Extent and Determinants of Discrepancy Between Self-evaluations of Weight Status and Clinical Standards

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OBJECTIVES: **To examine the extent and type of discordance between personal and medical classifications of weight status, and to examine the influence of sociodemographic factors on the misclassification of weight status.**

DESIGN/SETTING: **The 1991 Health Promotion and Disease Prevention Supplement of the National Health Interview Survey, a nationally representative, cross-sectional survey of the U.S. population.**

PARTICIPANTS: **Adults 18 years and older (*N* = 41,676).**

MEASUREMENTS AND MAIN RESULTS: **Respondents' self-evaluations of weight status were compared to classification of their body mass index (BMI) by medical standards. Twenty-nine percent of respondents incorrectly classified their weight status relative to medical standards, and the nature of this error was variable. While 27.4% of overweight persons judged their weight to be "just about right," of those who did judge themselves to be overweight, 23.9% were in fact normal or underweight according to their BMI. Overall, 16.6% of persons underassessed their weight category, and 12.4% overassessed their weight category. Multivariate analysis revealed that sex, age, race, income, education, and occupation influenced the misclassification of weight status.**

CONCLUSIONS: **A substantial proportion of Americans deviate from medical standards in their self-evaluations of weight appropriateness, and this lack of correspondence may reflect the normative judgments of various population subgroups. Clinical and public health programs that employ a uniform strategy or approach to the population may not be efficacious.**

KEY WORDS: **obesity; overweight; eating disorders; body image; weight perception.**
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Despite the directives of national public health campaigns,[1] a significant portion of the U.S. population continues to be overweight or obese. Data from the National Health and Nutrition Examination Surveys (NHANES) indicate that over half the adult population is now overweight or obese and that the prevalence of obesity per se increased from 14.5% in NHANES II (1976–1980) to 22.5% in NHANES III (1988–1994).[2] At the opposite extreme of weight, a significant number, especially women, are afflicted with eating disorders or excessive concern with thinness and body shape.[3] There exists a health paradox, wherein many who are normal or underweight nevertheless try to lose weight, while many who are overweight do not.[4–8] Prior studies have indicated that personal evaluations of weight appropriateness often deviate from weight status as defined by medical and public health guidelines.[8–13] It has also been noted that personal ideals for weight status can differ substantially from official standards.[14] The existence of behaviors and weight outcomes at opposite extremes indicates that the nature of this discrepancy is highly variable. Medical and public health guidelines with respect to weight status will have limited impact if there is a lack of correspondence with lay conceptions of weight appropriateness.

In this study, we use data from the 1991 National Health Interview Survey (NHIS) to assess, in the U.S. adult population, the extent and type of discordance between respondents' self-classifications of their weight status and standard medical classifications of their weight status. We then investigate the effect of various sociodemographic factors on the both the tendency to misclassify and the nature of the misclassification. It is possible to misclassify by either underassessing or overassessing one's weight status relative to medical standards. Given that weight behaviors and outcomes are not distributed homogeneously in the population, we hypothesize that the misclassification of weight status relative to medical standards may be a normative response among various subgroups in the population. Our results build on prior work in this area[8–14] by using a sample that is representative of the U.S. adult population and by evaluating the independent effects of a broad range of sociodemographic factors on the misclassification of weight status.

METHODS

NHIS and HPDP Data

The National Health Interview Survey (NHIS) is a cross-sectional survey of civilian households in the United States conducted each year by the National Center for Health Statistics to obtain information on illness and disability.[15] Basic demographic information is routinely collected in the core of the questionnaire. A Health Promotion and Disease Prevention (HPDP) supplement was incorporated in 1991 survey. This supplement included self-reported height and weight as well as a question pertaining to how respondents would classify the appropriateness of their own weight

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status. One person 18 years or older was randomly sampled from each household in the NHIS sample to respond to the supplement. The resulting response rate (which is the product of the response rate from the core and the HPDP response rate) was 87.8%.

Self-evaluation and Medical Classification of Weight Status

The self-evaluation of weight status was represented by responses to the question, "Do you consider yourself overweight, underweight, or just about right?" The medical classification of weight status was based on BMI (body mass index), which is defined as weight (in kilograms) divided by the square of height (in meters), and standard medical cut points for the designation of weight class and weight appropriateness. The following cut points were used for medical weight classification: overweight (BMI $\geq$25); normal (BMI 18.5–24.9); and underweight (BMI <18.5). These cut points are consistent with directives from the National Heart, Lung and Blood Institute (NHLBI), the 2000 Dietary Guidelines for Americans, and the World Health Organization.[16–18] Slightly higher cut points for overweight (BMI $\geq$27.8 for men and BMI $\geq$27.3 for women) have been used in past; these cut points were based on 85th percentile values of BMI from NHANES II rather than the potential for morbidity or mortality.[19] Although there is some disagreement over the appropriateness of the newer and lower cut points,[20] our goal was to evaluate standards that are widely promoted on a national and international basis. We did, however, perform subanalyses with the older cut points to assess the impact of alternative systems on misclassification.

Self-evaluations of weight status (overweight, just about right, underweight) were compared to classification by medical standards (overweight, normal, underweight), and respondents were placed into one of the following three categories: 1) correspond (self-evaluation is concordant with medical status), 2) underassess (self-evaluation is in a lighter category than medical status), 3) overassess (self-evaluation is in a heavier category than medical status).

Statistical Analysis

We used a multinomial logistic regression model to assess the predictive effects of sociodemographic variables on the accuracy of self-classified weight status (relative to classification of BMI by medical standards), using "correspond" as the baseline category of comparison. Therefore, all comments on odds refer to either 1) the odds of underassessment versus correspondence or 2) the odds of overassessment versus correspondence. Additionally, all odds are conditional on not being in the category excluded from comparison, and 95% confidence intervals are presented in square brackets following point estimates. We investigated the influence of sex, age, race, marital status, education, income, and occupation as predictor variables because many of these factors are associated with actual weight outcomes.[21–24] Age, education, and income were noted to bear nonlinear relationships with the dependent variable, so all predictor variables were modeled as categorical variables.

The 1991 NHIS/HPDP data set has 43,732 respondents. We excluded 1,044 (2.4%) persons who were missing data on either the self-evaluation of weight status or BMI. We then excluded an additional 1,006 (2.3%) persons who were missing data on one or more of the predictor variables of interest. Data was missing for marital status (52), education (109), and income (990). The occupational category "military" had only six persons, so we excluded these persons and the category from the analysis. Our working sample size was 41,676. All statistical analysis was performed with STATA 6.0 software (Stata Corp., College Station, Tex). The NHIS is a multistage survey with clustering and oversampling of particular groups, so we accounted for information on sample weights, cluster sampling, and stratification to generate appropriate population estimates and variances in multivariate regression.

RESULTS

Table 1 gives sociodemographic characteristics of our sample. Table 2 displays a cross-tabulation of medical and self-classified weight status. The majority of respondents classified themselves in a manner concordant with how they would be classified by medical standards (on-diagonal cells). Nevertheless, 29.0% of respondents incorrectly classified their weight status (off-diagonal cells), with 16.6% underassessing and 12.4% overassessing their weight status. Of particular note, less than three-fourths of those who were overweight by medical standards identified themselves as such; of those who were overweight according to their BMI (row 1 of Table 2), 27.4% judged themselves to be "just about right". Meanwhile, of those who did judge themselves to be overweight (column 1 of Table 2), 23.9% were in fact normal or underweight according to their BMI. Stratification of this cross-tabulation by sex revealed that the majority of those who failed to recognize their overweight status were men; 40.3% of overweight men considered their weight to be "just about right" compared to 14.6% for women. Women, on the other hand, accounted for much of the overassessment; 29.0% of normal weight women thought they were overweight, compared to 8.0% for men.

Subdividing the overweight group into the obese (BMI $\geq$30) and the overweight (BMI 25–29.9) revealed that the obese do not tend to misclassify their weight, with 91.7% judging themselves to be overweight. Revising the overweight cut-point to reflect older standards (BMI $\geq$27.8 for men and BMI $\geq$27.3 for women) did not substantively change the total percentage who erred in self-classification (30.6%), but it did shift the overall pattern of misclassification. For example, of those who were medically categorized as overweight, the percentage who correctly

Table 1. Sample Characteristics (*N* = 41,676)

Variable/Categories	%
Sex	
Female	57.8
Male	42.2
Age	
18–43	34.8
35–54	34.4
55 and over	30.8
Marital status	
Married	54.5
Not married	45.5
Race	
White	83.3
Black	13.5
Other	3.1
Family income (per y)	
$20,000 or more	60.3
Less than $20,000	39.7
Education	
13+ y (college or more)	41.9
12 y (HS graduate)	36.8
1–11 y (HS or less)	21.3
Occupation	
Managerial and professional specialty	19.2
Technical, sales, administrative support	19.2
Service	16.7
Operators, fabricators, laborers	9.7
Not in labor force	35.2

judged themselves as such increased from 72.0% to 86.3%. Of those who thought they were overweight, however, the percentage who were actually normal or underweight increased from 23.9% to 48.6%. Secondary to the more relaxed (higher) cut point for overweight, a significant portion shifted from being classified as overweight to being classified as normal weight; 43.6% of those classified as overweight using the BMI cut point of 25 were classified as normal weight under the older standards. Comparisons with sample-weighted versions for all of these cross-tabulations yielded negligible changes in results.

Table 3 displays the results of multinomial logistic regression for the accuracy of self-classified weight status when compared to classification of BMI by medical standards. Those who were on the diagonal in Table 2 "correspond" with respect to their judgements, while those who were above the diagonal "underassess" their body size, and those who were below the diagonal "overassess" their body size. "Correspond" is the baseline category of comparison.

Sex showed significant and large effects on the misclassification of weight status. Women had 0.23 (95% confidence interval [CI], 0.21 to 0.24) times lower odds of underassessing their weight class and 4.97 (95% CI, 4.42 to 5.58) times greater odds of overassessing their weight class compared to men. Age also had significant effects, with those in the younger age groups more likely to overassess and less likely to underassess their weight status. Marital status did not show significant effects. Race, on the other hand, had large and significant effects. Compared to whites, blacks had 1.76 (95% CI, 1.61 to 1.94) times greater odds of underassessing their weight status and 0.43 (95% CI, 0.38 to 0.50) times lower odds of overassessing their weight status, despite controlling for socioeconomic factors such as income, education and occupation.

Income and education each had significant and independent effects. For example, those with an annual household income of $20,000 or more had 1.16 (95% CI, 1.06 to 1.26) times greater odds for overassessing their weight class when compared to those with a lower income. Those with a college education or more had 1.37 (95% CI, 1.20 to 1.58) times greater odds for overassessing their weight class compared to those who did not graduate from high school. For both income and education, opposite trends were found for their effects on the underassessment weight status. Occupation showed significant effects only on the odds of underassessing one's weight status. Compared to those in a "managerial or professional specialty occupation," most other occupational groups were estimated to have about 30% greater odds for underassessing their weight appropriateness, even after controlling for income and education. The "technical, sales, and administrative support" group was the only group that did not differ from the managers and professionals.

DISCUSSION

We found that a large percentage of Americans misclassify their own weight status relative to medical standards, and that both the tendency to misclassify and the nature of this misclassification is associated with

Table 2. Comparison of Self-evaluation of Weight Status with Classification of BMI by Medical Standards* (*N* = 41,676)

	Self-evaluation *n*, (%)			
Medical Status	Overweight	Just Right	Underweight	Total
Overweight	14,178 (34.0)	5,391 (12.9)	120 (0.3)	19,689 (47.2)
Normal	4,408 (10.6)	14,880 (35.7)	1,401 (3.4)	20,689 (49.6)
Underweight	50 (0.1)	713 (1.7)	535 (1.3)	1,298 (3.1)
Total	18,636 (44.7)	20,984 (50.4)	2,056 (4.9)	

* *Overweight (BMI >24.9); normal (BMI 18.5–24.9); underweight (BMI <18.5).*

Table 3. Factors Associated with Discrepancy between Self-evaluation of Weight Status and Classification of Weight Status by Medical Standards*

	Underassess vs Correspond		Overassess vs Correspond	
Variable	Odds Ratio	95% CI	Odds Ratio	95% CI
Female	0.23	0.21 to 0.24†	4.97	4.42 to 5.58†
Age				
18–34	0.90	0.82 to 0.98†	1.72	1.56 to 1.90†
35–54	0.83	0.76 to 0.91†	1.40	1.27 to 1.56†
55 and over	1.00	—	1.00	—
Married	0.95	0.89 to 1.02	1.07	1.00 to 1.16
Race				
Black	1.76	1.61 to 1.94†	0.43	0.38 to 0.50†
Other	1.06	0.86 to 1.32	1.16	0.95 to 1.41
White	1.00	—	1.00	—
Income $20,000+	0.80	0.73 to 0.87†	1.16	1.06 to 1.26†
Education				
13+ y (college or more)	0.69	0.62 to 0.77†	1.37	1.20 to 1.58†
12 y (HS grad)	0.75	0.69 to 0.82†	1.32	1.18 to 1.49†
1–11 y (HS or less)	1.00	—	1.00	—
Occupation				
Tech./sales/ adm. supp.	0.97	0.86 to 1.08	1.02	0.91 to 1.15
Service	1.33	1.19 to 1.47†	0.88	0.76 to 1.01
Operators/ laborers	1.33	1.17 to 1.51†	0.89	0.75 to 1.05
Not in labor force	1.29	1.16 to 1.44†	0.99	0.89 to 1.11
Manag./prof. specialty	1.00	—	1.00	—

**The table shows a multinomial logistic regression model of the comparison between self- and medical evaluations of weight status. "Correspond" refers to concordance. "Underassess" indicates that self-evaluation is in a "lighter" category than medical status. "Overassess" indicates that self-evaluation is in a "heavier" category than medical status.*

† $P < .05$.

various sociodemographic factors. A large fraction of the overweight did not register themselves as being overweight, while a large fraction of those who did register themselves as overweight were actually normal or underweight. Those who failed to recognize that they were overweight were generally in the overweight range (BMI 25.0–29.9) rather than in the obese range (BMI $\geq$30). Our data did not allow for the ascertainment of whether or how respondents would discriminate between being overweight and obese. Additional work would investigate whether or not those who are obese actually consider themselves as obese rather than simply as overweight.

Changing the BMI cut point for overweight from 25 to the older and less stringent standards (27.8 for men and 27.3 for women) did shift a significant portion from an overweight status to normal, revealing that many of those who are overweight under current standards have a BMI that falls somewhere between the low and high cut points. On the one hand, using the lower cut point results in a larger number of overweight persons who do not classify themselves as such. On the other hand, the lower cut point results in a smaller number of normal weight persons who perceive themselves as overweight. As expected, the change in cut point for overweight leads to somewhat of a tradeoff between underassessment and overassessment of body size appropriateness. Our data was collected in a time period prior to the widespread institution of the more stringent standards for normal weight. Even under the older standards, however, a substantial fraction (30.6%) misclassifies their own weight status. Future work would assess whether or not personal standards have changed, and if they have, whether or not they have changed in response to changes in medical standards.

The discordance of self-evaluation with medical classification is not distributed homogeneously in the population. The estimated effect of sex was relatively large in magnitude. Compared to men, women were almost five times more likely to overassess their body size. It appears that overweight men tend to tolerate their weight, while a large portion of normal weight women feel that they are overweight. These findings are consistent with much previous work showing that women impose stricter self-standards with respect to body image and are more likely to be dissatisfied with their weight.[8–11,25,26] Indeed, women are at greater risk for eating disorders than men.[3] In this regard, many have described the role of ideological norms of thinness imposed upon (and internalized by) women, as well as the effects of the media in this process.[27–30] Medical and public health standards, which take into account the relationship between BMI and health outcomes, use the same BMI cut points for men and women in determining weight status. Health concerns, however, are unlikely to be the only criteria employed in the self-evaluation of weight appropriateness. Higher weight consciousness among women with respect to a given BMI may reflect the difference in muscle to fat ratio between the sexes. A man and a women of equal weight at a given height are likely to have different degrees of adiposity with different effects on their self-evaluations of body size. Differences in adiposity, however, are unlikely to be the only factor contributing to the overall effect of sex on weight self-appraisal.

We found that in addition to sex, a number of other sociodemographic factors have independent effects on the misclassification of weight status relative to medical standards. On multivariate analysis, those who are younger, white, of higher income, or of higher educational level are more likely to overassess their weight status relative to medical categories. Those who are older, black, of lower income, of lower educational level, or in occupations other than management or professional specialty are more likely to underassess their own weight status. This suggests that there are norms of acceptable range for body size that depend on age, race, and socioeconomic status.

These findings are consistent with previous work on weight-related behaviors. For example, many of the factors

that we found to be associated with overassessment of body size have also been reported to be associated with increased weight loss behaviors.[6–10] Dieting, for instance, is generally more prevalent for women, particularly for those who are white and in higher socioeconomic groups,[7] suggesting that self-assessment may function as a critical mediating factor in these relationships. Given the association of actual body size (BMI) with age, race, and socioeconomic status,[2,22–24] it may be the case that many persons judge the appropriateness of their own weight status relative to their peers, i.e., those who are similar to themselves on social and cultural grounds, rather than relative to an externally imposed health-based ideal.

Our study is subject to three important limitations. First, the NHIS provides only a crude assessment of the self-evaluation of weight status. We do not know what respondents were using as a reference point when they answered the question on weight status. In rendering the judgment of overweight, for example, a respondent could have been making this assessment relative to personal standards, medical standards, or overarching cultural standards. In addition, it is possible for a respondent to employ one standard to answer the survey question while fully recognizing the existence of other standards. Future study would therefore obtain a more elaborated account of the process of weight self-evaluation. The second limitation is that in the NHIS height and weight are self-reported rather than directly measured. Many investigators have concluded that these self-reported values are an excellent approximation for actual values.[31–33] Though there may be some potential for higher, particularly obese, BMI values to be underestimated,[34,35] this concern is attenuated in our study given that our focus was on overweight rather than distinguishing between overweight and obese. In addition, the NHIS is conducted via in-person interview, which is shown to provide self-reported measures of higher sensitivity than those obtained from questionnaire data where obvious discrepancy would not be noted by an in-person interviewer.[36,37] Finally, the data we examined, while the most recent, nationally representative data of such type of which we are aware, are still almost ten years old. Nevertheless, we feel that our findings are important in that, if anything, obesity has risen in the past ten years. Future work will be necessary to evaluate the persistence of the patterns we describe.

In conclusion, there is a substantial amount of discrepancy between lay and medical evaluations of weight status, and the nature of this discrepancy is variable. These misclassifications, however, are under the influence of sociocultural factors, which undoubtedly mediate both the construction and acceptance of bodily standards. This suggests that clinical and public health guidelines aimed at weight-related health outcomes may not be efficacious unless the normative judgements of various population subgroups, and, moreover, the deviation of these judgements from medical standards, are taken into account. While some need to intensify their standards for overweight, others, to the contrary, need to relax their standards. Therefore, intervention efforts may have limited impact if they employ a uniform strategy or approach to the population.

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