DOI: 10.1590/1413-81232022274.01972021

Psychometric investigation of the Attention to Body Shape Scale in Brazilian adults

Investigação Psicométrica da Escala de Atenção à Forma Corporal em adultos brasileiros

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Abstract *The objectives of the study were to develop a Portuguese version of Attention to Body Shape Scale (ABS), estimate the psychometric properties of the ABS for Brazilian data, and compare the ABS scores between the sexes and the different sample characteristics. The Portuguese version was developed following a standardized protocol. The factorial and convergent validity were evaluated using goodness-of-fit parameters and average variance extracted. Composite reliability and ordinal coefficient alpha were calculated. The invariance of the fitted model was investigated across independent subsamples using multigroup analysis. The scores were compared between variables using two-way ANOVA. A total of 1,056 individuals (71% female) with a mean age of 26.1 (SD=6.4) years participated in the study. Item 3 was removed due to low factor loading. The refined model presented good psychometric properties for the data. Different characteristics contributed to greater attention to body shape. The Portuguese version of the ABS will be useful to investigate attention to body shape in Brazil. The validity and reliability of the data supported the adequacy of the refined model. Specific characteristics influenced attention to body shape, and therefore, should be considered in future protocols.*
Key words *Body image, Validation study, Attention, Scale, Psychometry*

Resumo *Os objetivos do estudo foram desenvolver a versão em português da Attention to Body Shape Scale (ABS); estimar as propriedades psicométricas da ABS para dados brasileiros; comparar os escores da ABS entre os sexos e diferentes características amostrais. A versão em português foi desenvolvida seguindo protocolo padronizado. As validades fatorial e convergente foram avaliadas por índices de ajustamento e variância extraída média. A confiabilidade composta e o coeficiente alfa ordinal foram calculados. A invariância do modelo ajustado foi investigada em subamostras independentes por análise multigrupos. Os escores médios da ABS foram comparados entre as variáveis usando ANOVA two-way. Participaram 1.056 indivíduos (71% mulheres) com média de idade de 26,1 (DP=6,4) anos. O item 3 foi excluído da escala devido ao baixo peso fatorial. O modelo refinado apresentou boas propriedades psicométricas aos dados. Diferentes características contribuíram para a maior atenção com a forma corporal. A versão em português da ABS será útil para investigar a atenção com a forma corporal no Brasil. A validade e a confiabilidade dos dados sustentaram a adequação do modelo refinado. Características específicas foram relevantes para investigar a atenção com a forma corporal, portanto, serão úteis para futuros protocolos.*
Palavras-chave *Imagem corporal, Estudo de validação, Atenção, Escala, Psicometria*

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Introduction

Body image is the mental representation that a person builds of his or her own body. The concept is multifactorial and involves perception, thoughts, feelings, and actions in relation to the body[1,2]. Experts[3,4] suggest that body image can be studied through a perceptual or attitudinal dimension. The perceptual dimension is the subject's own visual image, which implies a visual memory of one's size and proportions or an imagery reconstruction of the body made from sensations and impressions. The attitudinal dimension refers to the mental construction of the body image considering affective, cognitive, and behavioral aspects, and the subjective overall body satisfaction of a person[5,6]. The cognitive component involves the perceptions and beliefs of individuals regarding body image, which can be investigated measuring attention to body shape[2,7].

Attention is the process of investing energy on a specific subject. Thus, attention can be understood as a selective mental concentration to relevant or irrelevant stimuli, and may be temporary, subject to focus change, or depleted in a short time[8,9]. Selective attention refers to the differential processing of simultaneous sources of information. These sources can be internal as well as external[10], and thus, selective attention can encompass several facets of the individual's life, including attention paid to the body. Body attention usually relates to awareness of physical and emotional sensations. The degree of attention paid to the body is variable, as the direction of attention is different among individuals and may play different and important roles in people's lives[11,12]. Beebe[13] reports that when the level of attention to body shape is excessive, body dissatisfaction and eating disorders may develop, especially in women, since they are more vulnerable to cultural and aesthetic issues[14].

Assessing the level of attention to body shape is important to raise data that may be used in clinical and epidemiological studies and educational, preventive, or treatment protocols aiming to minimize the onset of eating or body dysmorphic disorders and maintain people's quality of life. For such assessment, psychometric instruments are commonly used[6], however, the selection of the tool should be based on the research objective, context of application, and ability of the tool to provide valid and reliable data[14-16]. Despite the importance of attention to body image, few psychometric instruments are available in the literature to investigate this specific concept. These include the Objectified Body Consciousness Scale (OBCS) developed by McKinley and Hyde[17], and the Attention to Body Shape Scale (ABS) proposed by Beebe[13], the latter being the only one that specifically assesses attention to body shape. The OBCS has shown poor psychometric properties[18] and is much longer (24 items) in relation to the ABS (7 items), making the ABS a preferable tool.

The ABS was developed in English in the American context[13] and only a Japanese version is available[19]. The items that make up the scale were adapted from the Appearance Orientation Subscale of the Multidimensional Body-Self Relations Questionnaire[20], but with a focus on body shape. The one-factor structure composed of seven items with a 5-point Likert-type response scale (1=strongly disagree to 5=strongly agree) was reported in the original study. Furthermore, item three was formulated with a reverse score in relation to the others. To date, only five studies[19,21-24] used the ABS, but none performed a confirmatory analysis to verify the construct validity of the instrument.

Despite being an instrument that assesses an important aspect of body image with a reduced number of items, the ABS is still rarely used in scientific and clinical contexts. The use of the ABS can help understand the degree of attention that people pay to their body shape. Brazil is a country that strongly values body aesthetics and it is one of the world leaders in plastic surgery and aesthetic procedures[25-27]. Furthermore, previous studies[28-30] have shown that Brazilians are highly concerned with body shape and eating habits. Therefore, having a tool to assess the degree of attention to the body shape of Brazilians can help in the development of strategies to reduce risk behaviors, such as body dissatisfaction and disordered eating.

In addition, when assessing attention to body shape, the literature highlights the need to investigate demographic and dietary characteristics and the practice of physical exercise, as these factors can influence aspects related to body image[31-33]. Authors report a significant relationship between aspects of body image and anthropometric nutritional status, as overweight/obese individuals have been shown to feel higher pressure from society regarding the adequacy of body shape. Previous studies[34-36] reported that young women are more dissatisfied with their bodies given the possible changes in society regarding the definition of an ideal weight. Moreover, people who have

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greater body dissatisfaction pay more attention to body exposure, do more physical exercise[37], as well as make greater use of weight control substances and supplements[38], and go on a diet more often[39] to try to ease discomfort with their body.

Thus, given the growing interest of the scientific and clinical community in Brazil regarding the study of body image and the impact that it has in people's quality of life, this study was performed with three objectives: (i) to develop the Portuguese version of the ABS; (ii) to estimate the psychometric properties of the tool in adults; and (iii) to compare the scores of attention to body shape between the sexes and the sample characteristics. The hypothesis were that the Portuguese version of the ABS will be well understood in the Brazilian population, the factorial model of the ABS will present adequate psychometric properties when tested in Brazilians, and that specific sample characteristics will affect attention to body shape.

Methods

Study design

This was a cross-sectional study. The calculation of the minimum sample size was performed considering the need for 15 respondents for each parameter evaluated in the study [ABS: 7 items, 7 residues, and 9 independent variables (sex, age, nutritional status, dieting, self-perception of diet quality, use of substances and supplements for body change, economic level, and physical activity)][40]. Thus, the minimum sample size calculated was of 345 individuals. However, we used a sample size larger than the one calculated in order to increase the power of the psychometric analyses.

Participants

The sample consisted of young adults (18 to 40 years old) from the Araraquara community (normative sample) of both sexes. Exclusion criteria were: pregnancy or lactation, visual impairment, and being under treatment for eating disorders at the time of data collection.

Data for sex, age, use of substances and dietary supplements for body change, dieting for weight loss, self-perceived diet quality, physical activity, and the economic class of the participants were collected. Weight (kg) and height (m) were self-reported by the participants to calculate the body mass index (BMI) and establish the anthropometric nutritional status[41]. The economic class was estimated using the Brazil Criterion[42]. Level of attention to body shape was estimated using the ABS. IBM SPSS Statistics for Windows, version 22.0 (Armonk, NY: IBM Corp.) was used to perform the descriptive analyses.

Measuring instrument

The ABS was originally developed with 7 items, 5-point Likert-type responses, and a single-factor model[13]. The tool was tested initially in three different samples and demonstrated high internal consistency (Cronbach's alpha=0.70-0.82) and test-retest reliability (r=0.76-0.87; $p<0.001$). The ABS also showed an adequate ability to discriminate groups of men and women ($t\ [57]=2.63$, $p<0.01$).

Cross-cultural adaptation

The ABS was first independently translated to Portuguese by 3 bilingual translators (two Brazilian and one Portuguese) with knowledge of the English language and American cultural context. The three versions were compared, and a single Portuguese version (intermediate version) was obtained. This version was back-translated into English by one North American translator with knowledge of Portuguese language, and this version was compared with the original one to assess the similarity of the content[43,44]. The translators and back-translators were not familiar with the ABS. After verifying the idiomatic and semantic equivalences, the Portuguese version of the ABS was evaluated by two Portuguese language specialists that attested the grammatical adequacy. In addition, two researchers from the field of psychology and body image analyzed the Portuguese version to assess conceptual and cultural equivalences.

Considering that item three ("*I am not self-conscious about my body shape*") is the only item with a reverse score in relation to the others and this could cause confusion, the regular and inverted sentences were tested in a pilot study for the best formulation. The language experts also had difficulty in agreeing about the translation of the term "*self-conscious*" in item three. As there was no consensus, the pilot study was also used to test two words for "self-conscious" in Portuguese: "insecure" ("*inseguro*") and "aware" ("*consciente*") and identify which was clearer. Thus, the Portuguese version of the ABS was pretested – using different sentences for item three – to

verify the misunderstanding index [MI] of the items, which evaluates if participants adequately understand the instructions and the item's words and expressions. An MI≤20% was considered adequate. The pretest included 58 individuals (female=81%; mean age 28.4 [SD=5.5] years). The minority (1.7%) were from the lower income classes (D/E), 20.7% were from the medium class (C), and 77.6% from the higher income classes (B: 65.5% and A: 12.1%). The use of the inverted item (i.e., "*I am not self-conscious…*") and the use of the word "*aware*" were considered confusing by participants (MI>20%); therefore, item three was translated as "*I am aware...*" (in Portuguese: "*Eu sou consciente…*"). After this adjustment, all the ABS items had MI=0 and the mean filling time was 84 (SD=31) seconds. Thus, the Portuguese version of the ABS was considered appropriate for use (Chart 1).

Procedures and ethical aspects

The study was announced (i.e., objectives, criteria for participation and contact of researchers) to employees, students, and professors of the São Paulo State University (UNESP, Araraquara campus) through different means of communication (e.g., e-mails, personal invitations, social network). Therefore, the sample obtained was non-probabilistic for convenience. Data collection was carried out by four trained researchers. Individuals interested in participating in the research received verbal information about the objectives of the project. All individuals who voluntarily agreed to participate in the study and met the eligibility criteria signed the consent form and were asked to complete a demographic questionnaire and the ABS in paper version individually or in groups of five maximum in a reserved room of the university. Participants were encouraged to respond honestly to the items of the questionnaire and were reminded that all responses were anonymous and results would be kept confidential. Participants were asked to tell their friends, colleagues and family about the survey to recruit more people for the study in a snowball sampling process. Data collection was carried out from March of 2018 to May of 2019 on working days (Monday to Friday) between 9 am to 9 pm.

The project was approved by the Human Research Ethics Committee of the Araraquara School of Dentistry (UNESP) (C.A.A.E. 88600318.3.0000.5416).

Data Analysis

Psychometric sensitivity of items - Summary statistics (means, medians, and standard deviations) and data distribution (skewness [Sk] and

Chart 1. Original English version and Portuguese version of the Attention to Body Shape Scale (ABS).

Item	Original English Version[13] Attention to Body Shape Scale (ABS)	Portuguese version Escala de Atenção à Forma Corporal
	Instructions: Please mark the degree to which you agree with each of the following statements. All of your responses will be held strictly confidential, so please be honest	Instruções: Por favor, marque o grau em que você concorda com cada uma das seguintes afirmações. Todas as suas respostas serão estritamente confidenciais, então, por favor, seja honesto.
1	I place a great deal of importance on my body shape	Eu dou muita importância à forma do meu corpo
2	I buy products that promise to give me a better body	Eu compro produtos que prometem me dar um corpo melhor
3	I am not self-conscious about my body shape	Eu sou consciente em relação à minha forma corporal
4	I am always trying to improve my body shape	Eu estou sempre tentando melhorar a minha forma corporal
5	I wear clothes that highlight the best aspects of my body and hide the worst aspects of my body	Eu uso roupas que destacam os melhores aspectos do meu corpo e que escondem os piores aspectos do meu corpo
6	It really bothers me when I can't keep my body in shape	Fico realmente incomodado(a) quando não consigo manter o meu corpo em forma
7	I'm very attentive to my body shape	Eu sou muito atento à minha forma corporal

Note: Item three was modified in the present study to a positive sentence, because this way of writing was better understood in a pilot study.

Source: Authors.

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kurtosis [Ku]) were calculated using the IBM SPSS Statistics software. Absolute values of Sk<3 and Ku<7 were considered indicative of adequate psychometric sensitivity of the items (i.e., data normality was assumed).

Construct validity - To verify the fitting of the proposed theoretical model to the study sample, a confirmatory factor analysis (CFA) was performed. Weighted least square mean and variance adjusted estimator (WLSMV) method was used. The chi-square by degrees of freedom ratio (χ^2/df), comparative fit index (CFI), Tucker-Lewis index (TLI), and root mean square error of approximation (RMSEA) were used to assess the fit of the model to the data[45,46]. The fit was considered acceptable when $\chi^2/df \leq 5.0$, CFI and TLI≥0.90, and RMSEA≤0.10[46]. The factor loadings (λ)≥0.50 were considered adequate. When the fit was not acceptable, modification indices were calculated using the Lagrange multiplier (LM) method. LM values >11 were inspected. Convergent validity was assessed using the average variance extracted (AVE) to verify whether items associated with the factor are strongly saturated within the factor[46]. The AVE was estimated using Fornell and Larcker[47] proposal and considered adequate if ≥0.50. The analyses were performed using the MPLUS software, Version 7.2 (Muthén and Muthén, Los Angeles, CA).

Factorial invariance - The invariance was evaluated by multiple groups analysis, performed in MPLUS, to evaluate if the factor mean is maintained in independent samples. The model obtained for the study sample ("Test Sample") was compared with the model fitted to an independent sample ("Validation Sample") from the same population. The CFI difference test (ΔCFI) was used to compare factor loading (λ), thresholds (t), and residual variance/covariance (Cov/Res). CFI values of the configural model (M0), the factor loading model (M1), the thresholds model (M2), and the residuals model (M3) were considered. Invariance was confirmed when the difference in CFI (ΔCFI) was less than -0.01[48].

Reliability - The composite reliability (CR)[47] and the ordinal coefficient alpha (α) were used. Values ≥0.70 were considered adequate[46]. To calculate α, the R program (R Core Team) was used.

Comparison of the ABS scores - Scores were calculated using the arithmetic mean of the responses given to the items of the ABS model fitted to the data. Sex (male *vs.* female) and sample characteristics of interest (weight loss diet, substances use, and dietary supplements use: never *vs.* once in life/sometimes/often; economic stratum: low [C/D-E] *vs.* high [A/B]; self-perceived quality of eating habits: poor/fair *vs.* normal/good/excellent; age: younger [<30 years old] *vs.* older [≥30 years old]; practice of physical exercise: no *vs.* yes; and nutritional status: eutrophic [BMI: 18.4 kg/m²-24.9 kg/m²] *vs.* overweight/obesity (BMI≥25.0 kg/m²) were considered as independent variables. Due to the large sample size, normality was assessed from psychometric sensitivity of the items[49]. Homoscedasticity of the data was verified using Levene's test (p=0.150-0.939). The scores were compared using two-way analysis of variance (ANOVA; Factor 1: sex; Factor 2: sample characteristic) implemented in SPSS Statistics. The effect size was estimated from η^2_p. The significance level adopted was 5%.

Results

A total of 1,170 people participated in the study. However, 114 individuals were excluded because they did not answer one or more ABS items. Thus, the final sample was composed of 1,056 individuals. Missing data was not imputed because the sample was large enough. Table 1 shows the sample characterization.

Most participants reported never taking substances or supplements for weight loss, practicing physical activity, considering their eating habit as having normal/good quality, and belonging to the A and B economic class. Table 2 presents the descriptive statistics of the answers to the ABS items. The psychometric sensitivity of the items was considered adequate and the data was normally distributed.

Despite adequate fit of the complete model (λ=0.257-0.826; χ^2/df=7.09; CFI=0.98; TLI=0.98; RMSEA=0.08), item 3 presented unsatisfactory factor loading (λ=0.257). Thus, item 3 was excluded, which resulted in a refined model with adequate fit and factor loading (λ=0.524-0.821; χ^2/df=7.75; CFI=0.99; TLI=0.98; RMSEA=0.08). Although the values of χ^2/df were high, probably due to the large sample size, they should not be considered alone for accepting or rejecting the model fit[46]. Convergent validity (AVE=0.51) and reliability (α=0.81; CR=0.86) of the refined model were adequate. The multiple group analysis (Test: n=528 *vs.* Validation: n=528) resulted in small CFI difference (ΔCFI_{M1-M0}=-0.003; ΔCFI_{M2-M1}=0.002; ΔCFI_{M3-M2}=0.001) indicating the strong invariance of the model.

Table 3 presents the comparison of the ABS scores between sexes and sample characteristics.

Table 1. Participants Characteristics (mean ± standard deviation or n (%)).

Characteristic	Total Sample (n=1,056)	Male Sample (n=304)	Female Sample (n=752)
Age (years)	26.06 ± 6.36	25.72 ± 6.27	26.12 ± 6.43
Body mass index (kg/m²)	24.3 ± 4.72	25.21 ± 5.04	23.99 ± 4.54
Substance use			
Never	603 (57.1)	177 (58.2)	426 (56.6)
Once in lifetime	106 (10.1)	28 (9.2)	78 (10.4)
Sometimes	296 (28.0)	82 (27.0)	214 (28.5)
Often	51 (4.8)	17 (5.6)	34 (4.5)
Supplements use			
Never	497 (47.1)	117 (38.5)	380 (50.5)
Once in lifetime	109 (10.3)	31 (10.2)	78 (10.4)
Sometimes	324 (30.7)	108 (35.5)	216 (28.7)
Often	126 (11.9)	48 (15.8)	78 (10.4)
Practice of physical activity			
Yes	624 (59.1)	96 (31.6)	336 (44.7)
No	432 (40.9)	208 (68.4)	416 (55.3)
Weight loss diets			
Never	360 (34.1)	112 (36.9)	248 (33.0)
Once in life	156 (14.8)	43 (14.1)	113 (15.0)
Sometimes	463 (43.8)	134 (44.1)	329 (43.8)
Often	77 (7.3)	15 (4.9)	62 (8.2)
Self-perceived quality of eating			
Poor	78 (7.4)	22 (7.2)	56 (7.4)
Fair	272 (25.8)	66 (21.7)	206 (27.4)
Normal	381 (36.0)	130 (42.8)	251 (33.4)
Good	286 (27.1)	68 (22.4)	218 (29.0)
Excellent	39 (3.7)	18 (5.9)	21 (2.8)
Economic Class (average household income)*			
A (R$ 20,888.00)	260 (24.6)	83 (27.3)	177 (23.5)
B (R$ 7,053.00)	561 (53.1)	156 (51.3)	405 (53.9)
C (R$ 2,165.00)	226 (21.4)	63 (20.7)	163 (21.7)
D-E (R$ 768.00)	9 (0.9)	2 (0.7)	7 (0.9)

*R$=BRL; 1USD=4.19 BRL[32].

Source: Authors.

Table 2. Descriptive statistics of the answers to the Attention to Body Shape Scale (ABS) by the participants of the Total Sample (n=1,054), Male Sample (n=304), and Female Sample (n=752).

Item	Total Sample/Male Sample/Female Sample						
	Mean	Median	Standard deviation	Skewness	Kurtosis	Minimum	Maximum
1	3.63/3,48/3.72	4.0/4.0/4.0	1.23/1.21/1.22	-0.48/-0.40/-0.56	-0.75/-0.73/-0.68	1/1/1	5/5/5
2	2.12/2.00/2.17	2.5/1.5/2.0	1.31/1.22/1.34	0.90/1.01/0.84	-0.40/-0.03/-0.54	1/1/1	5/5/5
3	4.07/4.04/4.09	4.0/4.0/5.0	1.12/1.09/1.14	-1.06/-1.06/-1.08	-0.30/0.50/0.27	1/1/1	5/5/5
4	3.38/3.30/3.44	3.0/3.0/4.0	1.39/1.37/1.40	-0.30/-0.26/-0.36	-1.18/-1.12/-1.19	1/1/1	5/5/5
5	3.41/2.83/3.65	4.0/3.0/4.0	1.46/1.46/1.40	-0.42/0.08/-0.68	-1.18/-1.35/-0.83	1/1/1	5/5/5
6	3.20/2.99/3.29	3.0/3.0/3.0	1.50/1.46/1.50	-0.16/0.18/-0.26	-1.39/-1.33/-1.38	1/1/1	5/5/5
7	3.25/3.20/3.29	3.0/3.0/3/0	1.36/1.36/1.36	-0.19/-0.21/-0.20	-1.12/-1.10/-1.12	1/1/1	5/5/5

Source: Authors.

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Table 3. Comparison of the mean scores (± standard deviation) of to body shape according to sex and sample characteristics.

Characteristic (F2)	Sex (F1)		Total	ANOVA*			
	Male	Female		Factor	F	p	η^2_p
Weight loss diets							
Never	2.53±0.99	2.80±1.01	2.72±1.01[a]	F1	16.58	<0.001	0.016
Once in life/sometimes/often	3.23±0.91	3.49±0.89	3.41±0.90[b]	F2	109.47	<0.001	0.094
Total	2.97±1.00[A]	3.26±0.98[B]		F1 X F2	0.02	0.890	<0.001
Substance use							
Never	2.64±0.94[Aa]	3.04±0.98[Ba]	2.92±0.98	F1	16.46	<0.001	0.015
Once in life/sometimes/often	3.42±0.90[Ab]	3.55±0.91[Ab]	3.51±0.91	F2	98.88	<0.001	0.086
Total	2.97±1.00	3.26±0.98		F1 X F2	4.40	0.036	0.004
Supplement use							
Never	2.43±0.90[Aa]	2.99±0.98[Ba]	2.86±0.99	F1	37.74	<0.001	0.035
Once in life/sometimes/often	3.30±0.91[Ab]	3.54±0.91[Bb]	3.46±0.91	F2	120.58	<0.001	0.103
Total	2.97±1.00	3.26±0.98		F1 X F2	6.68	0.010	0.006
Economic Class							
Low	2.76±1.03	3.11±1.05	3.01±1.05[a]	F1	14.94	<0.001	0.014
High	3.02±0.98	3.31±0.96	3.22±0.97[b]	F2	7.99	0.005	0.008
Total	2.97±1.00[A]	3.26±0.98[B]		F1 X F2	0.14	0.707	<0.001
Self-perceived quality of eating							
Poor/fair	2.75±0.89	3.19±0.98	3.08±0.98[a]	F1	22.06	<0.001	0.021
Normal/good/excellent	3.06±1.03	3.30±0.98	3.23±1.00[b]	F2	8.43	0.004	0.008
Total	2.97±1.00[A]	3.26±0.98[B]		F1 X F2	1.84	0.175	0.002
Age							
Younger	3.00±0.98	3.25±0.98	3.18±0.98	F1	19.38	<0.001	0.018
Older	2.85±1.05	3.29±1.00	3.17±1.03	F2	0.56	0.456	0.001
Total	2.97±1.00[A]	3.26±0.98[B]		F1 X F2	1.56	0.212	0.001
Practice of physical activity							
No	2.42±0.93	2.93±0.97	2.81±0.98[a]	F1	37.43	<0.001	0.034
Yes	3.22±0.92	3.53±0.91	3.43±0.92[b]	F2	111.65	<0.001	0.096
Total	2.97±1.00[A]	3.26±0.98[B]		F1 X F2	2.19	0.139	0.002
Nutritional status							
Eutrophic	2.99±0.98	3.26±0.99	3.19±0.99	F1	21.70	<0.001	0.021
Overweight/obesity	2.99±1.00	3.38±0.96	3.24±0.99	F2	0.73	0.393	0.001
Total	2.99±0.99[A]	3.30±0.98[B]		F1 X F2	0.69	0.408	0.001

*Anova: Analysis of variance, η^2_p: partial eta square; [AB]different capital letters indicate statistical difference between values on the same row; [ab]different lowercase letters indicate statistical difference between values in the same column.

Source: Authors.

Despite the significant interaction between sex and substance use and sex and supplement use, it was at the limit of significance (p=0.010-0.036) and the effect size was small (η^2_p=0.004-0.006). Therefore, this significance may be related to the sample size. Thus, it was decided to analyze the factors independently. Women and people who used substances and supplements for weight loss, who practice physical activity, and who reported having already been on a weight loss diet presented higher scores of attention to body shape.

Discussion

The present study contributes to both researchers and professionals in the field of Health and Nutrition by providing the Portuguese version of the ABS. In addition, we verified that a refined model of the scale presented validity and reliability to Brazilian data. Finally, we found that different sample characteristics affect the ABS scores. These findings may be important for future clinical and epidemiological protocols that aim to

develop educational and preventive strategies to treat or minimize the negative outcomes related to eating disorders and negative body image in the population.

During the process of transcultural adaptation of the ABS to Portuguese, the cultural adequacy of the term "*self-conscious*" (item 3) was challenging, which can have resulted in the low factor loading for this item. Further content analysis strategies are suggested in future studies to re-evaluate the construction of this item and obtain semantic and idiomatic equivalence between the original and the Portuguese versions of the tool.

The refined factorial model of the ABS had a good fit to the data and was invariant in independent samples, confirming that its use is adequate in adult individuals. Comparing these findings with those of other studies is difficult, since no study has verified the fit of the ABS factorial model to other samples using a confirmatory strategy. The two studies that verified the factorial validity of the ABS used others strategies (e.g., correlations between the total scores of the ABS and other instruments). The study by Beebe[13] conducted in an American population sample, and by Kagawa, Uchida[19] in a Japanese population evaluated the reliability of the ABS and, as in our study, they also found good results. These studies indicated that the ABS is a valid and reliable tool to assess body shape attention in adults from different cultures and contexts.

Our results also showed that most individuals are aware of their body shape, which corroborates previous data[21,22]. The greater attention to body shape found among females in our results is supported by the literature. Lokken *et al.*[21], Beebe[13] and Lonergan *et al.*[50] highlight that this finding might be related to the strong pressure women endure from culture and society to have a body in accordance to specific standards. The finding that individuals taking substances (e.g., medication) or supplements and dieting to improve their body shape have a higher body focus is in accordance with previous studies[19,28,51]. People with an exaggerated concern with their body shape tend to seek ways to change how their bodies look based on what society considers ideal by using strategies such as the ones evaluated[52]. The practice of physical activity was related to a greater attention to body shape, as supported by the literature[53]. Exercise is related to an increased focus on the appearance of the body. As argued by Corazza *et al.*[51] individuals who aim a "perfect" body see the practice of physical activity as a way to achieve that wish, without necessarily considering aspects related to health and well-being.

Thus, the significant relationship between attention to body shape and the studied independent variables indicates the importance of such variables in later studies to broaden the scenario for tracking clinical conditions and body shape-related behavior. We believe that these results can assist in the identification of risk groups for dysfunctional behaviors in relation to body image and eating. However, despite the significant differences found, we suggest caution in interpreting the findings of this study since the effect size was small, giving a low practical significance to the results.

This study has some limitations. First, there was a difficulty in the cultural adaptation of item 3 to Portuguese language, which may have influenced its suitability for the ABS factorial model. Second, the cross-sectional study design does not allow establishing a temporal relationship of cause and effect; however, it allowed the identification of characteristics that should be considered in intervention studies. Third, the use of a convenience sample limits the generalizability of the results to populations with different characteristics from the sample used. In this way, we suggest that future studies replicate our research protocol in other contexts (e.g., in coastal regions where body exposure may be greater). Fourth, only people with eating disorders were excluded, which may have contributed to the inclusion of individuals with other conditions (e.g., anxiety disorder) that may influence attention to the shape of the body. Fifth, we did not evaluate the sexual orientation of the participants, which may be relevant in future studies. Despite these limitations, the ABS was shown to be a simple and fast tool to measure attention to body shape, producing valid and reliable data from a refined model. It is hoped that this study can increase the understanding about attention to body shape in the Brazilian population, which can be an important aspect in people's lives.

Collaborations

PA Teixeira worked from the conception of the study to the final writing of it. WR Silva collaborated with the research both in the data collection and in the methodology, as well as in the review of the study. LA Campos worked with data collection, in addition performed some necessary analyzes. J Marôco collaborated with support in the programs used and the study methodology, as well as in the final review. JADB Campos worked supervising each stage of the research, thoroughly reviewing the study.

Acknowledgments

This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Finance Code 001 and Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP; Grant #2018/21467-8, #2017/20315-7, #2018/06739-1 and #2019/19590-9).

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Article submitted 01/10/2020
Approved 17/04/2021
Final version submitted 19/04/2021

Chief editors: Romeu Gomes, Antônio Augusto Moura da Silva