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Self-perception of weight and physical fitness, body image perception, control weight behaviors and eating behaviors in adolescents

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ABSTRACT

Introduction: self-perception of weight and physical fitness, aesthetic reasons to diet, self-weighing as a way to feel better and body image perception have been related to a constellation of risks to develop both body image dissatisfaction and eating behavior disturbances, especially among adolescents.

Objectives: to analyze weight self-perception and self-reported physical fitness, to explore the links between these variables and weight control behaviors, to explore possible relations among weight self-perception, self-reported physical fitness, dieting, self-weighing frequency and body mass index (BMI)/body image and to analyze the relation between all these variables and different eating behaviors.

Methods: a total of 336 students (mean age of 12.46 ± 2.14; 47.62% females) took part in this study. Different scales were administered (weight self-perception and self-

reported physical fitness, dieting, self-weighing frequency, body image perception, eating behaviors) and height and weight were measured in order to obtain the BMI.

Results: mean BMI was 20.18 ± 3.58 and 41.14% of participants had overweight/obesity. Among those who perceived themselves as overweight, 76.92% were girls. More than 70% of participants reported average or good physical fitness and more boys reported good or excellent physical fitness. Almost 60% of participants who planned to diet for aesthetic reasons were girls, and girls more than boys self-weighed to feel better. BMI was significantly correlated with body image dissatisfaction/restrictive eating.

Conclusions: there are clear links between weight self-perception, body image, dieting, self-weighing and eating behaviors at an age which might be considered as a starting point to eating behavior disturbances.

Key words: Weight misperception. Self-reported physical fitness. Diet. Self-weighing. Eating disorders. Adolescence.

RESUMEN

Introducción: la autopercepción del peso y de la forma física, razones estéticas para hacer dieta, pesarse como método para sentirse mejor y la percepción de la imagen corporal se han relacionado con una constelación de riesgos para desarrollar tanto insatisfacción corporal como alteraciones alimentarias, especialmente en adolescentes.

Objetivos: analizar la autopercepción del peso y de la forma física, explorar los vínculos entre estas variable y conductas de control de peso, explorar posibles relaciones entre la autopercepción del peso y de la forma física, realización de dietas, frecuencia con la que se pesan los adolescentes e índice de masa corporal (IMC)/imagen corporal, así como la relación de todo ello con diferentes conductas alimentarias.

Resultados: el IMC medio fue de 20,18 ± 3,58 y el 41,14% de los participantes presentaba sobrepeso/obesidad. Entre quienes se percibían con sobrepeso, el 76,92% eran chicas. Más del 70% de los participantes decían estar en una buena forma física o en la media y eran más los chicos los que decían estar en buena o excelente forma

física. Casi el 60% de los participantes que planeaban hacer dieta por razones estéticas eran chicas y ellas más que los chicos se pesaban para sentirse mejor. El IMC correlacionó significativamente con la subescala imagen corporal/ingesta restrictiva.

Conclusiones: existen claros vínculos entre autopercepción ponderal, imagen corporal, realización de dietas, pesarse y conductas alimentarias en una edad que podría considerarse como un punto de partida para la presentación de alteraciones alimentarias.

Palabras clave: Percepción del peso. Percepción del estado de forma física. Dieta. Pesarse. Trastornos alimentarios. Adolescencia.

INTRODUCTION

Misperception of weight is defined as the discordance between an individual's actual weight and the perception of his/her weight status. Weight perception and misperception might influence the healthy or unhealthy behaviors people engage in (1). In this regard, misperception has repeatedly been documented among overweight and obese adults, and it has been hypothesized that weight misperception among overweight and obese individuals may preclude the adoption of healthful attitudes and behaviors, perhaps as a result of lower weight loss motivation. Overweight and obese individuals who consider their weight healthy, for example, might not try to lose weight and might be less inclined to eat healthfully and to be physically active (2). On the other hand, some evidence indicates that weight misperception among overweight and obese individuals might be associated with healthful behaviors (e.g., better diet quality, more physical activity, and less sedentary behavior) (2,3). Perceiving oneself as overweight-obese is relevant given the association between that perception and unhealthy weight-control behaviors (1).

It seems that overweight misperception varies according to gender (among other variables), females tending to perceive themselves as overweight more than males do, even at the same measured body mass index (BMI) (4-6). Misperception of overweight-obesity among adolescents of normal weight might have negative consequences. The combination of overweight-obesity misperception causing body dissatisfaction predicts dieting, and dieting is a clear risk factor for developing different

eating disturbances (6). In addition, adolescents who have been engaged in dieting and other unhealthy weight-control behaviors have been found to be at risk of weight gain over time (7,8).

Besides the concept of weight misperception, one's body shape and/or one's body image play a relevant role in different behaviors (9). Both weight misperception and poor body image have negative psychological and psychosocial effects (e.g., low self-esteem, anxiety, depression, isolation, discrimination, family conflicts, etc.). It is well known that people engaged in a process of self-evaluation (included body checking) comparing themselves to others who they believe have more desirable sociocultural traits tend to be involved in behaviors aimed to achieve those desired characteristics (10).

Self-reported physical fitness is another variable to consider as a starting point to different healthy or unhealthy behaviors. Perceived physical ability (i.e., the individual's perception of physical abilities developed over time as a result of cumulative interactions with the environment) and perceived physical competence are two goal-oriented self-perception constructs (11). Recently, it has been shown that body dissatisfaction is a significant mediator of the effect of BMI on perceived physical activity (12). A large body of research has aimed to validate the idea that exercise improves body image through changes in physical fitness (13). However, Martin and Lichtenberger have suggested that improvements in physical fitness play a minor role in changing body image, because the effects of physical exercise and activity on body satisfaction should be mediated by changes in individuals' perceptions of their physical fitness and competence (13).

As a result, it seems that perceptions (weight, physical fitness) are core constructs to lead to healthy/unhealthy behaviors more than actual weight or actual physical fitness do.

Healthy or unhealthy behaviors as consequence of different perceptions and their corresponding psychological and psychosocial effects lead to the concept of emotional eating among other eating behaviors. Thus, it has been distinguished among restraint eating (conscious restriction of food intake aimed to control body weight and/or to promote weight loss), uncontrolled eating (inability to resist emotional cues, eating as a response to different negative emotions) and emotional eating (tendency to eat

more than usual due to a loss of control over intake with a subjective feeling of hunger) (14). Other authors have defined external eating as the tendency to overeat in response to external food-related cues like the sight, smell, and taste of palatable food, regardless of their physical need for food (15,16). Moreover, some authors have noted that different types of bingers and dieters may be found: bingers who are engaged in restraint-induced binging, and bingers generally disinhibited; dieters who eventually become disinhibited and overeat, and dieters who maintain the restrictive attitude (17,18).

It has been reported that BMI and negative emotional eating are highly related whereas positive emotional eating and external eating loaded onto another factor. In this regard, it is plausible that even though positive emotions may elicit eating, they do not necessarily mirror disordered eating. Eating in response to positive emotions might rather be related to hedonic or external eating (19,20).

Some models conceptualize eating disturbances as disorders of affect regulation, considering the impairment in the cognitive capacity to process and regulate emotions as the primary regulatory disturbance (21). According to these models, some eating behaviors, such as binge eating and compensatory behaviors, as well as restricted food consumption, are interpreted as responses to cope with intense or relatively undifferentiated emotional states (22-24). These intense emotional states are usually linked to self-perceptions (weight, physical fitness, body shape/body image), especially among adolescents (25-28).

Based on the above-mentioned previous research, the objectives of this study, focused on preadolescents and adolescents, were: a) to analyze weight self-perception and self-reported physical fitness; b) to explore the possible relationship between these variables and some weight control behaviors (dieting, self-weighing frequency); to explore possible relations among weight self-perception, self-reported physical fitness, dieting, self-weighing frequency and BMI/body image; and d) to analyze the relation between all these variables and different eating behaviors.

METHOD

Participants

The sample comprised 336 students, 160 females (47.62%) and 176 males (52.38%), with a mean age of 12.46 ± 2.14; they were all recruited from two public schools in Seville, representing a middle socio-economic status. The participants have not any psychiatric history, which was assessed by means of a brief questionnaire at the time of obtaining the parents' informed consent. None of the participants showed any comprehension and/or language difficulties. A total of 400 students were invited to take part in the study. Among them, 37 refused to participate and there were 27 students whose parents did not return the signed informed consent. Thus, the response rate was 84%.

Instruments and measures

Weight self-perception and self-reported physical fitness

Following several previous studies, these measures were self-reported, so no infographics or any types of guidelines were used. Participants were classified as "very overweight", "slightly overweight", "about the right weight", "slightly underweight" or "very underweight" after responding to the question "How do you think of yourself in terms of weight?" In addition, participants were asked about their self-reported physical fitness and they were classified as perceiving themselves as possessing a "poor", "fair", "average", "good" or "excellent" physical fitness (27,28).

Dieting

Participants were asked whether or not they were dieting at the moment (yes/no), the reason or reasons for dieting (aesthetic reasons, the specific objective of losing weight, other healthy reasons, others), the origin of the diet (prescribed or self-imposed) and the intention to keep on dieting or being about to do it (yes/no).

Self-weighing frequency

Participants indicated their self-weighing frequency, the possible responses being: "several times a day", "once a day", "several times a week", "once a week", and "occasionally". Then, participants were asked about "What is the reason for being weighed?": "controlling my weight", "no fattening", and "feel better".

Body image perception

The body silhouettes method was used. This method is based on self-reporting where participants must choose the silhouette that most closely resembles the shape of their body. In this study, the nine Stunkard's silhouettes were applied (29). Silhouettes numbered 1 represent the thinnest figure and number 9 represents the heaviest.

Body mass index (BMI)

BMI was calculated as the relationship between weight (in kg) and height squared (in m). Weight and height were taken in individual sessions, with the participants in the standing position, barefoot, and in light garments. A stadiometer Añó-Sayol Atlántida S13 model was used. Overweight and obesity rates were determined using the value of BMI-specific percentiles for age and sex in the reference population (30), considering the cut-off points of 85th and 97th for overweight and obesity, respectively.

Eating behaviors

Different eating behaviors were assessed by means of the Spanish version of the Three-Factor Eating Questionnaire-R18 (TFEQ-Sp) (31). The questionnaire measures three different aspects of eating behavior: a) restrained eating (defined as conscious restriction of food intake aimed to control body weight and/or to promote weight loss); b) uncontrolled eating (the tendency to eat more than usual due to a loss of control over intake with a subjective feeling of hunger); and c) emotional eating (inability to resist emotional cues, eating as a response to different negative emotions). The questionnaire comprises 18 items that are measured on a four-point response scale (definitely true: 1, mostly true: 2, mostly false: 3, definitely false: 4) and items scores are summated into subscale scores: a, b and c. Previous studies have reported that TFEQ-R18 has adequate internal consistency reliability coefficients for the three subscales, as well as for the whole questionnaire (ranging between 0.74 and 0.87) (14,31). In addition, the Spanish version of the Eating Behaviors and Body Image Test for Preadolescent Girls (EBBIT) was used. This instrument was designed to measure behavioral indicators of dieting and binging and to be put in practice with preadolescent population trying to avoid some of the limitations of previous instruments. The content of this questionnaire permits to be applied in samples of

preadolescents and early years of adolescence. The internal consistency reliability coefficients of the EBBIT are 0.92 for the BIDRE subscale (body image dissatisfaction/restrictive eating), 0.82 for the BEB subscale (binge eating behaviors) and 0.90 for the total scale (18).

Procedure

The study was approved by the direction of the Behavioural Sciences Institute (Seville, Spain). After having obtained the schools' headmasters' permission, the students' approval and the parents' informed consent, participants completed the aforementioned instruments in group sessions without time limits. A psychologist, a nutritionist and a teacher supervised the procedure, instructing the students about how to complete the questionnaires until they were completely sure about their full understanding of the instructions. Data collection was developed in a suitable setting so the attainment of the task could be reached easily. All the participants volunteered to take part in the study and none of them received any kind of reward after fulfilling the task. The anthropometric measures were taken by trained nutritionists with enough experience with working in these types of studies.

Statistical analyses

Data are expressed as means ± standard deviations. To study gender differences and others based on categorical variables, the proportions (percentages) were considered, the analysis being done by means of χ^2. An analysis of variance (ANOVA) was conducted to study differences with respect to the different variables included in the study, after having applied the Kolmogorov-Smirnoff test in order to analyze whether the data fitted a normal distribution. The software used for the analyses was "R", version 3.3.2 (2016-10-31), "Sincere Pumpkin Patch" (Copyright 2016, The R Foundation for Statistical Computing Platform: x86_64-apple-darwin13.4.0 -64-bit-).

RESULTS

The sample comprised 336 students, 160 females (47.62%) and 176 males (52.38%), with a mean age of 12.46 ± 2.14. With respect to BMI, the mean was 20.18 ± 3.58. Considering the value of BMI-specific percentiles for age and sex, 57.65% of

participants had normal weight, 14.41% had overweight and 26.73%, obesity. Thus, overweight + obesity (BMI ≥ 85th percentile) was 41.14%.

Considering weight self-perception, 66.02% of participants perceived themselves as normal weighted, 19.09% as overweight and 4.21% as obese. This way the perceived total overweight was 23.30%. No significant gender differences with respect to weight self-perception were found (χ^2 = 8.04; p = 0.09). Overall weight misperception was 44.77%. Among those participants who had overweight, 69.23% misperceived their weight, mainly considering that they had normal weight (62.82%). In case of obese participants, 88.63% misperceived their weight, 84.09% of them perceiving themselves as normal weight or slightly overweight. While 49.68% of boys misperceived their weight, in the case of girls that percentage was 39.58%. Nevertheless, among those who perceived themselves as very overweight, 76.92% were girls. On the contrary, among those who perceived themselves as very or slightly underweight, 62.5% and 60% respectively were boys.

Respecting self-reported physical fitness, most of participants reported an average (34.57%) or good (38.27%) physical fitness; poor (2.47%), fair (13.9%) and excellent (10.80%) were the reported physical fitness of the rest. Considering gender differences, while 57.40% of men reported good and excellent physical fitness, in case of women that percentage was 40.52%. On the contrary, 28.40% of men reported average physical fitness while this percentage was 41.83% for women (χ^2 = 14.59; p < 0.01).

Most participants who considered to have average, good or excellent physical fitness reported to be about the right weight (66.79%). When the reported physical fitness was poor or fair, there were more participants who perceived themselves as slightly or very overweight (55.32%). Bearing in mind the actual weight, we found similar results. Figure 1 represents the participants who considered their physical fitness as average, good or excellent and the corresponding percentages related to weight self-perception and actual weight (classified as normal, overweight or obesity). Among boys, considering not weight perception but actual weight, good and excellent physical fitness was reported by 72.27%, 42.10% and 25.92% of participants at normal weight, overweight and obesity, respectively. In case of girls, these percentages were 45.34%, 38.63% and 16.66%.

With respect to dieting, 18.73% of participants were dieting at the moment, and 29% planned to diet in the future. Among those who planned to diet, 30.95% gave aesthetic reasons to do it, 57.14% of them being girls. Considering self-weighing frequency, the following percentages were obtained: several times a day (2.15%), once a day (3.38%), several times a week (5.54%), once a week (20.31%), and occasionally (66.77%). Only 1.85% of participants never self-weighed. The main reason to self-weighing was "controlling my weight" (67.71%), followed by "no fattening" (17.01%) and "feel better" (12.15%). There were no significant gender differences with respect to dieting and self-weighing frequency. Nevertheless, 57.14% of those who self-weighted to "feel better" were girls.

Body image perception was assessed by means of the body silhouettes method. Table I shows the results by sex with mention to the BMI linked (approximately) to each silhouette.

Bearing in mind the silhouettes which correspond to normal BMI (2-4), more girls (60.51%) than boys (51.42%) chose silhouettes 3-4. Overall, no gender differences with respect to body image perception were observed (Fig. 2).

Taking into account actual BMI and body perception, among those who chose silhouettes 2, 3 and 4 (these silhouettes are usually associated to normal BMI), 1.25% had moderate denutrition, 12.5% were overweight and 2.5% were obese in case of silhouette 2; with respect to silhouette 3, 0.95% had severe denutrition, 30.48% were overweight and 2.86% were obese; finally, in the case of silhouette 4, 35.90% were overweight and 20.51% were obese. As a result, when participants identify their body image with silhouette number 2, 16.25% was misperceiving their weight; when participants chose silhouette number 3, the percentage of misperception was 34.29; and, finally, considering the silhouette number 4 the percentage of misperception was 56.41.

With respect to physical fitness, among those who identified themselves with silhouettes 2-4, self-reported physical fitness was "average", "good" or "excellent" in 89.01%. When participants chose silhouette number 1, that percentage was 85.71%. Finally, the percentage was 56.86% when participants identified themselves with silhouettes 5-9. It must be noted that poor physical fitness was considered by 0.78% when participants chose silhouettes 2-4 and 11.76% in case of silhouettes 5-9. Nobody

referred poor physical fitness in case of silhouette number 1. Due to the fact that silhouette number 8 has not been chosen and number 9 only was chosen by one participant, these two silhouettes have been removed from figure 3.

Means of eating behaviors as measured by means of TFEQ-Sp and EBBIT are shown in table II. It must be noted that the original purpose of the EBBIT was to test the hypothesis that young girls at risk of eating disorders may exhibit problems in several areas. Nevertheless, there are no psychometric reasons not to use this instrument in boys so for this work it was applied.

Considering different nutritional states (severe denutrition [SD], moderate denutrition [MD], normal weight [NW], overweight [OW], obesity [OB]), there were no significant differences with respect to restrained eating, emotional eating, uncontrolled eating and binge eating behaviors. Significant differences were found in case of body image dissatisfaction/restrictive eating (BIDRE) subscale ($p < 0.0001$). Tukey mean-differences test revealed that scores were higher in overweight/obesity than in normal weight ($p < 0.0001$) and scores were also higher in obesity than in overweight ($p < 0.0001$) (Fig. 4).

Correlational analyses between scores on eating behaviors and BMI revealed a unique significant correlation between BIDRE and BMI ($r = 0.47$; $p < 0.0001$; 95% CI = 0.38-0.55), the rest being not significant. With respect to different subscales of EBBIT and TFEQ-Sp, BEB correlated negative a significantly with restrained eating ($r = -0.23$; $p < 0.0.1$), uncontrolled eating ($r = -0.18$; $p < 0.01$) and emotional eating ($r = -0.32$; $p < 0.01$). No significant correlations were found between BIDRE and uncontrolled eating and restrained eating. BIDRE correlated positively with emotional eating ($r = 0.19$; $p < 0.05$).

DISCUSSION

Weight misperception may be associated to healthful or unhealthy behaviors (1-3). Misperception of overweight or obesity among adolescents at normal weight is a clear risk factor for eating behavior disturbances. The sequence weight misperception, body dissatisfaction and dieting is prone to develop negative eating attitudes and finally high risk for different pathologies, eating disorders being the most relevant among adolescents (6-8). It has been reported that females tend to perceive themselves as overweight more than males do (4-6). In the current study, despite no general

differences were found considering the weight self-perception scale, it must be noted that among the participants who considered to be very overweight, 76.92% were girls. On the contrary, among those who perceived themselves as very or slightly underweight, 62.5% and 60% respectively were boys. These results are similar to others previously found in a similar study with a sample of adolescents with a mean age of 16.22, so a bit older (28). Other studies have reported that females tend to perceive themselves as overweight more than men usually do (4-6). Generally, the identification with larger silhouettes (e.g., from 2 to 4) increases the percentage of weight misperception.

Body dissatisfaction has been considered as a mediator on the effect of BMI on perceived physical activity (12), and body image is improved by changes in physical fitness (13). Recently, it has been shown that body dissatisfaction is a significant mediator of the effect of BMI on perceived physical activity (12). A large body of research has aimed to validate the idea that exercise improves body image through changes in physical fitness (13). However, Martin and Lichtenberger have suggested that improvements in physical fitness play a minor role in changing body image, because the effects of physical exercise and activity on body satisfaction should be mediated by changes in individuals' perceptions of their physical fitness and competence (13). This study shows that most participants reported an average or good physical fitness (72.84%). Again, some gender differences appeared since 57.40% of boys reported good and excellent physical fitness, this percentage being 40.52% in case of girls. This difference has been reported previously (28). In view of our results, boys tend to have a better perception of their physical fitness than girls, this result appearing at normal weight, overweight and obesity.

A worse self-reported physical fitness (regardless of actual weight) and a tendency to perceive themselves as overweight could lead girls to higher risk of developing body dissatisfaction. In addition, it must be noted that almost 31% of participants who planned to diet in the future had aesthetic reasons to do it, 57.14% of them being girls. The main reason for self-weighing was "controlling my weight", but when the reason was "feel better", almost 58% of participants were girls. In this regard, a worse self-reported physical fitness, a worse weight perception, aesthetic reasons for planning to diet in the future and considering self-weighing as a way to feel better could yield a

constellation of risks to develop both body image dissatisfaction and eating behavior disturbances. In fact, a previous study has reported that dieting for aesthetic reasons, weight misperception, worse self-reported physical fitness and the fact of being female perform a high-risk group of developing eating disorders (28).

Healthy or unhealthy behaviors as a consequence of different perceptions and their corresponding psychological and psychosocial effects lead to the concept of emotional eating, among other eating behaviors. Thus, it has been distinguished among restraint eating (conscious restriction of food intake aimed to control body weight and/or to promote weight loss), uncontrolled eating (inability to resist emotional cues, eating as a response to different negative emotions) and emotional eating (tendency to eat more than usual due to a loss of control over intake with a subjective feeling of hunger) (14). Other authors have defined external eating as the tendency to overeat in response to external food-related cues like the sight, smell, and taste of palatable food, regardless of their physical need for food (15,16). Moreover, some authors have noted that different types of bingers and dieters may be found: bingers who are engaged in restraint-induced binging, and bingers generally disinhibited; dieters who eventually become disinhibited and overeat, and dieters who maintain the restrictive attitude (17,18). Also, in the field of eating behaviors, the concept of dietary restraint is relevant, highlighting the regulation of food intake in order to control weight and body shape (31). That control based on restrictions may cause consequent overeating episodes and eating disorders, and overweight and obesity at long-term (14). Along with dietary restraint, other eating behaviors have been described such as loss of control over intake and overeating as a consequence of emotional distress (32).

It has been reported that BMI and negative emotional eating are highly related whereas positive emotional eating and external eating loaded onto another factor. In this regard, it is plausible that even though positive emotions may elicit eating, they do not necessarily mirror disordered eating. Eating in response to positive emotions might rather be related to hedonic or external eating (19,20).

Some models conceptualize eating disturbances as disorders of affect regulation, considering the impairment in the cognitive capacity to process and regulate emotions as the primary regulatory disturbance (21). According to these models, some eating behaviors, such as binge eating and compensatory behaviors, as well as restricted food

consumption, are interpreted as responses to cope with intense or relatively undifferentiated emotional states (22-24). These intense emotional states are usually linked to self-perceptions (weight, physical fitness, body shape/body image), especially among adolescents (25-28). Thereby, it has been reported that people with higher weight and those who perceive themselves as overweight usually show higher scores on cognitive restriction (31). In fact, the link between higher BMI and higher scores on cognitive restriction has been reported previously (33,34). In the current study we have not found any significant differences with respect to restrained eating, emotional eating, uncontrolled eating and binge eating behaviors when the actual weight has been considered. In this regard, as other studies have shown, cognitive dietary restraint is not consistently linked to body weight-adiposity (35). Nevertheless, scores on body image dissatisfaction/restrictive eating (BIDRE subscale) were different with regards to actual weight (normal weight, overweight and obesity). The fact that the difference is showed in this subscale but not in the BEB subscale indicates that it is possible to maintain a tendency to restrictive attitudes without binge eating behaviors in both obese and overweight participants. With respect to the association, the correlation between BIDRE and BMI was 0.47. In fact, BIDRE and BEB suggest that these two factors might be considered as independent dimensions (18).

Another point to discuss refers to the instruments which aim to assess eating behaviors. Thus, BEB correlated negative a significantly with restrained eating, uncontrolled eating, and emotional eating. This result seems to indicate that binge eating behavior, restrained eating, uncontrolled eating and emotional eating are different constructs despite having possible shared elements. In addition, no significant correlations were found between BIDRE and uncontrolled eating and restrained eating. It seems that when there is a component linked to body image (e.g., BIDRE), correlations with uncontrolled and restrained eating are not significant but this changes with respect to emotional eating, in this case existing a positive correlation. In this regard, body image dissatisfaction could lead to eating disturbances through emotional more than restrained eating.

This study adds some new results to others previously published in the same field (25-28,31). Comparing to these others, we have studied a sample with the lowest age range which permits to study possible links between weight self-perception, body

image (and related variables such as dieting or self-weighing) and eating behaviors in a stage of life which could be recognized, to some extent, as a starting point to develop eating disorders. Some conclusions emerge from the results. First, the majority of participants who perceive themselves as obese are girls and the majority of participants who perceive themselves as underweight are boys. Second, boys tend to perceive themselves with a better physical fitness than girls. Third, more girls than boys plan to diet in the future for aesthetic reasons. Fourth, when the reason to self-weighing is feel better, more girls than boys are involved. Finally, BMI is significant and positively correlated to BIDRE. When body image dissatisfaction is controlled for analysis, then BMI correlates with emotional eating.

In view of these results, it would be interesting to study in depth the reasons that lead girls to overestimate their weight and, on the contrary, underestimate it in case of boys.

The current study has some limitations. Different variables are self-reported at an age which could reflect doubts about reliability. Nevertheless, previous studies have followed a similar way to assess some information. Despite that EBBIT was designed for young girls at risk for eating disorders, after analyzing the content of the test no psychometric reasons have been found to avoid that instrument in the current study. Body dissatisfaction has not been assessed by means of a specific instrument apart from the BIDRE subscale of the EBBIT. The body silhouettes method is based on self-reporting where participants must choose the silhouette that most closely resembles the shape of their body. Then, it is possible to analyze differences with respect to self-reported weight or actual weight as well as others measures. In this study, we emphasized some self-reported measures more than body image dissatisfaction scores as usually are measured by several questionnaires. Finally, precocious puberty is a risk factor clearly related to the onset of that puberty. Secondary sexual characteristics may lead to affective and psychosocial adaptive problems, which also lead to behavior disorders and a negative body image. Pubertal timing is a potentially significant factor when assessing psychopathological symptoms. Pubertal timing refers to the timing when pubertal development occurs in relation to peers, i.e., it relates to whether an adolescent is ahead of peers in pubertal development (early pubertal timing), in line with peers (on-time) or behind peers in pubertal development (late pubertal timing).

In this regard, not having applied the pubertal stage categorization (e.g., by means of Tanner stages) is a limitation to take into account in future similar studies (36).

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Table I. Body image perception by sex

Silhouettes									
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
Boys	5	42	53	37	24	10	3	0	1
Girls	10	39	52	43	10	2	1	0	0
BMI	17	19	19	23	25	27	29	31	33

$\chi^2 = 13.50$; $p < 0.05$.

Table II. Means of TFEQ-Sp and EBBIT by sex

	Boys	*Girls*	*p*
TFEQ-Sp			
Restrained eating	14.31	15.51	< 0.05
Emotional eating	8.16	9.55	< 0.001
Uncontrolled eating	24.54	26.2	< 0.05
EBBIT			
BIDRE	15.24	16.76	0.322
BEB	7.87	6.59	0.123

EBBIT: Eating Behaviors and Body Image Test; TFEQ-Sp: Three-Factor Eating Questionnaire-R18, Spanish version; BIDRE: body image dissatisfaction/restrictive eating; BEB: binge eating behaviors.

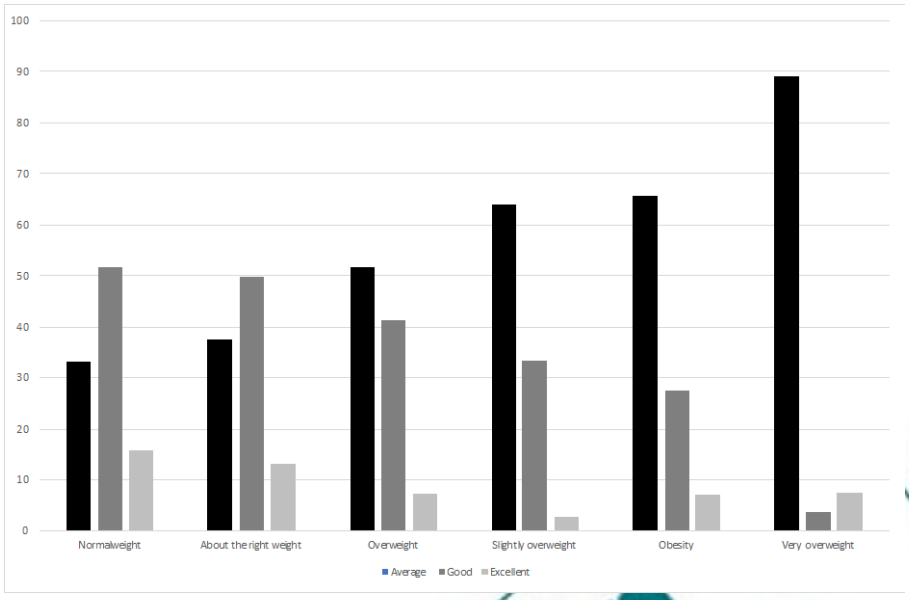

Fig. 1. Actual weight, weight self-perception and self-reported physical fitness (average, good, excellent).

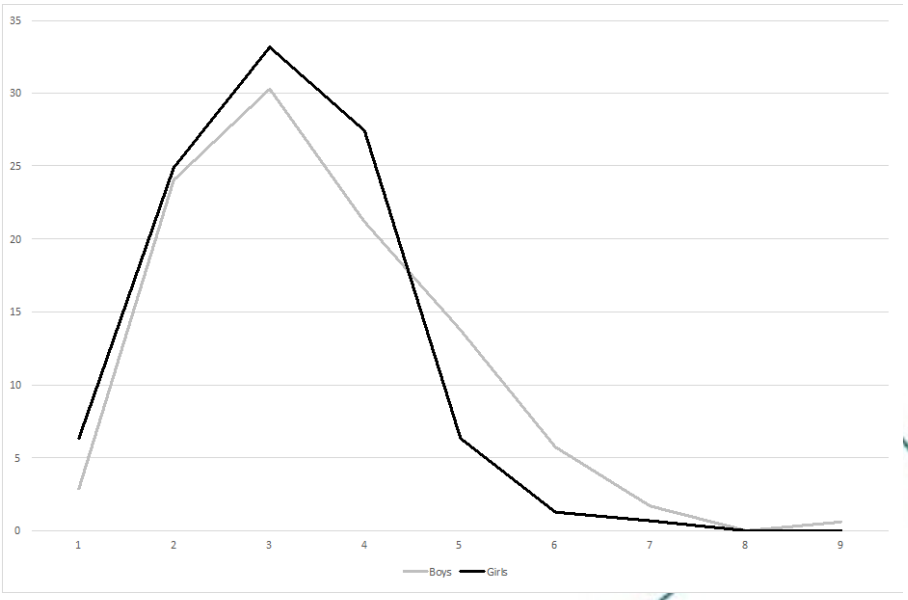

Fig. 2. Silhouettes chosen by boys and girls.

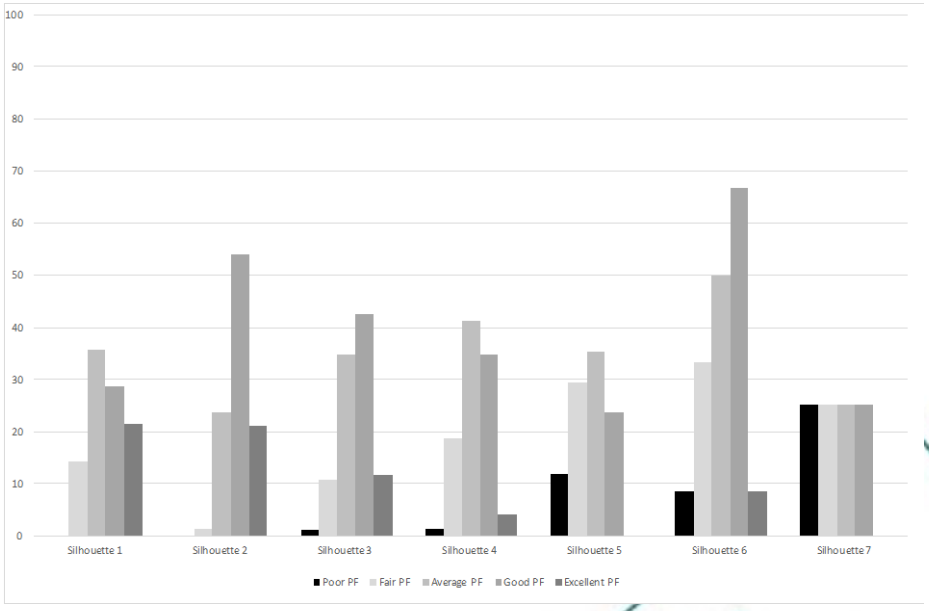

Fig. 3. Distribution of self-reported physical fitness by silhouettes.

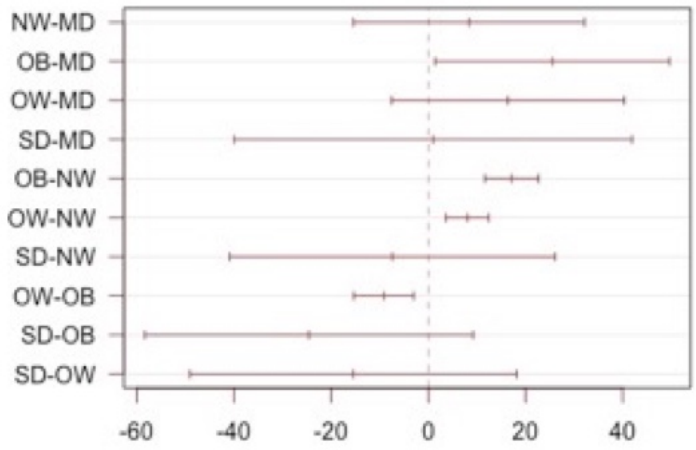

Fig. 4. Differences in BIDRE scores considering several nutritional states. SD: severe denutrition; MD: moderate denutrition; NW: normal weight; OW: overweight; OB: obesity.