**Body Understanding Measure for Pregnancy Scale (BUMPS): Cross-cultural adaptation and psychometric properties among Brazilian pregnant women**

Eduardo Borba Salzera, Juliana Fernandes Filgueiras Meirelesb, Elizabeth Kirkc, Catherine E. J. Prestond, Débora Antonietta Vasconcelos e Sáe , Clara Mockdece Nevesa\*.

a Federal University of Juiz de Fora, Faculty of Physical Education and Sports. Juiz de Fora, Brazil.

b University of Oklahoma, Department of Family and Community Medicine, Tulsa, USA.

c Anglia Ruskin University, Science Centre, Cambridge, UK.

d University of York, Heslington, York, UK.

e Anglia Ruskin University, School of Psychology and Sport Science, Cambridge, UK.

\* Correspondence to: Faculty of Physical Education and Sports, Federal University of Juiz de Fora, Marmelos, Juiz de Fora, Brazil. E-mail address: claramockdece.neves@ufjf.br

Abstract

The Body Understanding Measure for Pregnancy Scale (BUMPs) is a scale developed and validated for British pregnant women to assess body satisfaction during pregnancy. The aim of this study was to perform a cross-cultural adaptation and verify the psychometric properties of BUMPs for Brazilian adult pregnant women. The cross-cultural adaptation was performed using translation, back-translation, expert committee, expert analysis, and pre-testing, which showed easy comprehension by pregnant women. Psychometric analyses were evaluated in a sample of 618 pregnant women (31.08 ± 4.94 years old). Exploratory and confirmatory factor analyses resulted in 19 items and three factors, with satisfactory fit indices. BUMPs presented an invariant measurement across white vs. nonwhite women and across the three gestational trimesters. BUMPs showed good indicators of convergent, internal consistency, and test-retest reproducibility validity. It was concluded that the Brazilian version of BUMPs has adequate psychometric properties for Brazilian pregnant women, being an excellent instrument for analyzing body satisfaction in this population, facilitating additional investigations into these constructs.

*Keywords:* body image; body satisfaction; pregnant women; cross-validation; psychometrics.

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1. **Introduction**

Pregnancy is a complex and significant moment in a woman's life, bringing with it substantial biopsychosocial changes in a short period of time (Skouteris, 2011). Weight gain and an increase in body size are expected and considered healthy during pregnancy (Skouteris et al., 2005), but they challenge social standards of female body appearance, which can impact the body image of pregnant woman (Linde et al., 2022). Negative body image during pregnancy is linked with negative consequences, such as anxiety and depression (Solorzano et al., 2022), unhealthy eating patterns (Bergmeir et al., 2020), low birth weight (Brown et al., 2015), postpartum depression (Linde et al., 2022), and breastfeeding problems (Brown et al., 2015). Therefore, it is vital to promote a positive body image during the gestational period (Meireles et al., 2021; Watson et al., 2015).

Positive body image is a complex and multifaceted construct, distinct from a negative body image (Tylka & Wood-Barcalow, 2015). Body satisfaction is a crucial aspect of positive body image, capable of playing a significant role in the health and emotional well-being of pregnant individuals, influenced by social and cultural factors (Tylka & Wood-Barcalow, 2015; Wood-Barcalow et al., 2010). While negative body image is related to dissatisfaction and wanting one’s body to be different, positive body image refers to the ability to accept and value one's body for what it is, regardless of its size, shape, or appearance (Wood-Barcalow et al., 2010). Linde et al. (2022) point out that pregnant women are more likely to reflect on their body image and reassess their appearance-related values as their bodies undergo changes.

The adjustment of body image during this period is a challenge and is dependent on the importance attributed to pre-pregnancy body image, the ideals and values of body image during this period, and the expectations women have regarding bodily changes throughout pregnancy and postpartum (Watson et al., 2015). However, despite the importance of positive body image during pregnancy, research has mainly focused on body dissatisfaction (Meireles et al., 2015b), making it crucial to delve deeper into positive pregnancy experiences (Meireles et al., 2018).

*1.1 Positive body image assessment during pregnancy*

Body image ideals adapt throughout pregnancy, with pregnant women experiencing both body satisfaction and dissatisfaction at different times, or even coexisting during pregnancy (Watson et al., 2015; Galea & Spiteri, 2020; Linde et al., 2022). The scientific literature still diverges regarding the body image of pregnant women (Meireles et al., 2015a; Crossland et al., 2023). On the one hand, some research points to pregnant women being satisfied with their bodies because they are liberated from social ideals at this time (Kirk; Preston, 2019; Clark et al., 2009; Skouteris et al., 2005), while on other hand studies indicate dissatisfaction with body image in this population specially due to the direct conflict with social ideas of female beauty (e.g. weight gain) (Crossland; Kirk; Preston, 2022; Erkaya; Karabulutlu; Çalik, 2018; Johnson; Burrows; Williamson, 2004). Kirk and Preston (2019) highlight that these discrepancies in qualitative research are because pregnancy is a unique and exclusive moment in each mother's life, and these emotions are experienced individually. Meireles et al. (2015a) point out the differences in research methods used and variation in sample sizes as possible causes for such divergences.

Several authors (Kirk; Preston, 2019; Sun et al., 2018; Meireles et al., 2017; 2015a) highlight that one of the major problems in research on body image during pregnancy is the scarcity of valid and standardized measures, as most studies use instruments adapted for non-pregnant individuals. When it comes to instruments for assessing positive body image during pregnancy, research is still limited. A systematic review conducted by Salzer et al. (2023) identified a lack of assessment tools for positive body image during pregnancy. One potential option for this assessment is the Self-Acceptance Scale for Pregnant Women (SAS-PW), developed for Brazilian pregnant women, which measures self-acceptance (Meireles et al., 2021). The Body Understanding Measure for Pregnancy Scale (BUMPs) is a second available option that assesses positive body image during pregnancy, specifically body satisfaction (Kirk & Preston, 2019).

Thompson (2004) and Swami and Barron (2019) suggest that for a comprehensive assessment of body image, it is necessary to correctly specify the domain of the construct intended to be evaluated, as well as to use multiple instruments, given that body image is multidimensional. In the Brazilian context, a systematic review conducted by Salzer et al. (2023) has highlighted the limited availability of instruments designed for assessing body image during pregnancy. Specifically, only two instruments have been identified: the Body Image in Pregnancy Scale (BIPS) by Oliveira et al. (2020) and the SAS-PW by Meireles et al. (2021). Given this scarcity, the validation of additional tools to evaluate body image in this population becomes imperative. In this context, the BUMPs scale stands out as a pioneering instrument explicitly tailored for assessing body satisfaction in pregnant individuals. Recognizing the significance of diverse assessment tools for a comprehensive understanding, we encourage the cross-cultural adaptation and psychometrics evaluation of the BUMPs scale for the Brazilian context.

*1.2 A Body Understanding Measure for Pregnancy Scale*

The BUMPs scale was originally developed by Kirk and Preston (2019) for adult pregnant women from England, regardless of gestational period, with the aim of assessing body satisfaction during pregnancy. It is a 19-item instrument with a five-point Likert scale response format, and respondents base their answers on their feelings over the past two weeks. A lower total score on the instrument indicates higher body satisfaction. In its original version, the scale demonstrated good internal consistency for both the total scale (α .90 [CI .88, .92] and ω .90 [CI .88, .92]), as well as its three factors: Satisfaction with appearing pregnant (α .85 [CI .82, .88] and ω .85 [CI .83, .88]), Weight gain concerns (α .84 [CI .81, .87] and ω .84 [CI .81, .87]), and Physical burdens of pregnancy (α .74 [CI .68, .80] and ω .75 [CI .70, .81]). The original version of BUMPs showed a significant negative correlation with measures of body satisfaction (r = -.48), maternal-fetal attachment (r = -.44), marital quality (r = -.24), and interoceptive sensibility (r = -.46). Additionally, it was found to have a significant positive correlation with anxiety (r = .40) and depression (r = .55). Furthermore, the original scale also demonstrated good test-retest reliability over a two-week period (rBUMPsTotal = .91; rappearence = .93; rweight = .88; rphysical = .78).

The BUMPs scale is the only instrument that assesses body satisfaction during pregnancy and is currently available for Turkish (Satir & Hazar, 2021) and Chinese (Wu et al., 2022) adult pregnant women. These validation studies support the psychometric properties in terms of reliability; however, the factorial structure of the original study was not the same. The Turkish version consisted of a total of 17 items and two subscales, different from the original scale: Satisfaction with appearing pregnant (α = .87) and Weight gain concerns and physical difficulties (α .77), showing good test-retest reliability (r = 0.82, p < 0.05), as well as a significant negative correlation between the Body Cathexis Scale and BUMPs and its subscales (Satir & Hazar, 2021). The Chinese version included a total of 16 items and four subscales: Appearance focus (α .85 and ω .86), Weight gain concerns (α .60 and ω .60), Physical burdens of pregnancy (α .52 and ω .56), and Feelings about physical changes (α .76 and ω .77). It demonstrates good test-retest reliability (r = .80 p < .001) and positive and significant correlations with pre-pregnancy body mass index (BMI), gestational BMI, and current weight gain (Wu et al., 2022). Despite the limited number of instrument validation studies, the inconsistency in the factorial structure of the instrument is observed, which could be related to the various psychometric tests used or sociocultural differences.

*1.3 The present study*

In the Brazilian context, societal expectations regarding the physical appearance of women are deeply ingrained, with a strong emphasis on valuing a slim, fat-free body as a symbol of social status (Hudson et al., 2023). Brazilian population glorifies the body, and this cultural inclination is further influenced by the tropical climate, exposing individuals more physically (Goldenberg, 2010; Hudson et al., 2023). Nearly 9% of global plastic surgeries were conducted in Brazil, according to the International Society of Aesthetic Plastic Surgery (2022), positioning the country as the second-largest contributor to aesthetic and cosmetic procedures worldwide. These findings emphasize the unique landscape of body image expectations and concerns for Brazilian women (Laus et al., 2014). Given the prevalent emphasis on body aesthetics in Brazil and the transformative changes in shape and weight during pregnancy that deviate from the culturally idealized body, the body image of Brazilian pregnant women deserves attention from researchers and health professional (Meireles et al., 2016; Meireles et al., 2020). This emphasis is crucial not only for the preservation of their mental health but also to enhance the overall positive experience of pregnancy for these women.

As there is currently no instrument available to assess body satisfaction among Brazilian pregnant women, the objective of this study is to culturally adapt and examine the psychometric properties of the BUMPs scale for adult pregnant women in Brazil. The guidelines for validation and cross-cultural adaptation of body image measures were followed (Swami & Barron, 2019; Swami et al., 2021). The original factorial structure was examined through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), expecting a good fit to the original model. The measurement invariance test was conducted for white vs. non-white women and for the three gestational trimesters. It was expected that equivalence would be found between these subgroups.

Convergent validity was assessed by correlating the BUMPs scale and its factors with measures of body mass index (BMI), self-acceptance, negative aspects of body image, interoceptive sensibility, maternal-fetal attachment, marital quality, anxiety, and depression. Prior studies have demonstrated the importance of correlating a body image measure with other measures of the same construct (Swami & Barron, 2019; Swami et al., 2021). For this reason, we evaluated the convergent validity of the BUMPs by examining its correlation with self-acceptance and negative aspects of body image (Kirk & Preston, 2019). The existing scientific literature recognizes the association between BMI and body image, including evidence in pregnant populations (Kirk & Preston, 2019; Meireles et al., 2021; Meireles et al., 2015b; Watson et al., 2015). Furthermore, in parallel to the original version, we also investigate the convergent validity of the BUMPs by correlating it with interoceptive sensibility, maternal-fetal attachment, marital quality, depressive symptoms, and anxiety (Kirk & Preston, 2019). It was hypothesized that the BUMPs scale would be positively correlated with BMI, negative aspects of body image, anxiety, and depression, and negatively correlated with self-acceptance, marital satisfaction, interoceptive sensibility, and maternal-fetal attachment.

**2. Methods**

In this study, the BUMPs was transculturally adapted and its psychometric properties were evaluated (EFA, CFA, convergent validity, and reliability). The factorial structure of the adapted version of BUMPs for Brazilian adult pregnant women was evaluated through EFA and CFA. Next, convergent validity checked for possible correlations with other instruments that assess theoretically interconnected constructs. The reliability of the scale was tested through two strategies: internal consistency (Swami & Barron, 2019) and temporal stability through a two-week test-retest, similarly to the original study (Kirk & Preston, 2019) as well as Turkish (Satir & Hazar, 2021) and Chinese (Wu et al., 2022) versions.

*2.1 Participants*

We calculated our needed participant sample size following recommendations from Morgado et al. (2017), considering the appropriate number to be from 5–10 participants for each item of the instrument for the EFA and from 5–10 different participants for the CFA. Thus, adding further participants to accommodate a possible 20% loss due to attrition, we estimated a need for total of 456 pregnant women.

A total 1613 pregnant women initiated participation in the survey. Among this group, 681 adult pregnant women (M = 31.08 ± 4.94 years old) completed the BUMPs in its entirety and were considered the sample for this study. Out of this total, 77 (11,3%), 254 (37,3%), and 350 (51,4%) were in their first, second, and third gestational trimesters, respectively. The majority of whom self-reported as White (64,6%; n = 440), had a normal weight (42.9%; n = 292), had completed higher education (36.1%; n = 246), were married (94.6%; n = 644), were primiparous (72%; n = 490), had low gestational risk (84.3%; n = 574), had a good relationship with the baby's father (98.4%; n = 670), had family support (97.1%; n = 661), and belonged to the B2 socioeconomic class (39.5%; n = 269).

*2.2 Instruments*

*2.2.1 Body Understanding Measure for Pregnancy Scale (BUMPs).* The BUMPs measures a positive characteristic of body image called body satisfaction. For this purpose, the original version of the BUMPs, created in England (Kirk & Preston, 2019), was transculturally adapted to be applied to Brazilian pregnant women. The original questionnaire consists of 19 items, on a Likert scale with responses ranging from one (totally disagree) to five (totally agree), with the total sum of each item being the total score of the scale. It is worth noting that items 1, 4, 6, 8, 10, 11, 15, and 19 should be reverse scored. The lower the scores, the higher the level of body satisfaction. For this study, the authors followed the recommended guidelines for instrument translation (Beaton et al., 2000; Guilhemin et al., 1993; Swami & Barron, 2019).

The process of instrument translation and back-translation was carried out by two native Portuguese translators and two native English translators, respectively. After translation and back-translation, the authors of the original article and three experts in the areas of body image and psychometrics evaluated the preliminary version in an expert committee (Swami & Baron, 2019). The title, instructions for filling out, sub-scale names, and items 1, 4, 9, 10, and 15 underwent changes to culturally adapt the instrument to the Brazilian reality. The decision was made to change the title from "Escala de Compreensão de Medidas do Corpo na Gravidez" to "Escala de Medida de Compreensão do Corpo na Gravidez." In the questionnaire instructions, the word "indique" was replaced with "assinale" and the expressions "o quanto você concorda" and "nos seus sentimentos das" were respectively substituted with "seu grau de concordância" and "no que sentiu durante". Regarding the items 1, 4, and 9, the expressions "sobre meu corpo em transformação" and "mudanças do meu corpo" were modified to "com as mudanças que estão ocorrendo no meu corpo." As for item 10, the change was made from "Eu fico bonita grávida" to "Eu gosto de me ver grávida". The item 15 altered the beginning of the sentence from "Gostei" to "Eu estou gostando." The titles of the subscale underwent changes, with the words "aparentar" and "ganho" replaced by "aparência" and "aumento". All these mentioned changes aimed to better addressed to the most common linguistic structure and words in Brazilian Portuguese.

Subsequently, the adequacy of the items was analyzed by 10 judges for evaluation of the instrument in terms of idiomatic, semantic, cultural, and conceptual equivalences, as suggested by Guillemin et al. (1993), adopting an agreement index of above 80% as adequate. In order to enhance understanding for the readers, adjustments were made to certain items based on the judges’ feedback. For instance, on item 2, the expression “fazer tanto fisicamente quanto eu podia antes de engravidar” was changed to “ser tão fisicamente ativa como era antes de engravidar.” Similarly, item 5, originally “a quantidade de comida que eu como e com os efeitos que isso pode causar em minha aparência,” was revised to “a quantidade que estou comendo e com os efeitos que isso tem na minha aparência.” Item 7 underwent a modification from “minha silhueta depois da gravidez” to “minha forma física após a gravidez,” and item 10 changed from “gosto de me ver” to “gosto da minha aparência.” Additionally, the decision was made to rearrange the sentences in items 3 and 17, expressing the feeling before the comparison criterion as this is a more common sentence structure in Brazil. For example, item 3, originally “Quando comparo a forma do meu corpo com a de outras grávidas, eu me sinto insatisfeita com a minha própria” was altered to “Eu me sinto insatisfeita com a forma do meu corpo quando a comparo com a de outras grávidas.” Furthermore, words were substituted in items 9, 12, and 13 for better comprehension, with “incômodo” becoming “chateada”, “acho difícil” changing to “tenho dificuldade” and “excess” being replaced by “acima do”. Table 1 shows detailed information about the cross-cultural adaptation of BUMPs.

In summary, the cross-cultural adaptation process involved thorough adjustments to the instrument to ensure cultural and linguistic relevance for Brazilian Portuguese speakers. Notably, modifications were made to the title, instructions, subscale names, and specific items of the instrument to align with Brazilian linguistic conventions and cultural nuances. For instance, changes included altering expressions to enhance clarity and comprehension, adjusting sentence structures to match common linguistic patterns in Brazilian Portuguese, and substituting words to improve relevance and understanding. Overall, the adaptations aimed to optimize the instrument's relevance and applicability to the Brazilian context.

\*\*Add table 1 near here\*\*

The obtained version was submitted to a pilot test, which was conducted with 22 pregnant women through an online questionnaire, and 10 pregnant women were individually interviewed online. The objective of the pilot test was to analyze the comprehension of the target population regarding each item on the questionnaire. For this stage, the criterion of analyzing responses with a value above 80% comprehension of the item was adopted. The results showed comprehension values above 80% for all items, with values ranging from 95.5% to 100% comprehension, and therefore, no modifications were suggested.

For the present study, the instrument showed good internal consistency (α .76 [CI = .73, .78] and ω .78 [CI = .763, .80]).

*2.2.2 Self-Acceptance for Pregnant Women (SAS-PW).* The SAS-PW measures a positive aspect of body image called self-acceptance. The SAS-PW was created and validated by Meireles et al. (2021) for Brazilian pregnant women. The questionnaire consists of 10 items and two subscales: Body Acceptance and Pregnancy Acceptance. Scores range from one (never) to 5 (always), with the sum of points representing the total scale score. The higher the total score, the greater the self-acceptance of pregnancy. For the present study, the instrument showed good internal consistency (α = .94).

*2.2.3 Body Image in Pregnancy Scale (BIPS).* To evaluate the negative aspects of body image during pregnancy, the Body Image in Pregnancy Scale (BIPS) was used, originally developed by Watson et al. (2017) and adapted for Brazil by de Oliveira et al. (2020). The Brazilian questionnaire consists of 35 items, on a Likert-type scale, divided into 6 subscales: Preoccupation with physical appearance (BIPS PAA); Dissatisfaction with strength-related aspects of one’s body (BIPS DSB); Dissatisfaction with complexion (BIPS DCO); Attractiveness (BIPS ATT); Prioritization of appearance over function (BIPS PAF); and Dissatisfaction with body parts (BIPS DBP). Responses range from one (strongly disagree) to five (strongly agree). The higher the scores, the higher negative body image aspects index. For the present study, the instrument showed good internal consistency (α = .91).

*2.2.4 Hospital Anxiety and Depression Scale (HADS).* To assess the degree of anxiety and depression, the Hospital Anxiety and Depression Scale (HADS) was applied, which was translated and validated for Brazil by Botega et al. (1995). The questionnaire consists of 14 items, varying from 0 to three points. The total score ranges from 0 to 21 points and the severity of the symptoms are divided into their subscales: anxiety (HADS A) and depression (HADS D). For both, the grading varies from zero (absence of anxiety or depression) to four (severe anxiety or depression). For the present study, the instrument and its subscales presented good internal consistency (α = .82).

*2.2.5 Interoceptive awareness, prenatal attachment, and relationship quality.* In the original BUMPs study, Kirk & Preston (2019) included scales that evaluated interoceptive sensibility (thoughts and interpretations of internal bodily signals), prenatal attachment, and *relationship* quality. However, as there are no valid instruments for the Brazilian population that assess these aspects, we evaluated these constructs using the following direct questions: “Are you able to perceive your internal bodily sensations throughout your day (such as baby movements, sensations of pain and discomfort, changes in breathing, tension, etc.)?”; “When I think about the baby inside me, do I see myself talking/interacting with him/her?”; “Are you satisfied with your marital relationship?”. Participants responded on a five-response option scale ranging from one (never) to five (always), with higher scores indicating greater interoceptive sensibility, prenatal attachment, and marital quality, respectively.

*2.2.6 Sociodemographic Questionnaire.* The sociodemographic questionnaire was developed by the authors themselves to collect data on age, gestational period, weight, height, ethnicity, education, marital status, pregnancy planning, gestational risk, number of children, relationship with the baby's father, and family support for sample description. The weight and height data were used to calculate the BMI.

*2.2.7* *Brazilian Economic Classification Criteria.* The socioeconomic status was obtained through the “New Brazilian Economic Classification Criteria” (ABEP, 2020). This instrument uses a survey of household characteristics (presence and quantity of some household items and level of education) to differentiate the population. The criteria assign points based on each characteristic and add up the scores, ranging from 0 to 100. The classification is given by: A (100-45 points; average monthly income: $4789.48 USD); B1 (44-38 points; $2198.51 USD); B2 (37-29 points; $1178.95 USD); C1 (28-23 points; $641.45 USD); C2 (22-17 points $380.74 USD); D/E (16-0 points; $171.52 USD). The average monthly income was calculated by converting Brazilian currency to American dollars using the exchange rate as of July 27, 2023.

*2.3 Procedures*

This study complied with all ethical protocols and was approved by the Ethics Committee in Research of the Federal University of Juiz de Fora (*Universidade Federal de Juiz de Fora - UFJF*, protocol number 034443/21). All participants signed a consent form agreeing to voluntary participation in the study and did not receive any incentive/remuneration. Data collection was conducted online through the Qualtrics Research Suite software, between the months of May and June 2022. Participants were recruited through social media (Instagram and Facebook) and snowball sampling method. The inclusion criteria were as follows: adult pregnant women (aged 18 years or older), who could read and write and agreed to participate voluntarily in the research. Those who did not complete the BUMPs in its entirety were excluded.

*2.4 Statistical analyses*

For the analysis of means and correlations, the Statistical Package for the Social Sciences (SPSS), version 21, was used, while Jeffreys's Amazing Statistics Program (JASP), version 0.16.3 (2022), was adopted for factor analyses. In all cases, the level of significance adopted was p < .05.

The sample was randomly divided in half using a random number generator. The first half was used in the EFA and the second half was used in the CFA (Swami & Baron, 2019; 2021). It is crucial to conduct EFA and CFA on separate, adequately-sized samples to avoid bias and ensure the validity of results at each stage (Fokkema & Greiff, 2017; Swami & Baron, 2021).

*2.4.1 Descriptive analyses.*

Descriptive analyses were performed for continuous variables (mean and standard deviation) and categorical variables (frequencies). Skewness (with an absolute value less than 3) and kurtosis (with an absolute value less than 10) were also analyzed to assess the normality of the data (Kline, 2014). All analyses were conducted using the SPSS software.

*2.4.2 Exploratory factor analysis.*

EFA was used to detect the number of factors necessary for a better representation of the data. The Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were used, with recommended values of KMO tests above .80 and significant Bartlett's sphericity (p ≤ .05) (Hair et al., 2009). Items with a factor loading of .40 or greater were considered to belong to a specific factor (Hair et al., 2009). As there were no cross-loadings above .40, no treatment technique was performed. For data extraction, the principal axis factoring estimation method and Promax oblique rotation method were chosen. For the factor retention analysis, the Eigenvalue > 1 value was analyzed in conjunction with the results of parallel analysis and Scree plot. The accumulated variance of the final structure was also analyzed.

*2.4.3 Confirmatory factor analysis.*

To confirm or refute the structure, a CFA was conducted. For this purpose, model fit indices were analyzed, using the values proposed by Hair et al. (2009) as a reference: chi-square test (χ²) corrected by degrees of freedom < 3, Goodness of Fit Index (GFI) > .9, Root Mean Square Residuals (RMSR) < .08, Comparative Fit Index (CFI) > .95, Tucker Lewis Index (TLI) > .95, and Root Mean Square Error of Approximation (RMSEA) < .06 (90% CI; p-value). MPlus was used for factor confirmation, using the Diagonally Weighted Least Squares (DWLS) estimation method with Bootstrap sample (1000). DWLS method was deemed appropriate as it accounts for the ordinal nature of the measure.

*2.4.4 Measurement Invariance*

The BUMPs measurement invariance test was conducted for white vs. non-white women and for the three groups of gestational trimesters. Analyses were conducted to test whether women score differently on the BUMPs depending on the progress of their pregnancy and on the race/ethnicity differences. Measurement invariance was assessed at the configurational level (i.e., the number of factors and loading patterns are the same across groups), metric level (i.e., all factor loadings are the same across groups), and scalar level (i.e., all intercepts are equal between groups) (Cheung & Rensvold, 2002). Several criteria were evaluated, including χ2 difference tests and changes in CFI and RMSEA upon adding additional invariance constraints (Vandenberg & Lance, 2000). A significant change in the χ2 value at p < .05 indicates non-invariance, while a CFI difference of 0.01 or less and RMSEA differences of 0.015 or less indicate a lack of measurement variance (Chen, 2007).

*2.4.5 Convergent validity, internal consistency, and reliability*.

Convergent validity was assessed by Pearson correlation between BUMPs and six other assessment instruments for pregnant women, in addition to body mass index (BMI). Adequacy was considered with a significance level of p < .05. For the magnitude of the relationship, the reference values of Dancey and Reidy (2018) were adopted: 0 = “no relationship”; values less than or equal to 0.3 = “weak”; values between 0.4 and 0.6 = “moderate”; values between 0.7 and 0.9 = “strong”; one = “perfect”.

The reliability of the scale as a whole and its subscales was calculated through internal consistency, adopting reference values of Cronbach's α above .70 (Hair et al., 2009) and McDonald's ω between .70 and .90 (Viladrich et al., 2017) as appropriate. In addition, the temporal stability was analyzed by Pearson correlation between two distinct moments and through paired-samples t-test (Pasquali, 2009).

**3. Results**

*3.1. Exploratory Factor Analysis*

The EFA was conducted on the first subsample (n = 341). The results (KMO = .905 and χ² = 2614.425; p < .001) indicated that the data were suitable for analysis. Skewness and kurtosis were inspected, and the data indicated a symmetrical sample, with skewness values ranging from .006 to 1.47 and kurtosis values ranging from -.370 to 1.19.

Considering the Eigenvalue > 1 criterion, the results indicated a four-factor structure. However, both the findings from parallel analysis and the Scree plot pointed to a three-factor structure, closely resembling the original scale. Regarding the questionnaire items, all of them exhibited sufficient factor loadings (Hair et al., 2009) on their respective factors, except for item 14 (λ = .343 – .880), confirming the three-factor scale with 19 items. It was decided to retain item 14 for the CFA, since its exclusion did not result in an increase in the explained variance of the scale and replicated the original structure of the scale, with 19 items and 3 factors.

Therefore, a three-factor structure with 19 items was retained by the EFA, explaining a total of 45.1% of cumulative variance, allocated as follows: Factor one - **Satisfaction with appearing pregnant**: items 1, 4, 6, 8, 10, 11, 15, and 19; Factor two - **Weight gain concerns**: items 3, 5, 7, 9, 13, 14, 16, and 17; Factor three - **Physical burdens of pregnancy**: items 2, 12, and 18, as observed in Table 2.

\*\*Add table 2 near here\*\*

*3.2 Confirmatory Factor Analysis*

In order to estimate the model identified in the EFA, a CFA was conducted on the second subsample (n = 340). Good model fit was found based on the following indicators: χ²/df = 1.91; CFI = .97; TLI = .97; GFI = .98; RMSEA = 0.05 (90% CI = .043-.061; p = .356); and SRMR = .06.

*3.3 Invariance analysis*

A multigroup CFA was conducted to examine whether the factorial structure of the BUMPs scale was equivalent for white vs. non-white women and for the three gestational trimesters. Configural, metric, and scalar invariance were tested and demonstrated a good data fit, as presented in Table 3.

\*\*Add table 3 near here\*

*3.4 Convergent Validity*

Convergent validity was assessed, considering the total sample, by conducting Pearson correlation tests between BUMPs and its subscales with the following constructs: BMI, marital satisfaction, pre-natal attachment, interoceptive sensibility, body acceptance, negative aspects of body image, anxiety, and depression. Table 4 presents all the correlation results between BUMPs, its subscales, and the variables of interest. The hypotheses were confirmed, except for the relationship between BUMPs and interoceptive sensibility.

\*\*Add table 4 near here\*\*

*3.5 Stability*

BUMPs demonstrated satisfactory reliability values (α = .76 [CI = .73, .78]; ω = .78 [CI = .763, .80]). Similarly, the values for the subscales were adequate: Satisfaction with appearing pregnant (α = .837 and ω = .835; CIα = .809 – .862; CIω = .809 – .862); Weight gain concerns (α = .803 and ω = .807; CIα = .769 – .833; CIω = .776 – .838); Physical burdens of pregnancy (α = .776 and ω = .769; CIα = .722 – .809; CIω = .735 – .816).

Test-retest stability was evaluated with a sample of 28 pregnant women (M = 29.64 ± 9.48 years old). The correlation between the two time points, as well as the t-test, yielded satisfactory values, as presented in Table 5.

\*\*Add table 5 near here\*

**4. Discussion**

Pregnancy causes important biopsychosocial changes in a woman's life in a short period of time, leading her to reevaluate her body, which can trigger disorders affecting both her and the baby's health. BUMPs is the only instrument developed specifically for this population that evaluates body satisfaction (Salzer et al., 2023). It is essential to obtain and validate instruments that assess body image during pregnancy, as their appropriate use can track symptoms of possible disorders (Kirk & Preston, 2019; Meireles et al., 2015b; Salzer et al., 2023), which could serve as a screening tool for healthcare professionals directly engaged with this population. Due to the significance of the appearance of female bodies in the Brazilian context (Hudson et al., 2023), coupled with the scarcity of specific instruments for assessing body image in Brazilian pregnant women, the BUMPs presents an invaluable opportunity to expand the avenues for assessing and understanding body satisfaction. Its validation for Brazil contributes significantly to the scientific literature, broadening the potential for research on the subject.

Considering the association between body image and BMI and eating attitudes in Brazilian pregnant women (Meireles et al., 2016), gaining a deeper understanding of the woman's relationship with her own body during pregnancy can not only enhance maternal health management but also contribute to a more positive gestational experience. Therefore, BUMPs was cross-culturally adapted, and its psychometric qualities were evaluated for Brazilian adult pregnant women. The results demonstrated an instrument with adequate semantic, idiomatic, cultural, and conceptual equivalence, considered easy to understand, while maintaining the same meaning as the original instrument (Swami & Baron, 2019).

The three-factor structure (Satisfaction with appearing pregnant, Weight gain concerns, and Physical burdens of pregnancy) and 19 items are psychometrically robust, confirmed by both EFA and CFA, corroborating with the original article's structure (Kirk & Preston, 2019), apart from item 9, which, differently from the original scale, fell under the Weight gain concerns factor. However, the other validations of BUMPs presented different factorial structures. While Wu et al. (2022) resulted in a four-factor structure (Weight gain concerns, Focus on appearance, Feelings about physical changes, and Physical burdens of pregnancy) and 16 items for the Chinese version, Satir & Hazar (2021) found a two-factor structure (Weight gain concerns and physical difficulties and Satisfaction with appearing pregnant) and 17 items for the Turkish version.

Regarding the number of items, while the Chinese version excluded three items that presented factor loadings below 0.4 (Wu et al., 2022), the Turkish version excluded one item with a factor loading below 0.3 and one item that showed factor overlap (Satir & Hazar, 2021). However, for the Brazilian version, we decided to keep the item with a borderline factor loading of .385 as it did not significantly alter the variance explained by the scale. Thus, the total number of items was kept the same as in the original version, allowing for future comparisons with British women.

The divergences between the factor structures may have occurred due to the different statistical methods employed. While Kirk and Preston (2019) used the maximum likelihood estimation method, the Chinese (Wu et al., 2022) and Turkish (Satir & Hazar, 2021) versions used maximum variance orthogonal rotation, while the Brazilian version used Diagonally Weighted Least Squares. Another possible explanation for the divergences among the BUMPs adaptations could be cultural differences. While China is influenced by Eastern culture, and Turkey represents a blend of Eastern and Western influences, Brazil places a strong emphasis on body aspects within its culture, particularly highlighting physical appearance. This emphasis is also a reflection of the tropical climate, where bodies are more exposed (Goldenberg, 2010; Hudson et al., 2023). Beaton et al. (2000) point out that cross-cultural adaptation requires adjusting the instruments to different cultures, and therefore, the number of items and psychometric properties do not need to be the same. Thus, the results of the cross-cultural adaptation processes of BUMPs may present different body satisfaction evaluation structures according to each evaluated culture.

The measurement invariance conducted for the BUMPs, considering the three gestational periods (first, second, and third trimester) and the ethnic variable (white and non-white), revealed consistent results. Our findings suggest that the measure is robust and maintains its validity across different stages of gestation and among different ethnic groups. Kirk and Preston (2019) also performed invariance analysis, confirming that the scale is relevant for women across all three gestational trimesters. According to Cash and Smolak (2011), it is essential to understand ethnic differences in body image, so it is necessary to evaluate possible racial and cultural differences and factors that impact the health of pregnant women. The lack of disparities in scores between gestational trimesters and different ethnicities implies that BUMPs is an effective tool for assessing specific aspects related to pregnancy independently of these variables.

The BUMPs presented evidence of convergent validity in the studied population, obtaining significant associations with self-acceptance, negative aspects of body image, anxiety, depression, marital satisfaction, maternal-fetal attachment, and BMI. The results of the association between BUMPs and SAS-PW presented a moderate to strong negative correlation. In other words, the lower the total score values of BUMPs, the more satisfied the pregnant woman is with her body and, consequently, tends to have higher levels of self-acceptance (higher scores in SAS-PW). Meireles et al. (2021) and Fahami et al. (2018) studies had already shown that pregnant women with higher levels of self-acceptance also showed elevated body satisfaction. These results indicate the convergent validity of the BUMPs.

When relating the BUMPs to the BIPS, a weak to moderate positive correlation was found between total BUMPs, “Satisfaction with appearing pregnant”, “Weight gain concerns”, and “Physical burdens of pregnancy” and all the BIPS subscales. Thus, it is understood that the higher the scores of the BUMPs, the higher the scores of the BIPS subscales tend to be. It is worth noting that, although the BUMPs is a measure that evaluates body satisfaction, the interpretation of its total score indicates that the lower the score, the greater the body satisfaction of the pregnant woman. Kirk and Preston (2019) and Satir and Hazar (2021) also found the convergent validity of the BUMPs with instruments that evaluate body image with satisfactory results in English and Turkish pregnant women, respectively. Therefore, these results are another indication of the convergent validity of the Brazilian version of the BUMPs.

As in the original version (Kirk & Preston, 2019), the Brazilian version of BUMPs showed a positive correlation with HADS and its sub-scales. Similarly, the findings of Fahami et al. (2018) corroborate those of this study, where pregnant women with higher body satisfaction showed greater psychological well-being. In line with this, Meireles et al. (2017) and Solorzano et al. (2022) point out that pregnant women with symptoms of depression and anxiety have negative feelings about their bodies. Thus, the results of the present study show that body satisfaction assessed by BUMPs in Brazilian pregnant women is correlated with anxiety and depression constructs in line with the previous literature.

Regarding marital satisfaction and prenatal attachment, satisfactory correlations were identified between the BUMPs, its sub-scales, and the two direct questions developed to evaluate these constructs. These findings corroborate with Kirk & Preston (2019) who found that pregnant women who were less satisfied with their bodies had lower marital satisfaction; while pregnant women with greater body satisfaction had a greater prenatal attachment. Positive antenatal attachment and a supportive marital relationship have an association with increased body satisfaction (Kirk & Preston, 2019). During pregnancy, given that the baby is located within the maternal body, creating a connection through sensations, it is plausible that feelings towards the body would be linked to the development of antenatal attachment. This relationship might indicate that the connection with the fetus aids in acceptance. However, it could also imply that negative experiences with pregnancy body changes may relate to the developing fetus and may thus inhibit or detract from the formation of stronger bonds and the marital relationship. It is essential to note that, as this is a cross-sectional study, we cannot definitively establish causation. It is worth noting that the validations of BUMPs for China (Wu et al., 2022) and Turkey (Satir & Hazar, 2021) did not perform this analysis.

Regarding gestational BMI, our results in Brazilian pregnant women showed a weak positive correlation with total BUMPs scores and the “Weight Gain Concerns” factor. While the original (Kirk & Preston, 2019) and Turkish (Satir & Hazar, 2021) versions of BUMPs did not conduct this analysis, the Chinese version supported our findings (Wu et al., 2022). The specialized literature has extensively demonstrated that BMI is related to negative body attitudes among pregnant women (Kamysheva et al., 2008; Meireles et al., 2015a; Meireles et al., 2016, Girão & Lima, 2021). Therefore, the results of this study corroborate previous studies, indicating a direct relationship between gestational BMI and body satisfaction scores, with lower gestational BMI being associated with greater satisfaction with one's body. Thus, once again, convergent validity is confirmed for the Brazilian version of BUMPs.

Subjective experience of interoceptive awareness was the only construct analyzed in the convergent validity that did not present a correlation with the BUMPs. Kirk & Preston (2019) elucidate that experiencing one's body as safe favors the acceptance of bodily changes during pregnancy, finding a moderate correlation between the BUMPs and interoceptive sensibility. Additionally, Behar et al. (2011), Todd et al. (2019), and Solorzano et al. (2022) also found a correlation between interoceptive sensibility and changes in body image. Conversely, Crossland et al. (2022) point out that the prevention of interoceptive signals varies during pregnancy and that current assessment measures are limited and may not be relevant to pregnancy. Therefore, based on Crossland et al. (2022) analysis, one should pay attention to the results related to interoceptive sensibility during pregnancy. Possibly, the results of this research did not show a correlation due to the fact that the evaluation of this construct was performed with a direct question, which may have underestimated or overestimated the results for interoceptive sensibility. This may have also been driven partly by the nature of the direct question being asked, which specifically referred to baby movements. Whilst movements of the fetus do come from inside the maternal body, they do not come *directly* from the maternal body. Therefore, although these sensations may have an effect on maternal interoception (e.g., compromising the size of the bladder), baby movements do not directly inform about physiological state of the mother and thus arguably may not be considered as true interoception (Crossland et al., 2022).

Regarding the analysis of reliability, both the complete scale and the subscales presented adequate internal consistency for the studied sample. Similar results were observed in the original (Kirk & Preston, 2019), Turkish (Satir & Hazar, 2021), and Chinese (Wu et al., 2022) versions. In addition, the findings of the present study showed adequate values for test-retest. Pregnancy is a time of substantial physical and psychological change with rapid developments of the fetus, and therefore the pregnant mother’s body, over a short period of time. A two-week period was judged as being an appropriate amount of time to capture stability during pregnancy, a period of inherent instability. The test-retest results are consistent with the findings of the scale creation article (Kirk & Preston, 2019), as well as its psychometric adaptations for other populations (Satir & Hazar, 2019; Wu et al., 2022). Therefore, the BUMPs showed adequate reliability through internal consistency and reproducibility.

The results of this study should be interpreted in light of its limitations. The first limitation was the data collection in a virtual environment, which may have influenced the sample profile. Online surveys tend to recruit participants with higher socioeconomic and educational levels, missing data from lower social classes (Morgado et al., 2017), like in the current sample. Future research could expand the knowledge about body satisfaction in low-income and lower-educated pregnant women. On the other hand, online research has benefits, such as facilitating the obtaining of a greater number of respondents and enabling coverage of almost the entire national territory.

As a second limitation, despite data being collected from all regions of Brazil, the emphasis was on the population of the Southeast region. Considering the territorial extension of Brazil, a country with continental dimensions, the difficulty in achieving proportionality among the five regions is highlighted. These data are very important for understanding the body satisfaction of pregnant women in a representative and heterogeneous sample of the Brazilian population. We recommend that future research endeavors in the field of body image in Brazilian pregnant women consider the inclusion of comprehensive sociodemographic and socioeconomic factors. Incorporating these elements into investigations can offer a more nuanced understanding of how diverse contextual factors may influence body satisfaction during pregnancy, contributing to a more comprehensive understanding of maternal well-being.

Thirdly, despite encompassing pregnant women across all trimesters, the study faced a smaller participant pool in the first trimester (n = 77). This limited sample size poses a potential challenge for measurement invariance tests, which could impact the robustness of the analyses. Contributing factors to this limitation include the inherent difficulty in data collection during early pregnancy, as many women only become aware of their pregnancy at later stages or may be hesitant to disclose it. It is known that women go through specific changes in each trimester of pregnancy, which can affect their physical and psychological aspects (Meireles et al., 2015a).

Fourthly, we recognize the absence of verification procedures for true human participation as a limitation of our study. However, our entire sample consisted of 100% volunteers that participate in the study without receiving any financial incentives, this may imply that the likelihood of fake responses is reduced. Another limitation stems from the sample size utilized in the retest. This limitation is consistent with the approach taken in the previous validation of BUMPs by Satir and Hazar (2021), which also employed a small sample size in the retest. Therefore, the reproducibility finding should be interpreted in light of the sample size included in the retest.

Finally, direct questions were used to assess maternal-fetal attachment, interoceptive sensibility, and marital satisfaction. The results may have been underestimated or overestimated. However, currently, there are no instruments available to assess these constructs in Brazilian pregnant women. It is worth noting that other validation studies have also used this approach to address key constructs for convergent validity (Kirk & Preston, 2019; Meireles et al., 2021; Talmon & Ginzburg, 2018).

The present study concludes that the Brazilian version of the BUMPs showed adequate factorial structure, internal consistency, and reproducibility for application in Brazilian adult pregnant women. Furthermore, BUMPs demonstrated adequate convergent validity with self-acceptance, negative aspects of body image, anxiety and depression, marital satisfaction, maternal-fetal attachment, and BMI. The Brazilian version of BUMPs consists of 19 items, divided into three subscales: Satisfaction with appearing pregnant, Weight gain concerns, and Physical burdens of pregnancy.

The relevance of obtaining the first specific body satisfaction assessment tool for Brazilian pregnant women should be highlighted. The validated measure has the potential to be used in healthcare settings by professionals to provide insight into pregnant women’s body satisfaction and to identify women who may be struggling and offer additional support. In addition to that, the validation of a scale capable of assessing body satisfaction in pregnant women allows for more comprehensive and robust research on the subject, contributing to advances in the literature.

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## **Declaration of Competing Interest**

None.

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**Table 1**

*Cross-cultural adaptation of the BUMPs.*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Original Version (English) | Translation Synthesis (Portuguese) | Back-translation Synthesis (English) | Experts Version (Portuguese) | Pretest Version (Portuguese) |
| *Title:* The Body Understanding Measure for Pregnancy Scale (BUMPs) | *Escala de Compreensão de Medidas do Corpo para Gravidez (BUMPs)* | Body Understanding Measure for Pregnancy Scale (BUMPs) | *Escala de Medida de Compreensão do Corpo para Gravidez (BUMPs)* | *Escala de Medida de Compreensão do Corpo na Gravidez (BUMPs)* |
| *Instruction:* Please read each statement and indicate on the 5-point scale the extent to which you agree. Please answer based on your feelings **during the last two weeks.** | *Por favor, leia cada afirmação e indique em uma escala de 5 pontos o quanto você concorda. Por favor, responda com base nos seus sentimentos das duas últimas semanas.* | Please read each statement and indicate on a 5-point scale how much you agree. Please respond based on your feelings in **the past two weeks** | *Por favor, leia cada afirmação e assinale na escala de 1 a 5 o seu grau de concordância com a mesma. Por favor, responda com base no que sentiu durante as duas últimas semanas.* | *Por favor, leia cada afirmação e assinale na escala de 1 a 5 o seu grau de concordância com a mesma. Por favor, responda com base no que você sentiu durante as duas últimas semanas.* |
| *Options:* Strongly Disagree, Somewhat disagree, Neither agree nor disagree, Somewhat agree, Strongly Agree | *Opções: Discordo totalmente, Discordo parcialmente, Não concordo nem discordo, Concordo parcialmente, Concordo totalmente* | Options: Strongly Disagree, Partially Disagree, Neither Agree Nor Disagree, Partially Agree, Strongly Disagree | *Opções: Discordo totalmente, Discordo parcialmente, Não concordo nem discordo, Concordo parcialmente, Concordo totalmente* | *Opções: Discordo totalmente, Discordo parcialmente, Não concordo nem discordo, Concordo parcialmente, Concordo totalmente* |
| 1. I feel good about my changing body | *1. Eu me sinto bem sobre meu corpo em transformação* | 1. I feel good about my changing body. | *1. Eu me sinto bem com as mudanças que estão ocorrendo no meu corpo* | *1. Eu me sinto bem com as mudanças que estão ocorrendo no meu corpo.* |
| 2. I get embarrassed that I can’t do as much physically as I could before I was pregnant | *2. Eu me sinto envergonhada por não conseguir fazer tanto fisicamente quanto eu podia antes de engravidar* | 2. I feel embarrassed for not being able to do as much physical activity as I could before getting pregnant. | *2. Eu fico constrangida por não conseguir fazer tanto fisicamente quanto eu podia antes de engravidar* | *2. Eu fico constrangida por não conseguir ser tão fisicamente ativa como era antes de engravidar.* |
| 3. When I compare the shape of my body to other pregnant women, I’m dissatisfied with my own | *3. Quando comparo a forma do meu corpo com a de outras mulheres grávidas, eu fico insatisfeita com a minha.* | 3. When I compare my body shape to those of other pregnant women, I feel unsatisfied with mine. | *3. Quando comparo a forma do meu corpo com a de outras grávidas, eu me sinto insatisfeita com a minha própria.* | *3.Eu me sinto insatisfeita com a forma do meu corpo quando a comparo com a de outras grávidas.* |
| 4. I enjoy taking photos of my changing body | *4. Gosto de tirar fotos das mudanças do meu corpo.* | 4. I like taking photos of the changes in my body. | *4. Eu gosto de tirar fotos das mudanças que estão ocorrendo no meu corpo.* | *4. Eu gosto de tirar fotos das mudanças que estão ocorrendo no meu corpo.* |
| 5. I am concerned about the amount that I am eating and the effect this has on my physical | *5. Eu estou preocupada com o quanto estou comendo e com os efeitos que isso pode causar em minha aparência.* | 5. I am concerned with how much I am eating and the effects this can have on my appearance | *5. Eu estou preocupada com a quantidade de comida que eu como e com os efeitos que isso pode causar em minha aparência.* | *5. Eu estou preocupada com a quantidade que estou comendo e com os efeitos que isso tem na minha aparência.* |
| 6. I like it when people comment on the size of my bump | *6. Gosto quando as pessoas comentam sobre o tamanho da minha barriga.* | 6. I like it when people comment on the size of my belly. | *6. Eu gosto quando as pessoas comentam sobre o tamanho da minha barriga.* | *6. Eu gosto de quando as pessoas comentam sobre o tamanho da minha barriga.* |
| 7. I worry about getting my figure back after pregnancy | *7. Eu me preocupo em ter meu corpo de volta após a gravidez.* | 7. I worry about getting my body back after pregnancy. | *7. Eu me preocupo em como vou recuperar minha silhueta depois da gravidez* | *7. Eu me preocupo em como vou recuperar a minha forma física após a gravidez* |
| 8. I wear clothes to accentuate my pregnancy | *8. Eu visto roupas que realçam minha gravidez.* | 8. I wear clothes that emphasize my pregnancy. | *8. Eu visto roupas para realçar a minha gravidez.* | *8. Eu visto roupas para realçar a minha gravidez.* |
| 9. It upsets me when people comment on my changing body | *9. Eu me incomodo quando as pessoas comentam sobre as mudanças do meu corpo.* | 9. It bothers me when people comment on the changes in my body. | *9. Eu me incomodo quando as pessoas comentam sobre as mudanças que estão ocorrendo no meu corpo.* | *9. Eu fico chateada quando as pessoas comentam sobre as mudanças que estão ocorrendo no meu corpo.* |
| 10. I look good pregnant | *10. Eu fico bonita grávida.* | 10. I look beautiful pregnant. | *10.Eu gosto de me ver grávida* | *10. Eu gosto da minha aparência grávida.* |
| 11. I like it when people notice I’m pregnant | *11. Eu gosto quando as pessoas percebem que estou grávida.* | 11. I like it when people notice I am pregnant. | *11. Eu gosto quando as pessoas reparam que estou grávida.* | *11. Eu gosto quando as pessoas reparam que estou grávida.* |
| 12. I find it hard to accept that I get more tired now I am pregnant | *12. Eu acho difícil aceitar que fico mais cansada agora que estou grávida* | 12. I find it hard to accept that I am more tired now that I am pregnant. | *12. Eu acho difícil aceitar que fico mais cansada agora que estou grávida* | *12. Eu tenho dificuldade de aceitar que fico mais cansada agora que estou grávida* |
| 13. I look overweight | *13. Eu pareço estar acima do peso.* | 13. I seem to be overweight. | *13. Eu pareço estar com excesso de peso.* | *13. Eu pareço estar acima do peso.* |
| 14. I feel like my bump is too big | *14. Eu sinto que minha barriga está grande demais* | 14. I feel my belly is too big | *14. Eu sinto que a minha barriga está grande demais* | *14. Eu sinto que a minha barriga está grande demais* |
| 15. I have enjoyed changing my wardrobe during pregnancy | *15. Gostei de mudar meu guarda-roupa durante a gravidez.* | 15. I liked changing my wardrobe during pregnancy. | *15. Eu estou gostando de mudar meu guarda-roupa durante a gravidez.* | *15. Eu estou gostando de mudar meu guarda-roupa durante a gravidez.* |
| 16. I am worried about the amount of weight I am putting on | *16. Eu estou preocupada com a quantidade de peso que estou ganhando.* | 16. I am concerned with the amount of weight I am gaining. | *16. Eu estou preocupada com a quantidade de peso que estou ganhando.* | *16. Eu estou preocupada com a quantidade de peso que estou ganhando.* |
| 17. When I compare the shape of my body to other non-pregnant women, I’m dissatisfied with my own | *17. Quando comparo a forma do meu corpo com a de outras mulheres não grávidas, me sinto insatisfeita com a minha.* | 17. When I compare my body shape to those of other women who are not pregnant, I feel unsatisfied with mine. | *17. Quando comparo a forma do meu corpo com a de outras mulheres não grávidas, eu me sinto insatisfeita com a minha própria.* | *17. Eu me sinto insatisfeita com a forma do meu corpo quando a comparo com a de outras mulheres que não estão grávidas* |
| 18. I get frustrated that I am less physically able than I was before I was pregnant | *18. Eu fico frustrada por estar menos capaz fisicamente do que eu estava antes de estar grávida* | 18. I feel frustrated for being less physically capable than I was before I got pregnant. | *18. Eu fico frustrada por estar menos fisicamente capaz do que eu estava antes de engravidar* | *18. Eu fico frustrada por estar fisicamente menos capaz do que eu estava antes de engravidar* |
| 19. I am enjoying my new curves in pregnancy | *19. Eu estou gostando das minhas novas curvas na gravidez* | 19. I am enjoying my new curves during my pregnancy. | *19. Eu estou gostando das minhas novas curvas durante a gravidez* | *19. Eu estou gostando das minhas novas curvas durante a gravidez* |
| Subescales:  | *Subescalas:*  | Subscales: | *Subescalas:* | *Subescalas:* |
| Satisfaction with appearing pregnant: | *Satisfação com aparentar grávida* | Satisfaction with looking pregnant; | *Satisfação com aparência de grávida* | *Satisfação com aparência de grávida* |
| Weight gain concerns: | *Preocupações com o ganho de peso* | Concerns about weight gain; | *Preocupações com o aumento de peso* | *Preocupações com o aumento de peso* |
| Physical burdens of Pregnancy: | *Fardo físico da gravidez* | Physical burden of pregnancy | *Sobrecarga física da gravidez* | *Sobrecarga física da gravidez* |

**Table 2**

*Factor loadings of each item in the EFA of the Brazilian version of BUMPs*

|  |  |  |  |
| --- | --- | --- | --- |
| Item (original language and translated into Brazilian Portuguese) | Factor 1 | Factor 2 | Factor 3 |
| 1. I feel good about my changing body.1. *Eu me sinto bem com as mudanças que estão ocorrendo no meu corpo.* | **.448** | -.019 | .251 |
| 2. I get embarrassed that I can’t do as much physically as I could before I was pregnant.2. *Eu fico constrangida por não conseguir ser tão fisicamente ativa como era antes de engravidar.* | -.126 | -.059 | **.856** |
| 3. When I compare the shape of my body to other pregnant women, I’m dissatisfied with my own.*3. Eu me sinto insatisfeita com a forma do meu corpo quando a comparo com a de outras grávidas.* | .100 | **.540** | .058 |
| 4. I enjoy taking photos of my changing body.*4. Eu gosto de tirar fotos das mudanças que estão ocorrendo no meu corpo.* | **.613** | .064 | -.021 |
| 5. I am concerned about the amount that I am eating and the effect this has on my physical.*5. Eu estou preocupada com a quantidade que estou comendo e com os efeitos que isso tem na minha aparência.* | -.032 | **.763** | -.047 |
| 6. I like it when people comment on the size of my bump.*6. Eu gosto de quando as pessoas comentam sobre o tamanho da minha barriga.* | **.608** | .069 | -.071 |
| 7. I worry about getting my figure back after pregnancy.*7. Eu me preocupo em como vou recuperar a minha forma física após a gravidez* | .009 | **.472** | .134 |
| 8. I wear clothes to accentuate my pregnancy.*8. Eu visto roupas para realçar a minha gravidez*. | **.709** | -.158 | -.136 |
| 9. It upsets me when people comment on my changing body.9*. Eu fico chateada quando as pessoas comentam sobre as mudanças que estão ocorrendo no meu corpo.* | .178 | **.427** | .021 |
| 10. I look good pregnant.*10. Eu gosto da minha aparência grávida*. | **.769** | .044 | .082 |
| 11. I like it when people notice I’m pregnant.*11. Eu gosto quando as pessoas reparam que estou grávida.* | **.814** | -.081 | -.097 |
| 12. I find it hard to accept that I get more tired now I am pregnant.*12. Eu tenho dificuldade de aceitar que fico mais cansada agora que estou grávida.* | -.035 | -.053 | **.633** |
| 13. I look overweight.*13. Eu pareço estar acima do peso*. | -.092 | **.733** | -.116 |
| 14. I feel like my bump is too big.*14. Eu sinto que a minha barriga está grande demais*. | -.033 | **.385** | -.023 |
| 15. I have enjoyed changing my wardrobe during pregnancy.*15. Eu estou gostando de mudar meu guarda-roupa durante a gravidez.* | **.502** | .054 | .175 |
| 16. I am worried about the amount of weight I am putting on.*16. Eu estou preocupada com a quantidade de peso que estou ganhando.* | -.084 | **.841** | -.066 |
| 17. When I compare the shape of my body to other non-pregnant women, I’m dissatisfied with my own.*17. Eu me sinto insatisfeita com a forma do meu corpo quando a comparo com a de outras mulheres que não estão grávidas*. | .170 | **.488** | .162 |
| 18. I get frustrated that I am less physically able than I was before I was pregnant.*18. Eu fico frustrada por estar fisicamente menos capaz do que eu estava antes de engravidar.* | -.016 | -.007 | **.847** |
| 19. I am enjoying my new curves in pregnancy.*19. Eu estou gostando das minhas novas curvas durante a gravidez.* | **.663** | .143 | .049 |
| *Eigen value* | 6.407 | 1.206 | .959 |
| Explained variance | 33,7% | 6,4% | 5% |
| Total explained variance |  | 45,1% |  |

**Table 3**

*Adjustment indices of confirmatory factor analysis and multigroup confirmatory factor analysis.*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | χ² | df | χ²/df | CFI | TLI | SRMR | RMSEA [90% CI] |
| Confirmatory Factor Analysis 3 factors | 285.198 | 1.49 | 1.91 | .97 | .97 | .06 | .05 |
| Multigroup Confirmatory Factor Analysis (white vs. nonwhite) |  |
| Configuration Invariance | 473.668 | 295 | 1.60 | .98 | .98 | .06 | .04 |
| Metric Invariance | 569.045 | 314 | 1.81 | .98 | .98 | .06 | .04 |
| Scalar Invariance | 573.666 | 330 | 1.73 | .98 | .98 | .06 | .04 |
| Multigroup Confirmatory Factor Analysis (gestational trimester) |  |
| Configuration Invariance | 562.891 | 441 | 1.27 | .99 | .99 | .06 | .04 |
| Metric Invariance | 648.486 | 479 | 1.35 | .99 | .98 | .07 | .04 |
| Scalar Invariance | 704.895 | 511 | 1.37 | .98 | .98 |  .07 |  .04 |

*Note.* χ² = chi-square test; df = degrees of freedom; CFI = comparative fit index; TLI = TuckereLewis index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation.

**Table 4**

*Correlations for the convergent validity analysis of the Brazilian version of BUMPs*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | TOTAL BUMPs | Factor 1 Satisfaction with appearing pregnant | Factor 2 Weigh gain concerns | Factor 3 Physical burdens of pregnancy |
| BMI | .116\*\* | -.004 | .247\*\* | .016 |
| Marital satisfaction | .140\*\* | .157\*\* | .082\* | .089\* |
| Interoceptive awareness | -.52 | -.46 | -.61 | .002 |
| Pre-natal attachment | -.368\*\* | -.421\*\* | -.217\*\* | -.215\*\* |
| Total SAS-PW | -.829\*\* | -.804\*\* | -.635\*\* | -.506\*\* |
| SAS-PW AC | -.816\*\* | -.767\*\* | -656\*\* | -.491\*\* |
| SAS-PW AG | -.709\*\* | -.762\*\* | -.449\*\* | -.454\*\* |
| BIPS PPA | .458\*\* | .300\*\* | .517\*\* | .267\*\* |
| BIPS DSB | .318\*\* | .260\*\* | .236\*\* | .312\*\* |
| BIPS DCO | .200\*\* | .174\*\* | .163\*\* | .145\*\* |
| BIPS ATT | .460\*\* | .413\*\* | .359\*\* | .339\*\* |
| BIPS PAF | .235\*\* | .233\*\* | .181\*\* | .132\*\* |
| BIPS DBP | .347\*\* | .260\*\* | .327\*\* | .257\*\* |
| Total HADS | .488\*\* | .416\*\* | .336\*\* | .484\*\* |
| HADS A | .452\*\* | .372\*\* | .325\*\* | .449\*\* |
| HADS D | .420\*\* | .379\*\* | .267\*\* | .415\*\* |

*Note*. BMI = Body Mass Index; SAS-PW = Self-Acceptance Scale for Pregnant women; SAS-PW AC = body acceptance factor; SAS-PW AG = pregnancy acceptance factor; BIPS = Body Image in Pregnancy Scale*;* BIPS PAA = Preoccupation with physical appearance; BIPS DSB = Dissatisfaction with strength-related aspects of one’s body; BIPS DCO = Dissatisfaction with complexion; BIPS ATT = Attractiveness; BIPS PAF = Prioritization of appearance over function; BIPS DBP = Dissatisfaction with body parts; HADS = Hospital Anxiety and Depression Scale; HADS A = Anxiety; HADS D = Depression; \* p<.05; \*\* p<.01

**Table 5**

*Analysis of test-retest stability of BUMPs in the two time points*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | T1 (M±DP) | T2 (M±DP) | r Pearson | *p* | t | *p* |
| BUMPs | 57.92±8.04 | 59.46±7.81 | .647 | .0001 | -1.219 | .233 |
| SAG | 28.85±6.87 | 28.92±6.44 | .852 | .0001 | -.104 | .918 |
| PGP | 20.96±7.21 | 21.64±5.79 | .693 | .0001 | -.682 | .501 |
| SFG | 8.10±3.40 | 8.89±3.34 | .784 | .0001 | -1.875 | .072 |

*Note.* BUMPs = Body Understanding Measure for Pregnancy Scale; SAG = Satisfaction with appearing pregnant; PGP = Weight gain concerns; SFG: Physical burdens of pregnancy; T1 = time one; T2 = time two.