

## FACTORS ASSOCIATED WITH UNDERESTIMATION OF WEIGHT STATUS AMONG CAUCASIAN, LATINO, FILIPINO, AND KOREAN AMERICANS—DILH SURVEY

**Objective:** To describe weight misperception and to examine the influence of sociodemographic factors on underestimation of weight status in Caucasian, Latino, Filipino, and Korean Americans.

**Design:** Data from 886 non-pregnant adults who participated in a cross-sectional survey administered in English, Spanish, and Korean were analyzed. The actual weight status derived from the participants' body mass index (BMI) categories and their perceived weight status were compared. A multiple logistic regression model was used to explore if underestimation of weight status was associated with ethnicity, sex, and education level.

**Results:** Caucasians, Latinos, Filipinos, and Koreans represented 19.4%, 26.8%, 27.4%, and 26.4%, respectively, of the total sample of 886. Overall, two in three participants correctly perceived their weight status, but 42% of Latinos underestimated their weight status and 22% of Koreans overestimated their weight status. Latino ethnicity, male, and low education ( $\leq$ high school) were related to greater underestimation of weight status ( $P < .05$ ). In contrast, Korean ethnicity was related to less underestimation of weight status ( $P < .05$ ).

**Conclusions:** Misperception of weight status should be counted in any efforts to develop a weight management intervention for Latino and Korean Americans. (*Ethn Dis.* 2015;25[2]: 200–207)

**Key Words:** Body-Mass Index, BMI, Weight Status, Latino, Filipino, Korean

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### INTRODUCTION

In the United States, more than two-thirds of adults (68.5%) are overweight or obese.<sup>1</sup> Being overweight or obese not only increases the risk of developing adverse health problems including cardiovascular disease, type 2 diabetes, stroke, and certain types of cancers,<sup>2</sup> but also places an economic burden on individuals and the health care system.<sup>3</sup> In 2008, the estimated direct and indirect costs related to obesity increased to \$147 billion in the United States.<sup>4</sup> These costs are expected to escalate if no action is taken to reduce this obesity epidemic.

The prevalence of overweight/obese populations among some racial and ethnic minority groups is significantly higher than Caucasians (ie, non-Hispanic Blacks and Mexican Americans).<sup>5</sup> Although the prevalence of overweight/obese in Asian Americans as a group has been lower than Caucasians, dramatic increases in the prevalence of overweight/obesity among some Asian subgroups (eg, Asian Indians, Filipinos) were observed in 1992–2011 National Health Interview Survey. Between 1992 and 2011, the overweight/obese prevalence increased from 33.2% to 69.7% for Filipinos and from 22.4% to 32.9% for Koreans.<sup>6</sup> Moreover, Asian Americans are known to experience higher all-cause and obesity-related mortality/morbidity risk at lower body mass index (BMI) compared to Caucasians.<sup>7–9</sup> These findings suggest we closely monitor obesity risks in racial and ethnic minorities including Asians.

An individual's weight perception can be different from his or her actual weight status and weight misperception,

especially underestimation, may be one of obesity risks or barrier to any attempts to manage healthy body weight. Overweight/obese adults who misperceived their weight were less likely to report weight management behaviors than those with a correct weight perception in a nationally representative sample from the 1999–2006 National Health and Nutrition Examination Survey (NHANES).<sup>10</sup> Weight misperception is often reported among the US public and it is known to vary depending on sociodemographic factors such as racial and ethnic minority status, sex, and socioeconomic status.<sup>11,12</sup> Thus, our study focused on examining the influence of these factors on weight misperception, especially underestimation of weight status among ethnic minority groups and Caucasians.

Some evidence shows that underestimation of weight status is higher among Latinos than Caucasians.<sup>12,13</sup> Although Asian Americans are among the fastest-growing racial groups, the literature on weight misperception

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among Asian Americans is scant. Within Asian Americans, Filipinos and Koreans have a higher prevalence of type 2 diabetes compared to Caucasians, despite a low prevalence of overweight/obesity.<sup>14</sup> Correcting weight misperception may contribute to building better risk perception and motivating to lose weight in those at risk for developing type 2 diabetes.<sup>15</sup> That is, it is noteworthy to examine weight perception among underrepresented ethnic minority groups. Thus, the purpose of this study was: 1) to describe discrepancies between actual weight status and perceived weight status; and 2) to examine the influence of sociodemographic factors on underestimation of weight status in Caucasian, Latino, Filipino, and Korean American community-dwelling women and men.

## METHODS

### Study Design and Sample

A cross-sectional survey, entitled “the Digital Link to Health (DiLH) Survey,” was conducted to develop a culturally tailored diabetes prevention program for understudied high-risk racial and ethnic groups including Latino, Filipino, and Korean Americans in the San Francisco Bay Area and San Diego.<sup>16,17</sup> Online or paper surveys were administered in English, Spanish, and Korean. From August to December 2013, 1,039 adults, aged  $\geq 18$  years and reporting no history of diabetes, participated in the study. Among participants, 905 individuals identified themselves as Caucasian, Latino, Filipino, or Korean and 134 identified themselves as other racial/ethnic groups. Of these 905, individuals who were pregnant ( $n=17$ ) or who had missing data on sex ( $n=1$ ) or being pregnant ( $n=1$ ) were excluded. The sample for analysis consisted of 886 individuals (171 Caucasians, 238 Hispanics, 243 Filipinos, 234 Koreans). The study was approved by the Committee on Human Research (CHR) at the University of California, San Francisco.

### Procedures

Participants were recruited both online and in person. Online survey links in English, Spanish, and Korean were posted on Craigslist and websites that targeted Filipinos, Koreans, or Latinos on a weekly basis. Bilingual staff screened potential participants at the community events and churches. The community events included ethnic-specific (eg, Korean Day Cultural Festival, Pistahan Philippine Festival) and local (eg, North Fair Oaks Community Festival, Presidio Picnic & Food Truck Fair) festivals, community health fairs, as well as, three multiethnic and three mono-ethnic churches. Participants completed the self-administered survey independently. If participants had questions or preferred verbal administration, bilingual staff were available to answer specific questions or read the survey to participants. An online link was provided to participants recruited in person at community events but who preferred to take the survey online. Overall, it took approximately 15 minutes to complete the survey. Participants who completed a paper survey were given a complimentary tote bag and those who completed the online survey had the option of entering a \$25 gift card raffle.

### Data Collection and Key Measurements

#### *Classification of Calculated Weight Status*

Body mass index (BMI) was calculated (weight [kg]/squared height [ $m^2$ ]) on self-reported weight and height. According to the WHO expert consultation panel’s recommendation, the WHO classification for Asians was used for Filipino Americans and Korean Americans since the standard WHO classification has shown the tendency to underestimate obesity-related risks in Asian populations.<sup>9</sup> The WHO classification for Asians is as follows: underweight (BMI  $<18.5$  kg/ $m^2$ ), normal

(BMI between 18.5 and 22.99 kg/ $m^2$ ), overweight (BMI between 23.0 and 27.49 kg/ $m^2$ ) and obesity (BMI  $\geq 27.5$  kg/ $m^2$ ). For Caucasians and Latinos, the standard WHO classification was adopted: underweight (BMI  $<18.5$  kg/ $m^2$ ), normal (BMI between 18.5 and 24.9 kg/ $m^2$ ), overweight (BMI between 25.0 and 29.9 kg/ $m^2$ ) and obesity (BMI  $\geq 30.0$  kg/ $m^2$ ).

#### *Classification of Perceived Weight Status*

The perceived weight status was assessed by the question: “Do you know if you are?” The response options for the question were underweight, normal weight, overweight, obese, or don’t know. Those who chose the “don’t know” response option were excluded from the further analyses.

#### *Classification of Weight Misperception*

If the participant’s calculated weight status and perceived weight status were in agreement they would be classified as accurate. If a discrepancy between the participant’s calculated weight status and perceived weight status was found, the participant was classified as weight misperception. Individuals who reported their perceived weight status at least one category above their BMI categories were classified as overestimation and those who reported their perceived weight status at least one category below their BMI categories were classified as underestimation.

Education level was asked and it was classified into three categories: 1) high school or less, 2) some college or college, and 3) graduate school level. Age, sex, pregnancy (whether they are currently pregnant), race/ethnicity, the primary language spoken at home, survey administration mode (either online or paper) were assessed.

Weight loss attempts during the last month were assessed with a dichotomous question (yes/no) and an additional open-ended question to describe the weight loss attempts. All the responses

were categorized based on pre-determined coding systems. Experience of participating in commercial weight loss programs was also assessed with a dichotomous question (yes/no) with a list of commercial weight loss programs.

### Statistical Analysis

Descriptive statistics were used to describe four racial and ethnic group's sociodemographic and weight-related characteristics. Differences among the four racial and ethnic groups were compared using one-way ANOVAs for continuous variables, Chi-square tests for categorical variables, and Kruskal-Wallis tests for ordinal variables. The proportions of four BMI categories based on self-reported weight and height, and four categories of perceived weight status were compared in each racial and ethnic group. A multiple logistic regression model was examined with underestimation of weight status as the dependent variables, and ethnicity, sex, and education level as independent variables. The model was controlled for age, speaking English as primary language at home, and survey administration mode. Statistical significance was set at  $P=.05$ . Analysis of the data was conducted using the SPSS 21.0.

## RESULTS

### Sociodemographic Characteristics

Caucasians, Latinos, Filipinos, and Koreans represented 19.4%, 26.8%, 27.4%, and 26.4%, respectively, of the total sample of 886. The sociodemographic and weight-related characteristics of participants across four racial and ethnic groups are detailed in Table 1. The overall mean age was 44.4 (SD  $\pm$  16.1) years and 63.5% were female. About 27% reported high school or less than high school as their highest level of education and 45% reported English as a primary language spoken at home.

### Weight Status Characteristics

The overall mean BMI was 25.5 (SD  $\pm$  5.33) kg/m<sup>2</sup>, with 28% and 17% of the sample overweight and obese, respectively, based on their calculated BMI scores. Latinos had highest proportions for overweight (33%) and obesity (32%) among all racial and ethnic groups. Approximately 14% ( $n=120$ ) of the participants reported they knew their BMI scores. However, only 8% ( $n=72$ ) estimated their BMI scores within  $\pm$  2 kg/m<sup>2</sup> from the calculated BMI. The proportion of those who could estimate their BMI scores within  $\pm$  2 kg/m<sup>2</sup> from the calculated BMI varied across ethnic groups: 17% for Caucasians to 2.5% for Latinos (data not shown). Moreover, among the groups, the proportion of individuals unable to report their height in inches or centimeters was highest in Latinos (4.2%).

Regarding participants' perceived weight status, 37% and 6.3% considered themselves as overweight and obese, respectively, while approximately 6% did not know their weight status. The proportion of individuals who did not know their weight status was the highest (11.8%) among Latinos compared to Caucasians, Filipinos, and Koreans (3.5%, 5.4%, 2.1%, respectively). Overall, 67% accurately perceived their weight correctly, 22% underestimated, and 11% overestimated. About 78% of Caucasians correctly perceived their weight followed by Filipinos (69.6%), Koreans (68.6%), and Latinos (53.2%). Approximately 42% of Latinos underestimated their weight status, followed by Filipinos (19.6%), Caucasians (15.8%), and Koreans (9.7%). Weight status was overestimated by 22% of Koreans, followed by Filipinos (10.7%), Caucasians (6.7%), and Latinos (4.5%).

Roughly one out of two participants (48%) reported they tried to lose weight during the last month, and one-third reported either diet and/or physical activity as their weight loss strategies. Overall participation in commercial

weight loss program (eg, Weight Watchers, South Beach Diet, Nutritionist) was relatively low with 21.6% of Caucasians indicating past participation in commercial weight loss programs compared with Latinos (10.1%), Filipinos (7.8%), and Koreans (2.1%)

### Calculated vs Perceived Weight Status Proportions

Figure 1 shows the proportions of weight status classification according to: 1) the calculated BMI, and 2) perceived weight status across four racial and ethnic groups. Among Latinos, Filipinos, and Caucasians, there were wide discrepancies between BMI-classified obese individuals and those who self-classified themselves as obese. For example, 32.3% of Latinos were obese, but only 5.3% perceived themselves as obese. A similar pattern of weight underestimation was shown by BMI-classified obese Caucasians and Filipinos. In contrast, Koreans classified by BMI as normal weight tended to overestimate their weight status. Among Koreans, only 53.7% perceived their weight status as normal even though 71.4% actually fell within normal BMI weight limits.

### Multiple Logistic Regression

Table 2 summarizes the results of the multiple logistic regression in predicting underestimation of weight status and its known risk factors, controlling for age, speaking English as primary language at home, and survey administration mode. Latino ethnicity (adjusted odds ratio (OR) = 2.18; 95% CI = 1.09–4.36), male (OR = 1.62; 95% CI = 1.12–2.33), and low education ( $\leq$ high school) (OR = 2.16; 95% CI = 1.11–4.20) were significantly related to greater underestimation of weight status ( $P<.05$ ) compared with Caucasian, female sex, and higher education ( $\geq$  graduate school). On the other hand, Korean ethnicity (OR = .38; 95% CI .18–.82) was significantly related to less underestimation of weight status ( $P<.05$ ) compared with Caucasians.

**Table 1. Sociodemographic and weight characteristics across four racial/ethnic groups<sup>ab</sup>**

| Variables  | All         | Caucasian   | Latino      | Filipino      | Korean        | P                  |
|--|-------------|-------------|-------------|---------------|---------------|--------------------|
| Age, years, n=878  | 44.4 ±16.10 | 45.0 ±16.12 | 41.7 ±14.02 | 41.24 ± 18.16 | 49.94 ± 14.34 | <.001 <sup>d</sup> |
| Sex, n=886   |             |             |             |               |               | .014 <sup>e</sup>  |
| Female   | 63.5 (563)  | 72.5 (124)  | 64.3 (153)  | 63 (153)      | 56.8 (133)    |                    |
| Male   | 36.5 (323)  | 27.5 (47)   | 35.7 (85)   | 37 (90)       | 43.2 (101)    |                    |
| Education, n=883   |             |             |             |               |               | <.001 <sup>f</sup> |
| High school or some high school  | 27.1 (239)  | 11.1 (19)   | 62.3 (147)  | 13.4 (32)     | 17.5 (41)     |                    |
| College or some college  | 57.5 (508)  | 63.7 (109)  | 34.7 (82)   | 74.8 (181)    | 58.1 (136)    |                    |
| Graduate school  | 15.4 (136)  | 25.1 (43)   | 3 (7)       | 12 (29)       | 24.4 (57)     |                    |
| English as primary language, n=886                                     |             |             |             |               |               | <.001 <sup>e</sup> |
| Yes  | 44.6 (395)  | 98.2 (168)  | 18.1 (43)   | 66.7 (162)    | 9.4 (22)      |                    |
| No   | 55.4 (491)  | 1.8 (3)     | 81.9 (195)  | 33.3 (81)     | 90.6 (212)    |                    |
| Knew height  | 98.6 (874)  | 100 (171)   | 95.8 (228)  | 99.6 (242)    | 99.6 (233)    | <.001 <sup>d</sup> |
| Knew weight  | 98.4 (872)  | 100 (171)   | 97.5 (232)  | 97.9 (238)    | 98.7 (231)    | .204 <sup>d</sup>  |
| BMI, kg/m <sup>2</sup> , n= 866  | 25.5 ± 5.33 | 25.6 ± 6.05 | 27.9 ± 5.53 | 25.5 ± 5.22   | 23.1 ± 3.22   | <.001 <sup>d</sup> |
| BMI categories based on self-reported height/weight <sup>c</sup> n=866 |             |             |             |               |               | <.001 <sup>f</sup> |
| Underweight  | 2.7 (23)    | 1.8 (3)     | 1.3 (3)     | 2.5 (6)       | 4.8 (11)      |                    |
| Normal weight  | 52.4 (454)  | 52.6 (90)   | 33.2 (75)   | 52.1 (124)    | 71.4 (165)    |                    |
| Overweight   | 27.9 (242)  | 26.9 (46)   | 33.2 (75)   | 30.3 (72)     | 21.2 (49)     |                    |
| Obese  | 17 (147)    | 18.7 (32)   | 32.3 (73)   | 15.1 (36)     | 2.6 (6)       |                    |
| Do you know your BMI? n=884  |             |             |             |               |               | <.001 <sup>e</sup> |
| No   | 86.4 (764)  | 74.9 (128)  | 95.8 (228)  | 83.5 (202)    | 88.4 (206)    |                    |
| Yes  | 13.6 (120)  | 25.1 (43)   | 4.2 (10)    | 16.5 (40)     | 11.6 (27)     |                    |
| Do you know if you are... n=884  |             |             |             |               |               | <.001 <sup>f</sup> |
| Underweight  | 4 (35)      | 2.3 (4)     | 4.2 (10)    | 2.5 (6)       | 6.4 (15)      |                    |
| Normal weight  | 46.8 (414)  | 53.8 (92)   | 33.3 (79)   | 49.2 (119)    | 53 (124)      |                    |
| Overweight   | 37 (327)    | 29.2 (50)   | 45.1 (107)  | 36 (87)       | 35.5 (83)     |                    |
| Obese  | 6.3 (56)    | 11.1 (19)   | 5.5 (13)    | 7 (17)        | 3 (7)         |                    |
| Don't know   | 5.9 (52)    | 3.5 (6)     | 11.8 (28)   | 5.4 (13)      | 2.1 (5)       |                    |
| Weight perception, n=816   |             |             |             |               |               | <.001 <sup>e</sup> |
| Correctly perceived  | 66.9 (546)  | 77.6 (128)  | 53.2 (107)  | 69.6 (156)    | 68.6 (155)    |                    |
| Overestimated  | 11.4 (93)   | 6.7 (11)    | 4.5 (9)     | 10.7 (24)     | 21.7 (49)     | <.001 <sup>e</sup> |
| Underestimated   | 21.7 (177)  | 15.8 (26)   | 42.3 (85)   | 19.6 (44)     | 9.7 (22)      | <.001 <sup>e</sup> |
| Have you tried to lose weight during the last month? n=877             |             |             |             |               |               | <.001 <sup>e</sup> |
| No   | 52.5 (460)  | 62.6 (107)  | 52.4 (120)  | 41.6 (101)    | 56.4 (132)    |                    |
| Yes  | 47.5 (417)  | 37.4 (64)   | 47.6 (109)  | 58.4 (142)    | 43.6 (102)    |                    |
| Weight loss strategies, n=886  |             |             |             |               |               | <.001 <sup>e</sup> |
| Diet   | 33.4 (296)  | 32.2 (55)   | 31.1 (74)   | 38.3 (93)     | 31.6 (74)     |                    |
| Reducing caloric intake  | 18.2 (161)  | 15.8 (27)   | 10.1 (24)   | 21.8 (53)     | 24.4 (57)     |                    |
| Healthier diet   | 12.9 (114)  | 16.4 (28)   | 21 (50)     | 11.5 (28)     | 3.4 (8)       |                    |
| Self-monitoring  | 2.4 (21)    | 3.5 (6)     | .8 (2)      | 4.5 (11)      | .9 (2)        |                    |
| Changing eating pattern  | 1.9 (17)    | 1.2 (2)     | 1.3 (3)     | 2.9 (7)       | 2.1 (5)       |                    |
| Fasting and/or detox   | 1 (9)       | 0 (0)       | .4 (1)      | 0 (0)         | 3.4 (8)       |                    |
| Dietary supplement   | .8 (7)      | 1.2 (2)     | .4 (1)      | 1.2 (3)       | .4 (1)        |                    |
| Other  | 1.4 (12)    | 4.7 (8)     | .4 (1)      | .8 (2)        | .4 (1)        |                    |
| Physical Activity  | 31.7 (281)  | 25.1 (43)   | 29.8 (71)   | 41.6 (101)    | 28.2 (66)     | <.001 <sup>e</sup> |
| Endurance activity   | 30.9 (274)  | 22.2 (38)   | 29.8 (71)   | 41.6 (101)    | 27.4 (64)     |                    |
| Muscle strengthening   | 1 (9)       | 0 (0)       | .8 (2)      | 1.2 (3)       | 1.7 (4)       |                    |
| Flexibility activity   | .8 (7)      | .6 (1)      | .4 (1)      | .8 (2)        | 1.3 (3)       |                    |
| Commercial program   | 9.6 (85)    | 21.6 (37)   | 10.1 (24)   | 7.8 (19)      | 2.1 (5)       | <.001 <sup>e</sup> |
| Weight Watchers  | 5.6 (50)    | 17.5 (30)   | 2.9 (7)     | 3.7 (9)       | 1.7 (4)       |                    |
| Nutritionist   | 4 (35)      | 7 (12)      | 6.3 (15)    | 2.5 (6)       | .9 (2)        |                    |
| South Beach Diet   | 1.8 (16)    | 4.7 (8)     | 1.7 (4)     | 1.2 (3)       | .4 (1)        |                    |
| Nutrisystem  | 1.5 (13)    | 2.3 (4)     | 1.7 (4)     | 1.2 (3)       | .9 (2)        |                    |
| Jenny Craig  | 1 (9)       | 2.9 (5)     | .4 (1)      | .8 (2)        | .4 (1)        |                    |

<sup>a</sup> Data are mean ± SD or % (n).

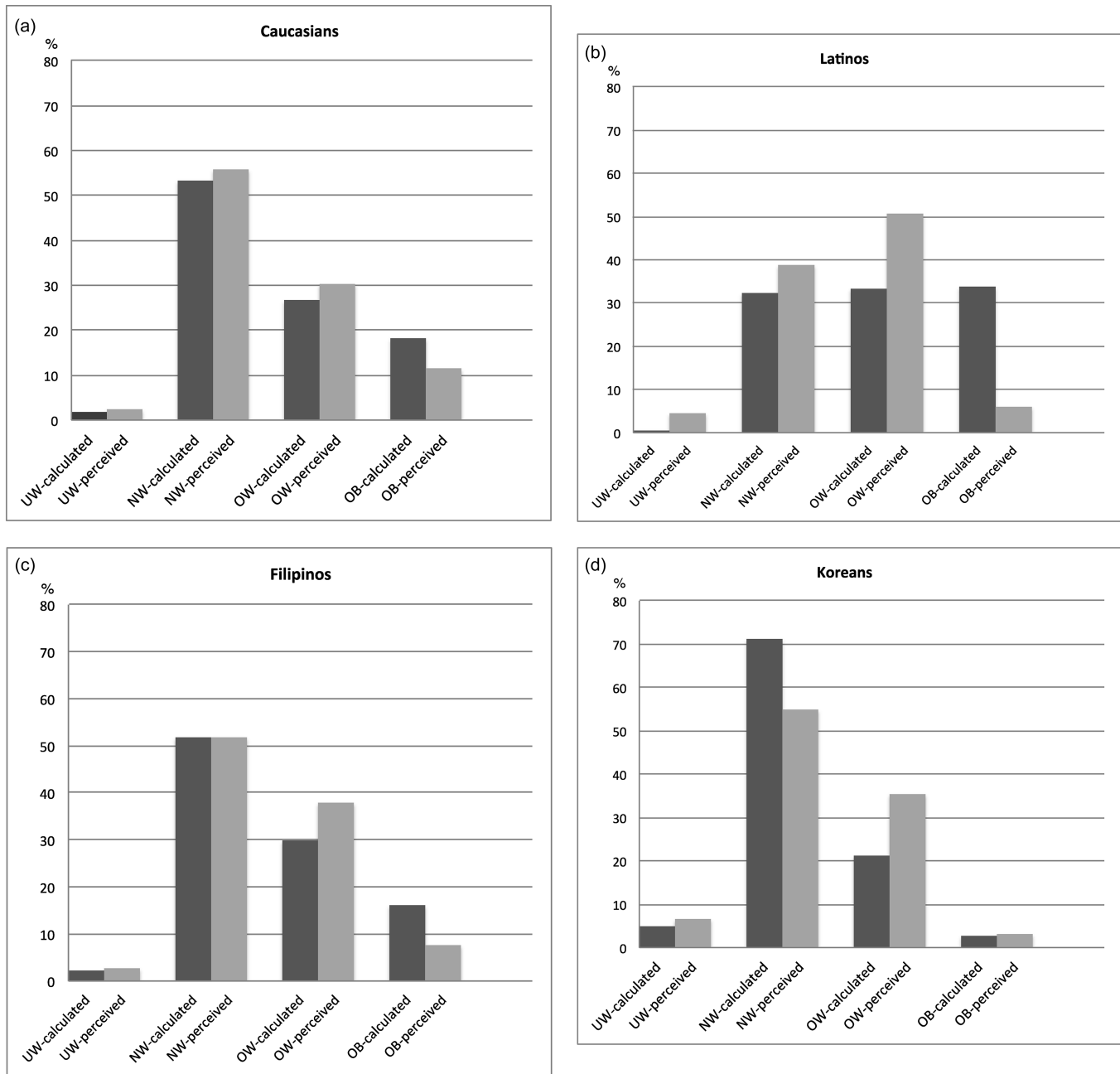
<sup>b</sup> The sample size for each item varies due to missing values (range: n=816 to 886).

<sup>c</sup> Body mass index. For Filipino and Korean, Asian BMI was used: underweight (< 18.5 kg/m<sup>2</sup>), normal (18.5–22.99 kg/m<sup>2</sup>), overweight (23.0–27.49 kg/m<sup>2</sup>) and obesity (≥27.5 kg/m<sup>2</sup>). For Caucasian and Latino, the standard BMI was used: underweight (< 18.5 kg/m<sup>2</sup>), normal (18.5–24.9 kg/m<sup>2</sup>), overweight (25.0–29.9 kg/m<sup>2</sup>) and obesity (≥ 30.0 kg/m<sup>2</sup>).

<sup>d</sup> P represents the results of ANOVA tests to compare means across racial/ethnic groups.

<sup>e</sup> P represents the results of chi-square tests to compare proportions across racial/ethnic groups.

<sup>f</sup> P represents the results of Kruskal-Wallis tests to compare proportions across racial/ethnic groups.



Figs 1a–1d. Proportions of individuals in BMI categories (calculated vs perceived) across four racial/ethnic groups. UW, underweight; NW, normal weight; OW, overweight; OB, obese  $P < .001$ .  $n=165$  Caucasians; 224 Filipinos; 201 Latinos; 226 Koreans

## DISCUSSION

The aims of our study were to examine the discrepancies between the actual weight status and perceived weight status, and to examine the influence of sociodemographic factors on underestimation of weight status in

Caucasians, Latinos, Filipinos, and Koreans. While the majority of the Caucasians could report their heights and weights, there were small proportions of racial and ethnic minorities who could not report their heights (in either centimeters or inches) and weights (in either kilograms or pounds). This lack

of awareness suggests a significant proportional disconnect in weight estimation and subsequent weight misperception among racial and ethnic minorities. For example, 11% of the Latinos could not report their weight status and 42% of the Latinos underestimated their weight status. Of all the groups,

**Table 2. Multiple logistic regression predicting underestimation of weight status, n=808<sup>a</sup>**

|                             | Adjusted Odds Ratio <sup>b</sup> | 95% CI    | P                  |
|-----------------------------|----------------------------------|-----------|--------------------|
| Race/ethnicity              |                                  |           |                    |
| Caucasian                   | 1.00                             | –         | <.001 <sup>c</sup> |
| Latino                      | 2.18                             | 1.09–4.36 | .03                |
| Filipino                    | 1.17                             | .64–2.14  | .60                |
| Korean                      | .38                              | .17–.82   | .01                |
| Sex                         |                                  |           |                    |
| Female                      | 1.00                             | –         |                    |
| Male                        | 1.62                             | 1.12–2.33 | .01                |
| Education                   |                                  |           |                    |
| Graduate school             | 1.00                             | –         | <.005 <sup>c</sup> |
| College or some college     | .97                              | .54–1.75  | .92                |
| ≤ High school               | 2.16                             | 1.11–4.20 | .02                |
| Age                         | 1.01                             | 1.00–1.02 | .13                |
| English as primary language |                                  |           |                    |
| Yes                         | 1.00                             | –         |                    |
| No                          | .77                              | .47–1.27  | .31                |
| Survey administration mode  |                                  |           |                    |
| Paper                       | 1.00                             | –         |                    |
| Online                      | .94                              | .58–1.52  | .80                |

<sup>a</sup> 78 cases excluded due to missing values.

<sup>b</sup> Adjusted for age, speaking English as primary language at home, and survey administration mode.

<sup>c</sup> Overall P.

Latinos (about 4%) were the least likely to know their BMI. Only 2.5% could actually estimate their BMIs within  $\pm 2 \text{ kg/m}^2$  from the calculated BMI. Given that two-thirds of Latinos in the study were either overweight or obese, their reported lack of awareness of height, weight, BMI, and weight status should be considered when developing interventions to promote weight loss among this population.

*In our study, compared with Caucasians, fewer Filipinos and Koreans correctly perceived their weight status, demonstrated an awareness of their BMI and either underestimated or overestimated their weight status.*

Body mass index is a reliable screening tool of overweight and obesity and significantly correlated with total body fat content.<sup>18</sup> Since BMI is calculated from the information collected easily (height and weight), it has become a recognized indicator for overweight or obesity. However, only 14% of the sample reported that they knew their BMI score and only 8% of the sample correctly estimated their BMIs (within  $\pm 2 \text{ kg/m}^2$  from the calculated BMI). Compared with Caucasians, the minority participants in our study were consistently less knowledgeable about their BMIs and only a few could correctly estimate their BMI scores. This lack of awareness among racial/ethnic minority groups of BMI and the identified cut-off points for overweight and obesity classification is especially troubling.

It is widely recognized that weight perception is influenced by culture and norms<sup>19</sup>; however, there is dearth of research on Asian Americans' weight perception. In our study, compared with Caucasians, fewer Filipinos and

Koreans correctly perceived their weight status, demonstrated an awareness of their BMI and either underestimated or overestimated their weight status. Among Asian Americans, Koreans showed a greater tendency to overestimate their weight compared with Caucasians. According to the 2009 Korean Youth Risk Behavior Web-based Survey (KYRBWS), about 12% of Korean adolescent participants were actually overweight or obese, but about 38% of all participants perceived themselves as overweight or obese.<sup>20</sup> In an international study with young adults from 22 countries, Asian participants from Korea, Japan, and Thailand consistently showed higher prevalence of overestimation of weight status compared with those from other regions of countries.<sup>21</sup> Korean Americans may be influenced by Korean culture and the “thin ideal” norm. This finding suggests that racial and ethnic minorities may consider their own racial/ethnic group as their reference group to evaluate their weight status. Thus, it is important to assess cultural acceptance of obesity and cultural norm for healthy weight status for each racial and ethnic group when researchers design a weight management intervention.

We explored the effects of ethnicity, sex, and education level on underestimation of weight status controlling for age, speaking English as primary language at home, and survey administration mode. Latinos, men, and individuals with lower education level were more likely to underestimate their weight status whereas Koreans were less likely to underestimate their weight status.

The racial and ethnic differences in weight perception among Latinos are consistent with other studies that show that Latinos living in the United States are less likely to consider themselves as overweight than Caucasians.<sup>12,13</sup> This finding, however, does not implicate that Latino ethnicity itself is a cause of obesity. Instead, low education level

among Latinos in the sample should be noted. In our research, education level was adjusted. However, the other socioeconomic status (SES) factors, such as annual household income and type of occupation, as well as cultural norms, were not measured and adjusted. Thus, the finding can be confounded by these SES factors and cultural norms. Given the high prevalence of obesity among Latinos, cultural factors that may influence their attitudes to weight (eg, cultural acceptance to overweight/obesity, weight distribution of their ethnic groups) should be further explored.

Our study findings showed that men were more likely to underestimate their weight status than women. It may indicate common cultural phenomenon for underestimation or under-concern among men, and overestimation or over-concern among women. Given the higher prevalence of overweight and obesity among men (74%) than women (64%) among US adults, our findings highlight the need to focus men as much as women in weight loss interventions.<sup>22</sup>

### Strengths and Limitations

The major limitation of this study is the use of self-reported weight and height. Potential bias due to under- or over-reporting cannot be eliminated, but the use of self-reported weight and height is considered sufficiently accurate in the epidemiological setting.<sup>23</sup> Another limitation is that the sample of Caucasians, Latinos, Filipinos, and Koreans may not represent the populations living in the United States. Despite these limitations, to our knowledge, this study represents the first attempts to describe perceived weight status in under-represented Asian ethnic groups, and presents the evidence of possible associations among ethnicity, sex, education level, and underestimation of weight among these groups.

### IMPLICATIONS

To prevent the epidemic of obesity in our society, the perceived underestimation of weight status among Latinos, male, and individuals with low education level should be addressed and these populations should be targeted in future studies and public education programs. Perceived weight status may assist in explaining discrepancies between clinical recommendations based on weight status and actual weight loss attempts. Health care providers should investigate how a patient perceives his/her weight status and what kind of weight management attempts are being made if there are any. Our findings indicate that many are not familiar with BMI and do not understand the implication of their BMI scores. Raising public awareness of BMI should be promoted, especially among racial and ethnic minorities.

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