Subjective Body Image Dimensions in Normal Female Population: Evolution through Adolescence and Early Adulthood

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Abstract

To study subjective body dimensions in a sample of the adolescent and young female general population using a body site perception apparatus, and to obtain profile charts for different age groups. The subjects were 802 female adolescents and young girls ranging in age from 11 to 24, students at different schools and at University. The evaluation technique used was a new method for assessing body distortion which indicates the subject's idea of the size of the different parts of his/her body, and produces a life size global silhouette. Taken the sample as a whole, subjects significantly overestimated certain parts of their body: thorax, waist and hips ($p < .001$). Profile charts of differences between subjective and actual dimensions for the total group were calculated. At centile 50 thorax, waist and hips were overestimated by some 5 to 6 cm by all subjects and age groups. The overestimations of girls between 11 and 13 years were significantly higher than those of girls at other ages ($p < .001$). Girls who gave overestimations of the thorax one standard deviation above the mean in thorax were significantly heavier, taller and had higher body mass index than girls who gave overestimations of one standard deviation below ($p < .001$). Girls from the general population overestimated certain parts of their bodies, especially girls between 11 and 13 years of age. The largest overestimations were recorded in the subjects with greater height, weight and body mass index.

Key words: body image, normal population, overestimation.

Resumen

Estudiar las dimensiones corporales subjetivas en una muestra de adolescentes y jóvenes de sexo femenino de la población general utilizando un aparato de percepción de diferentes partes del cuerpo, y obtener unos baremos para los diferentes grupos de edad. Los sujetos fueron 802 adolescentes y jóvenes de sexo femenino desde los 11 hasta los 24 años de edad, estudiantes en diferentes colegios y facultades. La técnica de evaluación utilizada fue un método para evaluar la distorsión corporal que indica la idea del sujeto respecto al tamaño de diferentes partes de su cuerpo, y proporciona una silueta de tamaño real. Tomando la muestra en su conjunto, los sujetos sobrestimaron ciertas partes de su cuerpo: tórax, cintura y caderas ($p < .001$). Se calcularon, para el grupo en conjunto, los baremos de las diferencias entre las dimensiones subjetivas y las reales. En el percentil 50, en tórax, cintura y caderas se obtuvo una sobrestimación de entre 5 y 6 cm para todos los grupos de edad. Las sobreestimaciones de las chicas entre los 11 y los 13 años fueron

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significativamente más elevadas que las de las chicas de otras edades ($p < .001$). Las chicas que sobrestimaban en tórax más de una desviación estándar de la media eran significativamente más corpulentas, más altas y con mayor índice de masa corporal que las chicas que sobrestimaban por debajo de una desviación estándar ($p < .001$). Las chicas de la población general sobrestimaban ciertas partes de su cuerpo, especialmente las chicas entre 11 y 13 años de edad. Las mayores sobrestimaciones se dieron en los sujetos de más peso, altura e índice de masa corporal.
Palabras clave: imagen corpiral, población general, sobrestimación.

Body image distortion in eating disordered has been one of the most debated characteristics of eating disorders (Cash & Deagle, 1997; Hsu & Sobkiewicz, 1991). Some authors find that overestimation of body size is a normal finding in the general population (Bergstrom *et al.*, 2000; Dolce *et al.*, 1987; Raich *et al.*, 1992; Rand & Wright, 2000; Toro *et al.*, 1989). Nevertheless, it is generally accepted that there is a greater body image distortion in anorexic patients than in the normal female population (Cash & Brown, 1989; Gila *et al.*, 1998; Probst *et al.*, 1992), though researchers disagree about the specific disturbance underlying this disorder. Several authors have concluded that the body image disturbance in anorexic patients is not a "perception" disorder of a particular dimension, but a distortion which reflects patients' idea, internal image, cognitions or emotions related to their own body (Bowden *et al.*, 1989; Cash & Deagle, 1997; Gardner & Moncrieff, 1988; Franzen *et al.*, 1988). It seems that the distortions reflect, for instance, which parts of the body have cognitive and emotional importance for the patient, rather than a real alteration in the image of the body as a whole. These body estimation problems in anorexic patients and in the general population are probably related in some way to sociocultural pressures, and need to be studied with new approaches and from the perspectives obtained from previous research into the area. From this point of view it is important to know how normal female population at the ages which there is the greatest risk of an eating disorder perceive their body size, and how this perception changes through adolescence. Procedures to evaluate what is known as "body image distortion" have been widely discussed. Two main types of methods are used (Thompson, 1996). The first group includes methods that determine subjects' view of the size of specific parts of their body, or "body-site size estimation procedures". These methods offer only a partial approximation to body image and do not give a global idea either to the therapist or to the patient. The other main group consists of "whole-image adjustment procedures", methods that give the estimation of the body as a whole which is then adjusted by the subject (Collins, 1986; Gardner & Moncrieff, 1988; Probst *et al.*, 1992; Touyz *et al.*, 1985). Patients' estimations of specific parts of the body obviously provide important data because there may be many differences between sites, depending on which parts of the body particularly concern the patient. But the global silhouette is also a useful parameter because it allows subjects to be more realistic about the information they give, and offers clinicians an overall idea of the image that subjects have of themselves. Gila *et al.* (1998) developed a technique

named the *Subjective Body Dimensions Apparatus* (SBDA) which permits simultaneous assessment of subjective dimensions of several parts of the body and produces a life-size complete silhouette of the subject. This technique combines the advantages of evaluating several parts of the body separately, and obtaining an overall idea of the silhouette; additionally patients can correct their answers considering the global image.

The aim of the present study is to evaluate the subjective dimensions of adolescent and young general population using the SBDA, in order to determine whether they overestimate certain parts of their bodies and also to identify any differences between age groups. Another objective is to obtain profile charts of reference to compare a range of clinical groups that may have body image disorders.

Method

Subjects

The subjects were 802 girls from the general population, students at nine different educational centers: primary and secondary schools, vocational training colleges or University, all of them in Barcelona or smaller cities in the vicinity. The ages ranged from 11 to 24 years.

Materials

The Subjective Body Dimensions Apparatus. The technique used to evaluate the subjects' subjective perception of their body dimensions, the SBDA, is a "body-site size estimation procedures", but in its final stage it provides a simultaneous representation of several body-sites and thus gives a global silhouette of the patient. A validation carried out in a previous study (Gila *et al.*, 1998) showed an acceptable level of test-retest stability. The apparatus consists of a cylindrical bar 190 centimeters high, supported by a base. The bar has several holders supporting small sticks that represent different parts of the body: shoulders, thorax, waist, hips, thighs and calves. The holders are movable and can be adjusted to all subjects. On both sides of the sticks there are several rings with a string passing through them. The rings represent the extreme parts of the body, and can be moved along the stick to reflect subjects' idea of the distance from one side of the body to the other at the points in question. At the end of the task, the string forms a human silhouette which represents the subject's subjective impression of his/her body. Another set of rings is then used to make a second silhouette with the real measurements from one side of the body to the other at the same points. The evaluation takes about 10 minutes for each subject. At the end, the clinician has a double silhouette –one subjective image, and one real– which can be shown to the subject, at the clinician's discretion.

Procedure

The body image with the SBDA ant the real body measures were determined at

the same time. The younger subjects was evaluated with the SBDA at school during a normal class day, after consent had been obtained from the school authorities which had previously asked parents for permission. Consent was obtained from the older subjects attending university centers.

To carry out the evaluation of the body image with the SBDA, the subject was placed at a distance of two and a half meters from the apparatus. This distance is considered appropriate to provide, in perspective, a body image equivalent to the one that can be obtained looking at a full-length mirror. An enlarged silhouette was presented to the patient. The researcher stood in profile to the apparatus so as not to give a point of reference with his own body. He modified the positions of the rings and produced a silhouette according to the indications of the subject. Standard instructions were given to the subjects, explaining that the rings represent the shoulders, thorax, waist, hips, thighs and calves. Subjects were asked to give the exact position where they thought the rings should be to represent the different parts of their body. Subjects followed this procedure step by step, and at the end were allowed to rectify some parts, now with the silhouette in view, in order to reproduce the image they have of themselves as if they were perceiving it in a full-length mirror. The results were recorded and the real measurements were subsequently taken with an anthropometer. The real and subjective silhouettes were then compared.

Statistical analysis

To compare the means of subjective and actual dimension of the subjects and also to compare the different groups of subjects a Student-Fisher's *t* test for either dependent or independent samples was used. To compare the overestimations of the various age groups a one way analysis of variance was used. The level of statistical significance was $p < .05$. Significative centiles were calculated to construct profile charts for different age groups. Statistical analysis was performed using the SPSS package (Norusis, 1993).

Results

The mean of age of the subjects was 17.01 years (SD=3.8) and the mean of body mass index was 20.7 (SD=0.02).

Estimations of body dimensions in the whole sample

Taking the sample as a whole, subjects significantly overestimated some parts of their body: thorax, waist and hips (Table 1). Their conceptions of their shoulders, thighs and calves were close to the real measures.

Figure 1 shows a picture of the apparatus with the actual and estimated body measures of the whole sample.

Table 1. Differences (Student-Fisher's *t*) between subjective and actual body dimensions in all subjects (n=802).

	SUBJECTIVE DIMENSIONS		ACTUAL DIMENSIONS			
	Mean	SD	Mean	SD	*t*	*p*
SHOULDERS	37.5	3.5	37.4	2.3	1.2	.215
THORAX	30.7	3.5	24.6	2.0	53.5	<.001
WAIST	27.1	3.2	21.6	2.0	47.2	<.001
HIPS	34.8	3.9	29.6	2.5	41.4	<.001
THIGHS	14.9	2.7	15.1	1.7	-1.7	.920
CALVES	9.2	1.5	9.2	1.0	0.5	.607

Note: measurements are expressed in centimeters

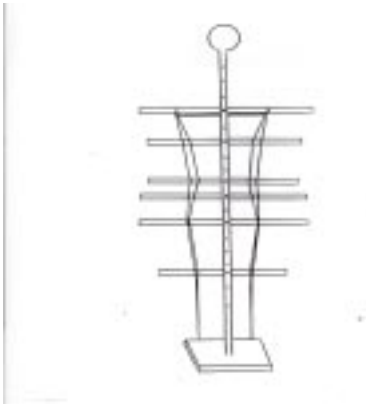

Figure 1. Apparatus with the actual and estimated body measures.

Profile charts in the whole sample and in different age groups

The profile charts of differences between subjective and actual dimensions for the total group are shown in table 2. Centil 50 shows an overestimation of about 5 to 6 centimeters in thorax, waist and hips.

Table 2. Profile charts of the differences (expressed in centimeters) between subjective and actual body dimensions for all subjects (N=802)

	Dif. Shoulders	Dif. Thorax	Dif. Waist	Dif. Hips	Dif. Thighs	Dif. Calves
Centils						
95	5	12	11	11	3	2
90	4	10	10	10	3	2
75	2	8	7	7	1	1
70	2	8	7	7	1	1
50	**0**	**6**	**5**	**5**	**0**	**0**
30	-1	4	4	4	-1	-1
25	-2	4	3	3	-2	-1
10	-4	2	2	1	-3	-2
5	-5	1	1	0	-4	-2
Mean (SD)	0.1 (3.2)	6.1 (3.2)	5.2 (3.5)	5.2 (3.6	– .1 (2.4)	.0 (1.5)

Table 3. Profile charts of the differences (expressed in centimeters) between subjective and actual body dimensions for subjects in different age groups

	Dif. Shoulders	Dif. Thorax	Dif. Waist	Dif. Hips	Dif. Thighs	Dif. Calves
CENTILS						
11-13 years (N=170)						
95	7	14	12	12	3	3
90	5	13	11	10	2	2
75	3	10	9	8	1	1
70	2	9	8	8	1	1
50	**0**	**8**	**6**	**6**	**-1**	**0**
30	-1	6	4	4	-2	-1
25	-2	6	4	4	-2	-1
10	-3	2	2	3	-3	-2
5	-5	1	1	2	-4	-2
Mean (SD	***.68 (3.4)***	***7.9 (3.6)***	***6.3 (3.6)***	***6.4 (3.3)***	***.4 (2.1)***	***.2 (1.9)***
14-17 years (N=290)						
95	5	11	10	10	3	2
90	5	9	9	9	2	2
75	2	8	7	7	1	1
70	1	7	6	6	1	1
50	**0**	**5**	**5**	**5**	**-1**	**0**
30	-2	4	3	3	-2	-1
25	-2	3	3	2	-2	-1
10	-5	2	1	0	-4	-2
5	-6	.5	1	-1.4	-5	-2
Mean (SD)	***-.4 (3.4)***	***5.4 (3)***	***4.8 (3)***	***4.5 (3.6)***	***-.57 (2.3)***	***.02 (1.3)***
18-19 years (N=116)						
95	6	11	13.3	12	4	2
90	4	9	10	10	4	2
75	3	8	8.7	8	2	1
70	2	8	8	7	2	1
50	**0.5**	**6**	**6**	**5**	**0**	**0**
30	-1	5	5	3	-1	0
25	-1	4	4	3	-1	0
10	-2	3	2	1	-2	-1
5	-4	2	1	0	-3	-2
Mean (SD)	***.7 (2.9)***	***6.1 (2.7)***	***6.3 (3.5)***	***5.3 (4.1)***	***.6 (2.4)***	***.03 (1.2)***
20-24 years (N=226)						
95	5	10	10	10	4	2
90	3	9	9	9	3	2
75	2	7	7	7	2	1
70	2	7	6	7	1	0
50	0	5	5	5	0	0
30	-1	4	4	4	-1	-1
25	-2	4	3	3	-1	-1
10	-3	2	2	1	-3	-2
5	-5	1	1	0	-4	-2
Mean (SD)	***.1 (2,7)***	***5.4 (2.7)***	***5.1 (2.8)***	***5.1 (3.1)***	***.2 (2.3)***	***.2 (1.4)***

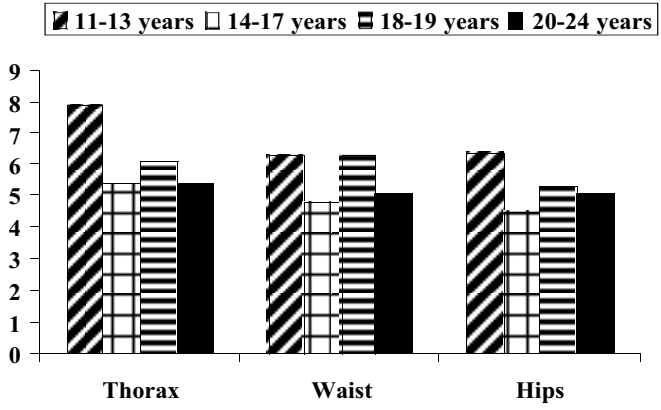

Figure 2. Actual and estimated mean body measures of the whole group of girls evaluated with SBDA (N=802)

To analyze the differences in the profile charts between age groups, the total group was divided into four subgroups: girls from 11 to 13 years (N=170), from 14 to 17 years (N=290), from 18 to 19 years (N=116) and from 20 to 24 years (N=226).

The profile charts of differences between subjective and actual dimensions for groups of subjects of different groups of age are shown in table 3.

Figure 2 shows the comparison between the different age groups in the mean overestimation of three parts of the body: Thorax, waist and hips. The 11 to 13 year old group presented the greatest overestimation of their body parts.

Comparison between subjects with different overestimations

The differences between the group of subjects with an overestimation of one standard deviation above or below the mean in thorax were analyzed. As can be seen in table 4, girls with a greater overestimation had significantly greater body mass index, height and weight. The thorax was chosen as the body site for comparison because it

Table 4. Comparison (Student Fisher´s t) between the groups of subjects with one standard deviation above or below the mean overestimation of the torax.

	>1SD (N=89;11.8%)		<1SD (N=108;13.4%)			
	Mean	SD	Mean	SD	*t*	*p*
Age (years)	16.2	3.6	16.5	4.2	- .5	.609
Height (cm)	163.8	6.8	157.5	8.2	5.9	< .001
Weight (kg)	60.6	9.5	49.3	9.1	8.3	< .001
Body mass index	22.5	.03	19.7	.02	6.5	< .001

was the part that showed the greatest overestimation in the various age groups.

Discussion

The first conclusion of the study is that the total group of adolescents and young adults overestimated certain parts of their body such as thorax, waist and hips. Some studies have related body weight satisfaction in adolescence with disordered eating behavior (Anstine & Grinenko, 2000; Cooley & Toray, 2001; Ghaderi & Scott, 2001; Lunner *et al.*, 2000; McFarlane *et al.*, 2001; Sherwood & Neumark-Sztainer, 2001) and with low self-esteem (Anstine & Grinenko, 2000; Geller *et al.*, 1999; Tomori & Rus-Makovec, 2000). On the other hand, low self-esteem has been also identified as a risk factor for anorexia nervosa (Fairnburn *et al.*, 1999).

Other authors have noted this trend among the normal population to overestimate specific parts of their body (Bergstrom *et al.*, 2000; Gupta *et al.*, 2001). Using a visual size estimation technique in Swedish adolescents and young adults from the normal population, Bergstrom *et al.* (2000) found an overestimation of dimensions of subjects' own bodies and that the greatest overestimation was of the waist, buttocks, and thighs. In Gila *et al.* (1998), adolescent anorexic patients showed a global overestimation of 28.14%. Considered separately, certain parts were overestimated by as much as 8.9 centimetres (thorax), 8.5 centimetres (waist) and 9.7 centimetres (hips). It is interesting that the parts most overestimated by anorexic patients (thorax, waist and hips) are the only ones that are also overestimated by the girls from the general population. The fact that normal adolescents and youngsters overestimated certain parts may reflect that the normal female population at the present time is concerned precisely about these parts of the body, a concern which may be highly determined by social pressure. Gupta *et al.* (2001) found that young girls from Canada were concerned about abdomen, hips, thighs and legs whereas girls from India were worried about other parts such as face, neck, shoulders and chest.

Table 4 shows that a 11.8% of the sample overestimated more than one standard deviation above the mean in thorax (the site with greater overestimation for the whole group). Than part of the group of girls can be considered as the population with more abnormal body image and thus at risk of having an eating disorder. This data are consistent with the results of other authors. Garner and Garfinkel (1979) in their validation of the questionnaire EAT (Eating Attitudes Test) found a 13% of girls from the general population with a score above the cut off point that differentiated normal populations from eating disorders. They considered this percentage of girls as being at risk of having an eating disorder.

The second important result is that we now have profile charts of normal overestimation of several parts of the body in different age groups. These results give a reference for comparison in other studies of populations from other cultures or adolescents with eating disorders or obesity. It seems that girls at the onset of puberty have a greater overestimation of body parts than older girls. Other studies have pointed out the influence of puberty in body concerns (Abraham & O'Dea, 2001). The fact that body

image distortion is one of the diagnostic criteria for anorexia nervosa gives an idea of its relevance. Even if it has not been conclusively demonstrated, altered body image may be a risk factor for eating disorders and therefore its evaluation is important.

The adolescents with the highest body mass index and also subjects who were larger overall (i.e. greater height and weight) were the groups with the greatest overestimations. Other authors have found that girls with higher body mass index or global size probably worry more about body shape and desire to be thinner (Vander & Thelen, 2000). It can be speculated that they, in comparison with peers, receive remarks from relatives or friends since childhood about being large and they form an image of themselves of being even larger.

The conclusion of the present study is that girls at the age of risk for eating disorders overestimate certain parts of their bodies. This is particularly true at pubertal onset. In addition, girls with greater body mass index, weight and height present greater overestimation. These profile charts for various age groups will make it possible to use this body perception technique to compare other groups from other cultures or with other disorders.

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