



# Discordance between measured weight, perceived weight, and body satisfaction among adolescents



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## ABSTRACT

**Objective:** To estimate prevalence, trends and persistence of discordance between measured body weight and perceived body weight and body satisfaction, and examine its association with gender, ethnicity, and family income.

**Methods:** Using two-wave data from a prospective cohort study of adolescents sampled from Houston metropolitan area, aged 11–17 years at baseline ( $n = 4175$ ) in 2000, and followed up in 2001 ( $n = 3134$ ). Survey logistic regression was used to compute odds ratios (OR).

**Results:** Females, European Americans, and adolescents in families with higher income were more likely to overestimate their body weight, and to be dissatisfied with their body weight, compared with males, African Americans, or those with a lower family income, respectively. Healthy weight females had significantly elevated odds of perceiving themselves as overweight compared with healthy weight males: OR = 1.82 (1.27–2.61) in Wave 1, OR = 2.81 (1.82–4.34) in Wave 2, and OR = 3.85 (1.58–9.38) in both waves. Similarly, healthy weight European Americans had about two times higher odds of perceiving themselves as overweight than healthy weight African Americans. Healthy weight females had over 1.5 odds of being dissatisfied with their body compared to healthy weight males. Compared with African Americans, European Americans were more likely to be dissatisfied with their body even they were within healthy weight range.

**Conclusions:** There was a high prevalence of discordance between actual weight and perceived weight and body satisfaction among adolescents. Discordances differed by gender, ethnicity, and family income, and should be taken into account in interventions for preventing overweight and obesity, and other undesired outcomes in adolescents.

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## 1. Introduction

High prevalence of obesity among children, adolescents, and adults in the United States is widely reported [1,2], its negative health consequences are well established [3–6], and the financial burden of overweight and obesity is substantial [5,7]. Previous studies reported a wide range of causes of overweight and obesity, including lack of physical activity or increase in sedentary behaviors [8,9], unhealthy dietary behaviors [10,11], and environmental factors that enable unhealthy diet and/or inhibit physical activity [12–14]. The causes of obesity are varied and interactions among them are complicated. Simple interventions produced limited effects [15]. There are potential interactions

among genetic, social environmental and behavioral factors on obesity [16].

Psychosocial factors have received increasing attention given the multifactorial nature of obesity. Of particular interest, perceived overweight and body dissatisfaction have been found to be associated with unhealthy weight control behaviors and an increased risk of overweight or obesity [19–22]. These psychosocial factors are not consistent across different demographic and socioeconomic groups [23–30]. Some previous studies examined mismatches between body weight and perceived body weight or body satisfaction [23,25–29], but most used self-reported height and weight [23,27–29], or involved small populations [25,26]. Our study estimated the prevalence, trends in the prevalence and persistence of discordance between measured body weight and perceived body weight and body satisfaction, and examined its association with gender, ethnicity, and family income among a large, and ethnically diverse population at two time-points twelve months apart.

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## 2. Methods

### 2.1. Sample

The sample was selected from households in the Houston metropolitan area enrolled in two local health maintenance organizations. One adolescent, aged 11 to 17 years, was sampled from each eligible household, oversampling for ethnic minority households. Initial recruitment was by telephone contact with parents. A brief screener was administered on ethnic status of the sample adolescents and to confirm data on age and sex of adolescents. Every household with a child 11 to 17 years of age was eligible. Because there were proportionately fewer minority subscriber households, sample weights were developed and adjusted by poststratification to reflect the age, ethnic, and sex distribution of the 5-county Houston metropolitan area in 2000. The precision of estimates is thereby improved and sample selection bias reduced to the extent that it is related to demographic composition [31]. Thus, the weighted estimates generalize to the population 11 to 17 years of age in a metropolitan area of 4.7 million people.

Data at baseline in 2000 were collected on sample adolescents and one adult caregiver using computer-assisted personal interviews and self-administered questionnaires. The computerized interview contained the structured psychiatric interview and demographic data on the adolescents and the household. Height and weight measures were conducted after the completion of the interviews. The interviews and measurements were conducted by trained lay interviewers. The interviews took on average 1 to 2 h, depending on the number of psychiatric problems present. Interviews, questionnaires, and measurements were completed with 4175 adolescents at baseline, representing 66% of the eligible households. There were no significant differences among ethnic groups in completion rates. A total of 3134 adolescents (75% of baseline dyads) were followed up approximately one year later using the same assessment battery used at baseline.

All information used in this paper was collected from the adolescents, except for family income which was collected from the parents. Adolescents and parents were interviewed in separate rooms to maintain data anonymity. All adolescents and parents gave written informed consent prior to participation. All study forms and procedures were approved by the University of Texas Health Science Center Committee for Protection of Human Subjects.

### 2.2. Measures

#### 2.2.1. Body mass index (BMI) and weight status

Height and weight were measured using standard field procedures [32]. BMI is defined as weight in kg/squared height in meter ( $\text{kg}/\text{m}^2$ ). Weight status was categorized as healthy weight – BMI < 85th percentile, overweight or obesity – BMI  $\geq$  85th percentile [2].

#### 2.2.2. Perceived body weight

Perceived body weight was measured by asking whether adolescents perceive themselves as: (a) skinny; (b) somewhat skinny; (c) average weight; (d) somewhat overweight; or (e) overweight; adolescents who rated themselves as somewhat overweight or overweight are scored as having perceived overweight [33]. The perceived weight measure was originally used in the Oregon Adolescent Depression Project with high school students in the late 1980s by Lewinsohn PM et al. [34] and later by Burns CM et al. in 1995 [35]. Based on Lewinsohn PM et al., internal consistency reliability and stability of this measurement was satisfactory.

#### 2.2.3. Body satisfaction

Body satisfaction was measured by asking how satisfied adolescents are with their body: (a) very dissatisfied; (b) somewhat dissatisfied; (c) neither; (d) somewhat satisfied; or (e) very satisfied. Those who rate themselves as somewhat or very dissatisfied with their body are scored

as having poor body image or body dissatisfaction [33]. This measurement procedure was previously validated and used [36,37].

### 2.2.4. Covariates

The covariates included were gender, ethnicity, and family income. Family income was assessed using total household income in the past year: <\$35,000, \$35,000–\$64,999, and \$65,000 or more. Ethnic status was treated as a categorical variable (European American, African American, and Latino American).

### 2.3. Analyses

#### 2.3.1. Calculate % discordance between measured weight and perceived weight and body satisfaction

Discordance was operationalized as the percentage of those with measured healthy weight based on CDC recommendations but perceived themselves as overweight (discordance 1), and the percentage of those who were measured overweight or obese but perceived themselves as healthy weight (discordance 2). Similarly, discordant percentages between measured weight status and body satisfaction were calculated, including the percentage of those who had measured healthy weight but were not satisfied with their body (discordance 3), and the percentage of those with measured overweight or obese but satisfied with their body (discordance 4). Discordances were calculated for all, and by gender, income, and ethnicity in Wave 1 and Wave 2. Percentage of concordance was equal to 100 minus percentages of discordance. Persistence of discordance in both waves was also calculated: (a) healthy weight in both waves but perceived overweight in both waves, (b) overweight or obese in both waves but perceived normal weight in both waves, (3) healthy weight in both waves but body satisfaction in both waves, and (4) overweight or obese in both waves but body satisfaction in both waves.

#### 2.3.2. Examine associations between discordance or misperception (between measured weight and perceived weight and body satisfaction) and demographic factors

Analyses were stratified by actual weight status (healthy weight, overweight or obesity). Specifically, we examined which demographic factors were associated with overestimation of body weight among healthy weight adolescents, or underestimation of body weight among overweight or obese adolescents. Odds ratios and their 95% confidence limits for the associations between misperception of body weight (between actual weight and perceived weight or body satisfaction) and gender, family income, and ethnicity were calculated for Wave 1, Wave 2 and both waves (i.e., persistent discordance over the two wave period) using survey logistic regression (Proc Surveylogistic) procedures in SAS V9.3 (34) and Taylor series approximation to compute the standard error of the odds ratio. Lepkowski and Bowles [38] have indicated that the difference in computing standard error between this method and other repeated replication methods such as the jackknife is very small [38]. The estimated odd ratios were adjusted for the other variables: gender and family income when doing ethnic contrasts, family income and ethnicity when doing gender contrasts, and gender and ethnicity when doing family income contrasts.

## 3. Results

Table 1 presents unweighted sample characteristics across two waves. Compared to those with complete follow-up, those lost to follow-up were more likely to be older at baseline (16+ years old), African American or Latino American with lower family income. Table 2A presents the percentage of discordance between actual body weight and perceived body weight. Due to some missing values of the studied variables, the remaining 4068 adolescents in Wave 1 and 3018 adolescents in Wave 2 were included in this analysis. Adolescents were more likely to underestimate than to overestimate their weight. Of those

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