ORIGINAL ARTICLE

Turkish validity and reliability study of Paternal Antenatal Attachment Scale

Tugba Enise Benli | Yeşim Aksoy Derya PhD

Department of Midwifery, Faculty of Health Sciences, Inonu University, Malatya, Turkey

Correspondence
Yeşim Aksoy Derya, PhD and Tugba Enise Benli, RA, Department of Midwifery, Faculty of Health Sciences, Inonu University, 44280 Malatya, Turkey.
Email: yesim.aksoy@inonu.edu.tr (Y. A. D.) and tugba.benli@inonu.edu.tr (T. E. B.)

Abstract

Purpose: The aim of this study was to adapt the validity and reliability of the Paternal Antenatal Attachment Scale (PAAS) for Turkish fathers.

Method: The sample of the methodological study consisted of 580 father candidates.

Results: In the study, as a result of the exploratory factor analysis, it was determined that the PAAS consisted of 16 items, eight items in the "quality of attachment" subdimension and eight items in the "time spent in attachment mode" subdimension. It supported the 2-factor scale structure the confirmatory factor analysis. Cronbach's α was found to be .82 in the total scale. In addition, item-total correlation and test-retest analysis of the scale had a high correlation.

Practice Implications: Based on the study results, the Turkish language version of the PAAS is valid and reliable.

KEYWORDS
antenatal, attachment, paternal, reliability, validity

1 | INTRODUCTION

During pregnancy, parents bond with their unborn babies mentally and emotionally.[1] Usually, this bond begins after the baby is seen on ultrasound, the heartbeat is heard, and the movements of the fetus in the womb are felt.[1,2] This relationship can be represented by the parents' recognition of the unborn baby, their willingness to be with it, and it accompanies interaction with the unborn baby, which is called antenatal attachment.[2,3] Research on antenatal attachment is important in that it can be seen as the earliest form of parenting.[4] It is reported that maternal and paternal attachment in the intrauterine period affects postpartum parenting roles and plays an critical role in the growth and development of the child.[5] Therefore, parental attachment starts in the antenatal period, not in the neonatal period. The basic documents obtained from the studies on this subject showed that attachment began long before birth, while in the mother's womb.[4-7]

Paternal antenatal attaching is a sense of subjective love for the fetus, which is accepted as the basis of father identity.[8] There are factors affecting the direction of attachment and this feeling of love that develops in the father. Studies have focused on distinct aspects of fathers' experimentations of pregnancy and fetus.[3,9] According to one study, it was determined that the attachment of fathers with planned pregnancy to the fetus was significantly higher compared with nonplanned pregnancies. It has also been emphasized that there is a positive relationship between the desire for pregnancy and attachment.[9] In another study, they reported that fathers who would become fathers for the first time would expect better attachment and more intense preoccupation with the fetus than fathers who already had children, but the quality of attachment did not change compared with the number of previous children. It was found that emotions of prenatal attachment increased between the first trimester and third trimester in fathers who were expecting a baby for the first time. Younger fathers reported better attachment and higher intensity of emotion. The cause of this effect is reported to be due to the fact that fathers who were fathers for the first time were younger than fathers who already had children.[3] In another study,

the quality of attachment was significantly higher in fathers who participated in pregnancy planning than fathers who did not plan to have a pregnancy.[10]

It is a sign of an emotional bond that the expectant father will make plans, ask questions, and make dreams about the baby to be born. This bond forms the basis of the relationship between the father and the baby that will be formed in the future.[1] For this reason, it is of great importance to screen for paternal infant attachment within the scope of prenatal health services and to detect possible attachment problems early. Some measurement tools are used in the evaluation of father-baby attachment in the literature. Paternal Antenatal Attachment Scale (PAAS) is one of the most widely used measurement tools. In our country, the number of studies on father-infant attachment is limited. In addition, although there is a measurement tool that evaluates the attachment of father-baby especially in the postnatal period,[11] no valid and reliable measurement tool that assesses the attachment in the prenatal period has not been found. Feelings about attachment may vary between regions in terms of personal and cultural characteristics. For this reason, it should be evaluated whether the measurement tools to be used are appropriate for distinct cultural structures. In this study, it was aimed to make validity and reliability of "Paternal Antenatal Attachment Scale-PAAS" developed by Condon by adapting it to Turkish.[12]

2 | MATERIALS AND METHODS

2.1 | Research design and sample

This study was carried out as methodological of out between November 2018 and April 2019 to determine the validity and reliability for the Turkish version the "Paternal Antenatal Attachment Scale," which was developed to evaluate paternal antenatal attachment. The study was conducted in the obstetric clinic of a public hospital in eastern Turkey. There were six obstetrics polyclinic in the hospital. There are one doctor and one midwife or nurse in each polyclinic.

The study population consisted of expectant fathers who applied to the obstetrics clinic of the related institution for the purpose of following pregnancy with their wife. The sample of the study consisted of expectant fathers who volunteered to participate in the study. The sample size required for scale adaptation was classified as 100 "weak," 200 "medium," 300 "good," 500 "very good," and 1000 "perfect."[13] Accordingly, 580 expectant fathers were selected by random sampling method and included in the study. Inclusion criteria were that had been living with the father of the fetus since conception. Exclusion criteria were inadequate command of Turkish to complete the questionnaire.

2.2 | Data collection

The data were obtained from expectant fathers who applied to the obstetrics clinics with their wife for pregnancy follow-up and were interviewed in the waiting room while waiting in line before the examination. A face-to-face interview technique was used for interviews conducted with the expectant fathers included in the research on weekdays. The questions on the data collection form were read to the expectant fathers and the answers received were marked and filled in by the researcher on the forms. The data collection forms consisted of a 16-question "Paternal Antenatal Attachment Scale" and a 10-question "Personal Identification Form" prepared by the researcher. The filling time of the PAAS lasted an average of 3 to 5 minutes for each expectant father, while the filling time of the entire data collection form lasted an average of 7 to 8 minutes.

2.3 | Instruments

2.3.1 | Paternal Antenatal Attachment Scale

PAAS was established by John Condon[12] by creating a 25-item item pool and as a result of the studies, nine items were eliminated and a Likert-type scale consisting of 16 questions was obtained. Each item of the scale focuses on measuring the feelings, attitudes, behaviors, and thoughts of the father towards the developing fetus in the womb. Most of the questions are based on the expectant fathers' experiences over the past 2 weeks. The factor structure of the scale was evaluated by Condon. In the Condon study, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted to evaluate the factor structure. A total of 112 expectant fathers were included in the study, provided that the fetus has been living with the father since his wife's pregnancy, whose spouse is below 38th gestational week. Items with factor loads of scale items below 0.40 were discarded. Cronbach's α value of the scale was .80. As a result, it was determined that 42% of the total variance revealed. Factors were determined as the "quality of attachment" (items 1-3, 7, 9, 11, 12, and 16), in which the father's emotional experience when thinking about the baby in the womb is measured, and "time spent in attachment mode" (items 4, 5, 8, 10, 14, and 15), which refers to the intensity of being engaged with the fetus. Items 6 and 13 do not load on either factor strongly enough for inclusion on subscale.[12] However, these items are added to the scale total score. Nine of the items (1, 3, 5-8, 12, 13, and 15) are reverse scored. Each item of the 5-point Likert-type scale scores between 1 and 5 (1 = represents the absence of feelings for the fetus and 5 = represents very strong feelings for the fetus). The minimum score that can be obtained from the scale is 16 and the maximum score is 80.[14] The scoring can be calculated separately for each of the subdimensions, as well as the "total attachment" score. The higher the score, the higher the attachment.

2.3.2 | Introductory features form

This form prepared by the researchers aims to determine several individual characteristics of fathers (eg, age, marriage year, education level, and working status). In addition, the form includes how many children, the wife's week of pregnancy, the sex of the baby, what he

wants the sex of the baby to be, and whether he is ready to become a father and consists of 10 questions in total.

2.4 | Cultural adaptation process of the PAAS

To adapt the PAAS to Turkish, cultural adaptation was primarily performed. The cultural adaptation phase of the scale consists of language validity, content validity, and pilot implementation processes.

2.4.1 | Language validity

In the first stage, the PAAS was translated from English to Turkish by two faculty members (English-Turkish) who were experts in both languages. The scale items that had been translated into Turkish were reviewed once again by the researcher and made into a single form. In the second phase, the back translation of the scale items translated into Turkish was performed by two faculty members who had never seen the original of the scale before, who were experts in the field and who knew both languages well. The most appropriate expressions were selected by comparing the original scale with the form translated into Turkish and it was found that there was no change in understanding in the expressions of the scale items. Thus, the Turkish translation of the scale was completed.[15]

2.4.2 | Content validity

In light of the basic information, for the scope validity of the scale, 10 academicians specialized in their field were reached via email and expert opinions were obtained. After the translation process was completed, the scale form for content validity was submitted to the opinion of 10 faculty members including five from the midwifery field and five from the nursing field. The intelligibility and cultural compatibility of the scale items were determined by the Davis method. English and Turkish forms of the scale were sent to the experts via email and their opinions were obtained. The experts were asked to grade each item on a scale of 1 to 4 (1 = "not appropriate," 2 = "should be made appropriate," 3 = "appropriate but needs minor modifications," and 4 = "very appropriate"), as well as to assess the suitability of the instrument for its purpose and the clarity of the items. After the examination of the score averages given by the experts for each item of the scale, it is recommended that the items that fall below the minimum compliance limit or that are least compatible items be completely removed from the scale or rearranged.[16] As a result of the evaluation of expert opinions obtained using the Davis method; while the statements that the experts very appropriate were accepted without any changes, the statements that the experts did not approve or wanted to correct were revised once again. As a result of the responses received from the experts, the content validity index (CVI) scores of PAAS items ranged between 0.80 and 1.00 and the

CVI value was found to be 0.95, and it was decided that there was agreement among the experts.

2.4.3 | Pilot implementation

After the content validity analysis, the scale form was applied to a pilot group of 20 expectant father (the 20-expectant father in the pilot implementation group were not included in the sampling). The expressions in the scale were found to be understandable in the group of the pilot implementation. As a result of the suggestions of experts and the preliminary implementation, the draft form of the Turkish version of PAAS was created.

2.5 | Psychometric testing of the PAAS

During the study of the adaptation to Turkish of PAAS; secondly, the psychometric analysis phase was started, and validity-reliability analysis were performed.

2.5.1 | Validity

Factor analysis was performed to determine the construct validity of the scale. Before the factor analysis, Kaiser-Meyer-Olkin (KMO) analysis and Barlett test were used to determine sample adequacy. In order for the sample to be suitable for the factor analysis, KMO value should be over 0.60 and the result of the Barlett's Test of Sphericity (BTS) analysis should be significant.[17,18]

Principal component analysis was used to examine the factor structure of PAAS. The factor load values of the items should be at least 0.30, and the opinion that it would be more appropriate to remove them if there were items below this value.[19] After the EFA, CFA was applied to support the findings of the subdimensions of the scale. It was accepted that the χ^2/df ratio obtained as a result of CFA was CFA less than or equal to 5, the root mean square error of approximation (RMSEA) value was less than or equal to 0.08, and the comparative fit index (CFI), goodness of fit index (GFI), and normed fit index (NFI) values were higher than 0.90.[20]

2.5.2 | Reliability

Cronbach's α internal consistency coefficient technique is proposed in examining the reliability of Likert-type scales. It is requested that the reliability coefficient, which can be considered sufficient in a measuring tool, be close to 1.[21] For this purpose, Cronbach's α coefficient was evaluated for PAAS.

The item-total correlation coefficients were examined to examine the relationship between the scores from the PAAS test items and the total score of the test. The proposal that the acceptable

coefficient should be greater than 0.20 was taken into consideration in the selection of items.[22]

Test-retest correlation was used to assess the invariance of the scale over time.[23] For the PAAS test-retest analysis, 38 expectant fathers were re-administered 3 weeks later. As the time interval between the two measurements was appropriate and the consistency did not change during this period, the invariance of the scale over time was shown.

2.6 | Data analysis

Statistical analysis of the study data was performed using the Statistical Package for Social Sciences (SPSS) for Windows (SPSS Inc, Chicago, IL) 25.0 and AMOS 24.0. To conduct the statistical analysis, descriptive statistics were used. On the other hand, exploratory and confirmatory factor analyses were used for the construct validity of the scale. Internal consistency and the item-total correlation was examined. Regarding internal consistency, Cronbach's α was calculated as a coefficient of reliability recommended. Item-total correlation was estimated by Pearson's correlation coefficient.

2.7 | Ethical issues

During the adaptation of PAAS to Turkish culture, firstly, John Condon, who developed the scale, was contacted via electronic mail and the necessary permission was obtained for the usability of the scale.

To conduct the study; Ethical approval (Decision No: 2018/15-24) from the Inonu University Health Sciences Scientific Research and Publication Ethics Committee Presidency was obtained. In addition, the participants were informed about the research and informed that their personal data would be kept confidential. Finally, participants who volunteered for the study were enrolled.

3 | RESULTS

Table 1 shows the distribution of fathers according to age, educational status, working status, number of children, week of pregnancy of wife, gender of the baby, the desired gender, and readiness for paternity. The average age of the fathers participating in the study was 31.6 years (SD 5.5; range,19-56), the average week of pregnancy of wives was 26.35 (SD, 10.3; range, 3-42), the average years of marriage was 5.64 (SD, 5.1; range, 1-25), and the average number of children was 1.92 (SD, 1.2; range, 1-9). Among the expectant fathers 35.7% were high school graduates, 89.7% were employed, 47.9% had no living children and would have children for the first time. Although 42.1% of the fathers had boy sex expecting babies, 73.1% stated that they did not matter their opinions about whether their expected babies were boy or girl. Besides, 98.3% of the fathers feel ready to be father themselves.

TABLE 1 Descriptive characteristics of the fathers candidates (n = 580)

Sociodemographic and individual characteristics	N	(%)
Education level		
Primary school	70	12.0
Secondary school	105	18.1
High school	207	35.7
University and above	198	34.2
Occupation		
Employed	520	89.7
Unemployed	60	10.3
Number of children living		
No	278	47.9
1	155	26.7
2 and ↑	147	25.4
Wife's pregnancy week		
1-12 wk (1st trimester)	84	14.5
13-27 wk (2nd trimester)	188	32.4
28 and ↑ (3rd trimester)	308	53.1
Gender of baby		
Girl	200	34.5
Boy	244	42.1
Unknown	136	23.4
Desired gender		
Girl	83	14.3
Boy	73	12.6
It does not matter	424	73.1
Ready for paternity[a]		
Ready	570	98.3
Not ready	10	1.7
Age of the fathers candidates, y, (mean ± SD): 31.60 ± 5.56		
Wife's pregnancy wk (mean ± SD): 26.35 ± 10.39		
Year of marriage (mean ± SD): 5.64 ± 5.05		
Number of children living (mean ± SD): 1.92 ± 1.16		

[a]The statements of the fathers have been taken into account.

3.1 | Validity analysis

The KMO test value of PAAS was found to be 0.891. This value indicates the suitability for the analysis of key components. Similarly, the result of Barlett's Test of Sphericity was found to be χ^2 = 1748.803, P < .001 for PAAS and it was determined that the data were correlated and therefore sufficient and suitable for factor analysis.

As shown in Table 2, the factor loadings of the items of the scale ranged from 0.321 to 0.721. The EFA to determine the validity of the 16-item PAAS used for expectant fathers resulted in factor loading values ranging from 0.477 to 0.721 for the subdimension "quality of attachment" and 0.321 to 0.681 for the subdimension "time spent in attachment mode." Since the item load was not less than 0.30, no item was removed from the scale. Items 6 and 13, which stated to be not strong enough to

TABLE 2 Results of exploratory factor analysis of PAAS

Item numbers	Factor load	
	Quality of attachment	Time spent in attachment mode
9	0.721	
2	0.692	
3	0.661	
11	0.622	
16	0.620	
7	0.525	
15	0.495	
12	0.477	
4		0.681
14		0.663
10		0.623
5		0.618
1		0.473
8		0.374
13		0.343
6		0.321
Explained variance (total = %41.01)	%23.40	%17.61

Abbreviation: PAAS, Paternal Antenatal Attachment Scale.

participate in the subdimensions and proposed to be added to the scale total score by inverting in the original scale, were included in the subdimension of "time spent in attachment mode." Thus, the Turkish version of the PAAS, which had a total of 16 items and two subdimensions, including eight items in the "quality of attachment" subdimension and eight items in the "time spent in attachment mode" subdimension, was obtained.

In addition, item first (over the past 2 weeks I have thought about, or been preoccupied with the developing baby) of subdimension "quality of attachment" in the original scale was included in subdimension "time spent in attachment mode" and item 15th (over the past 2 weeks I have found myself feeling, or rubbing with my hand, the outside of my partner's stomach where the baby is) of subdimension "time spent in attachment mode" in the original scale was included in subdimension "quality of attachment." In short, one item was displaced in both subdimensions.

After varimax rotation of the Turkish version of PAAS was performed; as in the original scale, there were two factor structures with eigenvalues exceeding 1. It was determined that the total variance explained by these two factors for the scale was 41.01%; factor 1 (of subdimension quality of attachment) explained 23.40% of the total variance and factor 2 (of subdimension time spent in attachment mode) explained 17.61% of the total variance.

Confirmatory factor analysis was used to assess the fit of the factor model obtained from EFA to the data. For this purpose, the covariance matrix was prepared by transferring the data to the AMOS program and 16-item two-factor (1st factor = 2, 3, 7, 9, 11, 12, 15, and 16 and 2nd factor = 1, 4, 5, 6, 8, 10, 13, and 14) model for the road diagram and GFI were following. The GFI values calculated for the following model are presented in Table 3.

As a result of the CFA, it was seen that there was a significant difference between the expected and observed covariance matrix for the two-dimensional model and when the other parameters were examined, it was observed that the model, especially the GFI value, gave excellent or acceptable values in many criteria. In addition, modification proposals were studied for the purpose of improving the two-dimensional model, and error covariances between items were associated. After the modification, it was found that the GFI values calculated for the two-factor model were within acceptable or excellent limits (Table 3). From here it

TABLE 3 CFA results of fit index for PAAS

Fit index	Excellent	Acceptable	Original scale	Two-dimensional models
P	>.01 or .05	<.01 or .05	.00016	.00015
χ^2/SD	≤2	2-5	121.99/71 = 1.72 (m)	157.95/99 = 1.59
RMSEA	≤0.05	≤0.08	0.036	0.033
RMR	≤0.05	≤0.08	0.031	0.034
SRMR	≤0.05	≤0.08	0.039	0.038
GFI	≥0.95	≥0.90	0.97	0.96
AGFI	≥0.95	≥0.90	0.95	0.95
CFI	≥0.95	≥0.90	0.99	0.99
NFI	≥0.95	≥0.90	0.97	0.96
NNFI	≥0.95	≥0.90	0.98	0.98

Abbreviations: AGFI, adjusted goodness of fit index; CFA, confirmatory factor analysis; CFI, comparative fit index; GFI, goodness of fit index; NFI, normed fit index; NNFI, non-normed fit index; PAAS, Paternal Antenatal Attachment Scale; RMR, root mean square residual; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.
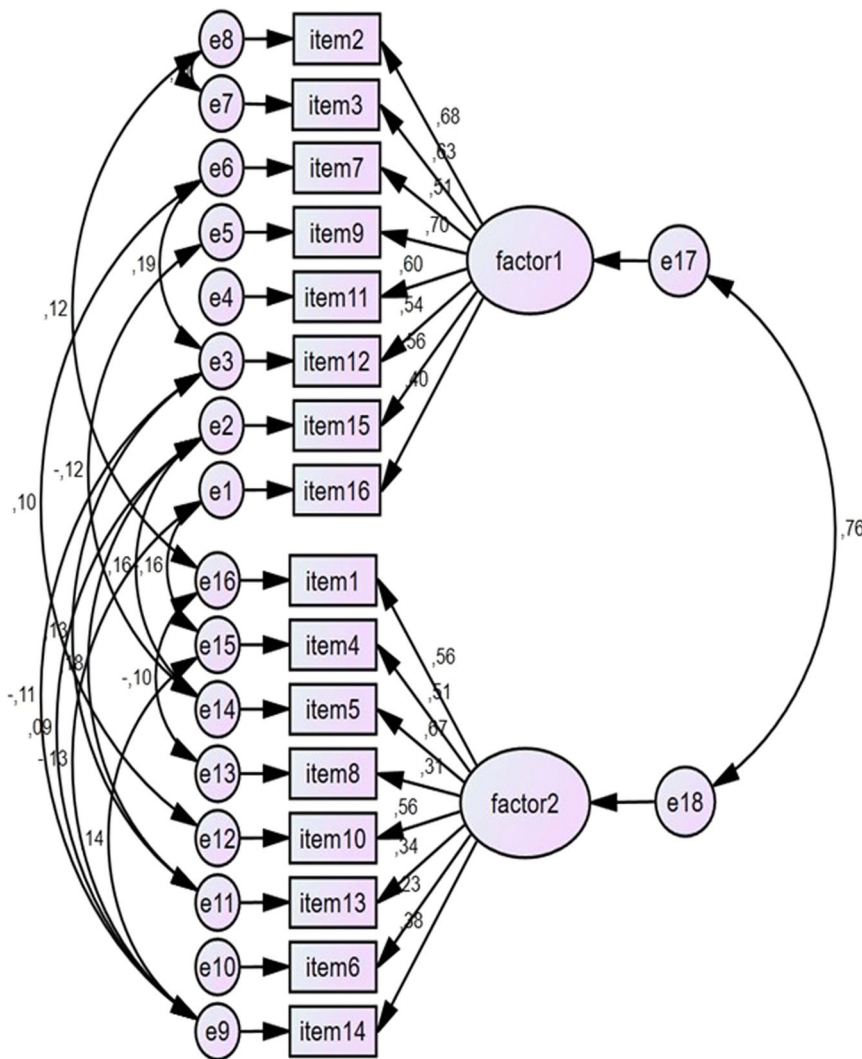
FIGURE 1 Road diagram of the model after modification

was concluded that the two-factor structure was confirmed. The road diagram of the verified model is given in Figure 1.

3.2 | Reliability analysis

The reliability of PAAS was evaluated by Cronbach's α coefficient, item total score correlation and test-retest analysis.

The "quality of attachment" subdimension of PAAS was found to be Cronbach's α coefficient .80, the "time spent in attachment mode" subdimension to be Cronbach's α coefficient .67 and for the entire scale Cronbach's α coefficient .82. PAAS was found to be quite reliable in terms of total and all subdimensions.

When the item total score correlation coefficients of the 16-item PAAS (n = 580) were examined, it was seen that the item total score correlation coefficients of the scale items ranged between r = .324 to .669 and were acceptable (Table 4). The correlation between each item and the total score was found to be statistically significant (P = .001).

Test-retest analysis was performed to demonstrate the invariance of the scale over time. Three weeks after the first application for analysis, the expectant fathers (n = 38) whose phone numbers were taken were reached again and the scale was applied a second time. As shown in Table 5, the correlation value of the relationship between the test and retest results was r = .85 and it was found to be statistically significant at P < .001 significance level.

In addition, the min-max scores that can be obtained from the subdimensions of "quality of attachment" and "time spent in attachment mode" are between 8 and 40; min-max scores that can be taken from the scale total are 16 to 80. The min-max scores of the expectant fathers in the subdimension of "quality of attachment" were 22 to 40 and the scores in the subdimension total were 34.97 ± 3.64 while the min-max scores of the expectant fathers in the subdimension of "time spent in attachment mode" were 12 to 40 and the scores in the subdimension total were 27.13 ± 5.11. In addition, it was determined that their min-max scores received from PAAS was 34 to 80 and the total score of the scale taken was 62.11 ± 7.78.

TABLE 4 Mean and item-total correlation coefficients of the PAAS

Item numbers	Mean	Standard deviation	Item-total score correlation
5	3.37	1.26	0.669
15	3.48	1.22	0.644
2	4.16	0.75	0.618
10	3.38	1.21	0.593
9	4.34	0.69	0.592
4	3.32	1.16	0.560
3	4.42	0.61	0.548
7	4.61	0.59	0.523
11	4.60	0.62	0.523
1	4.13	0.86	0.519
13	3.77	1.50	0.493
14	1.72	0.87	0.443
12	4.69	0.65	0.406
8	3.78	0.88	0.375
6	4.00	1.18	0.350
16	4.71	0.53	0.324

Abbreviation: PAAS, Paternal Antenatal Attachment Scale.

4 | DISCUSSION

The roots of father-baby attachment date back to before the baby came into the world. This process, which begins before pregnancy, increases as the trimesters progress, becomes stronger with birth and continues exponentially after birth. Father-infant attachment has a delicate place in the development of the child and success in the later stages of life.[24,25] The evaluation of father-baby attachment during the prenatal period provides the necessary approaches for early diagnosis and treatment of problems related to attachment. For this purpose, it is necessary to develop reliable and valid measurement tools to determine paternal infant attachment before birth.

In this section, the findings of the study conducted to ensure the reliability and validity of the "Paternal Antenatal Attachment Scale" were discussed under the following headings:

- Discussion of the findings on the validity of the PAAS.
- Discussion of the findings on the reliability of the PAAS.

4.1 | Discussion of the findings on the validity of the PAAS

Validity is the degree to which the desired property of a scale can be measured accurately by distinguishing it from other properties.[26] In this study, content and structure validity studies were conducted to test the validity of PAAS. To adapt the scale to Turkish culture and language, firstly the original form of the scale (English) was translated

TABLE 5 Correlation analysis of test-retest scores of PAAS

Implementation	Mean ± SD	$r_{n(38)}$	P
First Implementation	61.63 ± 7.83	.85[a]	.000
Second Implementation	64.47 ± 8.03		

Abbreviation: PAAS, Paternal Antenatal Attachment Scale.
[a]Pearson product moments correlation.

into our own language (Turkish). Then, it was then translated back using the group back translation method. The scale which was prepared in Turkish was presented to the opinion of 10 experts to evaluate the content validity. The CVI ratio was evaluated using the Davis technique as a result of the opinions received from the experts. Minor corrections were made for an item in the scale (item 16) according to expert opinions. After corrections, the content validity was completed, and a draft form of the scale was obtained. Pilot implementation was applied to 38 expectant fathers with the draft form created.

After content validity, the structure validity phase was started. The factor analysis method, which is one of the most used methods, was used to ensure construct validity. Before the factor analysis was performed, KMO and BTS analyses were performed to test the adequacy and suitability of the sample size. The KMO value of the PAAS was found to be 0.891. In the study, $\chi^2 = 1748.803$, $P < .001$ tested sample size analysis value showed that the sample size was quite enough for factor analysis. These values were consistent with the original values of the scale, and the number of samples was accepted for factor analysis, and the distribution of the data showed that it was suitable for homogeneous and principal component analysis.[27] When the literature was examined, in the Italian version of the scale, the Barlett's test result was $P < .0001$, the KMO value was 0.75; in the Portuguese version, the Barlett test result was $P < .0001$ and the KMO value was 0.76.[28,29]

Varimax rotation, one of the methods commonly used in the AFA phase of factor analysis, was used. In the original scale, the EFA result reported the variance described of the scale as 42%, the variance described of the Italian version as 34.58%, and the variance described of the Portuguese version as 37.50%.[28,29] In our study, the explained variance of the scale was found to be 41.01% (Table 2). The variances explained by the subdimensions in the original scale were not indicated separately and only the total variance of the scale was given.[12] In the Italian version, 12 items loaded on the first factor accounted for 23.07% of the variance, and four items loaded on the second factor accounted for 11.51% of the variance.[29] In the Portuguese version of the scale, it was stated that five items were loaded on the first factor and 20.50% of the variance was explained, while nine items were loaded on the second factor and 17% of the variance was explained. Later 14 items were then combined under one factor and the total variance was reported to be 37.50%.[28] For our study, eight items were loaded on the first factor and 21.11% of the variance was explained; as eight items were loaded on the second factor and 17.32% of the variance was explained (Table 2). As a result, it was seen that the variance explained according to EFA findings is enough for this study.

The original version of PAAS consists of two subdimensions and 16 items. In the literature, the lower value for the factor load of items in the measurement tool is stated as 0.30 to 0.40.[18] As a result of the EFA in this study, items were not removed from the scale due to the fact that the factor loadings of the PAAS items were not below 0.30. Thus, the Turkish version of PAAS remained in accordance with the model with two subdimensions and 16 items, as in the original and the Italian version (Table 2). One item was displaced in both subdimensions.

According to CFA results; the fit indices of the scale were calculated as χ^2/SD 1.59, RMSEA 0.033, root mean square residual 0.034, standardized root mean square residual 0.038, CFI 0.99, GFI 0.96, adjusted goodness of fit index 0.95, normed fit index 0.96, and non-normed fit index 0.98 (Table 3). These findings showed that the fit indexes of the instrument were excellent values and were in good agreement with the original model of the PAAS and the original factor structure of the scale was found to be consistent with the factor structure of the adapted scale.

4.2 | Discussion of the findings on the reliability of the PAAS

Reliability is a measure of consistency of measurement.[30] Cronbach's α coefficient and item-total correlation and test-retest analysis were used to determine the reliability of the Turkish version of the paternal antenatal attachment scale.

The Cronbach's α coefficient of the Turkish version of the PAAS was .82. The Cronbach's α coefficients of the "quality of attachment" and "time spent in attachment mode" subdimensions of the PAAS were found to be 0.80 and 0.67, respectively. The original version of the scale by Condon stated that Cronbach's α coefficient was .80, while the Italian version stated that Cronbach's α coefficient was .76.[12,29] In the Italian version, Cronbach's α coefficient of the "fantasising about the unborn baby" subdimension was found to be .75, while Cronbach's α coefficient of the "anticipating the real baby" subdimension was found to be .49.[29] The Cronbach's α coefficient of the Portuguese version of the scale was reported to be .73.[28] The obtained Cronbach's α coefficients were found to be compatible with the original scale and the scales in the other languages translated, and the Turkish version of the PAAS was highly reliable in terms of total and all subdimensions.

In this study, when the substance analysis results of PAAS were evaluated, the correlation coefficients of the item-total score ranged from the lowest .324 to the highest .669 (Table 4). In general, considering that most researchers use 0.20 sublevel in practice, it is seen that there are no substances that fall below this level and that need to be discarded.

Test-retest method was used to determine the time invariance of the scale that we adapted, and Pearson product moments correlation analysis was performed.

The correlation value between the test and retest results of the scale was $r = .85$, and it was found that there was a statistically significant relationship at $P < .001$ significance level (Table 5). This finding indicates that the test and retest results of the scale are like each other. The test-retest results of the Portuguese version of the

scale were reported as $r = .80$, $P < .0001$.[28] As a result of the findings obtained from the analysis conducted to determine the reliability of the scale, it was shown that the reliability of PAAS was high.

4.3 | Implications for nursing practice

The PAAS which was developed by Condon[12] to measure the attachment of fathers to their unborn babies and which we adapted in Turkish; It was determined that Turkish expectant fathers were a reliable and valid tool in the assessment of antenatal attachment levels due to their good agreement with the original scale. The fact that the level of antenatal paternal attachment, which is not much emphasized in the Turkish literature, will be evaluated with a reliable tool will contribute to early diagnosis and treatment-management of antenatal paternal attachment problems.

CONFLICT OF INTERESTS

All the authors declare that there are no conflict of interests.

ETHICS STATEMENT

Before the study, written permission was obtained from the institutions in which the study was conducted, and ethical approval was obtained from the Scientific Research and Publication Ethics Committee of the Malatya Inonu University of Health Sciences in Turkey (Decision No. 2018/15-24).

ORCID

Tugba Enise Benli http://orcid.org/0000-0002-6087-2199
Yeşim Aksoy Derya http://orcid.org/0000-0002-3140-2286

REFERENCES

1. Hicks LM, Dayton CJ, Brown S, Muzik M, Raveau H. Mindfulness moderates depression and quality of prenatal attachment in expectant parents. *Mindfulness.* 2018;9(5):1604-1614. https://doi.org/10.1007/s12671-018-0907-2
2. Bal S. İlk kez babalık deneyimi yaşayan erkeklerin bebek bakımına katılmaya İlişkin görüşleri ve bakıma katılma durumları (In Turkish), *The Status of Men Regarding Baby Care Involvement and Baby Care Participation Opinions Who Lived First Time Fatherhood Experiences* [Master's thesis; Thesis No: 383185]. Ankara, Turkey: University of Hacettepe, Institute of Health Sciences, Turkey); 2014. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp
3. Vreeswijk CMJM, Maas AJBM, Rijk CHAM, Van Bakel HJA. Fathers' experiences during pregnancy: paternal prenatal attachment and representations of the fetus. *Psychol Men Masculinity.* 2014;15(2):129-137. https://doi.org/10.1037/a0033070
4. Bouchard G. The role of psychosocial variables in prenatal attachment: an examination of moderational effects. *J Reprod Infant Psychol.* 2011;29(3):197-207. https://doi.org/10.1080/02646838.2011.592975

5. Dinç S. *Baba-bebek arasındaki bağlanma durumu ve etkileyen faktörlerin belirlenmesi (In Turkish), Determination of Father-Baby Attachment and Fathers That Effect This Condition* [Master's thesis; Thesis No: 361542]. Istanbul, Turkey: University of Istanbul, Institute of Health Sciences; 2014. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

6. Çitil F. *Adölesan ve yetişkin gebelerde evlilik uyumu ve yaşam doyumunun doğum öncesi bağlanmaya etkisi (In Turkish), Marital Adjustment, Life Satisfaction and Its Effect On Level Of Prenatal Attachment in Pregnant Womens Aim* [Doctoral dissertation; Thesis No: 379393]. Erzurum, Turkey: University of Ataturk, Institute of Health Sciences; 2014. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

7. Vreeswijk CMJM, Rijk CHAM, Maas AJBM, van Bakel HJA. Fathers' and mothers' representations of the infant: Associations with prenatal risk factors. *Infant Ment Health J.* 2015;36(6):599-612. https://doi.org/10.1002/imhj.21541

8. Nosrati A, Mirzakhani K, Golmakani N, Esmaeily H, Mohsen S, Nekah A. The effect of expectant fathers' training on paternal-fetal attachment. *J Midwifery Reprod Health.* 2019;7(2):1594-1601. https://doi.org/10.22038/jmrh.2019.19194.1199

9. Köse D, Cınar N, Altınkaynak S. Yenidoğanın anne ve baba ile bağlanma süreci (In Turkish), Bonding process of the newborn and the parents. *Merhaba.* 2013;22(6):239-245.

10. Camarneiro APF, de Miranda Justo JMR. Prenatal attachment and sociodemographic and clinical factors in Portuguese couples. *J Reprod Infant Psychol.* 2017;35(3):212-222. https://doi.org/10.1080/02646838.2017.1297889

11. Güleç D, Kavlak O. Baba-bebek bağlanma ölçeği'nin Türk toplumunda geçerlik ve güvenirliğinin incelenmesi (In Turkish), The study of reliability and validity of paternal-infant attachment scale in Turkish society. *J Hum Sci.* 2013;10(2):170-181. https://www.researchgate.net/publication/276417495

12. Condon JT. The assessment of antenatal emotional attachment: Development of a questionnaire instrument. *Br J Med Psychol.* 1993;66(2):167-183. https://doi.org/10.1111/j.2044-8341.1993.tb01739.x

13. Comrey AL, Lee HB. *A First Course in Factor Analysis.* 2nd ed. Avenue Mahwah, NJ: Lawrence Erlbaum Associates, Inc; 1992.

14. Habib C, Lancaster S. Changes in identity and paternal-foetal attachment across a first pregnancy. *J Reprod Infant Psychol.* 2010;28(2):128-142. https://doi.org/10.1080/02646830903298723

15. Ertuğrul M. *Tilburg gebelik distress ölçeğinin Türkçe'ye uyarlanması: Geçerlik ve güvenirlik çalışması (In Turkish), Adaptation of tilburg pregnancy distress scale into turkish: Reliability and validity test* [Master's thesis; Thesis No: 331300]. İzmir, Turkey: University of Dokuz Eylul; 2013. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

16. Öztürk H, Babacan E. Bir ölçek geliştirme çalışması: Hastanede çalışan sağlık personeli için iş güvenliği ölçeği (In Turkish), A study in scale development: the Occupational Safety Scale (OSS) for health care personnel working in. *Hospital. Hemşirelikte Eğitim ve Araştırma Dergisi (In Turkish), J Nurs Educ Res.* 2012;9(1):36-42.

17. Pallant J. *SPSS Survival Manual.* 3rd ed. London, UK: McGrath Hill; 2005.

18. Tavşancıl E. *Tutumların ölçülmesi ve SPSS ile veri analizi (In Turkish); Measurement of attitudes and data analysis with SPSS. Nobel Basımevi.* 2010;2010(5):253-268.

19. Büyüköztürk Ş. Faktör analizi: temel kavramlar ve Ölçek geliştirmede kullanımı (In Turkish). *Dergipark.* 2002;(32):470-483. https://dergipark.org.tr/en/pub/kuey/issue/10365/126871

20. Kline RB. *Principles and Practice of Structural Equation Modeling.* 4th ed. New York, NY: Guilford Press; 2011.

21. Kılıç S. Cronbach's alpha reliability coefficient. *J Mood Disord.* 2016;6(1):47. https://doi.org/10.5455/jmood.20160307122823

22. Bland Martin J, AGD. Statistics notes Cronbach's alpha. *BMJ.* 1997;314:572. https://doi.org/10.1136/bmj.314.7080.572

23. Gözüm S, Aksayan S. Kültürlerarası ölçek uyarlaması için rehber II: psikometrik özellikler ve kültürlerarası karşılaştırma (In Turkish), Guidelines for cross-cultural scale adaptation II: psychometric properties and cross-cultural comparison. *Hemşirelikte Araştırma ve Geliştirme Dergisi (In Turkish), Turk J Res Develop Nurs.* 2003;1:3-14.

24. Güleç D, Kavlak O. Baba-bebek bağlanması ve hemşirenin rolü (In Turkish), Father-infant attachment and the role of the nurse. *Turkiye Klinikleri J Nurs.* 2015;7(1):63-68. https://doi.org/10.5336/nurses.2013-36062

25. Uçan S. *Ebeveynlere verilen emzirme eğitiminin emzirme sürecine, kültürel davranışlara ve ebeveyn-bebek bağlanmasına etkisi (In Turkish) The effect of breafeeding education given to parents on the duration of breastfeeding, cultural behavior and parent-baby attachment* [Doctoral dissertation;Thesis No: 440508]. Manisa, Turkey: University of Celal Bayar, Institute of Health Sciences, Turkey; 2016. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

26. Alpar R. *Spor Sağlık ve eğitim bilimlerinden örneklerle uygulamalı istatistik ve geçerlik güvenirlik (In Turkish), Sports Applied Statistics and Validity Reliability with Examples from Health and Education Sciences.* 5th ed. Ankara, Turkey: Detay Yayıncılık; 2018.

27. Sinem S, Özmen D. *Mamografi davranış değişim süreci ölçeğinin (MDDSÖ) geçerlik ve güvenirlik çalışması (In Turkish), Reliability and Validity Study of Mammography Processes of Change Scale* [Master's thesis; Thesis No: 466273]. Selçuk, Turkey: University of Selçuk, Institute of Health Sciences, Turkey; 2017. https://tez.yok.gov.tr/UlusalTezMerkezi/tezSorguSonucYeni.jsp

28. Gomez R, Leal I. Vinculação parental durante a gravidez: Versão portuguesa da forma materna e paterna da antenatal emotional attachment scale. *Psicol Saúde Doenças.* 2007;8(2):153-165. http://www.scielo.oces.mctes.pt/scielo.php?pid=S1645-00862007000200001&script=sci_arttext

29. Della Vedova AM, Burro R. Surveying prenatal attachment in fathers: the Italian adaptation of the Paternal Antenatal Attachment Scale (PAAS-IT). *J Reprod Infant Psychol.* 2017;35(5):493-508. https://doi.org/10.1080/02646838.2017.1371284

30. Çakmur H. Araştırmalarda Ölçme - Güvenilirlik - Geçerlilik (In Turkish), measurement-reliability-validity in research. *TAF Prev Med Bull.* 2012;11(3):339-344. https://doi.org/10.5455/pmb