Development of a New Body Image Assessment Scale in Urban Cameroon: an Anthropological Approach

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Objective: Develop and validate body image scales (BIS) presenting real human bodies adapted to the macroscopic phenotype of urban Cameroonian populations.

Design: Quantitative and qualitative analysis.

Setting: Yaoundé, capital city of Cameroon.

Participants: Four samples with balanced sex-ratio: the first ($n=16$) aged 18 to 65 years (qualitative study), the second ($n=30$) aged 25 to 40 years (photo database), the third ($n=47$) and fourth ($n=181$), ≥18 years (validation study).

Main Outcome Measure: Construct validity, test retest reliability, concurrent and convergent validity of BIS.

Results: Body image scales present six Cameroonians of each sex arranged according to main body mass index (BMI) categories: underweight (<18.5 kg/m^2), normal (18.5–24.9 kg/m^2), overweight (25–29.9 kg/m^2), obesity class I (30–34.9 kg/m^2), obesity class II (35–39.9 kg/m^2), and obesity class III (≥40 kg/m^2). Test-retest reliability correlations for current body size (CBS), desired body size and current desirable discrepancy (body self-satisfaction index) on BIS were never below .90. Plus, for the concurrent validity, we observed a significant correlation ($r=0.67$, $P<.01$) between measured BMI and CBS. Finally, the convergent validity between BIS and a female African American silhouettes scale, for different dimensions of body size perceptions, is acceptable.

Conclusions: Body image scales are adapted to the phenotypic characteristics of urban Cameroonian populations. They are reliable and valid to assess body size perceptions and culturally adapted to the Cameroonian context. (*Ethn Dis*. 2011;21(3):288–293)

Key Words: Central Africa, Obesity, Body Image, Body Image Scales

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Introduction

Many studies have aimed to assess body image in different groups and populations. In developed countries, most of researchers study body image to evaluate psychological disturbances like body dysmorphia and eating disorders in different ethnic groups or according to sex, age class[1] and nutritional status.[2] In developing countries, most of researchers study body image to evaluate the impact of sociocultural valorization of stoutness on the prevalence of obesity in the context of a nutrition transition.[3] In both cases, methodologies employed to measure body image are qualitative or quantitative: interview,[4] focus group,[5] questionnaire[6] and figural stimuli presenting different sizes of a body.[7]

As far as figural stimuli are concerned, most studies do not use figural drawings or silhouettes scales based on real human shapes.[8] Most studies among Africans or African Americans used figural stimuli not adapted to phenotypic characteristics (especially including morphology and color of skin) of target populations.[9,10] Silhouettes scales usually do not include anthropometrical data to accurately assess body size perceptions[11–15] and to compare them, for example, to health criteria. Therefore, it seems important to construct scales able to solve these methodological problems for future studies aimed at the evaluation of body size perceptions in Africa.

In Cameroon, where high levels of obesity are common in urban areas,[16] and the valorization of stoutness is pregnancy,[17,18] the analysis of the impact of local cultural representations and practices relative to the body, stoutness and development of obesity appears inescapable. It seems pertinent to create a tool able to measure precisely these local representations to match it with various health indicators (body mass index [BMI], glycemia, blood pressure) in the context of the nutrition transition that Cameroon is currently experiencing.[19] In order to explore body weight perceptions in Cameroon, we developed and validated a human photographic stimuli and a body image assessment guide (BIAG) taking into account the biocultural characteristics of the population.

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Methods

Qualitative Study - Survey

Our objective was to create figural stimuli adapted to anthropological characteristics of a sub-Saharan African population. The body image scale (BIS) is aimed at the assessment of

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popular conceptions of body size so the construct validity of BIS, the elaboration of BIAG and the questionnaire on declarative body weight self-satisfaction, need to be adapted to local sociocultural dimensions. To do this, we performed a qualitative study, using classic, recognized procedures in social sciences, to identify vernacular conceptions of body size. Interviews were performed with a limited sample of 16 adults aged 18–65, recruited from various neighborhoods of Yaoundé. The sample presented a balanced sex ratio and the majority of interviewees had a mixed ethnic origin (with a dominant Bamileke). Individual interviews were performed at home, to allow each interviewee to express themselves both in a familiar context and without exterior pressure.

We explored three dimensions in the interview guide: 1) which terms are usually employed by the population in Yaoundé to characterize body weight; 2) which meanings they associated to these terms, and 3) their definition of the concept of ideal body. Since the main language at Yaoundé is French, the interviews were conducted in this language using a handheld recorder and transcribed by the first author. The average duration of interviews was approximately one hour and a half (other dimensions of body weight perceptions were investigated but not included in this article). We used results from this study to complete the validation protocol of the BIS and help construct the BIAG and the questionnaire on declarative body weight self-satisfaction.

Qualitative Dimensions Explored and Used for the Methodology Development

With the different interviews, we were able to identify two important dimensions. First, we observed the term obesity was related to three popular terms expressing weight: big, stout and fat. These terms, as expressed in Yaoundé French express three different semantic categories: big refers to big belly, pregnancy and large hips; fat is related to sickness through a deformed morphology and stout refers to the general size (volume) of the body. To realize the construct validity of BIS, we decided to employ these three terms to check if the BIS classification (ie, ascending BMI), can be linked to different vernacular conceptions of obesity. We also used results from this ethno-linguistic analysis to select the most appropriate term to be introduced in the declarative body weight self-satisfaction questionnaire.

Second, we noticed that the notion of ideal body size, employed in different studies,[8] is not well understood by interviewees; nobody can decide which body is ideal, "only God decides the physical nature of each person." For this reason, we only used the concept of desired body size in the BIAG.

Anthropometry

All participants in the validation study of the BIS had their height and weight measured by the same trained fieldworker (first author), using standardized procedures.[20] The height was measured to the nearest mm using a portable stadiometer (Siber Hegner, Zurich, Switzerland). The weight of each participant was measured, in very light clothing, to the nearest 100g, using a digital scale (Tanita, Tokyo, Japan) while BMI was calculated by dividing weight in kilograms by the square of height in meters.

Body Image Scales (BIS)

Most studies aimed at evaluating body size perceptions have used silhouette references to determine the participants' judgment about body size.[8] In this study, we used the same approach but adopted human photo references. Presenting real human bodies, compared to silhouettes, makes a more realistic image, better facilitating the participant's judgment. This method allowed associating the participants' body size perceptions with BMI categories.[21]

To build the BIS, we assembled a sample of 30 individuals (15 men) from Yaoundé's Emia neighborhood. All were aged 25–40 years, from three different ethnic groups: Foulbé, Beti and Bamiléké. Participants were selected from their visually assessed general morphology so that they covered the largest variation of BMI. Individuals were photographed from the front, indoors, with low light exposure, without jewelry or other distinctive object and dressed identically. Before taking the picture, we calculated body mass index of each participant.

We selected this age range (aged 25–40 years) since the body at this age is normally neutral in appearance; not too young or too old. Thus, it was possible for any adult participant, regardless of age, to compare oneself with the photos. We used the three ethnic groups because they seemed to cover a large anthropometric gradient, ie, the morphologic variability of this region[22] and so, potentially represented all BMI categories.

From the photo dataset of the 30 participants, we selected 6 individuals of each sex fitting 6 BMI categories: underweight, $<18.5 kg/m^2$; normal, ≥ 18.5 and <25; overweight, ≥ 25 and <30; obesity class 1, ≥ 30 and <35; obesity class 2, ≥ 35 and <40; obesity class 3 ≥ 40. We also selected body characteristics most adapted to making a progressive weight gain scale (ie, excluding participants presenting specific shapes - a pronounced android obesity and too wide hips and shoulders; and making sure that the interval between two consecutive images was small and consistent). Adobe Photoshop (CS) was used to mask faces and retouch photos (Figure 1).

Body Image Assessment Guide (BIAG)

All image photos were placed on a table, in random order and without BMI data. Men evaluated the male scale and women evaluated the female scale.

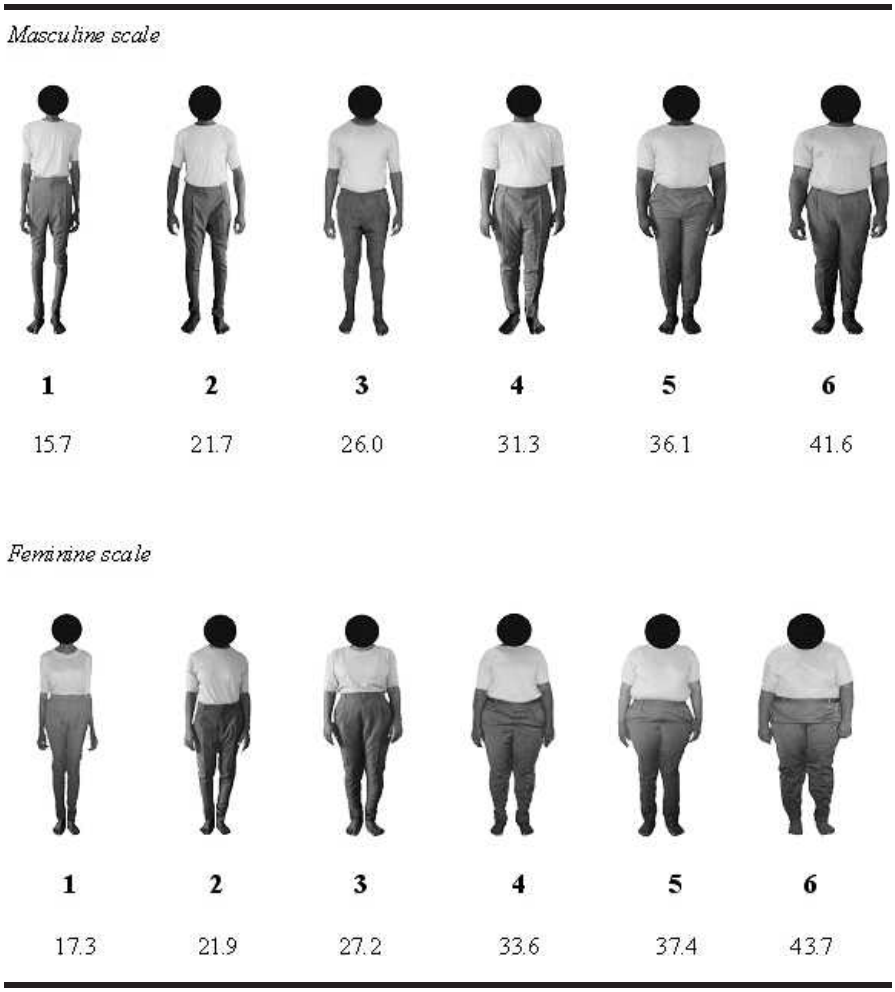

Fig 1. Male and female body image scales associated with the respective body mass index of selected participants, arranged from underweight to severe obesity

We randomized image order to avoid influencing participants by the ascending order of BMI.[23] We asked questions about the current and desired body size (CBS and DBS respectively). For the CBS we asked, ''Can you point out the individual that looks like you the most?'' For the DBS we asked, ''Can you show the individual that you want to look like the most?'' Before the second question was asked, the pictures were reshuffled and presented in a new random order.

Next, we asked the participants to define CBS and DBS of their partner,[24] with men evaluating the female scale and women evaluating the male scale. We asked, ''Can you point out the individual that looks like your husband/boyfriend, wife/girlfriend the most (CBS')?'' Can you point out the individual you would most like to have as your husband/boyfriend, wife/girlfriend (DBS')?''

The five variables BMI, CBS, DBS, CBS' and DBS' were used to create two indexices of body satisfaction. The discrepancy between CBS and DBS comprises the body self satisfaction index[25] and the discrepancy between CBS' and DBS' comprises the intra-couple body satisfaction index.

Body Image Scale Validation Protocol

We assembled a sample of 47 participants of both sexes (≥ 18 years old), chosen at random by going to every third house, selecting one man or one woman alternately in each house, in various districts of Yaoundé to assess the validity and reliability of the BIS.

Construct Validity

To assess the BIS as a tool able to measure body size, participants were asked to arrange photos, presented in a random order, in four different ways. The first was a spontaneous order: subjects arranging photos without specific instruction of body size, just an unconscious order anticipated by participants. The spontaneous order allows determining if, without instructions, the subjects unconsciously integrate the sense of the progressive rise of fat, underlied by the BIS. The three last ways of ordering the photos were according to three terms, identified by the qualitative study to cover all local representations of weight at Yaoundé: the less big to the biggest, the less fat to the fattest and the less stout to the stoutest. This step was implemented to validate the BIS as a tool able to measure body size in Cameroon.

Test-retest Reliability

To test the reliability of the BIS, the tool was administered twice, 2 weeks apart to the 47 participants. Six principal measurements: CBS, DBS, CBS', DBS' and two body satisfaction indices were test-retested.

Convergent Validity

We assembled 181 Cameroonian (≥ 18 years old) residents of different neighborhoods of Yaoundé (83 men), to make a convergence validation of the BIS with other tools. Participants were recruited using the protocol described above. As comparative tools, we used the female American 8-silhouettes scale developed by Bell, Kirkpatrick and Rinn[26] and the questionnaire on self satisfaction of body weight, ''Are you thin, a little bit thin, average, a little bit fat or fat?''

The Bell et al scale was used by Flynn and Fitzgibbon[10] to assess perceptions of body size in low-income

Table 1. Relation between body self-satisfaction based on BIS and declarative body weight self-satisfaction (*n*=181)*

Declarative Self-Satisfaction	Want to Lose Weight†	Satisfied†	Want to Gain Weight†
Thin/a little bit thin	5.9%	41.2%	52.9%
Normal	21.2%	63.5%	15.3%
A little bit fat	62.9%	34.3%	2.9%
Fat	81.8%	15.9%	2.3%

* BIS, body image scale.
† Based on body image scale.
Chi square=77.1, DF=6, $P<.001$.

African American women whose results are likely to be used for comparisons of culture in a future study in Cameroon. In the questionnaire, we used the term fat since it corresponds to the morbid overweight according to popular conception.

Data Analysis

First, we built correlations between the body self-satisfaction measured by the BIS and the body self-satisfaction measured by the declarative body weight self-satisfaction questionnaire; then, we built correlations between variables measured by BIS and American silhouettes.

All data analysis and statistical calculation were done using the SYSTAT software version 10 (SPSS Inc, 2000). Associations between variables were identified using correlations analysis and chi square tests.

Ethics

Oral consent was obtained from participants, after being fully informed on the goals and methods of the study. Before taking photos, we made sure that the participant had a clear understanding of the procedure and its purpose; they were eager to take part in the study and were aware that the data were strictly confidential and used only for research.

RESULTS

Construct Validity

Of the 47 participants, 40 (85%) and 37 (79%), spontaneously classified correctly the photographs on the female and male scales, respectively (Figure 1). The rest of the participants ordered the pictures according to their own preference criteria. Thirty-eight (80.9%) and 44 participants (93.7%) correctly classified the photographs when the reference was from the less big to the biggest. Thirty-eight 38 (80.9%) and 42 (89.5%) answered correctly when the reference was from the less fat to the fattest. Finally, ordering from the less stout to the stoutest, nearly all participants, except one, answered correctly.

Reliability

Test-retest Pearson correlation coefficients for the masculine scale were .92 for CBS, .96 for DBS (23 men), .88 for CBS' (22 women) and .81 for DBS' (24 women). The test-retest correlation coefficients for the feminine scale were: .90 for CBS, .98 for DBS (24 women) and .93 for CBS' and .65 for DBS' (23 men). We observed high test-retest correlations for the body self satisfaction index: .91 for men (n=23), .91 for women (n=24) and the intra-couple body satisfaction index: .89 for men (n=23), .85 for women (n=22).

Convergent Validity

There was an association between the body self-satisfaction on BIS and the declarative body weight self-satisfaction ($P<.001$), participants who declared themselves to be fat had the tendency to select a DBS smaller than their CBS on the BIS. Subjects who declared themselves to be thin had the tendency to select a DBS larger than their CBS on the BIS (Table 1).

Current body size showed a .67 correlation with measured BMI in the full sample (concurrent validity). We observed significant correlations between BIS and Bell's scale responses for CBS (r=.75), the body self-satisfaction index: (r=.70), CBS'(r=.62), intra couple body satisfaction index (r=.53) and to a lower extent for DBS (r=.44).

DISCUSSION

Whereas many studies aimed at assessing body size perceptions in Africa did not use an instrument presenting real human bodies[10] and corresponding to the macroscopic phenotype of the target population,[9] our study has developed a scale similar to that used for Western populations.[20,27,28] Although instruments such as the BSG[21] and the PFRS[27] have some properties superior to those of the BIS (eg, neutral type of clothing worn by the participants in the photos, wider range of figural stimuli), the BIS seems to be the more appropriate tool to be used when assessing body image in Cameroon. Indeed, the vali-

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dation protocol employed for the BIS followed the main aspects of scientifically recognized procedures[23,24,29] and was implemented on Cameroonian participants, whereas the BSG has been validated only for western populations and the PFRS has not been validated in an African population[30] and presents only photos of women.

Principal dimensions of the BIS validation – construct validity, test retest reliability, convergent and concurrent validity – are good. Particularly for the construct validity, with a high percentage of good answers for the spontaneous order and the three vernacular conceptions of weight (big, stout and fat), we observed that the BIS is valid to measure body size in general and, with the specific cultural validation protocol, valid to assess body size in Cameroon. Indeed, considering vernacular notions of obesity to assess validity of the BIS seems pertinent since the validation protocol of body scales cannot be separated from the cultural context of application; each population has its own linguistic expressions of body size and associated sociocultural meanings.

When using the BIS in Cameroon, even if the percentage of good answers is correct for each local meaning of obesity, stout seems to be the most appropriate term (97.9% of good answers for both scales) to express the progressive weight gain shown in the BIS. In fact, this term is defined by only one anthropometric criteria, BMI, which seems to represent the principal meaning of stout, the global silhouette of the body (volume). Nevertheless, for fat, we frequently observed an inversion between photos 5 and 6 (Figure 1) on the female scale (80.9% of good answers) since the first one presents someone having abdominal fat, generating an android shape, a sign of disease in Cameroonian women. For the term big, the inversion was primarily between photos 4 and 5 on the female scale (80.9% of good answers) since the individual in the fourth photo appears to have larger hips than the one in the fifth.

In summary, big and fat refer to body shape, fat regions and hips,[31] whereas stout refers to body size. Considering this, in order to advance research, it would be interesting to create new African scales that include both size and/or shape of the body[21,32] in order to integrate these two fundamental dimensions of body image (ie, scales based on somatotypes or waist to hip ratios).

Using a qualitative approach in the development of body image assessment scales is relevant to perform construct validity of scales and also to develop guides and questionnaires associated with the tool (ie, implement the term fat for the declarative body weight self-satisfaction and use desired body size instead of ideal body size on the BIAG). Indeed, the notion of ideal related to bodily aesthetic seems difficult to define in a religious context where sacralised perceptions of body refer to God's will. Therefore, sociocultural aspects may be taken into account in body image studies, particularly to explore body image in different cultures. To create new body perception scales or use previously published ones, anthropological validation is critical in order to know if the instrument is understood by participants in the same way the researcher has imagined.

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