

## Women's weight self-perception and perception of their children's weight

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### ABSTRACT

*Keywords:*

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Gender

Different socio-cultural factors might affect parental perception of children's nutritional condition. The purpose of this study is to identify factors related to women's weight self-perception, and its association with the perception they have of their children's nutritional condition. This is a cross-sectional study based on 1249 mother-children pairs from Vitória/ES-Brazil. Surveys were conducted in schools and households. Logistic regression models showed that mothers with low educational level underestimated their own weight. Misperception of children's weight was dependent on their gender but not on mother's educational level. Model-based findings suggest that mothers' weight underestimation is a risk factor in the underestimation of their sons' weight, but not in their daughters'. Results show that children gender is an important factor on mothers' perception of children's weight.

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### RESUMEN

*Palabras clave:*

Autopercepción del peso de las madres  
Percepción de las madres sobre el peso de sus hijos/as  
Estado nutricional de los niños/as  
Educación  
Género

Distintos factores socioculturales pueden afectar la percepción de los padres sobre el estado nutricional de sus hijos/as. El objetivo de este estudio es identificar factores asociados con la autopercepción del peso de las madres y su relación con la percepción que tienen del estado nutricional de sus hijos/as. Este es un estudio transversal basado en 1249 pares de madres e hijos/as de Vitória/ES-Brazil. Resultados de modelos logísticos mostraron que las madres con bajo nivel educativo subestiman su propio peso. La mala percepción de las madres sobre el estado nutricional de los niños depende del género pero no de su nivel educativo. La subestimación del peso corporal de las madres es un factor de riesgo en la subestimación del peso de sus hijos pero no en el de sus hijas, indicando la importancia del género en la percepción que tienen las madres sobre el peso de sus hijos/as.

## **Introduction**

Nutritional situation in Brazil as in other developing countries is heterogeneous. Under-nutrition -which has been considered as the main nutritional problem among children- is disappearing as an epidemiological event (Batista Filho and Rissin, 2003); conversely, overweight is now affecting half of the adult population in some Brazilian cities (Instituto Brasileiro de Geografia e Estatística, 2004). Furthermore, changes in nutritional patterns are associated to family incomes and other socioeconomic factors such as educational level, skin color, etc. (Bastos et al. 2008; Gigante et al. 2006; Instituto Brasileiro de Geografia e Estatística, 2004).

Considerations about body image are of great interest among researchers from different areas. Inadequate agreement between body weight self-perception and real body weight might influence feeding patterns (Almeida et al. 2005; Kakeshita & Almeida, 2006). This issue leads to discussion about a health component such as corporal satisfaction; it is important to identify people's self-perception of their nutritional status in relation to what is currently recommended as healthy. In other words, to identify under what conditions people's body weight perception is associated to higher risk of developing diseases. This is especially significant among women of different socioeconomic status (Braga et al. 2007; Robinson et al. 2001), which are the most sensitive population stratum to the influence of communication media, and still are responsible for feeding the family.

Parents' ability to identify overweight problems in children is an important factor in the prevention of obesity (Baughcum et al. 2000; Carroll, 2008; Maynard, 2003). A review of parental perception of children's overweight status based on twenty-three studies showed that more than half of parents were not able to recognize overweight condition in their children (Parry et al. 2008). Among the different socio-cultural factors that might affect this failure, women's self-perception of their nutritional condition might also affect the nutritional care of their children. Consequently, the hypothesis of the present study is that mothers' body weight self-perception (MWSP) is associated with the perception they have of their children's

weight (mothers' perception of their children's weight, MPCW). Since this perception depends on several socioeconomic and cultural factors, a better understanding of this process might represent an important contribution to the design and implementation of successful actions and interventions, focused on the prevention of overweight and obesity. This is so, since the fact of losing weight - a common prescription under the responsibility of health professionals - is not successful in most of the cases (Goodell et al. 2008; Huang et al. 2007).

Given the importance of women in family health care, this study proposes to identify factors related to women's weight self-perception (MWSP) and its association with the perception of their children's weight (MPCW).

## **Material and Methods**

### *Study population*

This is a cross-sectional study carried out in Vitória/ES city (Brazil) in 2007. Sample is formed by 1249 students (age range 7-10 years) from Vitória's public and private schools and their mothers (age range 18-57 years). Children participated in the Nutrition and Health in School Children's Project (Health Project). The study was designed to geographically cover the entire Vitória city and the sample size calculated based on an expected overweight prevalence of 20%, a 3% sampling error and a 5% of signification level. Sampling by clusters was carried out in two stages - being the school the primary unit.

Pregnant women at the time of the survey as well as those who did not report their height, weight and years of education were not included in the analyses.

### *Children's anthropometric variables*

Nursing students and professionals were trained to obtain children's anthropometric data in schools. Data of body weight (kg) -with 100g accuracy- was obtained using Family BWF Tanita scales (model f).

Children were weighed without shoes and wearing the minimum clothes as possible, standing straight in the center of the scale platform with arms extended along the body and looking ahead. Height (cm) was measured with a 1mm accuracy using a portable Seca model 206 stadiometer, fixed to a smooth straight wall. Children were all barefooted, with loose hair, buttocks and heels against the wall and looking ahead in a horizontal plane.

Children's nutritional condition was classified based on Body Mass Index (BMI) cut-off points proposed by the WHO (de Onis et al. 2007): "severe thinness"  $<-3SD$ ; "thinness"  $<-2SD$ ; "normal weight"  $-2<SD<+1$ ; "overweight"  $>+1SD$ ; "obesity"  $>+2SD$ . In further analyses, severe thinness and thinness were grouped into a single category, since there were only two boys and two girls with severe thinness in the sample.

#### *Mothers' self-reported variables*

Written informed consents were obtained from mothers in the study. Women's data were obtained from a structured questionnaire. Mother's self-reported height and weight were used to estimate their BMI and to classify their nutritional status according to the WHO (WHO, 1995). Women's weight self-perception and the perception of their children's nutritional status were obtained using closed questions; mothers had to choose among different options: if at the moment of the interview they perceived themselves and their children as underweight (thin or very thin), in normal weight, overweight or obese.

Then, two variables were created based on the classification of women's and children's nutritional status and body weight perception: "Mother's weight self-perception (MWSP)" and "Mother's perception of their children weight (MPCW)". Three categories were identified for each variable. "MWSP": Category 1 (same) - BMI classification being the same as body weight perception (mothers who said they had the same condition corresponding to her reported weight); Category 2 (under) - BMI classification above body weight perception category (they perceived themselves thinner than they reported) and Category 3 (above) - BMI classification below body weight perception ca-

tegory (they perceived themselves heavier than they reported). For "MPCW" the same categories were created considering measured, instead of self-reported BMI.

#### *Socioeconomic data*

The questionnaire included information on maternal age, number of children and mother's educational level (Primary incomplete, Primary complete, High school and Superior education - or Higher studies) and other socioeconomical indicators (Bisi Molina et al. 2009; Bisi Molina et al. 2010b). Educational level was selected to represent the socioeconomic condition of studied women (He & Evans, 2007). Consequently, the study population is described according to mother's educational level.

#### *Statistical analyses*

Statistical analyses were performed using SPSS 17.0. Quantitative variables were analyzed by one-way ANOVA followed by Tukey tests. Bi-variant tests (Chi-square) were performed for the analyses of qualitative variables. Kappa (k) test was used to evaluate the agreement between mothers' estimated nutritional status and mothers' self-perception of body weight. Non parametric analyses (Kruskal-Wallis) were performed when no variance homogeneity or normal distribution were assumed.

Multivariate analyses were performed using logistic regression models. MPCW was used as the dependent variable. For these analyses, the category of mothers who perceived their children above their real weight was not included due to the small number of children in this category, which could cause instability in the model. Children's (measured) and mothers' (self-reported) BMI, number of children, maternal age, maternal educational level, and women's weight classification were included in the model as independent variables. Adjusted odds ratio (OR) and 95% confidence intervals (CI) were estimated.

This study was approved by the Committee of Ethics Research of the Biomedical Center of the Federal University of Espirito Santo on 10/26/06 under 089/06 registration number in the CEP/UFES.

## Results

Table 1 shows the studied characteristics of women according to their educational level. Women with superior education are older, have fewer children and have lower self-reported weight and BMI than women with other educational levels.

No significant differences were found between boys and girls for weight ( $t = -0.034$ ;  $p = 0.973$ ), height ( $t = 0.903$ ;  $p = 0.367$ ), BMI ( $t = -0.682$ ;  $p = 0.496$ ) and BMI z-scores ( $t = 0.317$ ;  $p = 0.752$ ) (data not shown). Consequently, no sex-based analyses were made in children's anthropometric data according to mothers'

educational level (Table 2). Significant differences were found for children's weight, BMI and BMI mean z-scores, between the four groups of mother's educational level, but not for height. Mean values of BMI are higher than the P50 of the WHO standards (de Onis et al. 2007), shown by positive mean z-scores.

Differences were also observed in both mothers' nutritional status (estimated BMI) and weight self-classification, according to their educational level (Table 3). The frequency of women with normal estimated BMI is lower among those with primary incomplete studies and higher in women with superior studies. However, women with superior education have

Table 1: Study characteristics of women according to their educational level

Variables	Educational level				Anova (F)
	Primary incomplete	Primary complete	High school	Superior	
Age (n = 1215)	36.3 (7.6) <sup>b</sup>	33.8 (7.1) <sup>a</sup>	34.8 (6.8) <sup>a</sup>	38.1 (5.6)	17.42 <sup>c</sup>
N° of children (n = 1228)	3.2 (1.7) <sup>b</sup>	2.5 (1.1) <sup>b</sup>	2.1 (1.1)	1.9 (0.7)	67.35 <sup>c</sup>
Mothers' self-reported weight (n = 1195)	66.3 (13.5) <sup>a</sup>	67.0 (13.7) <sup>a</sup>	66.0 (11.9) <sup>a</sup>	62.0 (10.3)	7.85 <sup>c</sup>
Mothers' self-reported height (n = 1150)	161.0 (0.1)	162.0 (0.1)	162.0 (0.1)	163.0 (0.1)	1.59
Mothers' BMI (n = 1130)	25.5 (4.7) <sup>a</sup>	25.6 (5.0) <sup>a</sup>	25.1 (4.2) <sup>a</sup>	23.5 (3.6)	11.76 <sup>c</sup>

<sup>a</sup>  $p < 0.05$  with reference to Superior educational level - <sup>b</sup>  $p < 0.005$  with reference to complete High school educational level - <sup>c</sup>  $p < 0.001$

Table 2: Anthropometric characteristics of children according to mothers' educational level

Variables	Educational level				Anova (F)
	Primary incomplete	Primary complete	High school	Superior	
Weight	30.8 (8.1) <sup>a</sup>	32.0 (8.5)	32.9 (8.6)	30.8 (6.6) <sup>a</sup>	5.52 <sup>b</sup>
Height	134.1 (8.7)	135.1 (8.8)	135.0 (8.8)	134.0 (8.0)	1.36
BMI	17.0 (3.0) <sup>a</sup>	17.4 (3.3)	17.8 (3.2)	17.0 (2.6) <sup>a</sup>	6.50 <sup>c</sup>
BMI z-scores	0.15 (1.24) <sup>d</sup>	0.29 (1.34) <sup>d</sup>	0.58 (1.30)	0.28 (1.09) <sup>d</sup>	21.72 <sup>cK</sup>

<sup>a</sup>  $p < 0.05$  with reference to Primary complete and High school level - <sup>b</sup>  $p < 0.005$  - <sup>c</sup>  $p < 0.001$

<sup>d</sup>  $p < 0.05$  with reference to High school level - <sup>K</sup> Kruskal-Wallis, non parametric analysis

Table 3: Nutritional status and weight self-classification of mothers by educational level

	Educational level				$\chi^2$ test
	Primary incomplete	Primary complete	High school	Superior	
	N (%)	N (%)	N (%)	N (%)	
<i>Mothers' nutritional status</i>					
Low weight (BMI < 20)	28 (9.8)	22 (10.1)	32 (7.7)	30 (14.4)	38.69 <sup>a</sup>
Normal weight (20 < BMI < 24.99)	114 (39.9)	97 (44.7)	207 (49.5)	12 (58.4)	
Overweight (25 < BMI < 29.99)	103 (36.0)	60 (27.6)	131 (31.3)	46 (22.0)	
Obesity (BMI ≥ 30)	41 (14.4)	38 (17.5)	48 (11.5)	11 (5.3)	
<i>Mothers' weight self-classification</i>					
Under reported weight	104 (36.7)	84 (38.0)	104 (25.0)	31 (14.8)	43.27 <sup>a</sup>
Same as reported weight	146 (51.6)	106 (48.0)	236 (56.7)	141 (67.5)	
Above reported weight	33 (11.7)	31 (14.0)	76 (18.3)	37 (20.9)	

<sup>a</sup>  $p < 0.001$   $\chi^2$  analysis

higher frequency of low self-reported weight and lower frequency of overweight and obesity. In conclusion, women's self-perceived weight differs from the data reported by them depending on their educational level. Women with lower educational level perceived themselves thinner than they reported while women

with higher studies perceived themselves above the weight they reported (Table 3).

Regarding children's nutritional status, the frequency of overweight and obesity was higher than that of thinness (Table 4). Prevalence of thinness is higher

Table 4: Nutritional status of children according to mothers' educational level

<i>Nutritional status</i>	Educational level					$\chi^2$ test
	Total	Primary incomplete	Primary complete	High school	Superior	
	N (%)	N (%)	N (%)	N (%)	N (%)	
<b>Boys (n = 513)</b>						
Thinness (< -2SD)	11 (2.1)	5 (3.5)	5 (4.7)	1 (0.5)	0 (0.0)	22.41 <sup>a</sup>
Normal weight (-2 < SD < +1)	360 (70.2)	108 (78.8)	69 (67.6)	113 (63.5)	70 (72.9)	
Overweight (> +1SD)	78 (15.2)	13 (9.5)	16 (15.7)	33 (18.5)	16 (16.7)	
Obesity (> +2SD)	64 (12.5)	11 (8.0)	12 (11.8)	31 (17.4)	10 (10.4)	
<b>Girls (n = 732)</b>						
Thinness (< -2SD)	19 (2.6)	7 (3.4)	6 (4.2)	3 (1.1)	3 (2.5)	21.45 <sup>a</sup>
Normal weight (-2 < SD < +1)	497 (67.9)	153 (73.6)	92 (64.3)	164 (62.4)	88 (74.6)	
Overweight (> +1SD)	139 (19.0)	28 (13.5)	27 (18.9)	61 (23.2)	23 (19.5)	
Obesity (> +2SD)	77 (10.5)	20 (9.6)	18 (12.6)	35 (13.3)	4 (3.4)	

<sup>a</sup>  $p < 0.001$   $\chi^2$  analysis

in children with less educated mothers, while overweight and obesity are more frequent in those children whose mothers have complete primary and high school studies.

In regard to children's sex, 46% of sons and 34% of daughters were perceived under the weight they had, but no differences were observed in the perception that mothers had of their sons' ( $\chi^2 = 4.41$ ;  $p = 0.621$ ) and daughters' ( $\chi^2 = 2.70$ ;  $p = 0.845$ ) weight, according to mothers' educational level (data not shown).

Low agreement between maternal nutritional status and mothers' weight self-perception was found (Table 5). In general, underweight women tend to overestimate, while women with higher BMI tend to underestimate their weight. Furthermore, among those wo-

men classified as obese (BMI > 30Kg/m<sup>2</sup>), 5.8% said they had a normal weight, 69.6% said they were overweight and only 24.6% perceived themselves as obese.

Concerning mothers' perception of their children, boys and girls who are perceived by their mothers heavier or over normal weight, have negative mean BMI z-scores, corresponding to normal weight and even lower than the children perceived as thin. In addition, none of the six boys who were classified above their weight in Table 6 are overweight. A similar situation occurs in relation to BMI z-scores among girls. Out of the twenty three girls classified by their mothers as overweight, three of them are obese and three are in fact overweight (Table 6). The association between women's weight self-classification and their children's weight classification is shown in Table 6.

Table 5: Agreement between women's nutritional status (BMI) and weight self perception

Mothers' nutritional status (BMI)	Mothers' weight self-perception			
	Underweight N (%)	Normal N (%)	Overweight N (%)	Obese N (%)
Underweight	19 (52.8)	16 (44.4)	1 (2.8)	0 (0.0)
Normal weight (-2 < SD < +1)	72 (11.7)	393 (63.8)	148 (24.0)	3 (0.5)
Overweight (> +1SD)	2 (0.6)	111 (32.7)	217 (64.0)	9 (2.7)
Obesity (> +2SD)	0 (0.0)	8 (5.8)	96 (69.6)	34 (24.6)

Kappa = 0.317,  $p < 0.001$ .

Table 6: Association between mothers' weight self-classification with their children's weight classification

Sex	Children z-BMI Mean (SD)	Mothers' classification of children's weight	Mothers' weight self-classification			$\chi^2$ test
			Under N (%)	Same N(%)	Above N(%)	
Boys	0.60 (1.54)	Under real weight	74 (50.7)	110 (44.2)	27 (37.5)	7.88 <sup>a</sup>
	0.20 (1.07)	Correct classification	72 (49.3)	134 (53.8)	44 (61.1)	
	-0.79 (2.37)	Above real weight	0 (0.0)	5 (2.0)	1 (1.4)	
Girls	0.73 (1.41)	Under real weight	60 (34.7)	133 (35.4)	32 (30.8)	11.11 <sup>b</sup>
	0.18 (0.99)	Correct classification	112 (64.7)	223 (59.3)	69 (66.3)	
	-0.49 (1.60)	Above real weight	1 (0.6)	20 (5.3)	3 (2.9)	

<sup>a</sup>  $p < 0.097$  - <sup>b</sup>  $p < 0.025$   $\chi^2$  analysis

The frequency of boys perceived by their mothers under their real weight is higher among mothers who also perceived themselves thinner than they reported. The frequency of girls perceived by their mothers under their real weight is nearly the same as in women who perceived themselves correctly or under the weight they reported; most of the girls perceived above their real weight have mothers that perceived themselves correctly.

Logistic regression analyses were performed in order to consider the combined effect of all the variables studied in previous bi-variate analyses. In order to control sex effect, two sex-based models were performed (Tables 7 and 8). MWSP is only associated to the perception they have of their sons' weight. Boys but not girls are more likely to be perceived under their weight by mothers who also perceived themselves under their reported weight (Table 7). These analyses show that both boys and girls with higher BMI have more risk of being perceived under their real weight. Also mothers with higher BMI are less likely to underestimate their sons' weight. Finally, older women are more likely to perceive their daughters' weight correc-

tly, but this is in relation with mothers' educational level, which is higher among older women.

## Discussion

A systematic review about the proportion of parents who were able to recognize overweight condition in overweight children was published by Parry et al. (2008). Results of this review showed that more than half of parents cannot recognize an overweight condition in their children. A better understanding of those factors influencing the recognition of weight issues in children is clearly needed (He and Evans, 2007; Huang et al. 2007). Parental ability to discriminate the weight status of children is critical for successful efforts on the prevention of obesity, but this ability depends on several socio-cultural factors (Boa-Sorte et al. 2007; Jackson et al. 1990). The evidence of mothers' failure to perceive their children as overweight is increasingly clear and much research points to the inverse relationship between socioeconomic status and educational qualification with poor percep-

Table 7: Factors associated to mothers' perception of their sons' weight

Mothers' perception of sons' weight	B	p - value	OR	95% CI
Children's z-BMI	0.125	< 0.001	1.13	(1.06 - 1.21)
Mothers' BMI	-0.059	0.020	0.94	(0.90 - 0.97)
Number of children	0.055	0.505	1.06	(0.90 - 1.24)
Mothers' age	0.001	0.958	1.00	(0.97 - 1.03)
<b>Educational level</b>				
Primary incomplete	-0.244	0.456	0.78	(0.41 - 1.49)
Primary complete	0.384	0.239	1.47	(0.78 - 2.78)
High school	0.172	0.544	1.19	(0.68 - 2.07)
Superior	-	-	-	-
<b>Mothers' weight classification</b>				
Same as self-reported weight	0.288	0.314	1.33	(0.76 - 2.34)
Under self-reported weight	0.808	0.018	2.24	(1.15 - 4.38)
Above self-reported weight	-	-	-	-

-2 log likelihood = 599.8; df = 9; p < 0.005. Dependent variable: MPCW (Mothers' perception of son's weight) (correct, underweight). Independent variables: children's BMI, mothers' BMI, maternal age, number of children, mothers' educational level, MWSP (mothers' weight self-perception). Reference category: Correctly classified. OR= Adjusted odds ratio; CI= confidence intervals

Table 8: Factors associated to mothers' perception of their daughters' weight

Mothers' perception of sons' weight	B	p - value	OR	95% CI
Children's z-BMI	0.174	< 0.001	1.19	(1.12 - 1.26)
Mothers' BMI	0.023	0.317	1.02	(0.98 - 1.07)
Number of children	-0.085	0.299	0.92	(0.78 - 1.08)
Mothers' age	-0.029	0.032	0.97	(0.95 - 0.99)
<b>Educational level</b>				
Primary incomplete	0.134	0.648	1.14	(0.64 - 2.03)
Primary complete	-0.072	0.816	0.93	(0.51 - 1.71)
High school	-0.153	0.556	0.86	(0.52 - 1.43)
Superior	-	-	-	-
<b>Mothers' weight classification</b>				
Same as self-reported weight	0.310	0.224	1.36	(0.83 - 2.25)
Under self-reported weight	-0.092	0.766	0.91	(0.50 - 1.67)
Above self-reported weight	-	-	-	-

-2 log likelihood = 762.6; df = 9; p < 0.000. Dependent variable: MPCW (Mothers' perception of daughters' weight) (correct, underweight). Independent variables: children's BMI, mothers' BMI, maternal age, number of children, mothers' educational level, MWSP (mothers' weight self-perception). Reference category: Correctly classified. OR= Adjusted odds ratio; CI= confidence intervals

tion of children's nutritional status - especially overweight (Baughcum et al. 2000; Carnell et al. 2002).

Other related factors are involved in children's weight recognition (Bisi Molina et al. 2009; Jacoby et al. 2003; Paeratakul et al. 2002); e.g., the importance of gender is clear. The present study and others (Mamun et al. 2008; Maynard et al. 2003) show that the risk of misclassification or failure in overweight recognition by mothers is higher for boys than for girls. Such differences could be influenced among others factors, by the gap in the timing of sexual maturation between boys and girls. In girls, the process begins about two years before; this means that during pre-puberty and puberty, for the same chronological age, girls have greater fat accumulation than boys. This sexual dimorphism in terms of higher fat mass proportion in girls is particularly important for the correct achievement of sexual maturation. Therefore the knowledge mothers have about children growth and development process during the pre-puberty period can determine what behavior mothers will face on them in relation to feeding issues and physical activity.

As in previous studies (Baughcum et al. 2000), our results show an increased risk of not perceiving children's overweight by overweight mothers. Mothers' educational level is the most important factor in the prevalence of overweight and obesity in mothers and children, and it also influences the way women perceive their own nutritional status and their children's (Baughcum et al. 2000). Particularly, the prevalence of overweight and obese mothers in this sample is 30.0% and 13.5% respectively, but differently distributed depending on their educational level. Among women with incomplete primary education, this value reaches 36.0% for overweight and 14.4% for obesity. Therefore, in this study, sons of mothers with low education –who are also more overweight and obese and do not perceive it - have higher risk of being overweight or obese and their mothers are less likely to perceive it.

The most novel contribution of the present study is the association observed between mothers' self-perception –in terms of weight or nutritional condition- and the perception of the nutritional status of their sons and daughters. The use of mothers' self-re-

ported weight and height to estimate mothers' BMI is a limitation of this study. According to a review on height and weight validation studies in the general population, Gorber et al. (2007) indicated an under-reporting of weight, while height is generally over-reported. Even if an error occurs in the estimation of these measurements, studies including self-reported data have been conducted (Carvalhaes et al. 2008) observing a high correlation between self-reported and measured weight and height (McAdams et al. 2007). These results justify the use of self-reported data in the present study.

Most obese women generally have lower educational level and they self-perceived thinner than they really were. Women with higher educational level are more likely to overestimate their nutritional condition; they self-perceive "heavier" than observed from the measures reported by them. Results of this study provide additional information on this aspect. Mothers' self-perception under their reported weight is associated with mothers' failure to perceive when their sons but not their daughters are overweight.

Women with low educational level who perceive their children and themselves thinner than they are, might contribute to increase the risk of developing weight associated disorders (Boa-Sorte et al. 2007); being above the normal weight does not seem to be a health problem for them, nor is it a negative condition for their everyday life issues (He and Evans, 2007). Probably, this perception is likely to have an impact on the nutritional status and the health of women and their children in the medium and long term (Carroll, 2008; Whisenhunt et al. 2008). Our results agreed with these studies, highlighting the differences observed between sons and daughters. The fact that a thin female image is valued among higher socioeconomic groups might concern mothers about their daughters' overweight, while this could lead to not even identify boys' overweight. Significant associations between gender, ethnicity and mother's perception have been previously shown for this sample (Bisi Molina et al. 2009).

There is plenty of scientific evidence of the importance of mothers' educational level in children's health in societies undergoing a nutritional transition

process (Bisi Molina et al. 2010a; Bisi Molina et al. 2010b). Based on the results of our study and since mothers continue to be responsible for family feeding; authors believe it is important that they recognize when their children are overweight or obese to involve themselves in the prevention of childhood obesity and food behavior disorders. Especially mothers with low education do not recognize these problems, neither in them nor in their children, specific programs for population groups with particular socio-demographic characteristics could be activated.

Other informative and educational strategies focused on parents should be incorporated into prevention programs for obesity and food behavior disorders; e.g., the explanation of the differences between boys and girls in the 'normal' growth process and sexual development maturation, which involves a body composition with higher proportion of fat mass in girls than in boys by the end of this process. It would be useful for women and daughters to know these differences in body composition between men and women at a time in which the cult of the body in our society goes through a persecution of body fat (Whisenhunt et al. 2008).

## Conclusions

Mothers who perceive themselves thinner than they are, more likely underestimate their sons' but not their daughters' real weight. Misperception of children's weight was dependent on their gender but not on mother's educational level.

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