertility Scale is a reliable and valid instrument.

Key words: Infertility, scale development, attitudes

Öz

Amaç: Bu çalışmayla üniversite öğrencilerinin infertiliteye yönelik tutumlarını belirlemede güvenli ve geçerli bir ölçme aracının geliştirilmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışma iki aşamada gerçekleştirilmiştir, birinci çalışmaya 443, ikinci çalışmaya 309 öğrenci katılmıştır. Çalışma 1' de ölçme aracının madde analizi ve açımlayıcı faktör analizi yapılmış, ayırtedicilik geçerliği ve iç tutarlılığa dayalı güvenirliği hesaplanmıştır. Çalışma 2' de doğrulayıcı faktör analizi yapılmış ve iç tutarlılığa dayalı güvenirliği hesaplanmıştır.

Bulgular: Açımlayıcı faktör analizi sonuçları 12 maddeden oluşan ölçeğin tek faktörlü bir yapıda olduğunu gösterirken, doğrulayıcı faktör analizi sonuçları modelin iyi uyum gösterdiğine işaret etmektedir. Cronbach alfa güvenirlik katsayısı iki çalışmada sırasıyla .83 ve .85 olarak hesaplanmıştır.

Sonuç: Çalışma bulguları İnfertiliteye Yönelik Tutum Ölçeğinin geçerli ve güvenilir bir ölçme aracı olduğunu göstermektedir.

Anahtar kelimeler: İnfertilite, ölçek geliştirme, tutum.

INTRODUCTION

There are expected life events in human life. Starting to school, completing basic education, attending to university, graduating, marrying, having children, entering a job, retiring and having grandchildren are some of these expected life events. Coping with these expected life events are known as developmental tasks. Many researchers as Havinghurst[1], Erikson[2], and Chickering[3] underline the importance of these developmental tasks. Having healthy relationships, marrying and being parents are main developmental tasks during young adulthood. In this manner, many young adults are expecting to be parents. Being infertile on the other hand is an unexpected life event.

Infertility is the inability to reproduce after twelve months or longer unprotected sexual relationship[4].

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Although infertility is not a life-threatening illness, it is considered as a serious problem for both the individual and the society[5]. Many factors such as genetic abnormality, age, cigarette or tobacco usage, caffeine, sexual illness, and stress effect infertility[6-9]. Some of these factors are accepted as having preventive characteristics since early interventions of these factors might have a positive effect on reproduction. Therefore, being aware of these factors and their effects on infertility, taking necessary precautions are vital in terms of reproductive health. However, the limited number of studies conducted[10-12] point out that there isn't enough awareness on this issue.

Besides lack of knowledge, attitudes towards infertility have also an important role in early interventions. Because attitudes affect how individuals see their lives, how they assess themselves, and shape their future relationships[13]. For example, being infertile has still been defined as a shameful and humiliating experience, perceived as a failure[14]. Also, infertility causes psychological problems such as loss of self-esteem, control and depression[15,16] and infertile individuals try to deal with this issue by themselves and do not seek help. The negative attitudes and problems in help-seeking behavior lead individuals to various pursuits. As a matter of fact, according to the studies various options are tried in treatment of infertility as eating various vegetable mixtures, sitting on steams of mixtures, pulling waist or belly, putting raw meat on belly, making suppository from various herbs and putting in vagina, drinking water of amulet prepared by hodja for three days, eating walnut and hazelnut, boiling parsley and drinking its water[17]. It is obvious that trying these various options instead of seeking help from an expert result in both losses of time and hope.

It is important to explore negative attitudes towards infertility, to prepare individuals for healthy reproduction experience and to deal in a healthy way with possible infertility experience. Although it is important to evaluate the attitudes towards infertility or fertility, in many of the studies instruments that are not valid and reliable were used[18-20]. In another group of studies, it is observed that the reliability and validity of the measurements were done with only women[21]. However, in such studies, infertility can only be considered as a woman-related problem and negative attitudes towards infertility may be experienced.

Based on this need, in this present study a scale was developed to investigate university students' attitudes towards infertility. It is believed that this scale will be a qualified scale to provide necessary knowledge for professions who are working about sexual health and reproduction health.

MATERIALS AND METHODS

Participants

There are two study groups in the present study. 443 (213 female, 230 male) university students from five faculties attending a state university in western Turkey constituted the first study group. Of all students, 98.6 % were single and 1.4 % were married. The age of the participants ranged between 18 to 35 with a mean of 21.92 (SD = 1.79).

A total of 309 (146 female, 163 male) university students from three faculties attending to the same state university in western Turkey constituted the second study group. The age of the participants ranged between 18 to36 with a mean of 22.50 (SD = 2.46). Of the 309 students, 99.3 % were single and 0.7 % were married.

Instruments

Attitudes toward Infertility Scale (ATIS)

Development of ATIS. In order to develop an insturement that assesses university students' attitudes towards infertility, theoretical information was explored as recommended in scale development literature[22,23]. Existing measures of infertility[12,19,24-28] were examined in order to form the item generation process. This process resulted in 56 items. As suggested in the literature, the items were written in such a way that it is simple, easy to understand, and address of only single issue[29]. Also, reverse scored items were added to the item pool. These items were then reviewed and reduced based on lack of clarity, redundancy and undesirable similarity to other items and some correction were made. Based on this review 14 items were eliminated. Finally, the remaining 42 items (24 positives, 18 negatives) were scaled from 1 (strongly disagree) to 5 (strongly agree).

Content validity of ATIS

In order to test the validity of the scale, experts' opinions are gathered to determine whether the items cover the aimed characteristics30.

Schriesheim, Cogliser, Scandura, Lankau, and Powers31 mention that content analysis is the first psychometric property that needs to be evaluated and underline that if the content validity is not at an acceptable level, the scale does not measure the intended property.

In the present study in order to calculate the content validity of ATIS, five experts' (gynecologist, histologist, embryologist, an expert in measurement & evaluation and counselor) opinions were gathered. Experts were asked to rate the relevance of each item, on a 4-point scale (1- suitable, 2- item must be gently revised, 3- item must be seriously revised, d- item is not suitable) according to the Davis's32 technique. In this technique, content validity index (CVI) was calculated by computing the number of experts' rating of either 1 or 2, divided by the number of total experts. For content validity index, the items with a ratio lower that .80 are deleted from the scale32. According to the results, 9 items were deleted from the scale. After deleting 9 items, the scale was composed of 33 items (14 positives, 19 negatives). Sample items include "If a relationship is strong, being unable to have a child won't be a problem in this relationship." (Cognitive), "If I cannot have a child from my partner, I will marry with someone else." (Behavioral), "If I learnt that my partner is infertile I would die from grief." (Emotional).

Demographic questionnaire

A demographic questionnaire was included to gather information on participants' sex, age, and marital status.

Procedure

Prior to collecting data, official permission to apply the scale was gathered from ethical board of the university. The data were collected in two phases. The data in the first phase were collected in June 2016 and the second phase's data were collected in July 2016. The scale was administered to students in class environment after they were informed about the aim of the study and informed consent was provided verbally.

Statistical analysis

Analysis of data was completed in two phases. Since in scale development and adaptation studies confirmatory factor analysis (CFA) is suggested with another sample group[33] in order to test the factor structure obtained by exploratory factor analysis (EFA), in the present study this method was preferred.

In the Study 1, item analysis, construct validity, discriminant validity and reliability were evaluated. EFA was conducted for verification of construct validity. For discriminant validity, upper and lower distinct group based t-tests were conducted and the means difference between the upper 27 % and the lower 27 % were calculated. Internal consistency reliability was assessed using Cronbach's alpha coefficient and corrected total-item correlations.

In the Study 2, construct validity and reliability were evaluated. CFA, based on the covariance matrix and used maximum likelihood estimation, was used to confirm the hypothesized factor structure that was identified through EFA. For model fit evaluation, the following indices were used: Comparative fit index (CFI) $\geq .90$, Goodness fit index (GFI), $\geq .90$, Adjusted goodness fit index (AGFI) $\geq .90$, Root mean square error of approximation (RMSEA) $< .08$, (5) Standardized Root Mean Square Residual (SRMR) $< .08$, and the ratio $\chi 2$ statistical test / degress of freedom ($\chi 2/df$) with a value less than two or three[34-36]. Internal consistency reliability was assessed using Cronbach's alpha coefficient and corrected total-item correlations. In the following analyses, the criterion $p < .05$ was used to determine if the results were significant.

RESULTS

Study 1

Item analysis of ATIS

Item analysis is a process which examines participants' responses to individual test items in order to assess the quality of those items and of the test as a whole. For the item analysis, item analysis based on upper and lower group mean difference was used. *t* test for independent groups was conducted for the 27 % upper and lower group's mean scores. The results pointed that two items do not differentiate upper and lower group. These two items were deleted from the scale.

In order to obtain a scale with low item number, the rest of the items were listed according to their t values, and 12 items (8 positive, 4 negative) with the highest *t* values were selected and reliability and

validity studies were conducted with these 12 items. Mean scores, standard deviations and *t* values of upper and lower groups are presented in Table 1.

Table 1. Results of Item Analysis of ATIS

Item No	Lower Group		Upper Group			
	$\overline{X}$	*SD*	$\overline{X}$	*SD*	*t*	*p*
A8	2.97	1.01	4.65	.60	15.43	.000
A29	2.87	1.04	4.57	.64	15.05	.000
A16	2.93	1.10	4.62	.69	14.13	.000
A22	3.39	.95	4.82	.65	13.48	.000
A7	2.85	.99	4.41	.82	13.23	.000
A15	3.28	1.07	4.79	.62	13.21	.000
A28	2.60	.80	3.99	.87	12.79	.000
A30	3.43	1.04	4.78	.57	12.35	.000
A2	2.85	1.08	4.36	.79	12.19	.000
A10	3.55	1.21	4.94	.33	12.01	.000
A26	3.66	.89	4.78	.49	12.00	.000
A9	3.26	1.20	4.70	.71	11.27	.000

Results of ATIS's validity studies

Within the validity studies of ATIS construct validity and discriminant validity were explored.

Table 2. t-Test for the 27 % upper and lower groups

	n	$\overline{X}$	*SD*	*t*	*p*
Lower	118	34.13	3.91	42.64	.000
Upper	118	51.67	2.16		

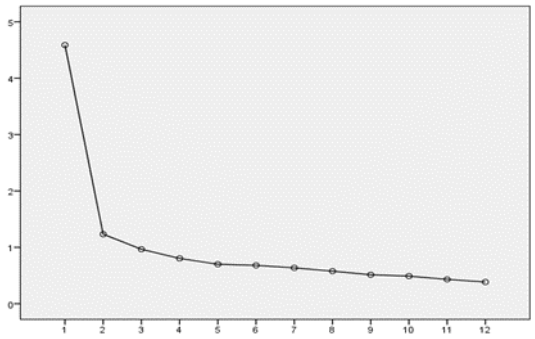

Figure 1. Scree plot of ATIS

Construct validity

Construct validity of ATIS was examined by EFA. Prior to the main analysis, Kaiser-Mayer-Olkin measure of sampling adequacy and Bartlett's test of sphericity were performed to check the appropriateness of data for factor analysis. KMO criterion of .88 indicated that suitable common variance for factor extraction, and Barlett test of Sphericity indicated that the intercorrelation matrix was appropriate for analysis, χ^2 (66) = 1496.01; $p <$ .00).

Principle axis analysis was used in EFA that provides opportunity to test the theoretical base of factor structure[37] and the factors were grouped in the first factor. According to results of EFA, the factor loadings of 12 items ranged between .51 to.63 and the total variance explained by the single factor was 45.33%. The Scree Plot is presented in Figure 1.

Table 3. Fit indexes of ATIS

Fit Indexes	Fit Value
χ2	136.17
SD	54
χ2/sd	2.52
GFI (Goodness of Fit Index)	.93
AGFI (Adjusted Goodness of Fit Index)	.90
CFI (Comparative Fit Index)	.91
RMSEA (Root Mean Square Error of Approximation)	.07
SRMR (Standardized Root Mean Square Residual)	.05

Discriminant validity

t test for independent groups was conducted for the 27 % upper and lower group's mean scores and results are presented in Table 2. The mean difference between upper and lower group's ATIS mean scores was significant *t* (234) = 42.64, $p < .05$. When the means were examined, lower group's mean score was found as 34.14 (*SD* = 3.91) and upper group's was as 51.67 (*SD* =2.16).

Results of reliability studies

Cronbach alpha reliability coefficient of the 12 items ATIS was found as .85. Within the reliability studies, corrected item-total correlations were also calculated. Item total correlations ranged between .46 and .58. which is above .30 that is considered as limit value[38].

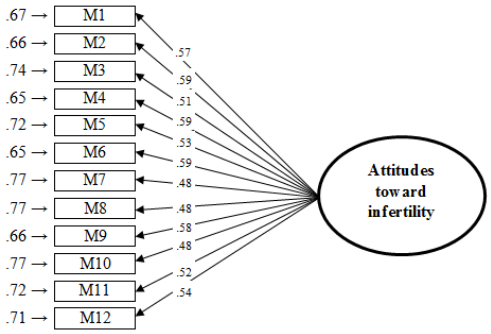

Figure 2. Path diagram of ATIS

Study 2

Results of ATIS's Validity Studies

Confirmatory factor analysis (CFA)

A CFA with maximum likelihood estimation was conducted on the 12 items of the ATIS. Results of CFA are presented in Table 3 and Figure 2.

Results suggested that single factor model was a good fit of the data. The model fit indices for the CFA as follows: $\chi 2 = 136.17$, $\chi 2/df = 2.52$, GFI = .93, CFI = .91, AFGI = .90, RMSEA = .07, and SRMR = .05. The $\chi 2/df$, CFI, GFI, AGFI, RMSEA, SRMR were in the acceptable range[34-36].

Results of ATIS's Reliability Studies

Cronbach's alpha value for the ATIS was found as .83. The corrected item-total correlation of the ATIS range from .42 to .54. These values were above .30, showing that all the items correlate with total score of the scale and were reliable[38]. These results indicated that internal consistency and reliability of the scale were adequate.

DISCUSSION

The purpose of the study was to develop a valid and reliable scale to determine the attitudes of university students towards infertility. There are no specific rules about the number of items to be retained but there are some heuristics related to the minimum number of items in order to reduce bias caused by boredom, to be parsimonious, to save time, and to improve internal consistency[29]. For this reason, firstly item analysis was performed on the data obtained from the first sample, following content validity in the scale development process. As a result of the item analysis, the number of items in ATIS decreased from 33 to 12 items. All other statistical analyses were based on ATIS that consisted of 12 items.

To determine the factor structure, firstly EFA, then CFA were performed to confirm the obtained result as recommended in literature[39]. These analyses conducted with two different samples. EFA results showed that cumulative percentage of variance accounted for by single factor was 45.4 %, which is considered adequate. The CFA results also showed that the model fit the data good[35]. In addition to construct validity, discriminant validity was determined by calculating the difference of the mean scores between two equal-sized subgroups of the sample, one built from the 27 % highest scorers, the other from the 27 % lowest scorers[40]. the results showed that differences between groups are meaningful. Low scores from the ATIS corresponded to negative attitudes towards infertility while high scores on the ATIS corresponded to positive attitudes towards infertility, so, it can be said that ATIS can distinguish both negative and positive attitudes.

To test the reliability of the ATIS, internal consistency and corrected item-total correlation values were computed. Cronbach's alpha values obtained from two samples are over .80, so that the ATIS demonstrates good internal consistency[41,42].

Morokoff and Caldrone[43] indicated that although there is an increase in term of the emphasis on diagnosis and treatment of infertility, social and psychological results of infertility are still less emphasized. Therefore it is important to determine negative attitudes towards infertility. Few research findings that have examined the relationship between attitudes toward infertility and help-seeking behavior suggest that negative attitudes toward infertility reduce help seeking behavior[20]. But, it is known that attitudes are correlated with health–seeking behaviour[44]. Therefore it is believed that ATIS will fill the gap in the literature by providing opportunity to collect data about attitudes towards

infertility.

As in many other countries, not being a mother or father may be perceived as an embarrassing situation in Turkey[45] and individuals are able to choose to hide if they are infertile. At this point, such negative attitudes about infertility may cause a delay in help-seeking behaviour. Moreover, evaluation of the attitudes about infertility during the infertility counseling process may play an important role especially in the correction of distorted cognitions. Therefore it is considered that ATIS may be a tool for assessing the potential barriers to help-seeking and conducting counseling process. Especially, in infertility counseling, distorted, exaggerated and illogical thoughts are defined and tried to be changed with more realistic and positive ones. In this way, it is aimed to reduce the painful emotions[46].

The study has some limitations. Criterion-related validity, test-retest reliability and measurement invariance were not evaluated in the study. It is recommended that in the further studies, these analyses are conducted by exploring relationships among various variables and infertility. Another limitation of this study is using self-report questionnaires because of possible social desirability effect. However, this effect was tried to be controlled by not taking the participant's name.

The ATIS is a reliable and valid measure. The scale has the potential to assist healthcare organizations to identify necessary interventions to reduce negative attitudes. The development of the scale is also expected to facilitate the empirical investigation of factors that related attitudes.

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APPENDIX

Attitudes Toward Infertility Scale (ATIS)

		Totally disagree	Disagree	Undecided	Agree	Totally agree
1	Couples who can not have a child are lacking in life.					
2	I would not have a relationship with an infertile person.					
3	If a relationship is strong, being unable to have a child won't be a problem in this relationship					
4	If a woman is infertile, this is not a reason for her partner to leave her.					
5	A woman who can not have children is faulty.					
6	If I learnt that my partner is infertile I would die from grief.					
7	Even if I can not have a child still I might be happy in the relationship.					
8	A man who can not have children is faulty.					
9	If I had known I was infertile, I would not have shared it with my partner before I got married.					
10	If I learn that I can not have children, I would not hesitate to share this with my friends.					
11	If I was infertile I would die from grief and ask, "Why me?"					
12	If I can not have a child from my partner, I will marry with someone else.					