Maternal Underestimation of Child's Weight Status and Health Behaviors as Risk Factors for Overweight in Children[1]

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Objectives To evaluate children's risk of being overweight associated with maternal underestimation of weight status and health behaviors.
Results: One hundred forty mother–child dyads were included. Children whose weight status was underestimated by their mothers were at greater risks of being overweight compared to those whose weigh status was correctly perceived (adjusted OR 2.31, 95% CI 1.11–4.81). Less television viewing time was associated with a 63% reduced risk of being overweight (adjusted OR .37, 95% CI .17–.83).
Conclusions: Maternal underestimation of weight status was common among overweight and normal-weight children, and it was associated with an increased children's risk of being overweight.
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CHILDHOOD OBESITY IS considered to be a chronic and epidemic disease with a rising prevalence. In preschool children, the worldwide prevalence of overweight increased from 4.2% in 1990 to 6.7% in 2010. This same year, the number of overweight children under age 5 was estimated to be over 42 million, 35 million of these in developing countries (De Onis, Blossner, & Borghi, 2010). In Mexico, according to the National Health and Nutrition Survey 2012, 9.7% of preschool children are overweight or obese; this prevalence is slightly higher compared to 7.8% reported in 1988 for this same age population (Gutiérrez et al., 2012).

It has been well established that parents are likely to misperceive the weight status of their overweight children (Parry, Netuveli, Parry, & Saxena, 2008), especially in children 2–6 years (Rietmeijer-Mentink, Paulis, van Middelkoop, Bindels, & van der Wouden, 2013), and this parental misperception of overweight might hinder early detection, preventive actions and management of overweight among children (Moore, Harris, & Bradlyn, 2012; Warschburger & Kröller, 2012). However, little is known about perception of weight status among parents of normal-weight children. Parental misperceptions of weight status of normal-weight children in any direction (underestimated or overestimated) might also misguide health-related parental behavior and impact children's weight status. The main objective of this cross-sectional study was to evaluate maternal perceptions of their child's weight status and the intention to modify family health behaviors among mothers of normal-weight and overweight children. Additionally, we explored the children's risk of being overweight associated with maternal underestimation of weight status and current implementation of health behaviors.

Material and Methods
Study Population

A cross-sectional study was conducted in a convenience sample of mothers and their children (2–6 years) attending a primary health care facility in Mexico City, from May to August 2010. Children with underweight, metabolic disorders, chronic pathologies affecting their nutritional status or currently receiving dietetic treatment for weight loss were excluded. Written informed consent was obtained from all participating mothers. The study was approved by the Institutional Health Research Ethics Board.

Body Mass Index Classification

Body weight and height were collected from all children with shoes, and heavy outer clothing was removed. Body mass index (BMI) Z-scores were calculated and classified according to the World Health Organization age- and gender-specific growth standards. Z-scores are used to describe how far a measurement (in this case BMI) is from the median, which is the exact middle of a distribution, in terms of standard deviation (SD). *Normal weight* was defined as a Z-score between −2 SD and 1 SD in both children aged 2–5 years and children above 5 years; *possible risk of overweight*, Z-score >1 SD in children aged 2–5 years; *overweight*, Z-score >2 SD in children aged 2–5 years and >1 SD in children older than 5 years; and *obesity*, Z-score >3 SD in children aged 2–5 years and >2 SD in children older than 5 years (De Onis et al., 2007; WHO Multicentre Growth Reference Study Group, 2006; World Health Organization, 2008). Children with underweight defined as a Z-score < −2 SD at screening were not included in this study.

Children were divided into two study groups: 1) normal-weight and 2) overweight children (children at possible risk of overweight, overweight or obesity).

Data Collection

Mothers were asked to complete a short questionnaire about perceptions and concerns about their child's weight status and health behavior intentions. Demographic data were also collected.

Maternal Perception of Children's Weight Status

It was assessed in two ways, first with verbal description and then with schematic body images. A 5-point scale was used for verbal description. Mothers were asked to classify their children's weight status as underweight, a little underweight, about the right weight, a little overweight, or overweight. Maternal perception of children's weight status was classified as: 1) *correctly perceived* when maternal perception matched real weight status, 2) *underestimated* when maternal perception of weight status was lighter than real weight status, and 3) *overestimated* when maternal perception was heavier than real body weight status.

Maternal perception of children's weight status by using body images was assessed with the gender- and age-range-specific sketches of body weight proposed by Eckstein et al.

The series of sketches has seven body images for each age group, the middle image was developed to represent a child at the 50th BMI percentile categories; upper and lower sketches were not tied to particular BMI percentile categories (Eckstein et al., 2006). Therefore, answers were classified as follows: lighter than middle sketch (1–3), middle sketch (4), and heavier than middle sketches (5–7).

Health Behavior

Mothers were asked to answer 4 questions to assess the intention to modify family health behaviors related to diet, physical activity, and television viewing (response options: I already do this, I will try, I will not try) (Eckstein et al., 2006).

Statistical Analysis

Continuous variables were expressed as mean ± standard deviation, and categorical variables were presented as frequencies. For comparison of continuous variables between groups of weigh status, Student's t test was used, and for categorical variables, Pearson chi-square test or Fisher's exact test were employed. Logistic regression analysis using the enter method was performed to establish the independent contribution of maternal underestimation of weight status and health behaviors on children's risk of being overweight. Health behaviors with $p < 0.05$ in the bivariate analysis were included in the full model and tested along with maternal underestimation of children's weight status in presence of sex and age. A p value < 0.05 was considered statistically significant, and 95% confidence intervals (CIs) were calculated for adjusted odds ratios (OR). All analyses were performed with commercially available software (SPSS 22.0 for Windows, SPSS, Inc., Chicago, IL, USA).

Results

Overall, 140 mother–child dyads were included, 65 in the normal-weight children group and 75 in the overweight children group. Demographic characteristics of mothers and children are shown in Table 1. There were no significant differences between groups either in children's age and sex or in mothers' age and education. Mean BMI Z-score for children in the normal-weight group was − .07 ± .52 SD, while Z-score in the overweight children group was 1.8 ± .25 SD, which indicates that BMI observed in the group of overweight children was 1.8 SD above the median BMI for the reference population.

Maternal perceptions of the child's weight status using verbal descriptions and body images are presented in Table 2. Misclassification rate of children's body image was higher in the group of mothers of normal-weight children (72.3%) than among mothers of overweight children (57.3%). Importantly, only 3.1% of normal-weight children were classified as having a heavier body image, pointing out that underestimation was the most common misperception of children's body image among mothers in both groups. Likewise, the percentage of maternal misclassification of