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METHODOLOGICAL ARTICLE

Validity and reliability of the Turkish version of the Maternal Antenatal Attachment Scale

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Abstract

Aim: The objective of this study was to translate the Maternal Antenatal Attachment Scale (MAAS) into Turkish, to adapt it to Turkish cultural conditions, and to determine its validity and reliability.

Methods: This study was conducted in a state hospital in the Central Anatolia Region, Sivas, Turkey. A total of 190 pregnant women were included in the study. Data was collected by MAAS. The validity of language, content, and construct were examined to evaluate the validity of the MAAS. Cronbach's alpha was used to assess internal consistency reliability.

Results: The consistency of specialist opinion on the scale, translated into Turkish and back-translated, was determined (Kendall W = 0.11; $P > 0.05$). The factor loadings resulting from the factor analysis directed at the construct validity of the scale were in the 0.33–0.71 range, and the items were grouped under two factors. Cronbach's alpha reliability coefficient overall for the entire scale was 0.79; it was calculated as being 0.76 for the first sub-dimension (11 items) and 0.65 for the second sub-dimension (eight items).

Conclusion: The Turkish version of the MAAS is a valid and reliable tool for the evaluation of the maternal–fetal attachment level in the antenatal period

Key words: instrument validation, maternal antenatal attachment scale, maternal attachment, Turkey.

INTRODUCTION

The concept of attachment represents an explanation of the human tendency for people to establish strong affectional bonds with other persons who are important to them (Kavlak & Sirin, 2009). The concept of attachment, which also explains the importance of the bond between mother and infant (Alhusen, 2008), was first defined by Bowlby as a "strong affectional tie between two people". Bowlby defined maternal attachment as a "warm, intimate and continuous relationship" between mother and child "in which both find satisfaction and enjoyment" (Bowlby, 1982).

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In fact, the establishment by the mother of an affectional tie with the child has already started in pregnancy, and, during pregnancy, the tie gradually increases (Siddiqui & Hagglöf, 2000). Hypotheses on the antenatal beginning of the mother–child relationship have been put forward and discussed during the last 20 years (Alhusen, 2008; Üstünsöz, Güvenc, Akyüz, & Oflaz, 2010). According to the results of the studies, attachment seems to begin well in advance of delivery (Alhusen, 2008; Damato, 2004; Yılmaz & Kızılkaya Beji, 2010).

Cranley defined maternal–fetal attachment (MFA) as the "mother's affiliation and interaction with their unborn child" (Cranley, 1981). This relationship, which continues during the entire pregnancy, is more intensely experienced in the second half of it (Ahern & Ruland, 2003; Öhman & Waldenström, 2010). It is well established that MFA increases significantly across time,

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with peak levels of attachment being reported in the second trimester (Lawson & Turriff-Jonasson, 2006). As the pregnancy progresses, a shift takes place from representations based on the past towards representations based on actual experiences, such as the quickening of the fetus (Damato, 2004; Van Bussel, Spitz, & Demyttenaere, 2010).

Certain factors affect the attachment between pregnant women and fetus. The reported studies indicate that the gestational age has a major effect on the mother's attachment to her unborn child (Alhusen, 2008; Salisbury, Law, LaGasse, & Lester, 2003; Yarcheski, Mahon, Yarcheski, Hanks, & Cannella, 2009). A qualitative study suggested that MFA is progressive in nature (Sandbrook & Adamson-Macedo, 2004). Prenatal testing (Alhusen, 2008; Öhman & Waldenström, 2010; Yarcheski *et al*., 2009) and social support (Alhusen, 2008; Feldman, 2007; Yarcheski *et al*., 2009) have moderate effects on MFA, while factors such as anxiety, depression, the planned nature of pregnancy, ethnic origin, and type of marital relationship have low effect on MFA (Yarcheski *et al*., 2009). Based on the moderate effect size found between prenatal testing and MFA, the use of ultrasound enhances the mother's attachment to her fetus (Yarcheski *et al*., 2009). As found by Sandbrook and Adamson-Macedo (2004), MFA is strengthened by the first ultrasound scan which provides visual evidence of fetal viability. The more social support women acquire, the further their adaptation to pregnancy is enhanced. Social support of family members and peers also can boost MFA (Kuo *et al*., 2013). The variables of maternal age, education, parity, self-esteem, and socioeconomic status are inconsistently related to MFA across studies (Salisbury *et al*., 2003). The findings are not very useful for theory building or clinical practice. Because these data are routinely collected in research, researchers should continue to study demographic variables knowing that they do not contribute significantly to MFA (Yarcheski *et al*., 2009).

Maternal–fetal attachment which begins during pregnancy is one of the most important factors in the child's healthy physical and psychological development (Kuo *et al*., 2013; Peluso, Peluso, Kern, & White, 2004). It was reported that if the mother's tie to her unborn child is of good quality, this positively affects the child's investigating and problem-solving ability, socialization, and pre-school development (Wilson *et al*., 2000). The importance of MFA extends beyond the psychological benefits of aiding women in adapting to pregnancy and preparing for motherhood (Lawson & Turriff-Jonasson, 2006). Maternal–fetal attachment has also been found to correlate with pregnancy-related health practices, such as receiving prenatal care and adhering to prenatal care regimens and reducing alcohol consumption during pregnancy (Lawson & Turriff-Jonasson, 2006; Ross, 2012). Determining the level of MFA is therefore important. Poorer quality of MFA was associated with maternal depression, anxiety, fatigue, and confusion. Depression also appeared to be associated with a lower quantity of attachment, as did a lack of pregnancy planning and having previous children. In addition to appropriate interventions in women at risk of poor MFA, education and motivation of pregnant women who show indifference or ignorance with regard to MFA may be useful (Lawson & Turriff-Jonasson, 2006; Shieh, Kravitz, & Wang, 2001; Üstünsöz *et al*., 2010).

Midwives or nurses should be able to describe the normal MFA process between the pregnant woman and fetus, in order to evaluate the mother's attitude towards their child correctly. Once pregnancy is established, the midwife or nurse must support the mother in accepting the pregnancy, feeling the fetal movements, and recognizing the fetus as a separate being. Midwives and nurses can thus help with initiating and maintaining the development of love within the MFA process (Hofer, 2005). On the other hand, midwives and nurses should be recognize that many women may not to develop love within the MFA process. For example, Alhusen, Gross, Hayat, Rose, and Sharps (2012) state that depressive symptoms influenced MFA in a sample of urban, predominantly low-income, African American women.

The number of studies on maternal attachment performed in Turkey is limited; even though a measurement tool for postnatal maternal attachment is available (Kavlak & Sirin, 2009), no such valid and reliable measurement for MFA has been identified. Therefore, this project was performed with the objective of adapting the Maternal Antenatal Attachment Scale (MAAS) to Turkish conditions, and performing a validation and determining the reliability of the translation.

METHODS

Design and study sample

This study was conducted in a state hospital in the Central Anatolia Region, Sivas, Turkey. The population of women visiting the antenatal clinic of Sivas State Hospital are of different socioeconomic levels and representative of the greater Turkish population. This study was completed to assess the reliability and validity of the

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Maternal Antenatal Attachment Scale (MAAS) among Turkish women. A sample of 5–10 subjects for each item is recommended for studies of scale validation and reliability (Pallant, 2005). The number of items in the MAAS to be validated in this study was 19. The plan was to recruit a sample size of 10 for each item; therefore, 190 pregnant women complying with the eligibility criteria, who attended Sivas State Hospital Gynaecology and Obstetrics Outpatient Clinics in January 2011, were included in the study. The criteria for eligibility to participate in the study were, as they were for the original scale evaluation form, a gravidity duration of 38 weeks or shorter with a singleton fetus, no hospitalization for any reason during the present pregnancy, and an absence of any problems relating to fetal health. In order to learn about hospitalization and fetal health problems, pregnant women were interviewed. The pregnant women were informed about the study. Those who complied with the eligibility criteria (190 pregnant women) and gave their voluntary oral consent to participate were included in the study. None of pregnant women refused to participate in the study.

Data collection tools

Data was collected by the MAAS. In addition, an Individual Characteristics Questionnaire was prepared for the purpose of determining some individual characteristics of the pregnant women participating in the study.

MAAS

The MAAS is a scale whose validity and reliability was established by Condon (1993). Several maternal–fetal relationship scales (the Maternal Foetal Attachment Scale, the Maternal Antenatal Attachment Scale, and the Prenatal Attachment Interview) have been developed. The MAAS is the newest instrument and one of the most often used in maternal–fetal relationship research (Bergha & Simonsa, 2009). It was developed in an attempt to create a questionnaire that adequately measured bonding to the fetus and did not contain questions to do with the "pregnancy state" or the "motherhood role", which Condon (1993) described as a pitfall of previously constructed questionnaires aimed at measuring the same construct. The 19 items making up the scale focus on the feelings, attitude, and behavior of the pregnant woman with regard to the fetus. Condon had applied the scale to a total of 112 patients, 49% of whom were multiparous and 51% primiparous, at a pregnancy stage of 38 weeks or less. Many of the questions require the respondent to select their answer based on their experience in the previous two weeks. This is a Likert-type scale with a score of between 1 and 5 attributed to each item (where 5 represents very intense feelings and 1 the absence of feeling). The minimum score for the total MAAS is 19 and the maximum 95. As well as scores for each of these subscales, a "total attachment" score can also be calculated. A high score indicates a high level of attachment. Eleven of the items (1, 3, 5–7, 9, 10, 12, 15, 16, and 18) are reverse scored. Factor analysis revealed two factors, explaining 39% of the variance. The scale contains two sub-dimensions: "attachment quality" (items 3, 6, 9, 10, 11, 12, 13, 15, 16, and 19) and "time spent on attachment" (items 1, 2, 4, 5, 8, 14, 17, and 18). Item 7 does not influence any factor of these sub-dimensions; it is added to the total score (Condon, 1993). Data on the internal consistency of the subscales and other psychometric data seem to be unavailable.

Individual Characteristics Questionnaire

This form was prepared by the researchers for the purpose of determining some individual characteristics (e.g. sociodemographic characteristics, marital history, obstetrical history, and thoughts about the present pregnancy).

Procedures for testing validity and reliability

The validity of language, content, and construct were examined to evaluate the validity of the MAAS (Aker, Dündar, & Peksen, 2005; Aksayan & Gözüm, 2002; Özen, Gülaçtı, & Kandemir, 2006). To check the language, the scale was translated from English into Turkish by three separate translators. All translations were reviewed by the investigators, who prepared a Turkish form with the text which best expressed each item. This Turkish text was back-translated and compared with the English-language original text.

Content validation was performed to determine the discrimination power of each item, its adequacy for the purpose, and its cultural fitness (Aker *et al.*, 2005; Gözüm & Aksayan, 2003). To effect this, expert opinion was obtained from 10 faculty members in Obstetrical and Gynaecological Nursing and in Mental Health and Psychiatric Nursing. The experts were asked to attribute a score from 1 to 4 for the suitability of each item. In this evaluation, directed at whether each item could be properly understood, a score of 1 expressed a valuation of "unsuitable", 2 "somewhat suitable; the item still needs to be made suitable", 3 "mainly suitable but needs minor adjustments", and 4

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"entirely suitable" (Gözüm & Aksayan, 2003). The consistency level of the expert opinions was examined by Kendall's W, a non-parametric test (Bowling & Ebrahim, 2005).

An important step in the preparation of scale items is that of testing the scale on 10–20 subjects who, without being part of the study, have the same characteristics as the study sample, and asking them if the items are properly understood, in order to correct omissions and mistakes and finalize the measurement tool (Gourounti & Sandall, 2011). Following the correction in accordance with the experts' evaluation, the Turkish form was tested on 10 pregnant women with characteristics matching those in the study sample. This preliminary testing established that the scale was understandable.

Before factor analysis could be performed for the construct validation of the scale, a Kaiser–Meyer–Olkin (KMO) analysis of sampling adequacy, and Bartlett's test of sphericity, to determine the test sample size, were performed. For factor analysis to be considered suitable, the KMO measure should be higher than 0.60 and Bartlett's test of sphericity should show statistical significance (Akın, Akın, & Abacı, 2007; Pallant, 2005). Principal component analysis, one of the most widespread factor analysis techniques, and the Varimax rotation method (Bowling & Ebrahim, 2005; Pallant, 2005), were used to examine the factorial structure of the MAAS.

The corrected item–total correlation, Cronbach's alpha reliability coefficient, and the split-half reliability coefficients were examined (Aker *et al*., 2005; Bowling & Ebrahim, 2005; Özen *et al*., 2006).

Statistical analysis

Statistical analysis was performed using the Statistical Package for the Social Sciences version 16.0 (SPSS, Chicago, IL, USA). The validity of language, content, and construct were examined to evaluate the validity of the MAAS. Internal consistency and the corrected item–total correlation were examined. With regard to internal consistency, Cronbach's alpha was calculated as a coefficient of reliability recommended for Likert-type scales. The corrected item–total correlation was evaluated by Pearson's correlation coefficient (Aker *et al*., 2005; Aksayan & Gözüm, 2002; Özen *et al*., 2006).

Ethical considerations

This study conformed to the Helsinki Declaration of Human Rights and respected the individual rights of the participants. Written consent was obtained by email from Condon, the scientist who developed the MAAS, to localize the scale in Turkey. This research was approved by Provincial Health Directorate, Sivas, Turkey (reference number and date: 773/28-24.01. 2011). All pregnant women were informed about the study before giving their oral consent and they were volunteers who were assured that their identities and other information would be kept confidential.

RESULTS

Subject characteristics

The average age of the pregnant women was 26.7 years (standard deviation [SD], 5.5; range, 17–42). The majority of women were nulliparous and had completed primary education; most of the pregnancies were planned and desired. The subjects were, on average, at week 26.3 (SD, 9.9; range, 6–37) of their pregnancy. Selected characteristics of the pregnant subjects making up the study are shown in Table 1.

Validity of the MAAS form in Turkish

Validity of the language

After translating, the English-language original text and Turkish text were the same.

Table 1 Demographic and obstetric characteristics of the sample ($n = 190$)

Characteristics	N	(%)
Mean age, 26.7 years (SD, 5.5)		
Educational level		
Primary school	115	60.4
High school	49	25.8
University	26	13.8
Mean gestational week 26.3 (SD, 9.9)		
Parity		
Nulliparous	77	40.5
Primiparous	61	32.1
Multiparous	52	27.4
Desired pregnancy		
Desired	160	84.2
Undesired	30	15.8
Planning of pregnancy		
Planned	139	73.2
Unplanned	51	26.8
Experienced quickening		
Experienced	158	83.2
Not experienced	32	16.8

SD, standard deviation.

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Content validity

The consistency level of the expert opinions was examined by Kendall's W, a non-parametric test (Bowling & Ebrahim, 2005). These opinions were seen as not significantly diverging from each other (Kendall's $W = 0.11$; $P > 0.05$), namely, achieving uniformity, when the scores attributed by the 10 experts for each item were evaluated. Some of the scale items were modified (some minor word corrections) in accordance with the experts' opinions.

Construct validity

For factor analysis to be considered suitable, the KMO measure should be higher than 0.60 and Bartlett's test of sphericity should show statistical significance (Akın *et al*., 2007; Pallant, 2005). In this study, the KMO test result was 0.805 and the result of Bartlett's test of sphericity was 661.582, both tests thus being significant at the $P < 0.001$ level. The obtained result indicates that the sample size was sufficient and adequate for factor analysis.

Factor analysis showed that the factor loading values varied between 0.33 and 0.71 (Table 2), with a breakpoint in the graph corresponding to component 2 (Fig. 1). The 19-item MAAS with two sub-dimensions was thus confirmed.

Reliability of the MAAS form in Turkish

Corrected item–total correlation

It was established that the corrected item–total correlation was $r = 0.19$–0.50 and that the correlation between each item and the composite score was statistically significant ($P < 0.001$).

Cronbach's alpha reliability coefficient

Cronbach's alpha coefficient was calculated as a measure of the MAAS internal consistency. This

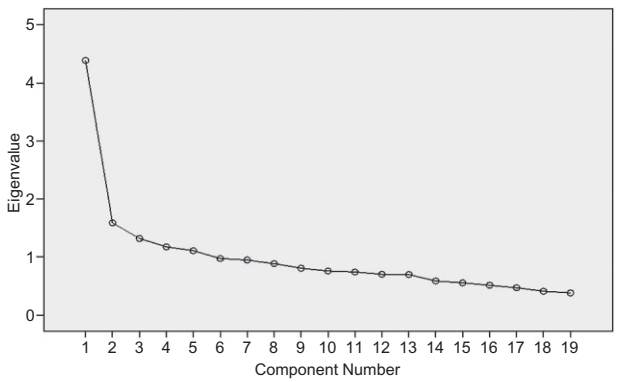

Figure 1 Eigenvalue scree plot for the Maternal Antenatal Attachment Scale (MAAS) after applying Varimax rotation.

Table 2 Factor analysis and corrected item–total correlation of the Maternal Antenatal Attachment Scale

Item no.	Item description	Factor 1	Factor 2	Corrected item–total correlation
12	Absence/presence of desire to hurt or punish fetus	0.715		0.42
13	Feeling emotionally close to/distant from fetus	0.637		0.47
15	Anticipate positive/negative first impression of baby	0.556		0.33
9	Tender/irritable feelings towards fetus	0.599		0.42
2	Strong/weak feelings accompanying thoughts of fetus	0.540		0.44
14	Frequent/infrequent concern about mother's diet	0.527		0.49
3	Positive/negative feelings towards fetus	0.475		0.46
7	Fetus dependent for well-being	0.466		0.38
11	Happy/sad feelings about fetus	0.455		0.30
16	Desire to hold baby immediately/later	0.434		0.37
19	Sadness/mixed feelings towards fantasized fetal loss	0.359		0.24
18	Frequent/infrequent palpation of fetus		0.665	0.50
5	Frequent/infrequent picturing of fetus in imagination		0.601	0.31
8	Frequent/infrequent talking to fetus		0.557	0.46
17	Frequent/infrequent dreams about baby		0.530	0.24
6	Concept of fetus as "person"/"thing"		0.517	0.28
1	Frequent/infrequent thoughts of fetus		0.466	0.36
4	Strong/weak desire to read or get information about fetus		0.415	0.46
10	Clear/vague mental picture of fetus		0.338	0.19

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Table 3 Split-half reliability analysis of the Maternal Antenatal Attachment Scale

Spearman–Brown	0.72
Guttman split-half	0.71
First half Cronbach's α for 10 items	0.68
Second half Cronbach's α for nine items	0.69

reliability analysis yielded a coefficient of 0.79. The internal consistency of the two factors that had emerged was also checked. The first factor (11 items) had an alpha of 0.76 and the second (eight items) 0.65. The reliability coefficient on subtracting each of the single items within each factor was also determined, and the distribution of items among factors was found to be consistent.

Split-half reliability coefficient

To characterize the consistency among the responses to the scale, split-half reliability was determined. The Spearman–Brown, Guttman split-half, and Cronbach's alpha reliability coefficients were calculated (Table 3).

DISCUSSION

Maternal–fetal attachment starts with pregnancy, and increases significantly across time (Siddiqui & Hagglöf, 2000). Determining the MFA level is important in the process of preparing for motherhood and in the child's growth and development. Prenatal evaluation of the MFA level may allow an early determination of problems related to MFA, and the taking of appropriate action (Üstünsöz *et al*., 2010). Thus, it is necessary to use valid and reliable measurement tools.

In this study, the authors investigated the psychometric qualities of the Turkish version of the MAAS (Condon, 1993). Overall, both the total MAAS and its subscales were found to be valid and reliable.

When examining the factorial structure of the MAAS form in Turkish, five factors with an eigenvalue greater than 1 were found, corresponding to the original scale. The variance in the scale explained by these five factors amounted to 50.41%. A breakpoint corresponding to component 2 was seen in the graph after applying the Varimax rotation (Fig. 1). It was decided to group all items under two factors, as with the original scale. Items with a factor loading smaller than 0.30 should be removed from a scale (Büyüköztürk, 2006; Üstünsöz *et al*., 2010). No item in the Turkish MAAS scale was removed as none had a factor loading of less than 0.30. An 11 item first factor and an eight item second factor were determined (Table 2). Similarly, the adaptation of scale in Dutch version has revealed two factors (Van Bussel *et al*., 2010).

To evaluate the scale's reliability, corrected item–total correlation, Cronbach's alpha reliability coefficient, and the split-half reliability coefficients were examined (Aker *et al*., 2005; Bowling & Ebrahim, 2005; Özen *et al*., 2006).

The corrected item–total correlation coefficients explain the relationship between the score obtained for the test items and the total test score. A positive and highly corrected item–total correlation indicates that the items are reflecting similar behaviors, and that the internal consistency of the test is high. In a test using Likert-type grading scales, Pearson's correlation coefficient is used to calculate the corrected item–total correlation. A high correlation obtained for each item shows a high correlation of the particular item with the measured theoretical structure, meaning that the item is effective and adequate as a measure of the targeted behavior. It is suggested that an acceptable coefficient should be higher than 0.20 (Aker *et al*., 2005; Bowling & Ebrahim, 2005). It was established that the reliability coefficients for the 19 items of the MAAS were in the range $r = 0.19$–0.50, and the correlation between each item and the composite score was statistically significant ($P < 0.001$). As for item 10, which had a corrected item–total correlation coefficient of 0.19, it was not removed from the scale because the alpha value for the scale remained unchanged on its removal.

Determination of Cronbach's alpha is recommended as a technique for examining the reliability of Likert-type scales; this value is a measure of the internal consistency of items within the scale. The reliability coefficient of a measurement tool should be as close as possible to 1 (Aker *et al*., 2005; Bowling & Ebrahim, 2005; Gözüm & Aksayan, 2003). The measurement tool is not considered reliable if Cronbach's alpha coefficient is smaller than 0.40; reliability is low at 0.40–0.59, somewhat reliable at the 0.60–0.79 level, and highly reliable at 0.80–1 (Aker *et al*., 2005; Gözüm & Aksayan, 2003). Cronbach's alpha as a coefficient to evaluate internal consistency was found to be 0.79 for the Turkish MAAS. The first of the determined two factors (11 items) had a Cronbach's alpha of 0.76 for internal consistency and the second (eight items) a value of 0.65. In the Dutch version of the MAAS, Cronbach's alpha was found to 0.70 or more for the total scale, and Cronbach's alpha for the first factor was 0.69 or more and for the second factor was 0.73 or more (Van Bussel *et al*., 2010).

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Among the reliability estimates for a scale, split-half reliability testing, including odd–even, first–second half, or random equal halves reliability, uses a reliability coefficient for the entire test calculated by the Spearman–Brown prophecy formula. Split-half reliability, also known as the halves method, shows the degree of consistency among the obtained test scores (Bowling & Ebrahim, 2005). The Spearman–Brown, Guttman split-half, and Cronbach's alpha reliability coefficients, calculated to test the two halves reliability of the scale, were found to be sufficiently high in this study (Table 3).

Limitations

The major limitation of this study is the lack of a comparison study on archival, previously published data. Second, this study population was somewhat representative of both the population of women visiting the antenatal clinic of the Sivas State Hospital and the women living in the region of the hospital.

CONCLUSION

In conclusion, it can be stated that the Turkish version of the MAAS is a valid and reliable tool for the evaluation of the maternal–fetal attachment level in the antenatal period. As also reported by Condon (1993), pregnant women at risk of low levels of attachment (such as those with high-risk pregnancy or with psychological problems during pregnancy) can be evaluated using this scale in order to prevent future attachment problems between the mother and the child.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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