

# Photo Silhouettes for Assessment of Body Image of Bodybuilders



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## ABSTRACT

**Introduction:** Recent studies on body image have proposed sets of silhouettes with the characteristics of specific groups. Sets of silhouettes specifically developed to depict in detail the body structures of bodybuilders have not been developed yet. **Details are essential to this sport. Objective:** to propose a specific set of silhouettes to bodybuilders, composed of photos (photo silhouettes). **Method:** The study was structured in three phases: 1) photos of bodybuilders, selection and organization of the photos by the researchers; 2) organization of the photos by professors and bodybuilding coaches; 3) application of the proposed set of photo silhouettes. **Results:** Phase 1 – the BMI values were distributed in increasing order (BMI from 24.1 to 35.6 kg/m<sup>2</sup>); Phase 2 – six physical education teachers and six bodybuilding coaches participated and all of them organized the photo silhouettes in the same increasing order proposed by the researchers. Phase 3 – 20 bodybuilders participated; only one of them did not point the set of photo silhouettes proposed as the preferred for the perceptive assessment of body image. **Considering the three silhouettes attributed by the researchers, intraclass correlation of 0.92 was observed. Comparing the silhouette mean attributed by the researchers (3.8 +/- 1.0) and the mean attributed by athletes (3.9 +/- 1.0) significant difference and a correlation of 0.75 (p<0.05) have not been found. Conclusion:** It was concluded that the set of photo silhouettes is valid for the study of perceptive dimension of the body image of bodybuilders concerning the identification of the current silhouette.

**Keywords:** body mass index, anthropometry, body image perception.

## INTRODUCTION

Body image is understood as a multidimensional construct which widely describes the inner representations of the body structure and physical appearance, regarding oneself as well as the others<sup>(1,2)</sup>. According to Cash and Pruzinsky<sup>(1)</sup>, body image is composed of four domains: cognitive, affective, behavioral and perceptive. The perceptive domain has been frequently used in the health field in a trial to evaluate how the individual perceives the shape and/or size of his/her body<sup>(3-5)</sup>.

There are many methods which assess the perceptive dimension of body image. The simplest use sets of silhouettes, which consist of a set of photos or drawings of bodies, representing several body sizes and generally contain from seven to nine images, which range from the thinnest to the most obese or from the weakest to the strongest, and can be of children, adolescents and adults<sup>(1,4,6)</sup>. The sets of silhouettes are generally devised to assess specific groups of the population, as in the case of the group proposed by Stunkard et al.<sup>(7)</sup>, who aim to assess the body image of obese individuals and the one proposed by Pulvers et al.<sup>(8)</sup> who propose a set of silhouettes for African-American men and women.

In a trial to fulfill the specificity of bodybuilding practitioners, some studies have recently presented new sets of silhouettes with the aim to assess the level of muscularity<sup>(9-11)</sup>. In one of these studies, Lima et al.<sup>(11)</sup> aimed to verify the optimum silhouette of bodybuilding practitioners and therefore developed a set of silhouettes in which individuals were represented from the thinnest to the strongest (figure 1).

Although bodybuilding has been a sports modality continuously remarkable and very popular amongst men, sets of silhouettes specific to it have not been developed yet. It is known that in this sport well-defined body shapes with well-defined and harmonious muscles besides symmetry between the different body segments are reached. Thus, the devising of a set of silhouettes based on photos could present more details and hence provide the assessment of the perceptive dimension of the body image in this sport. Thus, the proposal of this study was to develop and validate a set of photo silhouettes in order to assess the body image of bodybuilders.

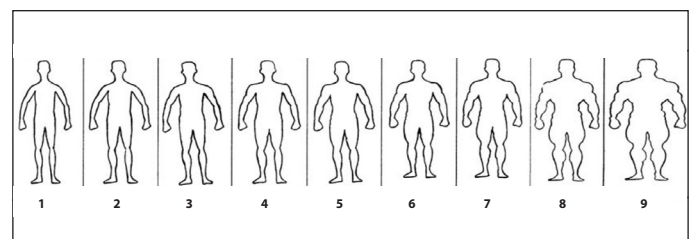


Figure 1. Set of silhouettes proposed by Lima et al., 2007.

## METHOD

The validation of the photo silhouettes set occurred in three stages: the first stage consisted of photographing bodybuilders, selecting the photos which would constitute the set and ordering them in an increasing order of muscularity. This stage was carried out by the researchers and had the BMI of the athletes as grounding. On

the second stage, university professors experienced in body assessment and bodybuilding coaches were asked to sort the photos in increasing order. Finally, the third stage consisted in applying the set proposed in the assessment of bodybuilders, confronting it with the one proposed by Lima et al.<sup>(11)</sup> and correlating the current silhouette (CS) reported by the athletes with the one pointed by the researchers experienced in body assessment and with their BMI and height.

1) Photography of the bodybuilders, selection and organization of the images by the researchers – The photos were taken during a bodybuilding competition in which athletes from different regions of the country and from all categories, from the lightest to the heaviest, took part. The bodybuilders were invited to voluntarily participate in the study and were verbally informed on the ethical care with highlight to the use of their image, according to the Guidelines and Regulating Norms of Research Involving Humans (Resolution # 196, October, 1996) from the National Health Committee. Subsequently to the invitation acceptance and before the photographs shooting, the athletes signed the Free and Clarified Consent Form (FCCF) and had their body mass, stature and height of umbilical scar recorded. A scale brand name Filizola® (Brazil) with precision of 100g was used for measurement of body mass. All athletes were shoeless and with were wearing the outfit used in the competition. Afterwards, stature was determined in steel clinical stadiometer brand name WCS® (United States of America), the individual should be at standing position with erect trunk and head oriented on the Frankfurt plane<sup>(12)</sup>. In order to standardize photography, the athlete remained standing at the standardized position (figure 2). The camera was positioned at the umbilical scar and was moved away until a full body photo with no cuts could be taken. The best photos for the composition of the sequence in increasing order of muscularity, determined by the BMI (table 1) were obtained from these photos, obtaining hence a set of seven photo silhouettes.

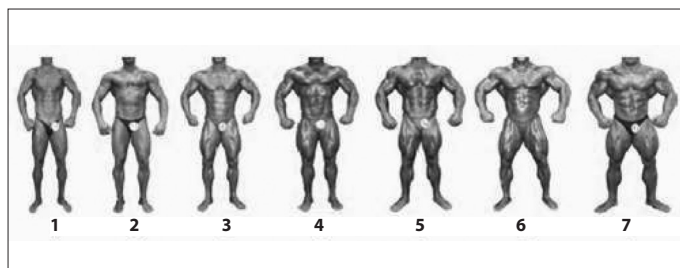


Figure 2. Set of silhouettes proposed.

Table 1. Body dimensions related to the photo silhouettes.

Silhouette	BMI (kg/m <sup>2</sup> )	Stature (cm)	Body mass (kg)
1	24.1	173	72.3
2	25.9	169	74.1
3	28.4	174	85.6
4	29.7	172	87.8
5	31.0	160	79.3
6	32.4	169	92.7
7	35.6	167	99.2

2) Organization of the images by professors and bodybuilding coaches – a set of seven 15 x 20cm cards was performed, each one containing a photo silhouette of the set. The cards were handed shuffled to the collaborators and they were asked to order the cards in increasing order of muscularity.

3) Application of the proposed set of photo silhouettes – 20 competitors from another bodybuilding championship organized by the Bodybuilding Federation of Minas Gerais affiliated to the International Federation of Bodybuilding (IFBB) participated in this stage of the study and had athletes from all the weight categories and three evaluators experienced in anthropometric evaluation. Firstly, the two sets were presented to the athletes, Lima et al.<sup>(11)</sup> and the proposed set, and they were asked to point the set which best represented their muscularity. Subsequently, they were asked to point the silhouette which was the most similar to their current appearance (CS) in both sets. Besides the athletes' self-evaluation, the experienced evaluators individually pointed in the proposed set the silhouette which was most similar to the athlete's silhouette. The athletes signed the FCCF and their body mass and stature were also measured following the same procedures described in stage 1.

### Statistical treatment

The results were presented in descriptive statistics. Mean were compared through Pearson correlation and Student's t test ( $p < 0.05$ ).

## RESULTS

1) Bodybuilders photography, selection and organization of the photo silhouettes by the researchers – Table 1 presents the body dimensions of the bodybuilders whose photos composed the set of photo silhouettes. The BMI values are in increasing order from 24.1 to 35.6kg/m<sup>2</sup> with mean value of 29.6kg/m<sup>2</sup>. The set of photo silhouettes proposed is presented in figure 2.

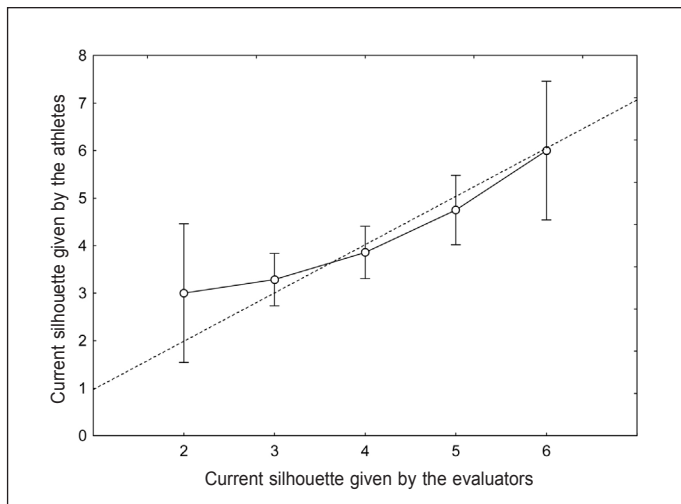
2) Organization of the photo silhouettes by the professors and bodybuilding coaches – Six physical education professors and six bodybuilding coaches participated in this stage and all of them ordered the cards in the same increasing way, which corroborated the proposed order.

3) Application of the set of photo silhouettes proposed – 20 bodybuilders whose physical characteristics are presented in table 2 participated in this stage. Only one in the 20 athletes pointed to the set by Lima et al.<sup>(11)</sup> as the ones which best represented muscularity. In the inter-evaluator reliability assessment, intra-class correlation of 0.92 and absence of significant difference between means of the three evaluators were observed. In order to compare the CS given by the evaluators and the one given by the athletes themselves ( $3.9 \pm 1.0$ ), the mean of the values given by the three evaluators was used ( $3.8 \pm 1.0$ ) and no significant difference was observed between these values ( $p < 0.05$ ) and the correlation between them of 0.75 ( $p < 0.05$ ) (figure 3).

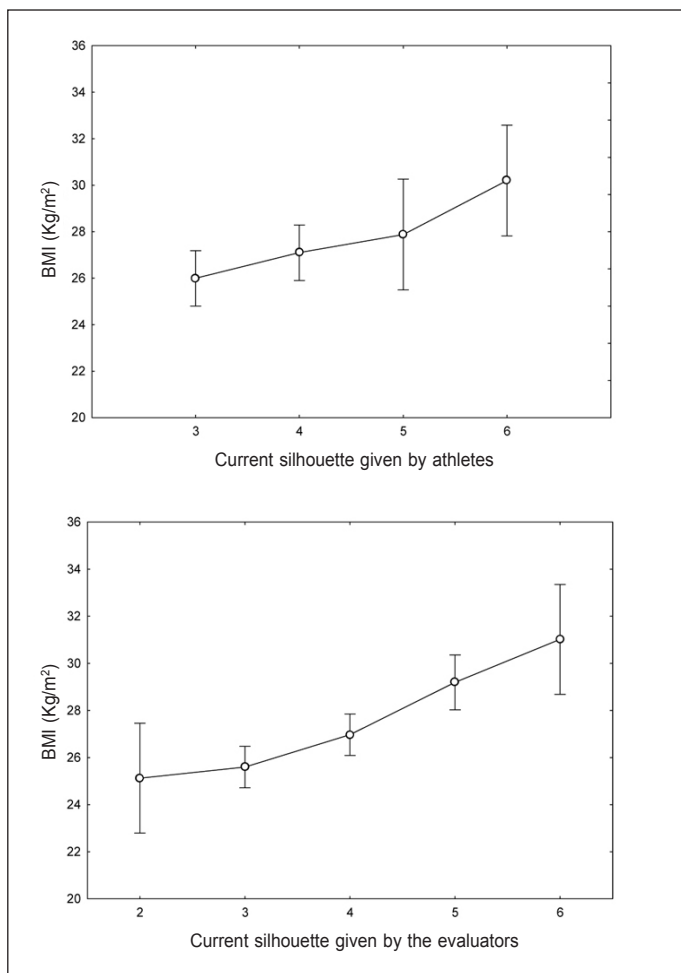
Figure 4 shows the BMI values of the bodybuilders by CS given by the evaluators and the athletes themselves. Significant correlation between BMI and CS given by the evaluators ( $r = 0.84$ ) and between the CS given by the bodybuilders ( $r = 0.64$ ) was observed. Correlation between the CS and stature has not been observed ( $r = -0.02$  and  $-0.11$ ).

**Table 2.** Características corporais dos fisiculturistas que participaram da fase 3 do estudo.

	Mean	SD	Minimum	Maximum
Body mass (kg)	81.3	9.1	68.0	100.0
Stature (cm)	173.0	7.0	160.0	187.0
BMI (kg/m <sup>2</sup> )	27.1	1.9	22.9	31.0



**Figure 3.** Mean and standard deviation of the current silhouette given by the athletes compared to the one given by the evaluators (mean of the three evaluators).



**Figure 4.** BMI (mean  $\pm$  SD), by current silhouette attributed by the evaluators (left) and by the bodybuilders (right).

## DISCUSSION

Sets of silhouettes have been used by researchers in sport and exercise sciences as well as health professionals, such as doctors and nutritionists, for assessment of the body image in its perceptive domain since they are a simple instrument, of easy application and with low cost<sup>(1,4,6,7,13)</sup>. Despite its simplicity, Gardner et al.<sup>(14)</sup> highlight the need to meet some methodological presuppositions for the designing of sets of silhouettes. Nevertheless, since it has not been performed, our instrument did not meet the many pre-requisites, since it is evident the difference between the sketch of a body shape and a photograph. The use of photos for the designing of a set of photo silhouettes for bodybuilders is a pioneering episode. We believe that the use of photographs enables more reliable characterization of details and outlining of the muscular groups, which is important in bodybuilding, since in this sport the aims are besides big muscular volume, symmetry and proportions in harmony. As far as it is known, the sets of silhouettes traditionally used are composed of body outline drawings<sup>(10,11,15)</sup> which provide a simplified view of the body silhouette.

The procedures adopted in the assessment of the set of photo silhouettes were organized in three stages. As result of the first stage, a set of seven photo silhouettes in increasing order of BMI was obtained. The set comprises BMI of 24.1 to 35.6kg/m<sup>2</sup> and body mass of 72.3 to 99.2kg. Such values amplitude includes the many categories of the bodybuilding competitions, which suggests that the proposed set could be used in the assessment of any practitioner of this sport. On the second stage, the sequence proposed for the set of photo silhouettes was unanimously confirmed by the coaches and professors with experience in body assessment.

On the third stage, four procedures were carried out: a) confrontation with the set of silhouettes proposed by Lima et al.<sup>(11)</sup>; b) concordance test on the CS judgment by three evaluators; c) comparison of the mean CS (three evaluators) with the CS reported by the athletes; and d) correlation of the mean CS given by the evaluators and the CS reported by the athletes with the BMI and the height. In the comparison with the set proposed by Lima et al.<sup>(11)</sup>, only one in 20 athletes did not consider that the set of photo silhouettes better represented the body image of bodybuilders, which means that the details of the shapes and proportions obtained with the photos make the athletes better identify with the set of photo silhouettes. Concerning the inter-evaluator reliability, high correlation between CS given by three independent evaluators was observed (0.92,  $p < 0.0001$ ), demonstrating that the use of the set of photo silhouettes for identification of CS is objective. When the inter-evaluator reliability study is extended to the CS reported by the athletes, strong correlation between their evaluation and the one by the experienced evaluators (0.75,  $p < 0.001$ ) was observed. Such fact suggests that the proposed set can be applied in the self-evaluation of the athletes. This possibility broadens the applicability of the instrument. The correlation observed between the BMI and given CS both by the evaluators ( $r = 0.84$ ,  $p < 0.001$ ) and the athletes ( $r = 0.64$ ,  $p < 0.001$ ), demonstrates the validity by criteria of the set of photo silhouettes when compared to the variable MBI cri-

terion. Many other studies found similar values, Gardner et al.<sup>(14)</sup>, in their study proposed the validation of two types of scale, one analogical of two pictures and another containing 13 figures; for both correlation coefficients between CS and BMI of 0.63 and 0,58 were found, respectively. Scagliusi et al.<sup>(16)</sup>, in a study for validation of the silhouette scale by Stunkard for Brazil, found a correlation coefficient of CS with BMI of 0.71 ( $p < 0.0001$ ). The lack of correlation with stature demonstrates that the CS evaluation is determined by the body volume, regardless of the individual's height. It is important to highlight that amongst the many sets of silhouettes proposed, Thompson and van den Berg<sup>(17)</sup> there are no studies which report the inner consistency of the scales, and only four scales (Body Image Assessment – Williamson et al.<sup>(5)</sup>; Figure Rating Scale – Stunkard et al.<sup>(7)</sup>; Contour Drawing Rating Scale – Thompson and Gray<sup>(18)</sup>; Bodybuilder image grid – Hildebrandt et al.<sup>(19)</sup> present test-retest values. The test-retest values were significant for the four scales mentioned. In our study the test-retest became impossible since our sample has been selected from a regional bodybuilding championship.

In this study, the validity of the set of photo silhouettes for identification of the optimum silhouette was not determined. The proposed set needs to be validated for this purpose since the identification of the optimum silhouette enables that the

insatisfaction with the body image is estimated, which is an important factor in studies on body image and eating disorders, as well as on the use of illicit substances. Additional investigation in which the set of photo silhouettes is also confronted with other sets of silhouettes besides the ones proposed by Lima et al.<sup>(11)</sup> should be carried out. Besides photographs, the use of measurements which better portrait the body characteristics of the studied group can be tested<sup>(6)</sup>. Amongst the new method, we can mention the use of tridimensional graphic constructs, computer simulations and shooting.

## CONCLUSION

The results obtained in the three stages of the validation let us conclude that the set of photo silhouettes demonstrates validity as well as reliability to evaluate the perceptive dimension of the body image in the current silhouette aspect, both concerning the opinion of experienced evaluators as well as self-evaluation by the bodybuilding athletes.

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All authors have declared there is not any potential conflict of interests concerning this article.

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