

# The correlation between body conception and actual body mass index among adolescents: some variables and their role

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**Summary.** *Objective:* This study aimed to determine the relationships between adolescents' actual body mass indices BMIs and their body image perceptions and how they vary by gender and age. *Subjects and Methods:* The questionnaire which has two sections includes general information about the students and the Stunkard Figure Rating Scales. Gender and age were used as explanatory variables. The research data were analyzed using SPSS statistical software. Statistical analyses included factor analysis and Cohen's kappa test (K) A criterion alpha level of  $<.001$  was used to determine statistical significance. *Results:* A total of 321 students participated in the study; of these, 58.6% were boys, 41.4% were girls. The mean age was  $14.6 \pm 1.2$  years old. The difference by age and gender groups between the real BMIs of adolescents, the BMIs they perceived and the perceptions of others was significant and the compatibility between their real BMIs and the BMIs they perceived are at the medium level ( $p=0.000$ ). The compatibility of the perception which figure they were regarded by others with their real BMI perceptions are in medium level for boys for the age group of 12-14 whereas poor level for girls and for the age group of 15-18 ( $p=0.000$ ). *Conclusions:* This study found that adolescents had misconceptions about their real weights, about the weights they wanted to be and about their perceptions of others' views of their weights. Age and gender were effective factors in these perceptions.

**Key words:** adolescent, body image, BMI, perception, gender

## Introduction

In recent years, researches have demonstrated that body dissatisfaction has become widespread among adolescents (1). When a person has a low opinion about the way they look, this can be described as body image dissatisfaction (2). Body image problems involve misperceptions, and those who suffer from them tend to overestimate or underestimate the size of parts of their bodies or their entire bodies (3).

New research has shown that body image is a determinant factor in adolescent weight problems (4, 5), physical health (6) and mental health (7). Some teen-

agers may diet despite not being overweight and need to be helped to understand the discrepancy between their body image and their actual weight (8). Bronner, Welch, Serpa (9), found that nearly 50% of the overweight participants in their study had body images that did not correspond to reality. Danubio et al. (10) have shown that teenagers tend to think that they are more slender than they actually are. The commonest body image problem is dissatisfaction with one's body. This problem leads adolescents, particularly females, to develop abnormal eating habits, to have poor diets, low self-esteem, depression and to engage in risky behavior (11, 12). Females (34.0%) are more than two

times more prone to see themselves as fat than males (15.0%) (13). Nearly 70% of teenage females would prefer to be slender (14), and 60% would like to have a different weight. Approximately 30% are dissatisfied with their bodies (5). Adolescent males feel pressure to be muscular, and their wish for physical prowess causes body image problems (15). Nearly 30% of adolescent males would like to modify their physical size (16), and 24% report body image problems (5, 17). Overweight and obese adolescents have especially troubling problems with their body images. If they are dissatisfied with their bodies they are more likely to try to get their weight under control (18), whereas teenagers who feel body dissatisfaction are more prone to diet in unhealthy ways and gain weight (5).

Adolescents' social environment-in particular, their peers-greatly affects their body images. Peer pressure makes adolescents want to be thin. Male and female adolescents become dissatisfied with their bodies due to the discrepancy between ideal body images and their real bodies (19).

Having inaccurate thoughts about their body image may make teenagers want to look thinner even if their body weight is normal. This can lead to a variety of health problems such as hormonal disorders, low bone density and eating disorders. In order to prevent health problems, it is important to understand the differences in adolescents' body perceptions based on gender and develop plans and programs to create solutions. The body perception of adolescents in Turkey has not been studied adequately. This study aimed to determine the relationships between adolescents' actual body mass indices (BMIs) and their body image perceptions and how they vary by gender and age.

## Materials and Methods

This study was designed as cross-sectional. The study population consisted of adolescents in the 10-19 age range. The study sample was composed of primary and high school students who were registered to the 6th, 7th 8th 9th or 10th grade of primary and high schools in the spring term of 2013 in semi urban and urban districts. Three schools were randomly selected, one from the center and two from the rural area.

## Procedure

Planning phase of the study began in January 2013 and data was collected in May 2013. Permissions from education authorities and the administrative bodies of the schools were obtained. Through the school administration, parents were informed about the study.

The subjects participated on a voluntary basis after being fully informed about the objectives and methods of the study. They signed an informed consent and filled in questionnaires which adhered to Declaration of Helsinki protocols (World Medical Association). After receiving the oral approvals that they were volunteers for the study, the questionnaire was conducted.

School teachers accompanied the research team during data collection. Evaluation of data was completed in February 2014.

## Participants

A total (T) of 321 students participated in the study. Of these, 58.6% were boys (B:188), 41.4% were girls (G:133). The mean age was  $14.6 \pm 1.2$  years old (B:  $14.6 \pm 1.2$  years old, G:  $14.4 \pm 1.1$  years old). The data analysis phase, the age distribution of the students were grouped by considering quantitative equity (12-14 years old : 165, 15-18 years old : 156).

## Measures and instruments

Data were collected using a questionnaire and in face-to-face interviews. The questionnaire had 2 sections: general information about the students and the Stunkard Figure Rating Scale.

## Body Mass Index (BMI)

The body weight of each student was measured while wearing minimal clothing to the nearest 0.1 kg with a digital scale (Seca 767) with light clothing and without shoes on by trained nutrition and dietetic department students. Height was measured with a stadiometer (CHARDER HM-200P Portstad) in the Frankfurt plane. Body mass index (BMI;  $\text{kg}/\text{m}^2$ ) was calculated as body weight (kg) divided by height (m) squared. The BMIs of the students in the study were

**Table 1.** Mean BMIs of adolescents

BMI (%)	n	%	$\bar{x}\pm SD$	Minimum	Maximum
Thinner (<.5.)	12	3.7	15.5±1.0	13.89	16.71
Underweight ( $\geq 5$ .<15.)	25	7.8	16.7±1.0	15.31	19.10
Normal ( $\geq 15$ .-<85.)	196	61.1	19.9±1.7	16.61	24.34
Overweight( $\geq 85$ .-<95.)	46	14.3	23.3±1.2	20.28	25.59
Obese ( $\geq 95$ )	42	13.1	27.1±1.7	23.44	31.14

evaluated according to percentile ranges of World Health Organization (WHO) for boys and girls between the ages of 5 and 19. Their BMIs were classified as: less than 5, thin; between .5 and .15, underweight, between  $\geq .15$  and <.85, normal, between  $\geq .85$  and <.95 overweight; and  $\geq .95$ , obese (20).

The BMI percentile distribution of the adolescents' mean BMIs is shown in Table 1.

### *Body Image Assessment*

Numerous techniques have been employed to assess the different aspects of Body Image Dissatisfaction (BID), including figure preferences, questionnaires and examining cognitive, affective, and behavioral functions. The most commonly used technique is known as figure preferences. These figure preferences, also referred to as silhouette or contour line drawings, consist of a series of frontal images ranging from thin to fat. Individuals are typically asked to select the image that best represents their current and ideal body size. The discrepancy between these two ratings represents a measure of body dissatisfaction (21). The BMI values of the adolescents were analyzed according to Stunkard Figure Rating Scale (Fig. 1). The figure rating scale was introduced by Stunkard, Sorensen, & Schulsinger, (22) as an easy-to-administer self-reporting scale for body image.

The figure rating scale has been widely used in epidemiological investigations as an adjunct to measured or self-reported height and weight (23). A nine-figure, gender-specific silhouette drawing instrument was administered to the students, with figure 1 being the thinnest and figure 9 being the heaviest.

The figure rating scale includes the items: "Which silhouette is closest to your usual appearance?" and

"Which figure would you like to look like?" The question, "Which figure do you think that people around you find you similar to?" was added to determine the adolescents' perceptions of other peoples' ideas about their bodies.

Each of the figures corresponds to a previously established BMI (22). To analyze the data statistically in a better way, they were classified as: less than .15 percentile (BMI:<18.5kg/m<sup>2</sup>) "thin" (Figure 1); between .15 and <.85 (BMI:18.5-<25.0 kg/m<sup>2</sup>), "normal" (Figures 2, 3 and 4); and  $\geq .85$  (BMI:  $\geq 25.0$  kg/m<sup>2</sup> ) "heavier" (Figures 5, 6, 7, 8 and 9).

### *Statistical analysis*

Gender and age were used as explanatory variables. The research data were analyzed using SPSS statistical software. Statistical analyses included factor analysis and Cohen's kappa test (K) (24). A criterion alpha level of <.001 was used to determine statistical significance.

## **Results**

The mean weight and height of the boys was B:1.7±0.1 m, 58±1.2 kg, and for the girls it was G:1.6±0.1 m, 54.4±1.0 k. The students' overall mean BMI was 20.9±3.3.4 kg/m<sup>2</sup> (B:20.9±3.6 kg/m<sup>2</sup>, G:21.0±3.0 kg/m<sup>2</sup>). Of the adolescents, 11.5% were thin (n: 37), 61.1% were normal (n: 196), and 27.4% (n: 88) were heavy.

Table 3 shows the actual BMI data of the adolescents by gender.

Question 1 is "Which figure is closest to your usual appearance?" The responses indicate that 13.5% of those who have thin actual BMI values describe

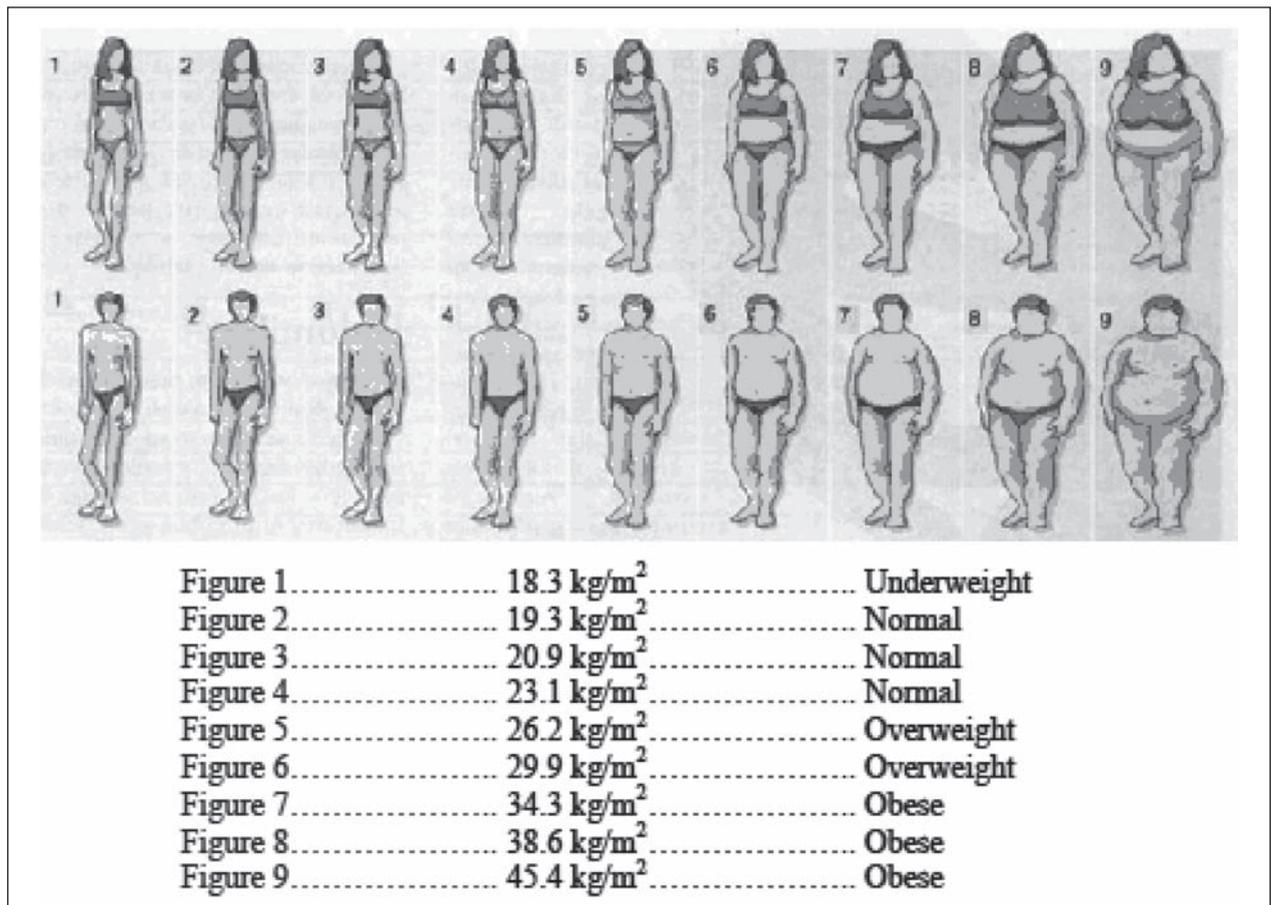


Figure 1. Stunkard figure rating scale and established conversion to BMI

Table 2. Interpretation of Kappa

Kappa	Agreement
< 0	Less than chance agreement
0.01–0.20	Slight agreement
0.21– 0.40	Fair agreement
0.41–0.60	Moderate agreement
0.61–0.80	Substantial agreement
0.81–0.99	Almost perfect agreement

themselves accurately as thin (B:10.0%, G:26.6%), 82.1% of those who are at a normal weight describe themselves accurately as normal (B:81.0%, G:83.3%), and 72.7% of those who are heavy described themselves accurately as heavy (B:72.4%, G:73.3%).

Question 2 is “Which figure would you like to look like?” 78.4% of those who are thin according

to their actual BMI data want to look like normal (B:73.3%; G:100.0%), 76% of those who are actually normal want to look normal (B:70%; G:82.3%) and 75% of those who are heavy want to look like the normal figure (B:74.1%; G:76.7%). Question 3 is “Which figure do you think those around you regard you as?” and the answers show that 24.3% of those who are actually thinner think that they are regarded as thin (B:13.3%; G:71.4%); 73.5% of those who are normal think that they are regarded as normal (B:76.0%; G:70.8%) and 73.9% of those who are heavier think that they are regarded as heavy (B:81%; G:60%).

The difference between real BMIs of the students, the BMIs they perceived and the perception which figure they were regarded by others are significant ( $p=0.000$ ) and they are compatible in medium level with their real BMIs [B(K):0.406; G(K):0.498]. The compatibility of the perception which figure they were

**Table 3** The relationships between adolescents' actual body mass indices (BMIs) and their body image perceptions by gender

		Figures Groups								Statistics				
Actual BMI Groups	Gender	Thinner		Normal		Heavier		Total						
		n	%	n	%	n	%	n	%					
Which silhouette is closest to your usual appearance?											x <sup>2</sup>	p	K	p
Thinner	B	3	10.0	26	86.7	1	3.3	30	81.1	B	71.243	0.000	0.406	0.000
	G	2	28.6	5	71.4	-	-	7	18.9	G	56.189	0.000	0.498	0.000
	T	5	13.5	31	83.8	1	2.7	37	100.0					
Normal	B	4	4.0	81	81.0	15	15.0	100	51.0					
	G	3	3.1	80	83.3	13	13.5	96	49.0					
	T	7	3.6	161	82.1	28	14.3	196	100.0					
Heavier	B	2	3.4	14	24.1	42	72.4	58	65.9					
	G	-	-	8	26.7	22	73.3	30	34.1					
	T	2	2.3	22	25.0	64	72.7	88	100.0					
Which figure would you like to look like?														
Thinner	B	2	6.7	22	73.3	6	20.1	30	81.1	B	1.723	0.787	-0.031	0.498
	G	-	-	7	100.0	-	-	7	18.9	G	7.983	0.092	0.026	0.624
	T	2	5.4	29	78.4	6	16.2	37	100.0					
Normal	B	4	4.0	70	70.0	26	26.0	100	51.0					
	G	16	16.7	79	82.3	1	1.0	96	49.0					
	T	20	10.2	149	76.0	27	13.8	196	100.0					
Heavier	B	4	6.9	43	74.1	11	19.0	58	65.9					
	G	4	13.3	23	76.7	3	10.0	30	34.1					
	T	8	9.1	66	75.0	14	15.9	88	100.0					
Which silhouette do you think those around you regard you as?														
Thinner	B	4	13.3	19	63.3	7	23.3	30	81.1	B	66.849	0.000	0.433	0.000
	G	5	71.4	2	28.6	-	-	7	18.9	G	46.206	0.000	0.358	0.000
	T	9	24.3	21	56.8	7	18.9	37	100.0					
Normal	B	4	4.0	76	76.0	20	20.0	100	51.0					
	G	13	13.5	68	70.8	15	15.6	96	49.0					
	T	17	8.7	144	73.5	35	17.8	196	100.0					
Heavier	B	-	-	11	19.0	47	81.0	58	65.9					
	G	-	-	12	40.0	18	60.0	30	34.1					
	T	-	-	23	26.1	65	73.9	88	100.0					

B: Boys; G: Girls; T: Total

regarded by others with their real BMI perceptions [B(K):0.433; G(K):0.358] are in medium level for boys ( $p=0.000$ ) and poor for girls ( $p=0.000$ ; Table 3).

Table 4 shows the relations between participants' actual BMI and their body image perceptions by age.

Question 1 is, "Which figure is closest to your usual appearance?" The responses show that 17.6% of those between 12 and 14 years of age actually thin and 10% of those between 15-18 years age and actually thin indicated the thin figure group. Of those with an actually

normal BMI, respectively 86.2% and 78.4% in the same age groups indicated the normal figure group, while of those who are heavy, 66.6% and 82.4% indicated the heavy figure group. In response to the second question, "Which figure would you like to look like?", of those who are actually thin and between 12 and 14 years of age, 76.5% want to look like the normal figure, while the same rate is 80% for those between 15 and 18 years of age. These rates are respectively 73.4% and 78.4% among those who are in the same age group and actually normal, and 72.2% and 79.4% among those who are heavy. Question 3 is, "Which figure do you think those around you regard you as?" and the responses indicate that 17.7% of those who are actually thin and are between 12 and 14 years of age have accurately judge the perceptions of those around them, while this rate is 30% among those between 15 and 18 years of age, 75.6% and 71.5% for those who are actually normal, and 72.2% and 76.5% among those who are actually heavy.

The difference by age group between the real BMIs of adolescents, the BMIs they perceived and the perceptions of others was significant ( $p=0.000$ ) and the compatibility between their real BMIs and the BMIs they perceived [a(K): 0.479; b(K): 0.406] are at the medium level ( $p=0.000$ ), the compatibility between others' BMI perceptions [a(K):0.428; b(K):0.383] were at the medium level for the age group of 12-14 ( $p=0.000$ ) and a poor level for the age group of 15-18 ( $p=0.000$ ) (Table 4).

## Discussion

Adolescence is a period of physical growth, sexual development and psycho-social maturation along with the recognition of social influences. A comprehensive review of the literature found that risk factors for negative body image are either related to individual attributes or to external social and environmental factors (25). Having an ideal body type and weight is important for adolescents of both genders. Our study found that adolescents' actual BMIs and their body image perceptions vary by gender and age.

Some studies have indicated that adolescents are inclined to regard themselves as different weight than they actually are (10,26,27). This study asked students

to identify their body images, and the results were inconsistent with their actual BMIs (Table 3). Many adolescent girls report dissatisfaction with their bodies, and most often is expressed in relation to weight and shape (28). Although earlier research on body dissatisfaction has focused on girls (29,30,31,32), recent research indicates that boys are equally prone to body image issues (33,34). However, this study found that boys perceived their own BMI values more incorrectly than girls ( $p=0.000$ ). Also our body image assessment indicated that 15.0% of males with a normal BMI perceive themselves as heavy (Table 3). Body dissatisfaction among boys may result in harmful situations. There are fewer studies conducted with male participants and these studies reveal that they have anxiety about their body image, their concern about negative body image leads to an increase in their desire to be muscular and increased BID levels (33,35,36,37,38).

In this study, a large majority of the adolescents stated that they wanted to have normal BMI (76.0%) values (Table 3). Mulasi-Pokhriyal & Smith's (39) study similarly determined that 75.0% of adolescents wanted to have a normal weight. Considering the possible effects of the factors that have a negative influence on body image perception, it is good that this rate is high. Poor body image in adolescents can have severe health-related implications (40). Therefore, there is a need for early intervention to reduce the onset of negative body image among young people (41). It is necessary to develop a variety of strategies for this issue. Educational seminars should be held at schools to increase awareness and help adolescents be more satisfied with their body images. It would also be beneficial to create correct perceptions and knowledge to prevent eventual health problems.

Recognizing the negative body perceptions of young adolescents is important to resolving the problem. Body dissatisfaction develops during childhood, and typically 40.0–50.0% of 6–12 year olds report being unhappy with the way they look (42).

Individuals' thoughts about their dissatisfaction with body may change as they grow old. In this study, of those with a thin BMI between 15-18 years age, 90.0% regarded themselves as normal, while 20.6% of those who are normal regarded themselves as heavy. Of those who are actually heavy and between 12-14

**Table 4.** The relationships between adolescents' actual body mass indices (BMIs) and their body image perceptions by age

Actual BMI Groups	Gender	Figures Groups								Statistics				
		Thinner		Normal		Heavier		Total		x <sup>2</sup>	p	K	p	
n	%	n	%	n	%	n	%							
Which silhouette is closest to your usual appearance?														
Thinner	12-14	3	17.6	13	76.5	1	5.9	17	45.9	a	69.022	0.000	0.479	0.000
	15-18	2	10.0	18	90.0	-	-	20	54.1	b	61.187	0.000	0.406	0.000
	T	5	13.5	31	83.8	1	2.7	37	100.0					
Normal	12-14	6	6.4	81	86.2	7	7.4	94	47.9					
	15-18	1	1.0	80	78.4	21	20.6	102	52.1					
	T	7	3.6	161	82.1	28	14.3	196	100.0					
Heavier	12-14	1	1.9	17	31.5	36	66.6	54	61.4					
	15-18	1	2.9	5	14.7	28	82.4	34	38.6					
	T	2	2.3	22	25.0	64	72.7	88	100.0					
Which figure would you like to look like?														
Thinner	12-14	1	5.9	13	76.5	3	17.6	17	45.9	a	2.653	0.618	0.001	0.992
	15-18	1	5.0	16	80.0	3	15.0	20	54.1	b	0.221	0.994	-0.01	0.985
	T	2	5.4	29	78.4	6	16.2	37	100.0					
Normal	12-14	16	17.0	69	73.4	9	9.6	94	47.9					
	15-18	4	3.9	80	78.4	18	17.6	102	52.1					
	T	20	10.2	149	76.0	27	13.8	196	100.0					
Heavier	12-14	7	13.0	39	72.2	8	14.8	54	61.4					
	15-18	1	2.9	27	79.4	6	17.7	34	38.6					
	T	8	9.1	66	75.0	14	15.9	88	100.0					
Which silhouette do you think those around you regard you as														
Thinner	12-14	3	17.7	9	52.9	5	29.5	17	45.9	a	54.872	0.000	0.428	0.000
	15-18	6	30.0	12	60.0	2	10.0	20	54.1	b	51.698	0.000	0.383	0.000
	T	9	24.3	21	56.8	7	18.9	37	100.0					
Normal	12-14	10	10.6	71	75.6	13	13.8	94	47.9					
	15-18	7	6.9	73	71.5	22	21.6	102	52.1					
	T	17	8.7	144	73.5	35	17.8	196	100.0					
Heavier	12-14	-	-	15	27.8	39	72.2	54	61.4					
	15-18	-	-	8	23.5	26	76.5	34	38.6					
	T	-	-	23	26.1	65	73.9	88	100.0					

a : 12-14 years; b: 15-18 years

years age, 31.5% regard themselves as normal ( $p=0.00$ , Table 4). Ricciardelli & McCabe (16) found in their study that body dissatisfaction increased with age, and that it could be dependent on the fat increase in body during adolescence. Law & Labre (19) found that ado-

lescent boys had body dissatisfaction at every age. Another study by Rosenblum & Lewis (43) found that girls' body satisfaction decreased between the ages of 13 and 15, but remained stable between the ages of 15 and 18, while Carlson-Jones (44) observed that body

satisfaction was stable in a larger sample of girls over a 1-year period at two age levels. Both studies found improvements in boys' body satisfaction over time. Relatively little has been done to identify the important developmental periods in adolescence during which body satisfaction may be particularly prone to change.

The responses to the question, "Which figure do you think those around you regard you as?" were analyzed by gender and age group (Tables 3-4), and it was found that the perception of the environment was also changeable, and there were inconsistencies between actual BMIs and figure ratings. It was observed that the thoughts of others, particularly their friends, influence adolescents' perceptions of their body image. The positive association for boys and girls between social engagement and body satisfaction supports the idea that peers and social relationships are important for adolescent development (38).

## Conclusion

Body dissatisfaction among adolescents is an important public health issue that should be eliminated. Adolescent females have more conversations with their friends and others about body image and are affected by media broadcasts related to this matter. Adolescent males wish to have more muscular bodies since it is perceived as the correct body image, which leads to different forms of body dissatisfaction.

This study found that adolescents had misconceptions about their real weights, about the weights they wanted to be and about their perceptions of others' views of their weights. Age and gender were effective factors in these perceptions. For these reasons, adolescents and families should be taught about body image problems in order to prevent misconceptions with regard to adolescents' bodies.

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