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Construct validity and reliability of the Brazilian version of the *Maternal-Fetal Attachment Scale* (MFAS): a proposal for a 12-item short version

Validade de construto e confiabilidade da versão brasileira da *Escala de Apego Materno-Fetal* (MFAS): uma proposta para uma versão curta de 12 itens

Validez de constructo y confiabilidad de la versión brasileña de la *Escala de Apego Materno-Fetal* (MFAS): una propuesta para una versión corta de 12 ítems

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Abstract

This study aimed to update the assessment of construct validity and reliability of the Brazilian version of the Maternal-Fetal Attachment Scale (*MFAS). This is part of a cohort study, in which the scale was applied to 415 pregnant women. The factor structure was verified via structural equation models. Comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA) were used to verify the model fit. Additionally, to test the validity of the MFAS based on external variables, generalized linear model was performed to test the association between obstetric variables, social support, and symptoms of depression with the MFAS. The reliability was analyzed via the composite reliability coefficient (CR). The 12-item short version of the Brazilian MFAS showed adequate parameters of construct validity (CFI = 0.969, TLI = 0.960 and RMSEA = 0.032, 90%CI: 0.012-0.048) and is composed of three factors ("empathy and care", "role-taking", and "interaction with the fetus") containing 12 items. The total scores of the MFAS were positively correlated with social support (p-value < 0.001) and negatively correlated with depressive symptoms (p-value = 0.007). Moreover, women who live with a partner (p-value = 0.026) and had intended pregnancies (p-value < 0.001) presented a better bond with the fetus. Regarding reliability, factors 1 and 2 showed adequate values (CR = 0.72 and CR = 0.82, respectively) and factor 3 regular value (CR = 0.63). This 12-item short version of the Brazilian MFAS may be a reliable and valid instrument for scientific studies and clinical assistance in Brazil.*

Pregnant Women; Psychometrics; Child; Fetus

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Introduction

Maternal-fetal attachment is the relationship that a pregnant woman establishes with her unborn child and represents the intensity of engaging in behaviors of affiliation and interaction with the fetus in the intrauterine stage [1,2]. The quality of the attachment between mother and fetus influences the pregnant woman's health and self-care practices during pregnancy [3,4]. Maternal-fetal attachment affects the mother-baby relationship in the postpartum [5,6]. Disturbances in maternal-fetal attachment may be a marker of early relationship difficulties between a mother and her child and, possibly, indicate a need for early intervention [7,8]. Therefore, valid and reliable measurements instruments to assess this construct are essential for scientific research and clinical assistance.

Currently, a range of tools for measuring mother-fetus attachment is available and the *Maternal-Fetal Attachment Scale* (MFAS) is one of the most used [9]. Mecca Cranley published the MFAS in 1981 to measure mother-fetus attachment during pregnancy [1]. The items were constructed based on the tasks and behaviors that women develop during pregnancy, combining literature, clinical experience and the judgements of specialists on the subject, and consultation with a group of pregnant women. The final version of MFAS was composed of 24 items distributed in five factors: (1) differentiation of self from the fetus (items 3, 5, 10 e 13), (2) interaction with the fetus (items 1, 7, 17, 20, 24), (3) attributing characteristics and intentions to the fetus (items 6, 9, 12, 14, 16, 21), (4) self-giving (items 2, 11, 15, 22, 23), and (5) role-taking (items 4, 8, 18, 19). The items were scored on a 5-point scale that represents the frequency (from "most of the time" = 5 to "never" = 1). The score ranges from 24 to 120, and higher scores represent higher levels of prenatal attachment. The reliability of the total scale was 0.85 (Cronbach's alpha) and the factors ranged from 0.52 to 0.73 (scale 1 = 0.62, scale 2 = 0.68, scale 3 = 0.67, scale 4 = 0.52, scale 5 = 0.73). The assessment of factor validity was based on the theoretical assumption of the construct and the correlation analysis between the items and the scale, and no type of factor analysis was performed [10].

MFAS has been widely used in several countries, and most studies indicate adequate reliability for the total score. Nevertheless, some factors present low or regular reliability in multidimensional factorial models. Moreover, none of these studies has confirmed Cranley's original factorial model [11,12]. The Italian and German versions of the MFAS suggested a 3D structure, with adequate reliability values for the total score and the first subscale, and regular and poor values for subscales two and three, respectively [12,13].

Feijó [14] adapted the MFAS for Brazil in 1999. The author found a multidimensional factorial model with 18 items distributed in five factors. The internal consistency of the total score was regular (Cronbach's alpha = 0.63). However, the reliability per factor was inadequate (Cronbach's alpha ranging from 0.56 to -0.18). Due to the low reliability of the subscales, the author argue that only the total score of this Brazilian version of the MFAS should be used. Notably, even the total score of this version of the MFAS showed regular reliability [14]. Despite these limitations, the MFAS is the most used instrument to assess maternal-fetal attachment in Brazil [15,16].

Since the cross-cultural adaptation study in 1999 (more than 20 years ago), there has been no other research on the psychometric properties of the MFAS in Brazil [14]. It is necessary to check the validity of instruments over time [17] and reexamine the properties of the MFAS with more modern and accurate methods of psychometric analysis [18] in comparison to those used in the cross-cultural adaptation study by Feijó [14]. Moreover, the first psychometric study of the MFAS showed an inadequate value of reliability. Therefore, this study aimed to update the psychometric properties of construct validity and reliability of the Brazilian version of the MFAS.

Method

Study design, participants, and procedures

This is part of a cohort study conducted from February 2016 to November 2019 in two Family Health Strategy (FHS) units in the municipality of Rio de Janeiro, Brazil. These health facilities assist a low-income population who lives in precarious sanitation conditions, and the area has the fifth lowest

Human Development Index (HDI) in the city. In total, 513 pregnant women with low obstetric risk, with less than 20 weeks of gestational age, and aged 18 years or older were considered eligible for the baseline sample. Three interviews were conducted, the first up to the 20th week of gestation, the second around the 34th week of gestation, and the third interview in the postpartum period. The interviews were conducted by trained interviewers in the prenatal waiting room and lasted about 20 minutes. The MFAS was applied in the second interview and information about guidance received in prenatal consultations and satisfaction with care; use of alcohol, tobacco, and drugs during pregnancy; violence against women during pregnancy were collected. Furthermore, the screening scales for symptoms of anxiety (*Patient Health Questionnaire*) and depression (*Edinburgh Postnatal Depression Scale* – EPDS) were applied in this interview. Due to the loss of 105 women (20.19%) between the first and second interviews, the MFAS were applied to 415 pregnant women.

Instruments

The MFAS was created by Cranley in 1981 to assess the mother-fetal attachment [10]. The version of the MFAS used in this study was validated for Brazil in 1999 by Feijó [14]. This instrument has no copyright restrictions and can be used freely.

The EPDS was used to assess symptoms of postpartum depression. This instrument was created by Cox et al. [19] and validated for the Brazilian population by Santos et al. [20]. The EPDS has ten items with score ranging from 0 to 30, and the higher the score, the greater the presence of symptoms of depression [19].

The *Medical Outcome Study* (MOS) instrument assessed social support. It is a questionnaire developed by Sherbourne & Stewart [21] and validated for Brazilian pregnant women [22]. This instrument has 19 items, comprising five functional dimensions of social support: material (four questions – provision of practical resources and material help); affective (three questions – physical displays of love and affection); emotional (four questions – expressions of positive affection, understanding, and feelings of trust); positive social interaction (four questions – availability of people to have fun or relax); and information (four questions – availability of people to obtain advice or guidance). For each item, the woman should indicate how often she considered each type of support available in case of need: never (= 0), rarely (= 1), sometimes (= 2), almost always (= 3), or always (= 4).

The sociodemographic and obstetric data for mothers (age, skin color, marital status, schooling level, wage labor, pregnancy intention, and satisfaction with pregnancy) and social support were obtained from a structured questionnaire administered in the first interview of the cohort study (before 20 gestational weeks).

Data analysis procedures

Descriptive analyses were performed to describe the sample's sociodemographic profile. The analysis of the construct validity and reliability of MFAS followed three steps. Firstly, the original and the Brazilian factor structure of MFAS were verified by confirmatory factor analysis (CFA) using robust weighted least squares estimator (weighted least squares mean and variance – WLSMV) for parameter estimation, as recommended for categorical data and oblique rotation. The model fit was evaluated by the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA). The values of CFI and TLI > 0.95, and RMSEA < 0.06 were considered well-fitting models. Furthermore, the 90% confidence interval (90%CI) for the RMSEA was calculated and a lower limit close to 0 and an upper limit lower than 0.08 were considered appropriate [23].

Secondly, to evaluate the factor structure of MFAS, exploratory structural equation models (ESEM) were performed [24]. The decision of retaining the number of factors was made by parallel analysis with a random permutation of the observed data [25]. The estimator, the type of rotation, and the adjustment indices used were the same as the CFA. Analyses of ESEM started with all instrument items and in each round of analysis, the items loaded in each factor were analyzed. The item should have a load above 0.30 and could not have a cross-load to remain in the model. The item that showed a difference between the two largest loads (which must be greater than 0.30) lower than 0.2 was removed [26].

Finally, the factorial structure obtained by ESEM was tested via CFA. In this stage, the reliability of each factor of MFAS was tested via the composite reliability coefficient (CR). Convergent and discriminant factor validities were also analyzed. CR and average variance extracted (AVE) are two measures of reliability that can estimate the convergent factor validity. Thus, CR and AVE per factor were estimated using the standardized factor loads of the items and their measurement errors to verify convergent factor validity. Values for CR ≥ 0.7 indicate good reliability and values between 0.6 and 0.7 are acceptable. Values for AVE ≥ 0.5 were considered adequate for convergent validity. The factor discriminant validity analysis was performed by comparing the correlation between the factors and the square root of the AVE. To be considered a good discriminant validity, the square root estimates of the AVE should be higher than the correlation between the factors [26].

To further examine the construct validity of the MFAS, aiming to test the validity based on external variables, additional hypotheses testing [27] analyses between mother-fetal attachment and obstetric variables (intentionality and satisfaction with pregnancy), social support, and symptoms of perinatal depression was performed by generalized linear model (GLM) using the gamma family. Regression coefficients (β), their respective standard deviations, and p-values obtained by these models were used to verify the association between the variables. A p-value ≤ 0.05 associated with β was considered significant.

Data entry and quality control were performed in the EpiData 3.1 program (http://www.epidata.dk/). All statistical analyses were performed using the R version 3.5.1 (http://www.r-project.org) and MPlus version 8 (http://www.r-project.org). The ESEM and CFA analyses were performed in Mplus version 8.

Ethics

This study was conducted in accordance with *Resolution n. 196/1996* of the Brazilian National Health Council, which establishes the standards for studies involving human beings, issued by the Research Ethics Committee of the Sergio Arouca National School of Public Health, Oswaldo Cruz Foundation (ENSP/Fiocruz; CAAE 21982613.6.0000.5240). All participants received and signed an informed consent form.

Results

Participants' mean age was 26.32 years (standard deviation – SD: 5.86), and most women lived with a partner (78.8%), had 9 to 12 years of education (52.5%), self-declared themselves as mixed-race (49.4%), had a wage labor (53.2%), reported that the pregnancy was intentional (46.3%), and felt satisfied when they found out about the pregnancy (61.9%) (Table 1).

CFA of proposed structural models

The original structural model of MFAS showed good value of RMSEA (0.051; 90%CI: 0.045-0.057) and inadequate values of CFI (0.815) and TLI (0.788). The factor structure of the Brazilian version also obtained good values in RMSEA (0.068; 90%CI: 0.060-0.078), except in the CFI (0.788) and TLI (0.740) (Table 2).

EFA

Since the models tested achieved unsatisfactory fit indices, a series of ESEM were conducted. The ESEM started with 4-factor dimensional structure suggested by parallel analysis as the most representative for the data. In each round, items with a factor loading < 0.30 and/or a cross-load with a difference below 0.2 between the two largest loads (which must be above 0.3) were removed. When an

Table 1

Sociodemographic and obstetric characteristics of women included in the study. Rio de Janeiro, Brazil, 2016/2019.

Characteristics	n	%
Maternal age (years)	26.32 *	5.86 **
Marital status		
Lives with a partner	327	78.8
Has a partner but does not live with them	62	14.9
Has no partner	26	6.3
Schooling (years)		
0-9	163	39.2
9-12	218	52.5
13 or more	34	8.3
Skin color		
White	115	27.7
Black	84	20.2
Mixed-race	205	49.4
Wage labor		
Yes	221	53.2
No	194	46.8
Intention of pregnancy		
Wanted	192	46.3
Would wait more time	114	27.5
Unintended	109	26.2
Satisfaction with pregnancy		
Satisfied	257	61.9
Relatively satisfied	113	27.2
Unsatisfied	45	10.9

* Mean value;

** Standard deviation.

Table 2

Confirmatory factor analysis (CFA) of the original and Brazilian factor model of *Maternal-Fetal Attachment Scale* (MFAS).

Factor model	RMSEA (90%CI)	CFI	TLI
Original factor model *	0.051 (0.045-0.057)	0.815	0.788
Brazilian factor model **	0.068 (0.060-0.078)	0.788	0.740

90%CI: 90% confidence interval; CFI: comparative fit index; RMSEA: root mean square error of approximation; TLI: Tucker-Lewis index.

* Cranley [1];

** Feijó [14].

item was removed, a new round of ESEM was performed (Table 3). In the first round of ESEM, items 4 and 15 were excluded for showing cross-loading and items 6, 16, 21, and 22 for low factor loadings (< 0.3). In the second round of ESEM, items 2, 3, 13, and 23 were excluded for cross-loading and items 13 and 23 for low factor loadings (< 0.30).

Table 3

First and last exploratory analyses of the *Maternal-Fetal Attachment Scale* (MFAS) using exploratory structural equation models (ESEM): standardized loads and general adjustment estimates of the model.

Item	ESEM 4 factors *				ESEM 3 factors **		
	λi1	λi2	λi3	λi4	λi1	λi2	λi3
MFAS1	0.294	**0.469**	0.147	0.079	**0.603**	0.110	0.135
MFAS2	**0.603**	0.292	0.077	0.180	***	***	***
MFAS3	**0.612**	0.004	0.011	-0.099	***	***	***
MFAS4	**0.393**	**0.355**	0.012	0.087	***	***	***
MFAS5	**0.760**	-0.191	0.107	0.033	-0.032	**0.596**	0.046
MFAS6	0.294	0.002	0.097	0.281	***	***	***
MFAS7	0.187	0.053	0.131	**0.313**	0.174	-0.065	**0.336**
MFAS8	**0.536**	0.256	0.018	0.093	0.284	**0.429**	0.083
MFAS9	0.038	0.269	0.099	**0.379**	0.225	-0.007	**0.319**
MFAS10	-0.188	0.022	**0.589**	-0.010	***	***	***
MFAS11	0.008	**0.550**	-0.091	-0.083	**0.387**	0.035	0.024
MFAS12	-0.040	**0.773**	0.045	0.151	**0.871**	-0.049	-0.040
MFAS13	-0.027	**0.414**	-0.312	0.277	***	***	***
MFAS14	0.003	-0.039	**0.704**	0.032	***	***	***
MFAS15	0.180	**0.491**	0.120	**-0.349**	***	***	***
MFAS16	0.042	0.294	-0.050	0.229	***	***	***
MFAS17	0.249	0.011	0.085	0.420	-0.072	0.027	**0.715**
MFAS18	**0.879**	-0.016	-0.026	0.054	-0.007	**1.150**	-0.008
MFAS19	0.284	0.158	0.086	**0.309**	0.161	0.159	**0.334**
MFAS20	**0.344**	0.278	0.183	0.056	**0.383**	0.260	0.053
MFAS21	0.068	0.188	0.087	0.192	***	***	***
MFAS22	-0.091	-0.002	-0.277	0.266	***	***	***
MFAS23	0.052	**0.506**	-0.279	-0.202	***	***	***
MFAS24	0.050	0.237	-0.009	**0.409**	0.080	-0.087	**0.512**
Φ (F1-F2)							
Φ (F1-F3)							
Φ (F2-F4)						***	
Φ (F2-F3)							
Φ (F2-F4)						***	
Φ (F3-F4)						***	
CFI/TLI	0.951/0.927				0.973/0.947		
RMSEA (90%CI)	0.030 (0.020-0.039)				0.037 (0.015-0.055)		

90%CI: 90% confidence interval; λ: factor load; Φ: correlation coefficient; CFI: comparative fit index; RMSEA: root mean square error of approximation; TLI: Tucker-Lewis index.

Note: bold loads are greater than 0.30.

* First ESEM;

** Last ESEM;

*** Not applicable.

CFA

The 3-factor model obtained from ESEM showed adequate fit indices in CFA analysis (CFI = 0.969, TLI = 0.960 and RMSEA = 0.032; 90%CI: 0.012-0.048). Four items (Q1, Q11, Q12, Q20) comprise factor 1, three items (Q5, Q8, Q18) were included in factor 2, and five items (Q7, Q9, Q17, Q19, Q24) in the factor 3. The factorial loads varied from 0.390 (item 11) to 0.959 (item 18) and the correlations between the three factors was 0.612 (F1-F2), 0.689 (F1-F3), and 0.569 (F2-F3) (Table 4).

Table 4

Confirmatory factor analysis (CFA) and reliability of the *Maternal-Fetal Attachment Scale* (MFAS): standardized loads, measurement errors, and general adjustment estimates.

Items	CFA final model			
	λi1	λi2	λi3	δi
Factor 1 – Empathy and caring				
MFAS1	0.772			0.404
MFAS11	0.390			0.848
MFAS12	0.702			0.507
MFAS20	0.594			0.647
Factor 2 – Role-taking				
MFAS5		0.621		0.614
MFAS8		0.713		0.491
MFAS18		0.959		0.080
Factor 3 – Interaction with the fetus				
MFAS7			0.412	0.830
MFAS9			0.495	0.755
MFAS17			0.571	0.674
MFAS19			0.579	0.665
MFAS24			0.463	0.786
AVE	0.400	0.610	0.260	
RQ (AVE)	0.630	0.780	0.510	
CR	0.720	0.820	0.630	
Φ (F1-F2)		0.612		
Φ (F1-F3)		0.689		
Φ (F2-F3)		0.569		
CFI/TLI		0.969/0.960		
RMSEA (90%CI)		0.032 (0.012-0.048)		

90%CI: 90% confidence interval; δ: measurement errors; λ: factor load; Φ: correlation coefficient; AVE: average variance extracted; CFA: confirmatory factor analysis; CFI: comparative fit index; CR: composite reliability; RMSEA: root mean square error of approximation; RQ (AVE): square root of the extracted average variance; TLI: Tucker-Lewis index.

Regarding reliability, the CR of the factors 1 and 2 was adequate (0.72 and 0.82) and the factor 3 was regular (0.63). The overall CR for the instrument was 0.81. Factor 2 presented an AVE > 0.50, and the factors 1 and 3 presented AVE < 0.50 (0.40 and 0.26, respectively). AVE square root of factor 2 (0.78) was greater than the correlation between this factor and factor 1 (0.612) and 3 (0.569), indicating good discriminant validity between this factor and the others. AVE square root of factor 1 (0.63) was greater than the correlation between this factor and factor 2 (0.612) indicating good discriminant validity between this factor and was slightly below than the correlation between this factor and factor 3 (0.689), indicating regular discriminant validity between factor 1 and 3. AVE square root of factor 3 (0.51) was slightly below than the correlation between this factor and factor 2 (0.569), indicating regular discriminant validity between this factor and was lower than the correlation between this factor and factor 1 (0.689), indicating bad discriminant validity between factor 3 and 1 (Table 4). To obtain this final factor model of MFAS, none of the model modification indices were used.

Concerning the hypothesis test (construct validity), the scores on the MFAS scale were positively correlated with social support (p-value < 0.001). Moreover, women who live with a partner (p-value = 0.026) have a better bond with the fetus than those who do not live with or do not have a partner. Women who had intended pregnancies (p-value < 0.001) have a better maternal-fetal bond than those who wanted to wait a little longer or did not want to get pregnant. Women who were satisfied with the pregnancy (p-value < 0.001) had a better bond compared to those who were relatively satisfied or

dissatisfied with the pregnancy. Regarding maternal mental health, the greater the presence of depressive symptoms (p-value = 0.007), the worse the bond between mother and fetus (Table 5).

Discussion

The 12-item short version of the Brazilian MFAS presented good construct validity and the factorial validity and hypothesis testing proved to be adequate. This study found a multidimensional factor model, with three factors ("empathy and caring", "role-taking", and "interaction with the fetus") containing 12 items. The association of the instrument total scores with other constructs was consistent with the literature. The reliability of the total score of the instrument proved to be adequate, with the first two subscales obtaining satisfactory reliability indices and the third one regular reliability index.

Following other studies, this analysis did not corroborate the original model [12,13,28]. Possibly, these studies employed different analysis methods, leading to different outcomes [26]. Furthermore, the attachment between mother and fetus may be sensitive to cultural differences [1] and removing some items may be partly due to cultural differences. Moreover, the instrument may be temporally outdated since the context of motherhood has changed in recent decades, compromising the items and the factorial structure of the instrument. One change regarding the context of motherhood related to pregnancy that can affect the maternal-fetal attachment is the improvement of ultrasound examinations. These imaging exams are more modern, and mothers can "see" their baby more clearly in the belly (e.g., face, body) and find out the sex of the baby earlier. These changes can impact the development and quality of the maternal-fetal attachment [29,30]. Some of these reasons may also explain why this study does not corroborate the Brazilian version [14].

Regarding the structural validity of the MFAS proposed in this study, the first factor corresponds to items 1, 11, 12, and 20. According to the theme of the items, this factor was named "empathy and caring". Items 1 and 20 represent a caring attitude of the mother towards the fetus, and items 11 and 12 indicate the mother's empathy towards the fetus. Factor 2 was composed of items 5, 8, and 18. The last two items belong to the factor "role-taking" in the original model, which was maintained in this study. These three items correspond to the "anticipation role-taking" factor in the German version [13]. In the Italian version, these three items also belong to the factor "future parental role-taking" [12]. Factor 3 was composed of items 7, 9, 17, 19, and 24. Like most items, except 9 and 19, these belong to the subscale "interaction with the fetus" of the original scale [10] and remained with the same name. Items 9 ("I can almost guess what my baby's personality will be from the way they move around") and 19 ("I try to picture what my baby will look like") can also be associated with behaviors of interaction between mother and fetus.

Table 5

Hypothesis test: association between sociodemographic characteristics, social support, pregnancy intention, and depression symptoms with mother-fetus bond measured by *Maternal-Fetal Attachment Scale* (MFAS).

	MFAS	
	β	**p-value**
Marital status	-0.936	**0.026**
Social support (MOS)	0.071	**< 0.001**
Intention of pregnancy	-1.210	**< 0.001**
Satisfaction with pregnancy	-1.592	**< 0.001**
Symptoms of depression in pregnancy (EPDS)	-0.136	**0.007**

β: regression coefficient obtained from generalized linear model (gamma); EPDS: *Edinburg Postpartum Depression Scale*; MOS: *Medical Outcome Study Scale*.

Note: in bold, p-value < 0.05.

Furthermore, item 11 ("I do things to try to stay healthy that I would not do if I were not pregnant") showed the lowest factorial load in the CFA. This may indicate that taking care of health during pregnancy in the perception of women is motivated more by a certain kind of self-love (taking care of herself) than by the attachment to the baby. Although pregnancy is seen as a time when women are more willing to change their habits and adopt the role of the "good mother" [31], findings reveal that pregnancy is a time when women think about themselves and their own needs, rather than exclusively focusing on those of their unborn child. The adoption of healthier behaviors during pregnancy is strongly influenced by socioeconomic conditions, which may explain the poor performance of item 11 in the study population. However, for a better understanding of behavioral changes, it is necessary to consider the myriad of internal and external factors that may affect women's motivation [32].

Regarding reliability, the convergent validity of the third factor presented regular assessment due to the inadequate AVE value. However, the CR was regular and their items obtained a factorial load above 0.45. These two last parameters corroborate the regular convergent validity [26], which is not adequate/ideal. Consequently, it is discouraged to use this factor separately from the rest of the instrument. Factor 1 also obtained a regular AVE value; however, its CR showed adequate reliability, indicating that this factor may have acceptable convergent validity.

Discriminant validity was more problematic between factors 1 and 3. One of the explanations for this problem is that factor 1 has two items from Cranley's original dimension of "interaction with the fetus" [10]. Thus, these two factors showed more problematic/regular discriminant validity. Therefore, there is marginal theoretical convergence between these two factors. Factor 2 presented adequate convergent and discriminant validity.

As the literature indicates, MFAS scores are consistently related to other constructs about hypothesis testing. The association between the MFAS scale with social support is reported in studies that show that social support is an essential factor in developing the mother-fetus attachment [2,33]. Similarly, living with a partner increases the quality of the bond, thus having a partner may represent a higher perception of social support. Therefore, these results reinforce the importance of the social support to childbearing women. The intention of pregnancy and satisfaction with pregnancy were factors associated with higher levels of maternal-fetal attachment. We found a negative association between MFAS scores and symptoms of depression, mothers with depression were associated with lower levels of maternal-fetal attachment [2,34].

This study has some limitations that may have influenced the results. The study was conducted in a low-income population, showing little socioeconomic variability, which may have influenced the item variances. The scale was applied in an interview format, face to face, which may increase the bias of social acceptability, thus women answered to the items with less reliability. Moreover, due to the sample size, we could not confirm or execute the CFA of the structural model obtained by the ESEMs with a distinct sample. Future studies confirming the structural model using a distinct sample from the one used in the exploratory phase are necessary.

Despite the limitations, this study showed that the 12-item short version of the Brazilian MFAS instrument seems to be a reliable and valid instrument to measure maternal-fetal attachment in Brazil. In this way, MFAS can be used in clinical care and scientific research, enabling their expansion and the screening of maternal-fetal bonding problems during prenatal consultations. Therefore, monitoring and strengthening the mother's bond with her baby during the prenatal period effectively reduces bonding problems after birth.

Contributors

M. L. Baldisserotto contributed to the study design, data analysis and interpretation, writing, and review; and approved the final version, being responsible for all aspects of the work in ensuring the accuracy and completeness of any part of the study. M. M. Theme Filha contributed to the study design, data interpretation, writing, and review; and approved the final version, being responsible for all aspects of the work in ensuring the accuracy and completeness of any part of the study.

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Resumo

O objetivo deste estudo foi atualizar a avaliação da validade de construto e confiabilidade da versão brasileira da Escala de Apego Materno-Fetal *(MFAS). Esta pesquisa faz parte de um estudo de coorte, no qual o instrumento foi aplicado a 415 gestantes. A estrutura fatorial foi verificada por meio de modelos de equações estruturais e o índice de ajuste comparativo (CFI), o índice de Tucker-Lewis (TLI) e a raiz do erro quadrático médio de aproximação (RMSEA) foram utilizados para verificar o ajuste do modelo. Além disso, para testar a validade da MFAS com base em variáveis externas, foi utilizado um modelo linear generalizado para testar a associação entre variáveis obstétricas, suporte social e sintomas de depressão com a MFAS. A confiabilidade foi analisada por meio do coeficiente de confiabilidade composta (CC). A versão curta de 12 itens da MFAS brasileira apresentou parâmetros adequados de validade de construto (CFI = 0,969; TLI = 0,960; RMSEA = 0,032; IC90%: 0,012-0,048) e é composta por três fatores ("empatia e cuidado", "desempenhando um papel" e "interagindo com o feto") e 12 itens. Os escores totais da MFAS correlacionaram-se positivamente com o suporte social (p < 0,001) e negativamente com sintomas depressivos (p = 0,007). Além disso, as mulheres que vivem com um parceiro (p = 0,026) e tiveram a intenção de engravidar (p < 0,001) têm melhor vínculo. Em relação à confiabilidade, os fatores 1 e 2 apresentaram valores adequados (CC = 0,72 e CC = 0,82, respectivamente) e o fator 3, um valor regular (CC = 0,63). Esta versão curta de 12 itens da MFAS parece ser um instrumento confiável e válido para ser aplicado em pesquisa científica e assistência clínica no Brasil.*

Gestantes; Psicometria; Criança; Feto

Resumen

El objetivo de este estudio fue actualizar la evaluación de la validez de constructo y confiabilidad de la versión brasileña de la Escala de Apego Materno-Fetal *(MFAS). Esta investigación es parte de un estudio de cohorte, en el que el instrumento se aplicó a 415 mujeres embarazadas. La estructura factorial se verificó mediante modelos de ecuaciones estructurales y se utilizaron el índice de ajuste comparativo (CFI), el índice de Tucker-Lewis (TLI) y la raíz de error cuadrado medio (RMSE) para verificar el ajuste del modelo. Además, para probar la validez de la MFAS en función de variables externas, utilizamos un modelo lineal generalizado para evaluar la asociación entre las variables obstétricas, el apoyo social y los síntomas de depresión con la MFAS. La confiabilidad se analizó mediante el coeficiente de confiabilidad compuesto (CC). La versión corta de 12 ítems de la MFAS brasileña presentó parámetros adecuados de validez de constructo (CFI = 0,969; TLI = 0,960; RMSE = 0,032; IC90%: 0,012-0,048) y está compuesta por tres factores ("empatía y cuidado", "toma de papeles" e "interacción con el feto") y 12 ítems. Las puntuaciones totales de MFAS se correlacionaron positivamente con el apoyo social (p < 0,001) y negativamente con los síntomas depresivos (p = 0,007). Además, las mujeres que viven con una pareja (p = 0,026) y tuvieron la intención de quedar embarazadas (p < 0,001) tienen un mejor vínculo. En relación con la confiabilidad, los factores 1 y 2 presentaron valores adecuados (CC = 0,72 y CC = 0,82, respectivamente) y el factor 3, un valor regular (CC = 0,63). Esta versión corta de 12 ítems del MFAS parece ser un instrumento fiable y válido para ser aplicado en la investigación científica y la atención clínica en Brasil.*

Mujeres Embarazadas; Psicometría; Niño; Feto

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