

Cross-cultural adaptation, validation and reliability of the *Body Area Scale* for Brazilian adolescents

Adaptação transcultural, validação e confiabilidade da *Body Area Scale* para adolescentes brasileiros

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Abstract

The aim of this study was to translate, validate and verify the reliability of the Body Area Scale (BAS). Participants were 386 teenagers, enrolled in a private school. Translation into Portuguese was conducted. The instrument was evaluated for internal consistency and construct validation analysis. Reproducibility was evaluated using the Wilcoxon test and the coefficient of interclass correlation. The BAS demonstrated good values for internal consistency (0.90 and 0.88) and was able to discriminate boys and girls according to nutritional state ($p = 0.020$ and $p = 0.026$, respectively). BAS scores correlated with adolescents' BMI ($r = 0.14$, $p = 0.055$; $r = 0.23$, $p = 0.001$) and WC ($r = 0.13$, $p = 0.083$; $r = 0.22$, $p = 0.002$). Reliability was confirmed by the coefficient of inter-class correlation (0.35, $p < 0.001$; 0.60, $p < 0.001$) for boys and girls, respectively. The instrument performed well in terms of understanding and time of completion. BAS was successfully translated into Portuguese and presented good validity when applied to adolescents.

Validation Studies; Body Image; Adolescent

Introduction

The body image is a multifaceted construct, defined as perceptions and attitudes regarding one's own body appearance, involving thoughts, beliefs, feelings, and behaviors ¹. Its assessment is based on verifying the degree of dissatisfaction and satisfaction a subject reports in regard to his or her body, which includes the evaluation of beliefs ^{2,3}.

Adolescence is a critical period in the development of one's body image, when several intertwining factors, including pubertal development, awakening for sexual activity and enhancement of one's societal role, may in conjunction exert influence over this process ⁴.

So far, few epidemiological studies from developed countries have investigated the multi-dimensional aspects of body image among adolescents. Among US girls for instance, 40 to 70% reported dissatisfaction with at least two of their body parts. Evidence from other surveys show that 50 to 80% of girls wish they were slimmer, while 20 to 60% report being on diets ⁵. In contrast, boys would rather be taller and stronger, and express dissatisfaction with their weights and shapes of their entire bodies, as well as of body parts ⁵.

Among the scarce Brazilian data on this subject, studies by Conti et al. ^{6,7} and Pinheiro & Giugliani ⁸ apparently confirm those findings. In the former two surveys, girls and boys reported

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being unhappy with several of their body parts, whereas in the latter, 82% of interviewees reported dissatisfaction with their body image – namely, 55% of girls wished they were slimmer and 28% of boys would like to be bigger.

Dissatisfaction with their bodies among youth, and the particular wish that boys express to grow stronger have been shown to have an association with the development of eating disorders and depression⁹. Therefore, early detection of such dissatisfaction may be useful for the establishment of prevention measures, as well as for the management of eating disorders and depression among adolescents.

A critical issue for body image research concerns the selection of accurate and trustworthy instruments¹⁰. According to Thompson¹⁰, there are at least 50 measurement tools available. However, few have been properly evaluated. Investigators must first clarify which specific dimension of body image is of their particular interest so as to opt for a tool that, given its psychometric properties, will enable proper evaluation. Among available instruments, questionnaires and scales have been the most widely used, due to their practical applicability and readiness for correction, and also because they allow for epidemiological surveys with large population samples¹¹. When targeting adolescents, commonly used tools include the silhouette and the body parts scales, as well as questionnaires¹² that address multiple aspects of body image, including affective, behavioral and cognitive components.

One of these instruments is the *Body Area Scale* (BAS)¹³, defined as an assessment technique of attitudinal accuracy, capable of evaluating satisfaction with one's weight and with different body parts, therefore capturing comprehensive information on one's body image. In addition, it has been shown to be easily understandable and feasible for application in clinical practice and research. Though originally used to survey young women, this instrument has also been applied to adolescents^{6,7,14,15}. Validation of the scale by Richards et al.¹⁶ revealed satisfactory scores for both US adolescent girls and boys.

Given that there are no validated scales for the assessment of body image among Brazilian adolescents, as well as the lack of validity and reliability studies, in the present survey we have aimed at translating the BAS into Portuguese, and at validating and verifying its reliability when applied to Brazilian adolescents.

Methods

This is a methodological study¹⁷, carried out in 2006, at a private educational institution located in São Bernardo do Campo, São Paulo State, Brazil, as part of a broader project of validation of epidemiological methods to assess body image among adolescents^{15,18}.

The sample comprised all students who attended Junior and Senior High School at that institution, with ages ranging from 10 to 17 years old.

The BAS document underwent cross-cultural adaptation^{19,20,21}, as follows: (1) translation – at first the original English document was independently translated into Portuguese by two experienced researchers, who were fluent in English; (2) synthesis – based on the two translated documents, both researchers agreed upon a consensus Portuguese version; (3) back-translation – the consensus version was then back-translated into English by a scholar, who is an English native speaker; (4) discussion with experts was then carried out for analysis of semantic, idiomatic, experiential and conceptual equivalences; (5) the final version of the document was completed (Figure 1).

The BAS comprises 24 items and the satisfaction degree for each is assessed using a Likert scale: 1 – very satisfied; 2 – fairly satisfied; 3 – neutral; 4 – fairly dissatisfied; and 5 – very dissatisfied. The final score equals the total number of body areas the subject is dissatisfied with (rated 4 and 5). Scores range thus from zero (none) to 24 (all areas), and the higher the score, the more dissatisfied the adolescent.

The questionnaire was applied collectively in the classroom, followed by anthropometric assessment, according to the methods proposed by Gordon et al.²². Soon after completing assessment, a second interview was scheduled for three weeks thereafter¹¹. The first author (M.A.C.) conducted these procedures.

Two measurements of weight, height, waist circumference (WC) and waist-hip ratio (WHR) were carried out, and the mean values used for analysis. Classification of nutritional status was accomplished, according to World Health Organization (WHO) recommendations²³ for this particular age group: (1) underweight < 5th percentile; (2) eutrophic between 5th percentile and 85th percentiles; (3) at risk of overweight ≥ 85th percentile and < 90th percentile; and (4) obese ≥ 90th percentile.

In order to verify their degree of understanding, adolescents were asked to answer the following question after filling out the questionnaire: “*Did you understand what has been asked for*

Figura 1

Model of the *Body Area Scale*.

Body characteristics	1 Very satisfied	2 Moderately satisfied	3 Neutral	4 Moderately dissatisfied	5 Very dissatisfied
Facial complexion					
Ears					
Chest					
Profile					
Weight					
Eyes					
Height					
Ankles					
Waist					
Arms					
Legs					
General appearance					
Hips					
Shoulder					
Mouth					
Neck					
Teeth					
Nose					
Chin					
Hair texture					
Body built					
Hair color					
Thighs					
Face					

in this scale?"²⁴. The answers were of the Likert scale type: 0 – I did not understand anything; 1 – I understood a little; 2 – I understood so-so; 3 – I understood almost everything, but I had some doubts; and 4 – I understood perfectly and I do not have any doubts. The time spent to fill out the instrument was recorded.

The sample size calculation was based on a $\alpha = 5\%$ and $\beta = 10\%$ to detect correlation coefficients of 0.40 to 0.60^{11,15}, requiring a minimum participation of 62 adolescents of each gender.

For descriptive analysis, variable minimum and maximum values were reported, and means and standard deviations calculated. In case variables of interest were not normally distributed (Kolmogorov-Smirnov test), non-parametric tests were used for statistical analyses. In addition,

the Kruskal-Wallis test was used when variances differed between groups.

BAS psychometric properties were verified for internal consistency (Cronbach's α coefficient), discriminant validity, as well as for reliability. In the discriminant validity analysis, one aims at verifying whether the instrument was able to properly differentiate groups of particular interest¹⁸. Therefore, we compared BAS mean scores among the four study groups: underweight, eutrophic, overweight and obese adolescents²³, using the Kruskal-Wallis analysis of variance. Obese adolescents were expected to report more dissatisfaction when compared to others^{7,8,24,25,26,27}, and this was evaluated using the Spearman correlation coefficient between the BAS score and the adolescent's body mass

index (BMI), WC and WHR. We expected adolescents with higher BMI, WC or WHR to exhibit greater dissatisfaction.

Reliability was assessed comparing mean BAS scores obtained at two time points (test-retest), using the Wilcoxon test and the intra-class correlation coefficient ($r_{\text{intra-class}}$). For verbal comprehension analysis we calculated mean values and standard deviations. Time analysis recorded the average time spent in filling out the instrument. All analyses were conducted separately for both genders.

The present study followed *Regulation no. 196/96* from the National Health Council and its protocol was approved by the Ethical and Research Committee of the Faculty of Public Health of the University of São Paulo. Participation in the study was fully voluntary and written informed consent was obtained from study subjects and/or their legal guardians.

Results

Translation

The translation and the back-translation¹⁹ were undertaken resolving any disagreements with the original version.

Characterization of the study population and description of BAS results

The study sample comprised 386 adolescents, 53.9 % of whom were females. Mean ages and standard deviations (in brackets) were 13.8 years old (2.0) and 13.9 years old (2.2) for boys and girls, respectively.

Regarding weight, height and BMI, their mean values and standard deviations were 59.3kg (16.4kg), 163.8cm (11.8cm), 21.9 (4.6) and 55.8kg (11.5kg), 158.8cm (7.5cm), 22.0 (3.7), for boys and girls, respectively.

Body areas with the highest frequency of dissatisfaction were: weight (49%, 17.4%), waist (23.6%, 11.2%), legs (20.2%, 10.7%) and body type (17.8%, 9%), for girls and boys, respectively. BAS scores ranged from 0 to 24, mean 2.5 (SD = 3.1), median 1.5.

Validity and reproducibility

Internal consistency yielded Cronbach's α coefficients of 0.90 and 0.88, respectively for boys and girls. In the discriminant analyses, a statistically significant difference was found among mean scores from the four study groups ($p = 0.020$ and $p = 0.026$, respectively for boys and girls). After

stratification of the study population in early (10-14 years old) and intermediate (15-17 years old) adolescence²³, mean BAS scores were shown to differ significantly among the four study groups for boys ($p = 0.007$) and girls ($p = 0.030$) in early adolescence (Table 1).

Additionally, statistically significant correlations were found between scores obtained from the BAS scale and adolescents' BMI ($r = 0.14$, $p = 0.055$; $r = 0.23$, $p = 0.001$) and WC ($r = 0.13$, $p = 0.083$; $r = 0.22$, $p = 0.002$), for boys and girls, respectively. In early adolescence BAS scores were correlated with boys' BMI ($r = 0.18$, $p = 0.058$), WC ($r = 0.28$, $p = 0.028$) and WHR ($r = 0.19$, $p = 0.0430$), and with girls' BMI ($r = 0.27$, $p = 0.002$).

In the reliability assessment, there were no losses from follow-up between test and retest and there was a statistically significant difference in mean scores (sd) obtained at the two time points. Moreover, there was a correlation between scores obtained at test and retest, both for boys and girls (Table 2).

It took a mean time of two minutes to have the scale applied, and the instrument's mean verbal comprehension score was 3.5 (maximum 4.0).

Discussion

BAS is considered a technique of attitudinal assessment of one's body image that is focused on the degree of personal satisfaction or dissatisfaction with different body areas. The present study aimed at translating BAS into Portuguese and at evaluating its psychometric properties. Our results show that its Portuguese translation performed well in almost all assessments, including validation, reliability and verbal comprehension, when applied to a sample of adolescents.

This investigational tool has been previously used in body image research to address different target groups. In the original study¹³, young adults were interviewed and 4 scales (satisfaction – body areas, importance – body areas, physical attractiveness to the opposite sex – body areas, and self concept scale) were applied. Rosenblum & Lewis¹⁵ later applied this same instrument to investigate body image among adolescents of both sexes, aged from 13 to 18 years, adopting the same experimental procedures we used in this study.

It should be highlighted that though adolescence is characterized by significant biological, physical, social and psychological changes, adolescents are expected to present enough cognitive maturity to be able to understand and analyze abstract questions, such as those included in the BAS questionnaire. Accordingly, verbal

Table 1

Summary of evidence of validity and reliability of the *Body Area Scale* according to age groups: early (10-14 years old) and intermediate (15-17 years old) adolescence. São Bernardo do Campo, São Paulo State, Brazil, 2006.

Analysis	Statistics	Male				Female			
		Early adolescence	p	Intermediate adolescence	p	Early adolescence	p	Intermediate adolescence	p
Internal consistency	α Cronbach	0.91		0.87		0.88		0.86	
Discriminant validation									
Underweight	average (sd)	2.0 (4.0)	0.007	1.5 (2.1)	0.575	1.9 (2.7)	0.030	3.1 (3.1)	0.314
Eutrophic		1.7 (3.4)		1.5 (1.9)		2.8 (3.1)		3.9 (2.6)	
Overweight		2.2 (2.3)		1.0 (1.5)		4.0 (3.0)		2.4 (1.5)	
Obese		4.6 (1.5)		2.5 (2.2)		7.0 (3.4)		3.1 (3.1)	
Convergent validation									
BMI	r (p)	0.18	0.058	0.07	0.586	0.27	0.002	0.10	0.372
WHC		0.19	0.043	-0.16	0.214	0.04	0.629	0.19	0.082
WC		0.28	0.028	-0.10	0.440	0.24	0.007	0.08	0.505
Reliability test (retest)	average (sd)	1.88 (3.34)	< 0.001	1.57 (1.87)	0.002	2.99 (3.14)	0.184	3.14 (2.94)	0.028
		1.42 (3.34)		0.98 (2.16)		2.79 (3.33)		2.56 (3.27)	
	r_{icc} (p)	0.28	0.002	0.65	< 0.001	0.78	< 0.001	0.30	0.007
Time (minutes)	average (sd)	2.04 (0.86)		1.99 (0.84)		2.23 (0.80)		1.99 (0.83)	
Oral comprehension	average (sd)	3.5 (0.3)		3.7 (0.8)		3.7 (0.4)		3.5 (0.9)	

BMI: body mass index; WHC: waist to hip ratio; WC: waist circumference.

Table 2

Summary of evidence of validity and reliability of the *Body Area Scale* for boys and girls. São Bernardo do Campo, São Paulo State, Brazil, 2006.

Analysis	Statistics	Male	p	Female	p
Internal consistency	α Cronbach	0.90		0.88	
Discriminant validation					
Underweight	average (sd)	1.9 (3.6)	0.020	1.9 (2.7)	0.026
Eutrophic		1.6 (3.0)		2.9 (3.1)	
Overweight		1.7 (2.1)		3.9 (2.6)	
Obese		3.4 (2.1)		4.4 (3.4)	
Convergent validation					
BMI	r (p)	0.14	0.055	0.23	0.001
WHC		0.09	0.248	0.01	0.167
WC		0.13	0.083	0.22	0.002
Reliability test (retest)	average (sd)	1.77 (2.89)	< 0.001	3.05 (3.05)	0.015
		1.26 (2.96)		2.70 (3.29)	
	r_{icc} (p)	0.35	< 0.001	0.60	< 0.001
Time (minutes)	average (sd)	2.0 (0.8)		2.1 (0.8)	
Oral comprehension	average (sd)	3.6 (0.6)		3.7 (0.4)	

BMI: body mass index; WHC: waist to hip ratio; WC: waist circumference.

understanding of this assessment tool in our cohort was close to maximal for all study groups.

However, it is important to point out that assumptions have to be made when conducting research on body image. In the absence of actual “gold standards” to be used, validation of research instruments usually relies on measurement of more objective anthropometric parameters, such as weight and BMI^{3,11,13,28,29,30,31}. In doing so, investigators assume that overweight and obese adolescents would report a greater degree of dissatisfaction with their body appearances. However, this approach might not be fully appropriate. Objective measurements of weight and height may not necessarily correlate with subjective concepts, such as satisfaction with one’s body. This methodological limitation should therefore be taken into account in the interpretation of our results.

BAS was translated into Portuguese and did not show disagreement with the original English instrument. The internal consistency of our translated BAS was shown to be significant, yielding very close values to those reported in the original study (0.89) and in the survey by Richards et al.¹⁶ values of 0.93 and 0.87 for boys and girls, respectively.

As for its discriminant validity, BAS was able to discriminate among the four groups of our study, and BAS scores were shown to be significantly correlated with adolescents’ BMI and WC, but not with WHR, either for boys or girls. It should be noted, though, that even when statistically significant, low correlation values were seen, most likely because some of the constructs that are evaluated by the scale, such as “teeth”, or “skin color” may not be associated with objective measurements of BMI, WC and WHR. As these analyses were not carried out in the studies by Rosenblum & Lewis¹⁵ and Richards et al.¹⁶ no comparison is feasible, even though one may assume that WHR is not the most suitable parameter for this kind of analysis. In order to clarify this particular aspect, we believe further studies are warranted.

It is also important to highlight the gender differences that were seen in convergent and discriminant analysis, as the instrument had a better performance among obese girls as compared to obese boys, particularly in early adolescence. Even though body dissatisfaction is known to often emerge in the discourse of adolescent boys and girls³¹, there are relevant and complex gender differences in the understanding of such dissatisfaction. In developed countries 40 to 70% of adolescent girls express dissatisfaction with their bodies and over 50% wish to be slimmer³². In contrast, conclusive data are still unavailable

for boys. Some studies point out that their body dissatisfaction is expressed mainly as a wish to either be slimmer or to get stronger (body building), enhancing their muscle mass²⁶. In our study such differences were noticed and girls in all age groups, as well as boys in early adolescence turned out to be more dissatisfied with their nutritional status.

Regarding reliability, BAS did not show good results when mean scores were compared at test-retest, even though point estimates were very close. Nevertheless, boys were more likely to be less consistent in their answers when both time points were considered. This might relate to the fact that boys at this age tend to be less attentive to their body features, as compared to girls. In the intra-class correlation, observed values were reasonable. In previous studies, reproducibility data were not described, hindering any possible comparison with our results.

The mean time for completion and BAS’s verbal comprehension were shown to be good, revealing further satisfactory features of the translated scale.

In summary, BAS was successfully translated into Portuguese and we conclude that the instrument’s translated version presented good validity and reasonable reliability, when applied to adolescents.

Final comments

Research on body image should be particularly attentive to what aspects (eg.: size, weight, muscular composition), and dimensions (eg.: affective, cognitive, behavioral, perception) of this construct are relevant in each study¹². Particular features of the studied population are also critical when deciding which assessment tool to use. Especially for adolescents, time-consuming instruments should be avoided. Furthermore, research tools must be validated and reliable so as to ensure answers will be correctly interpreted.

We have demonstrated that the Portuguese version of BAS meets some of these criteria when applied to adolescents. It not only provided information on their satisfaction with their body images, but it was also shown to be easily understandable and readily applicable. Psychometric results obtained with BAS were quite reasonable, rendering it useful in clinical practice and research.

Further studies are however warranted, using distinct target populations and applying other comparison measures in order to provide a more thorough assessment of its usefulness as a measurement instrument for the body image construct.

Resumo

O objetivo do estudo foi traduzir, validar e confirmar a confiabilidade da Escala de Áreas Corporais (EAC). Participaram 386 jovens de uma escola particular de ensino. Avaliou-se a consistência interna e a validade de constructo. Para confiabilidade, utilizou-se o teste de Wilcoxon e o coeficiente de correlação intraclasse. A EAC apresentou bons valores na consistência interna (0,90 e 0,88) e foi capaz de discriminar meninos e meninas, segundo o estado nutricional ($p = 0,020$ e $p = 0,026$), respectivamente. Correlacionou-se com o índice de massa corporal ($r = 0,14$, $p = 0,055$; $r = 0,23$, $p = 0,001$) e a circunferência da cintura ($r = 0,13$, $p = 0,083$; $r = 0,22$, $p = 0,002$). No reteste confirmou-se sua confiabilidade por meio da correlação intraclasse (0,35, $p < 0,001$; 0,60, $p < 0,001$), respectivamente para meninos e meninas. Verificou-se boa compreensão e tempo de conclusão. A EAC encontra-se traduzida, apresentando boa validade para aplicação na população adolescente.

Estudos de Validação; Imagem Corporal; Adolescente

Contributors

M. A. Conti designed the study and participated in the data collection, article write up and statistical analysis. M. R. D. O. Latorre participated in the design of the study, statistical analysis and revised the article. N. Hearst conducted the back-translation and revised the article. A. Segurado wrote up and revised the article.

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