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Physician evaluation of obesity in health surveys: “who are you calling fat?”

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Abstract

Previous research on status generalization suggests that physicians may use non-medical factors in their evaluation, interpretation, and treatment of persons presenting for care. This study compares physicians' evaluations of obesity with physical measurements of body stature and fat collected from a large national health examination survey. While the anthropometric measures are strong predictors of physician evaluations of obesity, between 13% and 19% of the respondents were classified in ways that could not be predicted from the anthropometric measures. Moreover, personal and status characteristics were related to physicians' evaluations of obesity. Women, especially White and taller women, were more likely to be evaluated as obese than would be predicted from the anthropometric measures—African American women were less likely than their White counterparts to be so classified. Physicians' evaluation of obesity was least consistent with measured obesity for older respondents. Indeed among men, age was the most important status characteristic shaping physician evaluations: older men were more likely to be evaluated as obese. The findings suggest that the cluster of status characteristics is important to physicians during medical evaluations.

Keywords

Obesity; Status generalization; Physician evaluation; Body mass index; Adiposity; Anthropometric measurement

Introduction

The practice of contemporary medicine requires physicians to make many decisions regarding the diagnosis, prognosis, and treatment of patients in a relatively brief period of time. While the decision-making process in modern medicine is grounded in scientific knowledge, it nonetheless remains hinged on social interaction. Previous research shows that non-medical factors shape the way physicians make decisions, thereby increasing the likelihood that social statuses may influence the practice of medicine. As Rudolph Virchow (1990), a 19th century German pathologist, suggested, medicine is basically a social science.

The present research examines non-medical influences on one judgment made by physicians in the process of a medical examination: the evaluation of a person as obese. Obesity, often assessed as a body mass index (BMI; kg/m^2) ≥ 30 , is both a dimension of physical attractiveness and a risk factor for a host of health problems (Sobal & Maurer, 1999). Given the accumulated body of evidence implicating obesity as a risk factor for disease and premature death, the decision to evaluate a person as obese is an important matter in the

treatment of persons presenting for care (e.g., National Heart, Lung, & Blood Institute, 1998). Moreover, the increasing rate of obesity in many modern societies makes the judgment by physicians about who is obese all the more important for both preventive and clinical medicine (Kuczmarski, Flegal, Campbell, & Johnson, 1994; Laurier, Guiguet, Phong Chau, Wells, & Valleron, 1992).

The medical evaluation of a person as obese is also important because it may influence the course of care. For instance, a study of physicians reported that pelvic examinations were less likely for obese women (Adams, Smith, Wilbur, & Grady, 1993). Obesity may not always lead to less efficacious treatment by health or psychiatric professionals (Agell & Rothblum, 1991), but professionals appear to judge obese patients more negatively, sometimes leading to stigmatization (Young & Powell, 1985).

With data from a national sample of subjects undergoing a medical examination, the present research seeks to identify the non-medical factors that influence evaluations of obesity. The logic of this analysis is to examine the degree of concurrence between several anthropometric measures and physician evaluations of obesity to better understand how status characteristics may influence the judgments physicians make about patients.

Status generalization in medical settings

A substantial amount of sociological work regarding the role of status characteristics on social interaction has accumulated in recent decades. Whether the outcome is attraction in small groups or discrimination at work, social scientists have uncovered numerous instances where external status characteristics are imported to shape the conduct of interaction. The process has been described as one of status generalization, where characteristics such as gender, race, age, and socioeconomic status shape expectation states, behavior, and, ultimately, power (Berger, Fisek, Norman, & Zelditch, 1977; Webster & Hysom, 1998). While it is often fruitful to isolate one status characteristic for detailed study, it is the cluster or aggregate configuration of characteristics that is most often seen as shaping interactions (Jackson, Hunter, & Hodge, 1995). People are not typically judged in social situations by a single characteristic, but based on all of the presenting (visible) information. As such, one must attend to the possibility of interactions among status characteristics.

While multiple characteristics need to be considered, the extant research shows that some characteristics are observed to be more consequential for interaction in a variety of settings. Gender emerges as one of the most consistent predictive characteristics in empirical research on status generalization (Biernat & Kokbrynowicz, 1997; Feldman et al., 1997; Hall, Epstein, De Ciantis, & McNeil, 1993; Jackson et al., 1995; Schulman et al., 1999). Other studies have noted that social relations are influenced by socioeconomic status (Bland, Ferraro, & Miller, 1987; McKinlay et al., 1998; Scott, Shiell, & King, 1996), race (Biernat & Kobrynowicz, 1997; Mizrahi, 1984; Schulman et al., 1999), age (Bland et al., 1987; Feldman et al., 1997) and physical attractiveness, especially facial attractiveness (Eagly, Ashmore, Makhijani, & Longo, 1991; Hall et al., 1993; Jackson et al., 1995).

In medical settings, the process of status generalization may be quite consequential for patient care. Indeed, there is ample research showing that there are differences in diagnosis, test ordering, treatment, referral, and follow-up for patients of different status characteristics. Consider a few examples. Schulman et al. (1999) showed that physician referral for cardiac catheterization was lower for women and Black persons than for men and White persons—even though the symptoms described were invariant across the status characteristics. McKinlay et al. (1998) found that Massachusetts physicians specializing in gynecologic oncology were more certain of their diagnosis of breast cancer if the patient was of high socioeconomic status. In a study of older patients, Hall et al. (1993) reported that physicians

liked male patients more than female patients, especially when they were in good health. In short, the findings of many studies are consistent with the conclusion of Feldman et al. (1997) that “numerous reports suggest that medical decision-making—ideally a matter of symptoms, tests, and probabilities—is in fact a social transaction prone to medically extraneous influences” (p. 344).

While non-medical forces may shape the practice of medicine, detecting how personal or status characteristics influence physician decision-making is not easily accomplished. The bulk of the information on how non-medical factors influence physician behavior is based on vignette or scenario studies (e.g., Feldman et al., 1997; Schulman et al., 1999; Young & Powell, 1985). These studies have been most insightful for identifying how social characteristics influence physician decision-making, but they rely on *simulated* encounters. The present study avoids the use of simulated data by making use of information from physicians collected during a medical examination for a large national survey.

The focus of the present research is not how obesity may shape treatment, but whether status characteristics influence physicians’ evaluations of a person as obese. One would obviously expect a strong relationship between physician evaluations of obesity and anthropometric measures of body stature and weight. Nevertheless, might status characteristics independently influence the likelihood of being evaluated by a physician as obese? Physicians recognize, to varying levels, that obesity cannot be predicted perfectly from anthropometric measures such as body mass index and skinfolds (Galuska, Will, Serdula, & Ford, 1999; Willett, 1998); therefore, they typically turn to their clinical acumen to help in the diagnostic process. Morbidity may shape the classification of obesity, but we wonder whether status characteristics are part of the diagnostic calculus? For instance, are women more likely to be evaluated as obese, even women with a BMI<30? Stated differently, are women more likely to be false positives? Are persons of lower socioeconomic status (SES) more likely than higher SES persons to be classified as obese? Are African Americans more likely to be classified as obese net of the effects of anthropometric measures?

According to the status generalization literature, the answers to these questions may hinge on physicians’ perceptions of the prevalence of obesity across these status characteristics. Hence, the answers may not be straightforward in an intuitive sense (Hebl & Heatherton, 1998; Webster & Hysom, 1998). The unadjusted prevalence of obesity is fairly similar for White men and women, but women of color are much more likely to be obese (Kuczmarski et al., 1994; Kumanyika, 1993). SES is inversely related to the prevalence of obesity (Sobal, 1991), especially for women. Thus, when physicians evaluate obesity in their patients, they may simply use the relevant status characteristics to raise the likelihood of being so classified. Or, it is possible that the *expectation* of higher prevalence of obesity in selected groups may lead to a lower probability of being classified as obese—predicated on different norms for appropriate body weight (Crawford & Campbell, 1999). For instance, if women are more likely perceived to be obese, the higher relative prevalence may lead to revised norms and less concern about the problem (Hebl & Heatherton, 1998). The bulk of the evidence points to the first mechanism; thus, one would expect physicians to be more likely to evaluate women, especially African American women, and persons of lower socioeconomic status as obese. If, however, any of these status characteristics were associated with a lower likelihood of being evaluated as obese, it would suggest that distinct norms of body weight are used across those status characteristics. We are unaware of any studies that compare probability sample data of anthropometric measures with physician evaluations of obesity. Thus, the first step in this line of inquiry is determining whether status characteristics are related to physicians’ classification of obesity independent of physical stature.

Method

Sample

This project uses data from the *National Health and Nutrition Examination Survey I* (NHANES I) which collected medical examination and interview data in 1971–1975 (National Center for Health Statistics, 1973). The survey is longitudinal, but the physician evaluation of obesity was collected only during the baseline interview; therefore, this is the only time at which concurrence between anthropometric measures and physician evaluations of obesity can be examined. The focus of the research is on this concurrence, and in another paper we examine the predictive validity of physician evaluation of obesity on mortality over the study period.

The sampling design was a multistage, stratified, probability sample of non-institutionalized persons ages 25–74 resulting in a total of 14,407 respondents. The analyses will be completed on the NHANES I subsample, designed as a nationally representative sample, which was administered the “detailed component” in separate sessions including an extensive medical examination and phlebotomy ($N = 6913$). The response rates were 98.6% for the interview and 70% for the examination (National Center for Health Statistics, 1987). The examination response rate was similar for Black and White respondents (White, 69.4%; Black, 70.2%).

The sample included 878 African American respondents (12.7%), but relatively few Asian Americans, Hispanic Americans, Native Americans, and persons in other ethnic categories (e.g., $n = 41$ Asian Americans). Since these other groups appear in such small proportions, it is not possible to statistically analyze them fully in the present analysis. Sixty-six pregnant women were also deleted from the analysis. This study makes use of data from 6767 White and African American respondents. The final sample consists of 3129 men and 3638 women.

Measurement

Medical examination—NHANES representatives collected basic health and medical history information from sample members in their households and invited the respondent to the nearby mobile examination center. The medical examination was extensive, including urinalysis and hematology. Most physicians conducting the general medical examination were White male internists within 10 years of their medical residency (Findlay, 1999). They were also commissioned officers of the Public Health Service and trained by the NHANES staff regarding the conduct of the examination (National Center for Health Statistics, 1973, p. 29). Physicians were long-term employees of NHANES and traveled with the examination team over the course of the study. No information on physician characteristics was recorded, thereby precluding analyses that link individual physicians with specific respondents.

Information on morbidity and the classification of obesity were collected from the physician examination. Physicians commenced the examination by evaluating eight anatomical areas in what is referred to as the *general medical examination*. The eight domains are: (1) head, eyes, ears, nose, and throat; (2) thyroid; (3) chest; (4) cardiovascular; (5) abdominal; (6) musculoskeletal; (7) neurological; (8) skin. The general medical examination (eight domains) was designed to uncover findings based on anatomy and function. Findings from each domain were first binary coded (0, 1) and then summed.

Second, physicians conducted a *detailed medical examination* by recording findings (abnormalities) according to the *International Classification of Diseases, Eighth Revision* (ICD-8). The examination included detailed auscultation of the heart and a musculoskeletal

examination, including range-of-motion and straightleg-raising tests. The physician coded morbidity using 15 ICD domains after completion of the laboratory tests, medical history, and medical examination: (1) infectious and parasitic diseases, (2) cancers and neoplasms, (3) endocrine, nutritional, and metabolic disorders, (4) diseases of the blood and blood-forming organs, (5) mental disorders, diseases of the (6) nervous, (7) circulatory, (8) respiratory, (9) digestive, and (10) genitourinary systems, (11) diseases of the skin and subcutaneous tissue, (12) diseases of the musculoskeletal system and connective tissue, (13) congenital anomalies, (14) symptoms and ill-defined conditions, and (15) accidents, poisonings, and violence. Each ICD domain was coded as a binary variable (0=no findings; 1=one or more finding). The 15 binary codes were then summed; this measure is referred to as *ICD morbidity examination*. ICD codes were designed to be truly comprehensive in reliably classifying many types of pathology and are widely used in health research (Idler & Angel, 1990). The two protocols represent different classification schemes, but each procedure measured physician-evaluated morbidity. The simple correlation between *general medical examination* and *ICD examination morbidity* is 0.42.

At the conclusion of the general medical examination, physicians were asked to classify each subject as either obese or not (scored 1 and 0, respectively). This was not simply another disease classification, but was part of a separate section on nutrition and body stature. Physicians classified 23.3% of the sample as obese. The subject was not informed of this classification.

As part of the medical examination, NHANES health technicians gathered the anthropometric information (National Center for Health Statistics, 1973). The protocol for the medical examination specified that the physician examination be done prior to the anthropometric measurements. The body measurements required two health technicians—one to conduct the measurements and one to record the information. Body measurements were most often gathered at the end of the examination. Physicians did not have the anthropometric data at hand, but rendered their assessment of obesity upon examination (Findlay, 1999).

Weight was measured by a Toledo self-balancing scale to 1/4 pound intervals. “All participants wore a standardized examination gown and foam rubber slippers which ranged in weight from 0.20 to 0.62 lb. Height was measured using a level platform and an attached measuring bar. A Polaroid instant-developing camera was used to record the height measurement” (Cornoni-Huntley et al., 1991, p. 744). Weight and height were converted to metric scale and used to calculate BMI as the Quetelet Index (kg/m^2). A BMI 30 has long been used as a threshold for defining obesity (Bray, 1983) and confirmed in the recent National Heart, Lung, and Blood Institute (1998) guidelines.

In addition to weight and height, skinfold measurements (mm) for subjects’ right triceps and subscapular were collected with a Lange skinfold caliper during the medical examination at baseline. While BMI is a widely used measure to assess body weight, skinfolds are useful for assessing adipose tissue. Each measure is an indicator of body fat, but subscapular skinfolds reflect truncal body fat, and triceps reflect peripheral body fat (Gillum, Mussolino, & Madans, 1998). Thus, it may be helpful to identify if body fat distribution may influence physicians’ evaluations of obesity.

The coding of variables as well as means and standard deviations are presented in Table 1. The descriptive statistics are presented for all respondents and separately by physician evaluation of obesity.

Interview

The remaining variables for the analyses were drawn from a face-to-face interview with the respondents. Age was measured in years. Binary variables for female, Black, and rural were scored 0 and 1 (with the variable name indicating the high value of the variable). Several measures of socioeconomic status (SES) are used in the analysis. Education is coded in eight categories ranging from none (0) to graduate school (7). Household income (during 1971–1975) is coded in 12 categories ranging from <\$1000 (1) to \$25,000 (12). Medicaid status was identified, as well as whether the respondent had private insurance (both scored as dummy variables). Two types of health behaviors were also assessed and are considered important control variables in a study of obesity (Fitzgerald & Jarrett, 1992; Grinker, Tucker, Vokonas, & Rush, 1995). Smokers were identified with a dummy variable (preliminary analyses based on the smoking classification of “current, past, and never” failed to show any significance for past smokers in any of the equations). The frequency of recreational exercise was reported by the respondent as little or none (1), moderate (2), or very much (3).

Analytic plan

The analysis began with a consideration of the degree of simple concurrence between physician-evaluated obesity and the anthropometric measures. The second phase of the analysis was to estimate multivariate logistic regression models for the physician evaluation of obesity. BMI was measured continuously, and categorical forms of BMI (e.g., 30) were also tested in selected penultimate models (National Heart, Lung, & Blood Institute, 1998; World Health Organization, 1989, 1997). Polynomial forms of BMI were also examined to account for non-linear relationships, but none were significant (both quadratic and cubed terms were tested). The interpretation of results was similar across the categorical and continuous measures of BMI; the latter are presented for parsimony and ease of interpretation. (Alternative BMI thresholds were used to measure obesity [e.g., 31, 35], but the results were similar across BMI cut offs for obesity.)

The third phase of the analysis was a consideration of interactions across status characteristics. Given the findings of previous research, special attention was given to examining gender interactions. Interactions were examined in two approaches: testing specific interaction terms and testing the difference in coefficients across parallel models for men and women. For the latter approach, the formula for calculating the Wald χ^2 for each set of coefficients across the two groups is:

$$\chi^2 = \frac{(b_1 - b_2)^2}{[se(b_1)]^2 + [se(b_2)]^2}$$

where b refers to the unstandardized coefficient and se refers to the standard error of b (Allison, 1999). Whereas the covariance matrices for the two groups are unique, it is not sufficient to simply compare the pattern of significant coefficients in each group. Unlike linear regression coefficients, however, coefficients in logit and probit models are confounded with residual variation across the groups. Thus, to account for the unobserved heterogeneity, Allison (1999) recently developed procedures to adjust for residual variation when comparing coefficients across groups (or testing interactions). Although we are unaware of any statistical software that automatically makes this adjustment, we follow Allison's procedures with SAS (NLIN) and make such adjustments.

Allison (1999) recommends comparing the logit model (which does not account for residual variation) with a model that accounts for residual variation. This is done by constraining the

disturbance variance to be different for the groups in the form of δ . For a two-group comparison, the disturbance variance is set to 1 for one group and $1/(1 + \delta)$ for the other group. If there is no difference between the models, the δ term equals zero, and the researcher can proceed with interpreting the coefficients for the logit model as unaffected by unequal disturbance variance across the groups. If δ is significantly different than zero, the researcher knows that disturbance variance is present in at least one of the logit coefficients. To determine the source of the disturbance variance, the next step is to include each interaction term separately within the unconstrained model. (If the interaction term is significant in this test and was significant in the original logit model, there is no unobserved residual variation present in that coefficient across the groups. If, however, the interaction term is not significant in this test, but was significant in the original logit model, then there is unobserved residual variation across the groups, and the researcher should not interpret the difference in logit coefficients as evidence of statistical interaction.)

Findings

Table 2 provides a comparison of obesity status by the various anthropometric measures and reveals considerable concurrence with the physician evaluation of obesity. (Although continuous values of the anthropometric measures will be used in the multivariate analyses, Table 2 presents the percent obese as defined by the categorical measures.) Using a BMI threshold of 30 or more, about 17% of the sample were obese. Based on the medical examination, however, NHANES physicians classified 23.3% of the respondents as obese. The discrepancy is not just that physicians evaluated more people as obese than would be the case with the 30+ BMI threshold, but that all those over the threshold were not contained in the category of respondents evaluated as obese by physicians. Approximately 81% of the respondents with a BMI ≥ 30 were classified as obese by physicians. Nonetheless, approximately 19% of the respondents who have a BMI ≥ 30 were *not* defined by physicians as obese (what might be considered false negatives). The BMI values for the false negatives ranged from 30 to 46.21. Physicians also classified about 12% of the respondents who had a BMI < 30 as obese (i.e., false positives)—and the BMI values for the false positives ranged from 17.24 to 29.99. Thus, while there is substantial concurrence between the anthropometric measures and the physician classification, a considerable proportion of the sample is classified in a way not predicted by the standard BMI cut-point for obesity.

The same phenomenon is present when considering the skinfold measures. Using cut-points of 29mm for triceps and 28mm for subscapular skinfolds showed parallel findings. (The distributions for triceps and subscapular measures were demarcated to mirror the split on BMI ≥ 30 ; about 17% of the sample had a BMI greater than or equal to 30.) For instance, about 36% of those with triceps ≥ 29 were not classified as obese by physicians (and about 15% with triceps < 29 were classified as obese by physicians). The degree of congruence observed with the subscapular measure is better than for triceps, but still not as good as with BMI. It is also clear from Table 2 that the association between the skinfold categorization of obesity is stronger with physician evaluation than with the BMI threshold of 30 or more—this is the case for both triceps and subscapular.

Despite the considerable concurrence, physicians used other factors besides pure anthropometric information to classify respondents as obese. Correlations between the physician classification of obesity and the three anthropometric measures range from 0.44 for triceps (≥ 29) to 0.61 for BMI ≥ 30 or more. This suggests that knowing any of the anthropometric measures, even BMI, can explain, at best, about 37% of the variance in physician evaluations as obese. What are the other factors that influence why physicians classify people as obese?

Status generalization during a medical examination?

Table 3 presents the results of a logistic regression analysis for the physician evaluation of obesity. Model 1 includes the anthropometric measures only. Each of the anthropometric measures is significantly related to the physician evaluation of obesity. In this and preliminary models, it was observed that height has an independent effect on physician evaluation of obesity. Although BMI has height in the denominator, to adjust body weight for differences in height, the results of model 1 show that physicians are slightly more likely to classify those subjects who are shorter as obese. As anticipated, among the anthropometric measures, BMI demonstrates the strongest independent effect on the physician evaluation of obesity.

Model 2 of Table 3 includes all of the variables and again shows the statistical and substantive significance of BMI and the skinfolds. Of the two skinfold measures, subscapular skinfolds, indicative of truncal fat, emerge as having a stronger independent effect. Model 2 also reveals that older people, women, and rural respondents were significantly more likely to be evaluated as obese, even after controlling for the anthropometric measures. (The association with height observed in Model 1 is not observed in Model 2.) African Americans are no more likely to be classified as obese than are White respondents, and none of the SES variables are significant. Respondents who were evaluated by the physicians with more morbidity, on both the general medical examination and ICD measures, were also more likely to be classified as obese. As expected, exercise is negatively related to being classified as obese.

The effects of age and gender, both fixed status characteristics, on the likelihood of being evaluated by a physician as obese are noteworthy. The analysis shows that the likelihood of being classified obese rises 2% with each year of age. Fig. 1 is presented to show that the physician classification of obesity is quite consistent with BMI for younger people, but about 10% lower for older people. This suggests that other factors than BMI enter into a physician's classification of older people as obese. Second, the effect due to gender is striking (odds ratio = 2.23). Women are more than twice as likely to be classified as obese by physicians, even after controlling for several well-established anthropometric measures. The magnitude of this effect confirms the importance of considering separate models for men and women.

To assure that the results presented thus far were not an artifact of coding schemes for defining obesity, we performed two additional sets of analyses. First, given the changing standards of obesity since NHANES I, we re-estimated the analyses in Model 2 of Table 3 by substituting a binary variable for the linear form of BMI. We began with the current NHLBI cut-point of a BMI ≥ 30 , and then repeated the analysis with six additional cut-points. The results across these analyses were very similar. Indeed, the pattern of significant relationships was identical for the analyses using the 25 and 30 cut-points.

Second, we performed supplementary analyses to isolate those who were misclassified. These analyses were done separately for two groups defined by the BMI threshold of 30 or more. For those with a BMI < 30 , we predicted who was misclassified (i.e., false positives: physicians termed them obese, even though their BMI < 30). For those with a BMI ≥ 30 , we also predicted who was misclassified (i.e., false negatives: physicians termed them non-obese, even though their BMI ≥ 30). The results of these analyses, although piecemeal, are quite congruent with the analyses presented in the original Table 3. For the first analysis, false positives were more likely to have the following characteristics: a higher BMI, higher subscapular ratings, higher morbidity according to the ICD codes, older age, women, and less likely to exercise regularly. For the second analysis, false negatives were more likely to have lower BMI values, lower subscapular ratings, lower morbidity according to both

measures, and be residents of urban areas. These supplementary analyses added confidence in the results presented and showed that the findings are robust across cut-points and models.

The role of gender in status generalization

Given the substantial differences in gender shown in Table 3, the next phase of the analysis was to examine statistical interactions by gender. Interactions were examined in two approaches: testing specific interaction terms and testing the difference in coefficients across parallel models for men and women. Table 4 presents the results of the latter approach with the calculated Wald χ^2 value for testing the equivalence of two logistic regression coefficients.

The results of Table 4 are generally consistent with those for the total sample. BMI is strongly related to the physician classification, and subscapular skinfolds are somewhat more consequential than triceps skinfolds to being evaluated as obese. There are three interactions across gender that emerge from the subsample analysis (as reflected in the Wald χ^2 difference).

First, the effect of height is different for men and women. While height is not consequential to the physician evaluation of obesity among men, it is for women: taller women were more likely to be classified as obese. Second, the coefficients for age are distinct across the groups. Age is associated with a significantly higher likelihood of being classified as obese for men only. Physicians were more likely to evaluate older men as obese, perhaps related to the shift from muscle mass to adipose tissue in later life. Advanced age did not, however, increase the likelihood that physicians classified women as obese.

Third, the Wald χ^2 value also indicates a difference for African American men and women. There was no significant influence of Black on the evaluation of men as obese, but Black women were *less* likely to be evaluated by physicians as obese once anthropometric measures were controlled. Physicians' familiarity with the higher than average body weight among African American women may lead to expectations of a higher prevalence of overweight among Black women and attaching less salience to overweight among them (Hebl & Heatherton, 1998). Whatever the reason, this is an intriguing finding that merits further study.

Following Allison's (1999) procedures for testing for unequal disturbance variance across the two groups revealed δ values that were not significantly different from zero for these three instances of statistical interaction (95% confidence intervals for δ included zero). Thus, the reported differences for height, age, and Black were not due to unobserved heterogeneity in the subsamples of men and women.

Discussion

This research examined whether status characteristics influence physician evaluations of obesity. Results from the NHANES I show that status characteristics were consequential to physicians during the process of evaluating a person as obese. Correlations between the physician classification of obesity and the three anthropometric measures range from 0.44 for triceps (29+) to 0.61 for a BMI of 30 or more. Cross-tabulating each anthropometric measure by the physician evaluation of obesity reveals that between 13% and 19% of all respondents were classified by physicians in a way that could *not* be predicted by bodily measures. Moreover, it became clear that physicians use status characteristics in the process of rendering such judgments. Although each anthropometric measure is a fallible indicator

of obesity, this research makes clear that medical decision-making is a social transaction subject to non-medical influences (Feldman et al., 1997).

Chief among the status characteristics used in evaluating obesity is gender: physicians are much more likely to classify women as obese, even women who have a BMI<30. In the language of diagnostic accuracy, women were more likely to be false positives. This finding adds to the literature on gender as an important factor in status generalization (e.g., Hall, 1993; Jackson et al., 1995), but it does so with physicians as the judges and on a task that has a clear objective referent. It is important to recall that this judgment is not some type of incongruence based on “perceptual differences”. Previous research has documented that there are weak correlations between patients’ and physicians’ perceptions of interactional quality and satisfaction with care (Hall, Stein, Roter, & Rieser, 1999). Judgments about phenomena such as interactional quality and patient satisfaction are expected to vary because there is no objective referent for them. It is not surprising that physicians and patients perceive such phenomena differently because the patient is the only source for such information—it is largely a perceptual matter. The present research, however, examines physician evaluations of a phenomenon that has an objective external referent.

The literature on the social meaning of appropriate or ideal body weight concludes that there are genderspecific norms; hence, extremes of body weight mean different things for men and women (Crawford & Campbell, 1999). Indeed, Cash and Roy (1999) argue that “fat is (mostly) a feminine issue” because society is more accepting of overweight among men when defining ideal body images (p. 211). Physicians are apparently not immune to the distinct body weight norms for men and women, even when making a judgment about the presence of obesity. Physicians were much more likely to classify women as obese regardless of body weight and size measurements. Moreover, taller women were more likely to be evaluated as obese. This effect was for women of varying body weights suggesting that taller women are seen as “big” and, therefore, more susceptible to being classified by physicians as obese.

While women were more likely to be defined as obese, subsample analysis showed that this effect did not hold for African American women. There are clear differences in the distribution of obesity in the United States by ethnic and racial groupings (Kumanyika, 1993). Thus, it was anticipated that race would influence the degree of concurrence between the anthropometric measures and physician evaluations of obesity. There was no main effect for race, but an interaction for race and gender: being evaluated as obese differed for White and African American women only. For this interaction, moreover, it was uncovered that Black women were actually *less* likely to be classified as obese (i.e., false negatives). This finding suggests the operation of distinct norms for what is considered appropriate body weight among Black women. Black women, themselves, have been shown to be more acceptable of higher average body weight (Hebl & Heatherton, 1998), and it appears that physicians—aware of the higher prevalence of overweight and obesity among Black women—were not as likely to classify them obese during a medical examination. This is another instance showing how expectations shape the process of status generalization in a non-intuitive fashion. In addition, it adds to accumulating evidence that multiple characteristics must be considered simultaneously in the process of status generalization (Jackson et al., 1995; Webster & Hysom, 1998). This finding raises penetrating questions that merit further investigation. If physicians are less likely to diagnose Black women as obese, are they also less likely to advocate weight loss efforts to Black women? If so, what are the consequences of being a false negative to the long-term health and longevity of Black women?

The research also found that older people were more likely to be classified as obese, even after controlling for the anthropometric measures, but advanced age had a stronger effect on

physician evaluations of men than women. The proclivity of physicians to evaluate older men as obese may be, in part, influenced by an awareness of a greater concentration of fat tissue with age (Malina, 1996). This seems unlikely to be the sole explanation for this form of status generalization, however, because the skinfolds are fairly direct measures of fat deposits (Willett, 1998). Rather, these results are consistent with many previous studies showing that age shapes interactions between physicians and patients in ways that are not predicted by symptoms alone (e.g., Feldman et al., 1997). Although the prevalence of obesity in advanced ages is lower (Launer, Harris, Rumpel, & Madans, 1994), one limitation of NHANES I is that the sample is restricted to persons under 75 years. As such, it is impossible to determine if these relationships are as pronounced in advanced ages. In comparison to younger people, however, physicians are more likely to evaluate obesity among middle-aged and older men beyond what one would predict from the anthropometric measures. In other words, age is an important status characteristic that physicians use while judging obesity among men. The same relationship was not observed for older women, probably suggesting that there is a greater expectation for higher than average body weight among older women.

Unlike some studies probing decision-making by physicians (e.g., Schulman et al., 1999), findings from the present study did not uncover socioeconomic status differences in physician evaluations. Inasmuch as SES is associated with the distribution of obesity (Sobal, 1991), it was anticipated that SES would influence the degree of concurrence between the anthropometric measures and physician evaluations of obesity. Such was not the case, however, suggesting that physicians' evaluations of obesity were not simply influenced by perceptions of socioeconomic status. While other characteristics, especially skin color, were fairly easily discernible by the physicians, socioeconomic differences may have been less obvious because subjects were required to wear an examination gown. In primary care, however, the patient's socioeconomic status may be more salient as the physician attempts to understand the patient's health risks and develop rapport during examinations.

Rural women were more likely to be evaluated as obese, suggesting that physicians have different expectations of the prevalence of obesity by type of community. We are unaware of any studies probing the influence of community type on physician decision-making, but this study suggests that rural residence may be consequential.

Beyond the influences of status generalization, physicians also appear to take note of the location of body fat in evaluating obesity. Persons with more truncal fat, what is sometimes described as the android pattern, were more likely to be classified as obese. Recall that the medical examination included detailed auscultation of the heart and a musculoskeletal examination, including range-of-motion and straight-leg-raising tests. As a result, the medical examination gave physicians information regarding body fat distribution that was apparently important to them in rendering a classification of obesity.

The present research adds to our understanding of how personal and status characteristics influence physician decision-making. There are two important limitations of the study, however, that should be recalled. First, there is limited information on the physicians who conducted the examination. They were all White males, mostly internists within 10 years of their medical residency. Whether female physicians or physicians of color would evaluate obesity in a similar manner cannot be determined from the NHANES I. While it would be ideal to have variability in the race and gender of physicians, at least the race and gender of physician were constant in the NHANES I operation. Second, while many studies of physician decision-making rely on vignette studies, the present investigation made use of physicians examining persons in face-to-face encounters. This is a strength of the study, but the survey context of the interaction may be different from how physicians behave in their

medical practices. Research is needed on how physicians, interacting with their patients, render judgments of obesity. The findings here apply to health surveys and suggest how status generalization might operate in medical practice. It is clear from these data that in first encounters, gender, race, age, and rural residence are consequential for physicians evaluating a person as obese.

The fact that these status characteristics are related to physician evaluations of obesity is important, and the implications on the dispensation of care are substantial. The long-term consequences of obesity on health are considerable, including excess mortality (Allison, Fontaine, Manson, Stevens, & VanItallie, 1999; Must et al., 1999). Given the compelling evidence regarding the consequences of obesity on health and longevity, physicians could be a tremendous resource by recognizing obesity and advising patients regarding the health risks of it (Galuska et al., 1999). The present research shows that while anthropometric measures such as BMI and subscapular skinfolds are related to the physician evaluation of obesity, status characteristics also influence such evaluations. Inasmuch as status generalization influences this type of evaluation, it may also influence more complex decisions of physicians in making medical diagnoses, prognoses, and referrals for care.

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Fig. 1.
Percent agreement between respondent's BMI and the physicians' evaluation of obesity by age in NHANES I.

Table 1

Means and standard deviations of variables for obese and non-obese respondents as evaluated by physicians:
National Health and Nutrition Examination Survey I^a

Variables (coding)	Obese <i>n</i> = 1580	Non-obese <i>n</i> = 5187	Total <i>N</i> = 6767
<i>Anthropometric measures</i>			
Body mass index (BMI)	31.68±5.29	23.91±3.43	25.72±5.13 ***
Triceps skinfold	26.97±10.27	16.21±7.89	18.75±9.64 ***
Subscapular skinfold	28.72±9.63	15.43±7.27	18.50±9.66 ***
Height (cm)	164.58±8.62	168.24±9.39	167.39±9.34 ***
<i>Morbidity</i>			
General medical exam	1.68±1.22	1.24±1.15	1.34±1.18 ***
ICD morbidity	1.57±1.20	0.96±1.08	1.11±1.14 ***
<i>Background characteristics</i>			
Age (24–77 years)	52.66±13.35	47.52±14.20	48.72±14.17 ***
Female (0=male)	0.30 0.16	0.70 0.84	0.54 ***
Black (0=white)	0.32 0.22	0.68 0.78	0.13 ***
Rural (0=not rural)	0.26 0.21	0.74 0.79	0.39 ***
Education (0=none, 7=graduate school)	3.23±1.50	3.81±1.58	3.67±1.58 ***
Income (1=0\$1,000, 12=\$25,0007)	6.86±2.88	7.89±2.67	7.65±2.76 ***
Medicaid (0=no Medicaid)	0.34 0.23	0.66 0.77	0.04 ***
Private insurance (0=no other insurance)	0.22 0.29	0.78 0.71	0.84 ***
Smoker (0=non-smoker)	0.18 0.28	0.82 0.72	0.42 ***
Exercise (recreational) (1=little or none, 3=very much)	1.60±0.69	1.84±0.74	1.78±0.74 ***

^a *N* varies due to missing data. Means for both categories of binary variables are presented, but standard deviations are omitted. Significance tests were for differences between those classified and not classified as obese by physicians (χ^2 for binary variables and *t*-tests on ordinal or interval variables).

* *p*<0.05.

** *p*<0.01.

*** *p*<0.001.

Table 2

Comparison of obesity status by anthropometric measures: *National Health and Nutrition Examination Survey I* ($N = 6767$)^a

Percent obese		
	BMI 30	Physician evaluation
Body mass index (BMI)		
30	—	81 ***
<30	—	12
Triceps skinfold		
29	49 ***	64 ***
<29	10	15
Subscapular skinfold		
28	58 ***	70 ***
<28	8	14
<i>N</i>	1118	1580

^aSignificance tests by χ^2 .

 $p < 0.001$.

Table 3

Logistic regression of physician evaluation of obesity on anthropometric measures and background characteristics: *National Health and Nutrition Examination Survey F*^a

Characteristic	Model 1		Model 2	
	Coefficient (SE)	OR CI	Coefficient (SE)	OR CI
<i>Anthropometric measures</i>				
Body mass index (BMI)	0.449 *** (0.016)	1.57 1.52–1.62	0.451 *** (0.018)	1.57 1.52–1.63
Triceps skinfold	0.044 *** (0.006)	1.05 1.03–1.06	0.026 ** (0.008)	1.03 1.01–1.04
Subscapular skinfold	0.039 *** (0.007)	1.04 1.03–1.05	0.050 *** (0.007)	1.05 1.04–1.07
Height	−0.025 *** (0.005)	0.98 0.97–0.99	0.009 (0.007)	1.01 1.00–1.02
<i>Morbidity</i>				
General medical exam	—	—	0.138 *** (0.041)	1.15 1.06–1.24
ICD morbidity	—	—	0.157 *** (0.042)	1.17 1.08–1.27
<i>Background characteristics</i>				
Age	—	—	0.017 *** (0.004)	1.02 1.01–1.03
Female	—	—	0.803 *** (0.177)	2.23 1.58–3.15
Black	—	—	−0.233 (0.137)	0.79 0.61–1.04
Rural	—	—	0.284 ** (0.091)	1.33 1.11–1.59
Education	—	—	−0.028 (0.033)	0.97 0.91–1.04
Income	—	—	−0.027 (0.019)	0.97 0.94–1.01
Medicaid	—	—	−0.068 (0.230)	0.93 0.59–1.47
Private insurance	—	—	−0.007 (0.129)	0.99 0.77–1.28
Smoker	—	—	0.060 (0.095)	1.06 0.88–1.28
Exercise	—	—	−0.132 * (0.062)	0.88 0.78–0.99
Constant	−11.040	—	−17.927	—
−2 log likelihood	3682.833		3483.343	
df	4		16	
N	6726		6685	

^aNote: Numbers in parentheses are standard errors. Odds ratios (OR) and confidence intervals (CI) are given for each parameter estimate.

* $p < 0.05$.

** $p < 0.01$.

p<0.001.

Table 4

Logistic regression of physician evaluation of obesity on anthropometric measures and background characteristics for males and females: *National Health and Nutrition Examination Survey I^a*

Characteristic	Males		Females		$\chi^2{}^b$
	Coefficient (SE)	OR CI	Coefficient (SE)	OR CI	
<i>Anthropometric measures</i>					
Body mass index (BMI)	0.450 *** (0.027)	1.57 1.49–1.66	0.479 *** (0.025)	1.61 1.54–1.69	0.62
Triceps skinfold	0.015 (0.014)	1.01 0.99–1.04	0.029 ** (0.011)	1.03 1.01–1.05	0.62
Subscapular skinfold	0.055 *** (0.012)	1.06 1.03–1.08	0.047 *** (0.009)	1.05 1.03–1.07	0.28
Height	−0.013 (0.010)	0.99 0.97–1.01	0.036 *** (0.010)	1.04 1.02–1.06	12.01
<i>Morbidity</i>					
General medical exam	0.137 * (0.061)	1.15 1.02–1.29	0.132 * (0.057)	1.14 1.02–1.28	0.00
ICD morbidity	0.116 (0.062)	1.12 1.00–1.27	0.202 *** (0.058)	1.22 1.09–1.37	1.03
<i>Background characteristics</i>					
Age	0.031 *** (0.006)	1.03 1.02–1.04	0.007 (0.005)	1.01 1.00–1.02	9.44
Black	0.128 (0.206)	1.14 0.76–1.70	−0.478 ** (0.183)	0.62 1.00–1.02	4.84
Rural	0.161 (0.138)	1.17 0.90–1.54	0.379 ** (0.125)	1.46 1.15–1.87	1.37
Education	0.004 (0.048)	1.00 0.91–1.10	−0.042 (0.048)	0.96 0.87–1.05	0.46
Income	−0.037 (0.030)	0.96 0.91–1.02	−0.023 (0.025)	0.98 0.93–1.03	0.13
Medicaid	0.116 (0.348)	1.12 0.57–2.22	−0.258 (0.311)	0.77 0.42–1.42	0.64
Private insurance	0.145 (0.211)	1.16 0.76–1.75	−0.154 (0.167)	0.86 0.62–1.19	1.23
Smoker	0.038 (0.136)	1.04 0.80–1.36	0.092 (0.137)	1.10 0.84–1.43	0.08

Characteristic	Males			Females		
	Coefficient (SE)	OR CI		Coefficient (SE)	OR CI	χ^2_b
Exercise	-0.187* (0.091)	0.83 0.69-0.99		-0.065 (0.087)	0.94 0.79-1.11	0.94
Constant	-14.660	—		-21.593	—	—
-2 log likelihood	1542.696			1895.930		
df	15			15		
N	3090			3595		

^aNote: Numbers in parentheses are standard errors. Odds ratios (OR) and confidence intervals (CI) are given for each parameter estimate.

^bTests of unequal residual variation across groups were performed (Allison, 1999). Delta values were not significantly different from zero.

* $p < 0.05$.

**

$p < 0.01$.

*** $p < 0.001$.