



## Extending the use of the Body Appreciation Scale -2 in older adults: A Portuguese validation study



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### ABSTRACT

Body appreciation is a key characteristic, and the most common operationalization, of positive body image. Positive body image is often measured using the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a), which has demonstrated good psychometric properties in adult samples. The purpose of this study is to extend the validation of the BAS-2 to late adulthood facilitating future research with this population. A total of 202 male and female participants (aged 65–91 years) completed the Portuguese version of the BAS-2, along with other body image-related instruments and measures of self-esteem and intuitive eating. Confirmatory factor analysis supported the one-factor model and demonstrated sex invariance. There were no significant sex differences in BAS-2 scores. The BAS-2 had satisfactory convergent, discriminant, and incremental validity. Internal consistency and test–retest stability estimates were adequate. The BAS-2 will likely meet the needs of researchers interested in exploring body appreciation among elderly people.

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### 1. Introduction

Positive body image is a broad concept that involves love and respect for the body that allows individuals to appreciate its uniqueness and functionality (Tylka & Wood-Barcalow, 2015b). In particular, people with a positive body image accept their perceived body imperfections or deviations from cultural ideals, have a mindful connection with their body's needs, and interpret incoming information in a body-protective manner. Body appreciation is an attitude of acceptance, respect, and protection of the body (Avalos, Tylka, & Wood-Barcalow, 2005), and is considered a key component of positive body image and constitutes the most common way to operationalize this construct. The most widely-used measure of body appreciation is the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a). This version was updated and refined to address select limiting issues (e.g., the lack of cross-cultural validity, need for sex-specific forms, and use of body dissatisfaction-based language) of the original BAS (Avalos et al., 2005) as well as to

reflect current knowledge on positive body image (Tylka & Wood-Barcalow, 2015a).

Since the publication of this revised version, several studies have analyzed the factor structure and psychometric properties of the BAS-2 in different countries: Brazil (Alcaraz-Ibáñez, Chiminazzo, Sicilia, & Fernandes, 2017), China (Swami & Ng, 2015; Swami, Ng, & Barron, 2016), France (Kertechian & Swami, 2017), Iceland (Pálmarsdóttir & Karlsdóttir, 2016), Iran (Atari, 2016), Japan (Namatame, Uno, & Sawamiya, 2017), Netherlands (Alleva, Martijn, Veldhuis, & Tylka, 2016), Poland (Razmus & Razmus, 2017), Romania (Swami, Tudorel, Goian, Barron, & Vintila, 2017), Serbia (Jovic, Sforza, Jovanovic, & Jovic, 2016), Spain (Swami, García, & Barron, 2017), Denmark, Portugal and Sweden (Lemoine et al., 2018), and United Arab Emirates (Vally, D'Souza, Habeeb, & Bensumaidea, 2019). This growing body of research reflects the pertinence of the BAS-2 and the attempt to extend its validation to non-Western populations (for review see Tylka & Wood-Barcalow, 2015a).

Globally, studies with the BAS-2 suggest that this measure is psychometrically sound for the study of body appreciation. It has demonstrated a consistent single factor structure, adequate internal consistency, and good test–retest reliability. The BAS-2 has also been found to have good convergent validity. It is positively related to appearance satisfaction (Alleva et al., 2016; Pálmarsdóttir & Karlsdóttir, 2016; Swami, García et al., 2017), functionality satisfac-

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tion (Alleva et al., 2016), body image flexibility (Alleva, Tylka, & Van Diest, 2017; Webb, 2015), functionality appreciation (Alleva et al., 2017) and body acceptance by others (Augustus-Horvath & Tylka, 2011; Avalos & Tylka, 2006; operationalized by the BAS original version), and negatively correlated with self-objectification (Alleva et al., 2016), internalization of appearance ideals (Pálmarsdóttir & Karlsdóttir, 2016; Tylka & Wood-Barcalow, 2015a), and physical appearance comparison (Pálmarsdóttir & Karlsdóttir, 2016). Its associations with eating behavior were also found to be in a positive direction with intuitive eating (Pálmarsdóttir & Karlsdóttir, 2016; Tylka & Wood-Barcalow, 2015a) and in a negative direction with maladaptive eating behavior (Swami, García et al., 2017; Torres, Barbosa, Meneses, Tylka, & Vieira, 2018). Measures of general well-being are documented with a positive relationship between BAS-2 scores and self-esteem, life satisfaction (e.g., Atari, Jamali, Bahrami-Ehsan, & Mohammadi, 2016; Namatame et al., 2017; Swami, García et al., 2017; Swami & Ng, 2015; Swami et al., 2016; Swami, García et al., 2017; Torres et al., 2018), positive life orientation (Alleva et al., 2016; Razmus & Razmus, 2017), positive affect (Razmus & Razmus, 2017; Torres et al., 2018), and proactive coping (Tylka & Wood-Barcalow, 2015a). BAS-2 scores made an incremental contribution to self-esteem (Alleva et al., 2016; Namatame et al., 2017; Torres et al., 2018; Tylka & Wood-Barcalow, 2015a), eating behavior (Namatame et al., 2017; Tylka & Wood-Barcalow, 2015a), proactive coping (Tylka & Wood-Barcalow, 2015a), and satisfaction with life (Namatame et al., 2017) over other positive body image-related constructs, providing evidence for its incremental validity.

Establishing measurement invariance across sex will allow for meaningful comparisons between men's and women's scores on the BAS-2. Findings on invariance across sex are inconsistent, however. While the majority reported invariance across sex (Kertechian & Swami, 2017; Razmus & Razmus, 2017; Swami et al., 2016; Swami, García et al., 2017; Torres et al., 2018; Tylka & Wood-Barcalow, 2015a), others have suggested partial invariance (Alcaraz-Ibáñez et al., 2017) and lack of invariance (Swami, García et al., 2017).

To what extent body appreciation differs in each gender remains a pertinent, but inconclusive, research question. To date, some authors have not found statistically significant differences in positive body image according to gender (Razmus & Razmus, 2017; Swami et al., 2016; Swami, García et al., 2017); while others observed that men had significantly higher body appreciation scores than women (Atari, 2016; Kertechian & Swami, 2017; Tylka & Wood-Barcalow, 2015a). While Tylka and Wood-Barcalow (2015a) found that college men had higher BAS-2 scores than college women, they did not find a difference between women and men recruited from online community samples. One study reported that women had significantly higher scores than men (Jovic et al., 2016).

The equivalence of the scale among different age groups is another topic of interest (Webb, Wood-Barcalow, & Tylka, 2015) as it would enable researchers to investigate the development of positive body image over the lifespan (Tiggemann, 2015). The BAS-2 has been largely studied in samples of university students and adults. Only three studies have analyzed the psychometric properties of the BAS-2 among children (Halliwell, Jarman, Tylka, & Slater, 2017) and adolescents (Alcaraz-Ibáñez et al., 2017; Lemoine et al., 2018) and, to the best of our knowledge, no study has been conducted with geriatric populations over the age of 65. In line with the reported data in adult samples, findings in children and adolescents on the BAS and BAS-2 reflected the adaptive properties of body appreciation for body-related and psychological well-being (Atari et al., 2016; Halliwell et al., 2017; Lemoine et al., 2018; Lobera & Ríos, 2011; Moreira, Lorenzato, Neufeld, & Almeida, 2018). However, it remains unclear whether sex and age moderates body appreciation levels during these developmental stages. In some studies with adolescents, boys had higher levels of body appreciation than girls

(Alcaraz-Ibáñez et al., 2017; Lemoine et al., 2018; Lobera & Ríos, 2011), but these differences were not observed in other samples within the same age group (Moreira et al., 2018). In addition, no significant association between body appreciation and age was found in adolescents of either sex (using the BAS with 14- to 16-year-olds; Atari et al., 2016) or boys (using the BAS-2 with 9- to 11-year-olds; Halliwell et al., 2017). Conversely, in girls, a negative and significant relationship was observed, despite being of small magnitude (Halliwell et al., 2017). Given the young age ranges of the examined samples, no conclusions can be drawn about whether and how body appreciation is shaped by developmental transitions.

Within life transitions, attention should be given to the elderly. In the aging process, the body changes in a visible way, giving place to wrinkles, weight gain, and reduction of muscle tone (Grogan, 2011). These changes can potentially pose a threat to body image and, consequently, affect psychological well-being. A systematic review on body image in older adults demonstrated that body dissatisfaction remained stable across the lifespan, though older adults place increased value on body competence and health, rather than appearance (Roy & Payette, 2012). These findings, which are mostly inspired by the literature in negative body image, suggest that despite physical changes in the aging body, older women may have greater opportunities to experience positive body image. Nevertheless, empirical research is scarce on this topic.

To the best of our knowledge, only three studies have investigated positive body image in late adulthood. Two of them explored the relationship between age and body appreciation (operationalized by the BAS original version) in women aged from 18 to 75 years (Tiggemann & McCourt, 2013) and 90 years (Swami, Tran, Tieger, & Voracek, 2015) and found a positive association between these variables. However, a closer exploration of this relationship revealed that increased body appreciation tended to occur after 50 years of age (Tiggemann & McCourt, 2013). These authors pointed out that this is the typical time of menopause and hypothesized that this period may represent a turning point in the way women deal with society-defined body ideals, illustrating progressive appreciation of their body's physical imperfections. With increasing age, women may also shift their focus to, and become more appreciative of, their body's health and functionality. In addition, Tiggemann and McCourt (2013) observed different trajectories with age concerning positive and negative body image: while body appreciation increased, body dissatisfaction remained stable (Tiggemann & McCourt, 2013). These findings are in line with the abovementioned reviews on body image and aging, suggesting that older women may be able to simultaneously experience some level of body dissatisfaction and appreciate the body as it is. Later, Bailey, Cline, and Gammage (2016), in a qualitative study, corroborated that positive and negative body experiences were not only distinct, but can exist simultaneously. These authors also observed that older women might experience body appreciation even if they are not completely satisfied with their body.

Overall, these studies have made a significant contribution to the positive body image literature in older women. Nevertheless, they require replication with larger samples of participants over 65 years old, as previous studies were mostly weighted towards younger participants. The inclusion of men in the sample will also be pertinent in evaluating whether sex differences exist in body appreciation trajectories over the lifespan. Additional research is needed to investigate whether body appreciation is protective by offsetting body image threats in the elderly, and to identify potential predictors of positive body image in this later phase of life.

To facilitate future work on this topic, a valid measure is needed to operationalize body appreciation. Thus, the purpose of this study is to investigate the psychometric properties of the Portuguese version of the BAS-2 in late adulthood. We examined whether BAS-2 scores were invariant across sex and, in line with previ-

ous research conducted on adult samples (Tylka & Wood-Barcalow, 2015a; Razmus & Razmus, 2017; Swami et al., 2016; Swami, García et al., 2017), we did not expect significant differences between women and men. We examined the factor structure of the scale using confirmatory factor analysis (CFA) and hypothesized a unidimensional structure for the BAS-2 (Alcaraz-Ibáñez et al., 2017; Alleva et al., 2016; Atari, 2016; Jovic et al., 2016; Kertechian & Swami, 2017; Lemoine et al., 2018; Swami et al., 2016; Swami, García et al., 2017; Torres et al., 2018; Tylka & Wood-Barcalow, 2015a). We also predicted that the BAS-2 would be significantly and positively associated with self-esteem, intuitive eating, and other positive body image facets such as body acceptance by others and body image flexibility, thereby providing evidence for its convergent validity. Conversely, we expected that BAS-2 scores would be negatively and weakly associated with body mass index (BMI) and body dissatisfaction, based on the assumption that trajectories for positive and negative body image in late adulthood might be different (Bailey et al., 2016; Swami et al., 2015; Tiggemann & McCourt, 2013), such evidence would support the BAS-2's discriminant validity. Last, we expected the BAS-2 to demonstrate its distinctiveness as a measure of body image, accounting for unique variability in self-esteem above body dissatisfaction, body image flexibility, and body acceptance by others, thereby upholding its incremental validity. We also report on the internal consistency and temporal stability of BAS-2 scores over a one-month period.

## 2. Method

### 2.1. Participants

The sample was recruited through a non-probabilistic sampling process, the snowball method (Atkinson & Flint, 2004). Participants were recruited from North, Centre, and South elderly day care centers and Universities of the Third Age (U3A) - socio-cultural centers aimed to promote late-life learning and leisure activities. The inclusion criteria were to be 65 years of age or older, not have any terminal illness, and not have any decline in cognitive and functional abilities (e.g., dementia, active neurological or psychiatric disease). The institutional professionals, based on review of records, provided the information related to the cognitive functioning.

We estimated a minimum sample size to produce stable and significant results based on two guidelines. First, we followed general recommendations for sample size in SEM. Determination of appropriate sample size is a critical issue, and some evidence exists that simple SEM models could be meaningfully tested if  $N = 100$  to 150 (Anderson & Gerbing, 1988; Ding, Velicer, & Harlow, 1995; Tabachnick & Fidell, 2001). Some researchers consider an even larger sample size for SEM, for example,  $N = 200$  (Hoogland & Boomsma, 1998; Kline, 2011). Second, we used an iterative algorithm and the tables proposed by MacCallum, Browne, and Sugawara (1996) to estimate the minimum sample sizes for the test of exact fit for selected levels of degrees of freedom (df) and power. We found that, with 35 df, our statistical power ( $1 - \beta$ ) is within 0.50 and 0.80 (sample size of 180 and 279 participants, respectively). Participants of this study were 120 women and 82 men ( $N = 202$ ), ranging in age from 65 to 91 years ( $M = 70.07$ ,  $SD = 4.67$ ), with self-reported BMI between 19.4 and 57.8 kg/m<sup>2</sup> ( $M = 26.98$ ,  $SD = 4.24$ ). Most of the participants were married ( $n = 150$ , 73.4%), and 45% ( $n = 91$ ) had more than a 4th grade education.

### 2.2. Measures

#### 2.2.1. Demographics

Participants provided demographic details consisting of sex, age, height, weight, educational level, and marital status.

#### 2.2.2. Body appreciation

Body appreciation was measured by the BAS-2 (Tylka & Wood-Barcalow, 2015a). This questionnaire is composed of 10 items rated on a 5-point Likert-type scale, ranging from 1 (*never*) to 5 (*always*). The Portuguese version of the BAS-2 used in this study was translated by Lemoine et al. (2018) and validated on a community sample of adolescents. The Portuguese version was translated from the original BAS-2, without age adjustments in item content. Recently, the psychometric properties of this version were also examined in a large community sample of Portuguese adults with a broad age range (Torres et al., 2018). Results from both studies supported the factorial (single factor) and convergent validity of the Portuguese version of the BAS-2, as well as its internal consistency (adolescents:  $\alpha = .91$  for males,  $\alpha = .94$  for females; adults:  $\alpha = .94$ ).

#### 2.2.3. Body acceptance by others

The Body Acceptance by Others Scale (BAOS; Avalos & Tylka, 2006) assesses the extent to which participants perceive that their bodies are accepted by external sources (friends, family, people whom they have dated, society, and media). It is a one-factorial instrument, with 10 items answered on a 5-point Likert-type scale, ranging from 1 (*never*) to 5 (*always*). Scores on the Portuguese version of the BAOS have shown satisfactory internal consistency in adolescent ( $\alpha = .93$ ) and adult ( $\alpha = .94$ ) samples (Barbosa et al., 2018). In the present study Cronbach's  $\alpha$  was .94.

#### 2.2.4. Body dissatisfaction

The Body Shape Questionnaire-8C (BSQ-8C; Evans & Dolan, 1993) was employed to assess body dissatisfaction. With a unidimensional factor structure, the BSQ-8C includes eight items from the full version (Items 4, 6, 13, 16, 19, 23, 29, and 33) rated on a 6-point Likert-type scale (1 = *never*, 6 = *always*). Pook, Tuschen-Caffier, and Brähler, (2008) research on the derivations of the BSQ using confirmatory factor analysis supported the 8-item protocol as the derivation with the highest sensitivity to change when compared to the full BSQ. In addition, it does not contain any of the items that are specific to women. The Portuguese BSQ-8C version was adapted from the complete Portuguese version of the BSQ, which demonstrated good internal consistency ( $\alpha = .97$ ) and concurrent and convergent validity in women (Silva, Costa, Pimenta, Marôco, & Campos, 2016). Its psychometric properties were also examined in men, revealing adequate internal consistency ( $\alpha = .96$ ) and convergent validity with body dissatisfaction (Silva, Marôco, Dias, & Campos, 2017). In the present study, Cronbach's  $\alpha$  for the BSQ-8C was .86.

#### 2.2.5. Body image flexibility

The Body Image Acceptance and Action Questionnaire (BI-AAQ) is a 12-item self-reported instrument designed to measure body image flexibility, a concept that reflects the ability to experience aversive body-related thoughts and feelings fully and openly without defense or judgment (Sandoz, Wilson, Merwin, & Kellum, 2013). Its items are rated along a 7-point scale, ranging from 1 (*never true*) to 7 (*always true*). The Portuguese version showed excellent internal consistency ( $\alpha = .95$ ), three- to four-week temporal stability ( $r = .82$ ), and convergent and discriminant validity (Ferreira, Pinto-Gouveia, & Duarte, 2011). Here, Cronbach's  $\alpha$  was .94.

#### 2.2.6. Intuitive eating

The ability to connect, understand, and use one's internal hunger and satiety signals to guide one's eating behaviors was evaluated by the Intuitive Eating Scale-2 (IES-2; Tylka & Van Diest, 2013). This scale is composed of 23 items distributed among four factors: (a) eating for physical rather than emotional reasons; (b) unconditional permission to eat; (c) reliance on hunger and satiety cues, and (d) body-food choice congruence. Items are rated

**Table 1**  
Descriptive statistics for Body Appreciation Scale-2 (BAS-2) items (raw metrics).

BAS-2 Items	Range	Minimum	Maximum	<i>Mdn</i>	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Item 1	4	1	5	5	4.37	0.819	−1.153	0.854
Item 2	4	1	5	4	4.07	0.946	−0.648	−0.489
Item 3	4	1	5	4	4.08	0.877	−0.869	0.650
Item 4	3	2	5	4	4.14	0.829	−0.529	−0.665
Item 5	3	2	5	4	4.11	0.888	−0.570	−0.727
Item 6	4	1	5	4	4.24	0.877	−0.975	0.364
Item 7	4	1	5	4	3.88	0.997	−0.600	−0.154
Item 8	3	2	5	4	4.15	0.913	−0.656	−0.709
Item 9	4	1	5	4	4.10	0.900	−0.620	−0.422
Item 10	4	1	5	4	3.74	1.183	−0.572	−0.643

on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The Portuguese version produced excellent internal consistency ( $\alpha = .97$ ), 3-week temporal stability ( $r = .83$ ), and convergent and discriminant validity (Duarte, Pinto-Gouveia, & Mendes, 2016). In the present study, the IES-2 demonstrated acceptable internal consistency for the total score ( $\alpha = .71$ ).

### 2.2.7. Self-esteem

The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1972) is a measure of global self-esteem that assesses participants' overall sense of self-worth. The RSES is composed of 10 items rated on a 4-point scale from 1 (*totally agree*) to 4 (*totally disagree*). The higher the score obtained by the participant, the greater their overall self-esteem. The Portuguese version of this scale (Pechorro, Marôco, Poiares, & Vieira, 2011) presented a one-factorial structure with adequate internal consistency ( $\alpha = .79$ ), about 12-week temporal stability ( $r = .86$ ) and divergent and discriminative validity. Here, Cronbach's  $\alpha$  was .83.

### 2.3. Procedures

Permission to use the BAS-2 in our study with Portuguese older adults was granted by one of the original authors (Tracy Tylka). The Ethics Committee of the Faculty of Psychology and Education Sciences, University of Porto, Portugal (Reference 1-11/2016) approved the study. Participants were recruited by a research assistant in elderly day care centers and U3A, using direct solicitation. Those who agreed to participate provided written informed consent and individually completed the anonymous paper-and-pencil version of the questionnaires. Participation was voluntary, and respondents did not receive any remuneration for participation. The order of the scales was counterbalanced to control for order effects.

### 2.4. Statistical analyses

Statistical analyses to examine validity and reliability were performed using SPSS version 24. AMOS version 24 was used to conduct the CFA and test for measurement invariance. The psychometric sensitivity of the items was assessed for skewness and kurtosis and was considered adequate if below 3 and 8, respectively, following Kline's (2011) reference values.

We examined whether BAS-2 scores were invariant across sex for configural invariance (i.e., whether similar factors are measured), factor loading invariance (i.e., whether the magnitude of factor loadings is the same), intercept invariance (i.e., whether the intercept of the regression relating each item to its factor is the same), and strict invariance (residual or invariant uniqueness levels) (Hair, Black, Badin, & Anderson, 2010). A hybrid identification method for measurement invariance testing was used (Schroeders & Gnamb, 2018). Chi-square differences ( $\Delta\chi^2$ ) were used to test the significance of the different invariance levels. Since differences in the chi-square values are sensitive to small dissimilarities in

covariance matrices between the groups, and are also influenced by the sample size, it is suggested that, when using the  $\Delta\chi^2$  test, results should be interpreted along with other indicators of invariance, such as  $\Delta CFI$ ,  $\Delta RMSEA$ , and  $\Delta SRMR$  (Cheung & Rensvold, 2002).

Subsequently, we used CFA to examine the fit of a single-factor model, where all items loaded onto a single latent variable, with maximum likelihood estimation. The factor loadings were used as local indices of goodness of fit as well as the ratio of chi-square to degrees of freedom ( $\chi^2/df$ ), comparative fit index (CFI), incremental fit index (IFI), Parsimony Comparative Fit Index (PCFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). The model's fit was considered to be good if  $\chi^2/df < 3.0$ ,  $CFI \geq .95$ ,  $IFI > .90$ , PCFI higher than 0.6 or 0.8,  $RMSEA \leq .07$ , and  $SRMR < .08$ , whereas CFI values  $\geq .90$  and RMSEA and SRMR values  $\leq .10$  indicate an adequate fit (Byrne, 2016; Hair et al., 2010; Hu & Bentler, 1999; Steiger, 2007).

Convergent and discriminant validity were estimated using Pearson's correlation analysis ( $r$ ). In addition, convergent validity was assessed by the average variance extracted (AVE). A value  $\geq .50$  for the AVE was considered adequate (Hair et al., 2010). Incremental validity was investigated using hierarchical regression analysis. The BAS-2 and other body-related measures were entered in different blocks as predictors (BAS-2 entered in a second block, after the BI-AAQ, BAOS, and BSQ), to determine if the BAS-2 accounted for unique variability in self-esteem. A significant  $R^2$  increase at Step 2 would support the BAS-2's incremental validity (Field, 2009).

The reliability of the individual items was assessed with regression weights for all items ( $\lambda_{ij} \geq 0.5$ ,  $R^2 \geq 0.25$ ). Given the ordinal response format of items, the McDonald's Omega reliability coefficient was used to investigate the internal consistency for BAS-2 scores. A value  $\geq .70$  was considered satisfactory (Gadermann, Guhn, & Zumbo, 2012). To assess test-retest reliability (by means of paired-sample  $t$ -test), the BAS-2 was re-administered one month later in a subgroup of 35 participants (16 male, 19 female).

We used an independent-samples  $t$ -test to examine sex differences in body appreciation using the BAS-2 total score.

## 3. Results

### 3.1. Preliminary analysis

There were no missing data. Descriptive statistics for BAS-2 items are presented in Table 1. Items presented adequate sensitivity, with absolute values of skewness and kurtosis within the accepted limits for a normal distribution. Correlations between items are presented in Table 2. Correlations were all positive, ranging from .29 to .63, and significant ( $p < .01$ ).

### 3.2. Measurement invariance across sex

The unconstrained model had adequate fit in the female ( $n = 120$ ) and male ( $n = 82$ ) sub-samples, suggesting configural

**Table 2**  
Correlation matrix for Body Appreciation Scale-2 (BAS-2) items.

BAS-2 items	1	2	3	4	5	6	7	8	9
Item 2	.427*								
Item 3	.333*	.514*							
Item 4	.526*	.539*	.546*						
Item 5	.531*	.328*	.301*	.418*					
Item 6	.515*	.446*	.376*	.440*	.483*				
Item 7	.397*	.453*	.375*	.382*	.426*	.563*			
Item 8	.286*	.413*	.321*	.426*	.372*	.434*	.419*		
Item 9	.434*	.628*	.468*	.561*	.340*	.410*	.469*	.465*	
Item 10	.310*	.378*	.380*	.428*	.408*	.468*	.424*	.456*	.446*

\*  $p < .01$ .

invariance between women and men. Differences between the unconstrained and fully constrained model were not significant, indicating that the structure of the model achieved factor loading invariance across sex,  $\Delta\chi^2(9)=4.9$ ,  $p = .843$ . Despite the significant results found for scalar invariance,  $\Delta\chi^2(9)=17.0$ ,  $p = .049$ , when comparing  $\Delta CFI$ ,  $\Delta RMSEA$ , and  $\Delta SRMR$ , the results were  $-0.01$ ,  $-0.001$ , and  $0.000$ , respectively. Based on these results (Cheung & Rensvold, 2002), we considered these findings to support scalar invariance. Finally, strict invariance was also upheld,  $\Delta\chi^2(10)=11.8$ ,  $p = .299$ . Collectively, these findings provide acceptable evidence for the one-dimensional structure for the BAS-2 across sex (see Table 3).

3.3. Confirmatory factor analysis

The hypothesized one-factor solution provided an adequate fit to the data for the whole sample:  $\chi^2(35)=102$ ;  $\chi^2/df = 2.91$ ; CFI = .91; IFI = .92; PCFI = .71; RMSEA = .09,  $p < .01$ , C.I. 95% [.07, .10], and SRMR = .04. The final model is presented in Fig. 1.

3.4. Convergent validity

The AVE for the BAS-2 was .44. The BAS-2 was moderately correlated with body acceptance by others ( $r = .36$ ,  $p < .001$ ) and self-esteem ( $r = .41$ ,  $p < .001$ ) and slightly-to-moderately correlated with body image flexibility ( $r = .25$ ,  $p < .001$ ) and intuitive eating ( $r = .22$ ,  $p = .002$ ).

3.5. Discriminant validity

The association between the BAS-2 and body dissatisfaction was small-to-moderate in magnitude ( $r = -.29$ ,  $p < .001$ ). No significant correlation was observed between BAS-2 scores and BMI ( $r = -.07$ ,  $p = .322$ ).

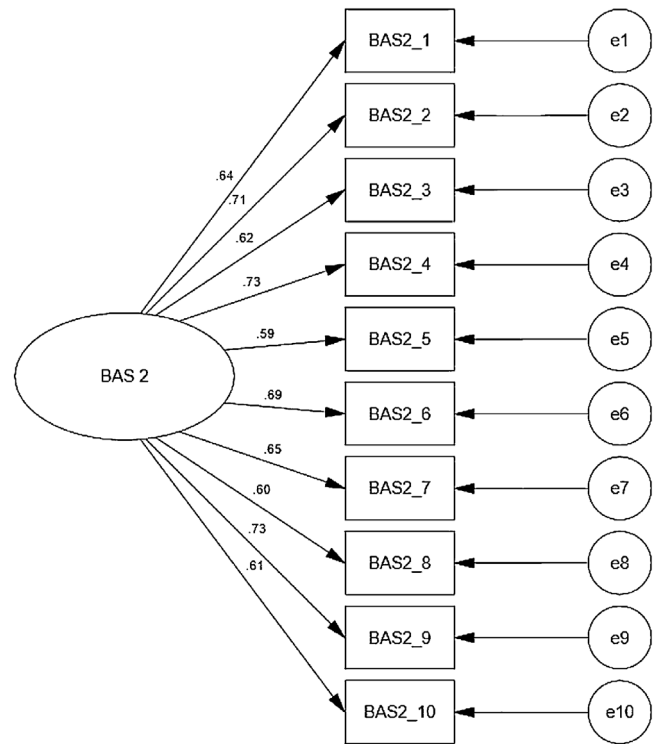
3.6. Incremental validity

Incremental validity was assessed with hierarchical regression analysis to determine whether the BAS-2 is related to self-esteem beyond measures of body image (i.e., body acceptance by others, body image flexibility, and body dissatisfaction). The final model

**Table 3**  
Model fit indices and tests of measurement invariance (hybrid approach) for the one-factor Body Appreciation Scale-2 model across participant sex.

	$\chi^2$	$df$	$\chi^2$ normed	RMSEA [90% CI]	SRMR	CFI
Men ( $n = 82$ )	66.11	35	1.89	.11 [.07, .14]	.07	.89
Women ( $n = 120$ )	89.00	35	2.54	.11 [.09, .14]	.06	.90
Configural invariance	155.12	70	2.22	.08 [.06, .10]	.07	.89
Factor loading invariance	160.02	79	2.03	.07 [.06, .09]	.08	.90
Intercept invariance	177.00	88	2.01	.07 [.06, .09]	.08	.89
Strict invariance	188.77	98	1.93	.07 [.05, .08]	.08	.89

Note.  $\chi^2$  = chi square;  $df$  = degrees of freedom; RMSEA (90% CI) = root mean square error of approximation at 90% confidence interval; SRMR = standardized root mean square residual; CFI = comparative fit index.



**Fig. 1.** Path diagram and estimates for the one-dimensional model of the Body Appreciation Scale-2. The path factor loadings are standardized with significance levels were determined by critical ratios (all  $p < .001$ ).

was significant,  $F(4, 197)=15.23$ ,  $R^2 = .24$ ,  $p < .001$ . BAS-2 scores significantly predicted self-esteem,  $B = 2.17$ ,  $SE = 0.47$ ,  $\beta = .32$ ,  $t = 4.66$ ,  $p < .001$ , above and beyond other measures of body image.  $R^2$  change from Step 1 to Step 2 was significant,  $R^2 = .15$  (Step 1) to .24 (Step 2),  $p < .001$ ,  $\Delta R^2 = .09$ . These findings support the incremental validity of the BAS-2.

3.7. Reliability

Regarding the regression weights, all items yielded  $\lambda_i \geq 0.5$  and the smallest observed  $\lambda$  was .592 ( $R^2 = .350$ ; Item 5). The internal consistency coefficient of BAS-2 scores was adequate in both women (Omega = .89) and men (Omega = .87).

Paired sample  $t$ -test was used to estimate the temporal stability of the BAS-2 ( $n = 35$ ). The BAS-2 scores did not change significantly over a 1-month period,  $t(34) = 1.88$ ,  $p = .068$ ,  $d = 0.32$ . McDonald's Omega coefficients for the second administration were .94 and .79, for women and men, respectively.

3.8. Sex differences

Since the BAS-2 revealed to be invariant across women and men, a  $t$ -test compared mean scores for men and women. There

was no significant difference in body appreciation between women ( $M = 4.06$ ,  $SD = 0.67$ ) and men ( $M = 4.13$ ,  $SD = 0.62$ ),  $t(200) = 0.85$ ,  $p = .398$ ,  $d = 0.11$ .

#### 4. Discussion

The present study aimed to examine psychometric properties of the BAS-2 in Portuguese adults over age 65. Our results are consistent with previous studies carried out with younger age groups, both in Portugal (Lemoine et al., 2018; Torres et al., 2018) and other Western and non-Western countries (Alcaraz-Ibáñez et al., 2017; Alleva et al., 2016; Atari, 2016; Jovic et al., 2016; Kertechian & Swami, 2017; Namatame et al., 2017; Pálmarsdóttir & Karlsdóttir, 2016; Razmus & Razmus, 2017; Swami & Ng, 2015; Swami et al., 2016; Swami, García et al., 2017; Swami, García et al., 2017; Tylka & Wood-Barcalow, 2015a; Vally et al., 2019), which supported the one-dimensional factor structure of the BAS-2. Using CFA, we confirmed that this one-factor solution had adequate fit in a sample of Portuguese older adults, similar to what was observed in other Portuguese studies with adolescents (Lemoine et al., 2018) and adults (Torres et al., 2018). Collectively, research points to the unidimensionality of the BAS-2 across the age spectrum.

Our results also indicated that BAS-2 scores were invariant across sex, which is in line with previous studies using younger samples (Razmus & Razmus, 2017; Kertechian & Swami, 2017; Swami et al., 2016; Tylka & Wood-Barcalow, 2015a), including Portuguese adolescents (Lemoine et al., 2018) and adults (Torres et al., 2018). To confirm this finding, it is important to replicate this analysis in other samples within the same older age group, ideally from different linguistic and cultural contexts. As predicted, we also found that women and men in late adulthood did not differ in mean values of body appreciation. This result converges with previous studies using the BAS-2 (Razmus & Razmus, 2017; Swami et al., 2016; Swami, García et al., 2017; community sample within Tylka & Wood-Barcalow, 2015a), but gender differences also exist with men reporting higher appreciation (Atari, 2016; Kertechian & Swami, 2017; Lemoine et al., 2018; college sample within Tylka & Wood-Barcalow, 2015a), although effect sizes have been mostly small. With ageing, it is possible that women's and men's levels of body appreciation become more similar, with increased sensitivity to body competence related issues (Roy & Payette, 2012).

Further, Portuguese BAS-2 scores revealed patterns of construct validity through convergent and discriminant indices. Body appreciation was positively and significantly related to body acceptance by others, body image flexibility, self-esteem, and intuitive eating. Although the AVE index did not fulfil Hair et al.'s (2010) criteria (AVE = .43 and not >.5), we considered the BAS-2 to have had acceptable patterns of convergent validity, considering the significant correlation with similar measures. However, it should be noted that the strength of correlations of the BAS-2 with body image flexibility and intuitive eating were of small magnitude. Limitations associated with weak correlations include the use of the BI-AAQ as a measure of body image flexibility (a facet of positive body image; Rogers, Webb, & Jafari, 2018). Besides being exclusively composed of negatively worded items, this instrument also places greater focus on adverse effect of negative body-related thoughts, behaviors and feelings, rather than on the mindful ability to accept them. Taken together, these issues call into question the face validity of the body image flexibility construct as assessed by the BI-AAQ, as previously noted by Webb et al. (2015). In terms of intuitive eating, consideration should be given to the possibility of sample specificities, which could condition the assessment of some dimensions of the construct. For example, part of the sample was recruited in elderly day care centers, in which mealtimes and menus are strictly defined. In this context, individuals are less prone to eat in agreement with their hunger and satiety cues, and the occurrence of

emotional eating episodes being more controlled as well. Moreover, eating behavior in late adulthood can also be influenced by several factors ultimately affecting intuitive eating. These include: (a) a natural decline of appetite and food consumption, often referred to as anorexia of aging; (b) physiologic alterations in taste sensations, as well as difficulty chewing and swallowing, can interfere on appetite and food choices; and (c) multiple medical conditions, as well as side effects of medication use, which can require alterations in dietary intake (Bernstein & Munoz, 2012). Despite the evidence of convergent validity globally obtained in this study, we consider it worthy of further exploration in this age group, by assessing the relationship with other constructs such as body-related emotions, body functionality, attunement, life satisfaction, and mood. The use of qualitative methodologies is also suitable to understanding more fully the nuances of positive body image in late adulthood, and should be considered in future investigations. By listening to older adults speak about their relationship to body, how they define body appreciation, and how they respond to the challenge of ageing in an appearance-focused culture, we can ascertain some age-related specificities of the construct. Grounded Theory (Charmaz, 2006) is one research methodology that can be used to analyze qualitative data collected through various techniques, such as focus group and individual interviews.

In terms of discriminant validity, as expected, the BAS-2 was slightly and inversely related to body dissatisfaction and unrelated to BMI. The absence of a link with BMI is in line with other studies conducted in adult samples (Alleva et al., 2016; Atari, 2016; Razmus & Razmus, 2017; Swami et al., 2016), including in Portugal (Torres et al., 2018). In practice, it suggests that older adults can experience comfort with and gratitude toward their body, independent of their weight. In addition, the weak negative correlation between the BAS-2 and body dissatisfaction is in agreement with previous research (Jovic et al., 2016; Swami & Ng, 2015; Swami et al., 2016). The small magnitude of this relationship supports the assumption that body appreciation is not simply a polar opposite of body dissatisfaction. In fact, despite being negatively correlated, they have been defined as distinct concepts (Tylka & Wood-Barcalow, 2015b). The distinguishing nature of positive and negative body image is reinforced by our findings on incremental validity, by demonstrating that body appreciation predicts self-esteem over other body image-related constructs, including body dissatisfaction. Of note, similar results were found in previous work with Portuguese adults (Torres et al., 2018), and other studies (Alleva et al., 2016; Namatame et al., 2017; Tylka & Wood-Barcalow, 2015a), highlighting the important role that body appreciation plays in psychological well-being.

In terms of reliability, we are able to conclude that the Portuguese version of the BAS-2 yielded evidence of adequate internal consistency in ageing individuals, corroborating evidence from Portuguese studies with younger samples (Lemoine et al., 2018; Torres et al., 2018). Test-retest analysis also supported temporal stability of the scale after one month. As of yet, only five studies have investigated the stability of the BAS-2 across time, finding evidence of high temporal stability in children (Halliwell et al., 2017), adolescents (Alcaraz-Ibáñez et al., 2017), university students (Swami, García et al., 2017), and adults (Torres et al., 2018; Tylka & Wood-Barcalow, 2015a). In this context, our findings are relevant given that this is the first time, to our knowledge, that the reliability of the BAS-2's scores has been examined in an elderly population.

This study has some limitations that must be acknowledged. First, our sample only represents a subset of the Portuguese population. All participants were White and most of them were from the North of Portugal. To increase the generalizability of the data, efforts should be given to increase recruitment from geographically and economically diverse populations, as well as from a wider array of geriatric institutions. It is difficult to determine similar-

ties between participants in body appreciation, when they are from different institutions and regions of the country. We assume that individuals from these settings may vary in terms of health condition, level of physical activity, and perception of body functionality, reflecting on the overall positive orientation to the body.

Second, it should be noted that approximately half of the sample had a literacy level equal or below 4<sup>th</sup> grade (primary school education). Despite this percentage being similar to that found in the larger Portuguese resident population aged 65 and over (52.5%; [Statistical National Institute, 2019](#)), the target literacy level of the instrument is unknown, and may impact the ability of respondents to interpret the meaning of the items. For this reason, we did not analyze the intraclass correlation coefficient (ICC), as an indicator of temporal stability, given the over-representation of basic education level (88.6%) in the sub-sample used in retest ( $n = 35$ ). Future studies should consider using a more heterogeneous geriatric sample to determine the extent to which scores on the BAS-2 can be generalized across educational levels. In addition, quantifying test-retest reliability using the ICC is worthy of further exploration.

Third, a larger sample may lead to results that are more robust. It is generally accepted that sample size can influence fit indexes, such as the chi-square test ([Tanaka, 1993](#)). For this reason, we also used SRMR and IFI indexes, as they seem to be less sensitive to sample size ([Fan, Thompson, & Wang, 1999](#)). Even so, a larger sample would have allowed for exploration of differences between specific subgroups in terms of age (e.g., <75 years old, >75 years old), type of institution (e.g., day care centers vs. U3A), and settings (e.g., rural vs. urban).

Fourth, from a methodological point of view, the scarcity of measures validated with Portuguese older adults limited the choice of variables that could be used as reference for construct validity examination. It should be noted that research on the BSQ-8C as a stand-alone questionnaire is needed in the Portuguese population. In addition, as the BSQ was constructed to evaluate women's body shape concerns, results from men should be explored psychometrically. With regard to the BI-AAQ, its use as a measure of body image flexibility (another facet of positive body image) requires further exploration due to its limited face validity. In the future, researchers may want to consider the relationship between body appreciation and other proposed facets of positive body image, such as embodiment ([Tiggemann, Coutts, & Clark, 2014](#)), attunement, and inner positivity ([Tylka & Wood-Barcalow, 2015b](#)), to increase understanding of positive body image in the elderly.

In sum, these results provide evidence that the BAS-2 is a valid and reliable tool for the assessment of body appreciation in a sample of Portuguese individuals in late adulthood. This is the first known examination of the BAS-2 in a specific sample of older adults, and our collection of data on both women and men is a strength. Our study should facilitate future research in positive body image in the elderly, allowing for determination of significant predictors, sex differences, and trajectories over the lifespan. Knowledge gained from these endeavors may then be used to shape psychological interventions, promote a broader exploration of body image beyond body dissatisfaction, and increase the identification of resources to optimize psychological health and well-being throughout all stages of development.

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## Declarations of interest

None.

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