The Weight of Reality: Determinants of Adult Weight Perception Incongruence

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Abstract

The obesity epidemic in America is growing. Unlike many health problems, obesity should be easy to self-diagnose. Lack of knowledge or denial, however, could inhibit self-recognition of weight problems. Guided by health congruency and social comparison theories, this study analyzes factors associated with the congruency between perceptions of subjective and objective BMI classifications using data from the National Longitudinal Study of Adolescent Health and multinomial logistic regression analysis. Results show that the presence of diagnosed high blood pressure and increased education increase agreement between the subjective and objective BMI classifications. Further, women and African Americans generally and African American and Hispanic women specifically are significantly more likely to misclassify their weight than other groups. Finally, recent weight fluctuations and clinically high waist circumference increase disagreement between matching subjective and objective weight classifications even after controlling for pregnancy. Further study is needed to assess how these factors affect health maintenance over the life course.

Key words: Obesity, health, subjective health measures, and Add Health

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Introduction

The obesity epidemic in America is growing, and yet emerging research shows that individuals may not always perceive extreme weight statuses as problematic (Burke, Heiland, and Nadler 2010). Frequently, multiple measures are included in health and social science surveys to capture both subjective measures, like the perception of one's weight or self-rated health (Conley & Boardman 2007; Frisco et al. 2010), and objective measures, such as actual measured body mass index (BMI) classification or blood tests to diagnose health conditions (Mikolajczyk et al. 2010), to measure individual health. However, few studies have examined what factors lead to incongruence between subjective and objective measures of weight classifications. Moreover, there is a noted lack of literature relating discordant weight perceptions to health trajectories. This study seeks to fill this gap in the existing literature by examining how the match between subjective and objective weight classifications is related to health and social location.

Self-rated health is an accepted and frequent covariate in analyses focused on respondent health (Idler and Benyamini 1997), but the applicability of other health awareness variables, such as one's ability to correctly identify his or her weight classification has largely been ignored as a potential indicator of health and health promoting behavior (Zajacova and Burgard 2010). Part of why self-rated health is such a strong indicator of morbidity and mortality risk is that it is assumed that people take into account many factors related to their overall health in determining how they rate their health (Idler and Benyamini 1997). It follows then that many factors related to health awareness could shape weight perceptions, which then may impact health behaviors related to how people view their weight.

To this end, the purpose of this study is to identify characteristics potentially associated with discordant assessments of weight by addressing the following questions: 1) What sociodemographic factors best predict subjective and objective weight classifications? 1a) Do social, cultural, or health indicators shape perceptions differently across race, social class, and gender? 2) What factors are associated with incongruence between subjective and objective BMI classifications? 2a) Are certain groups more likely to have discordant views? 2b) How do other indices of health awareness affect the likelihood of discordant views? 2c) Do discordant views increase the likelihood of negative health behaviors?

To answer these questions, this study utilizes data from the National Longitudinal Study of Adolescent Health (Add Health), a large nationally representative longitudinal sample of young adults (aged 25-34 in 2009) who were first sampled as youths in grades 7-12 in 1994-1995. The Add Health data is ideal for this analysis because it is rich with information encompassing several facets of respondent life, opportunity structures, education trajectories, health and social behaviors over time in a young adult sample. Moreover, this data set is well suited to explore the effects of discordant weight perceptions because more than two thirds of the sample, 67.4% of all respondents have non-normal body mass index scores (e.g., - underweight, overweight, or obese). Multiple measures have been included throughout the survey to capture both subjective measures, like the perception of one's weight or self-rated health, and objective measures, like actual measured body mass index (BMI) classification or diagnosed health conditions, to measure the respondent health and health perceptions.

Review of Literature

Normal Weight: Healthy Weight or Average Weight?

With regard to weight status, the term “normal” has two opposing meanings. In the context of medically healthy weight, “normal weight” is defined by having a body mass index between 18.5 and 24.9. However, “normal,” in the context of something that is “normative,” may also reflect an individual’s perception about what is normal relative to a greater population. In this context, *normal*, is a subjective term. Understanding the generalized cultural definitions of *normal weight* is important when studying subjective weight because this is also an indicator of what is perceived as a *healthy weight*. In response to the growing obesity epidemic, Burke, Heiland, and Nadler (2010), analyzed twenty years of National Health and Nutrition Examination Survey (NHANES) data to see changes over time regarding the range of values that individuals perceive their weight statuses as normal. The researchers found that the observed BMI values associated with individuals who perceived their weight status as “normal” had increased over time. They also found that the likelihood that younger individuals who would classify themselves as overweight significantly declined particularly between 1999 and 2004 even after accounting for race, socioeconomic status, and observed waist circumference or body fat percentage. Taken together, this means that, on average, people are getting larger, but weight increases are not being recognized as “non normal” at the same rate; particularly by young adults.

Prevailing trends may alter the perception of what is normal for some individuals. However, it is also important to understand how individual weight trajectories over the life course affect the development of weight perceptions. Scholars such as Sapolsky (2004) and Lynch and Smith (2005) discuss the importance of the in utero environment as a primer for adult health and obesity risk. These studies of the in utero environment have tied birth weight extremes- microsomia (i.e. low birth weight <2500g) and macrosomia (i.e. high birth weight

>3500)- to adult health problems such as obesity, cardiovascular disease, diabetes, and thrombosis risk, but do not explore how one's birth weight shapes perceptions of their weight over the life course. Given the potential health ramifications of extreme birth weights, it is important to examine whether starting off at an extreme weight shapes perceptions of body weight over the life course. Said another way, it is worth examining whether starting out at an extreme normalizes the extreme status to respondents (e.g. - "I have always been big." Or "I started out small, so I have to catch up."), which may alter health perceptions and health risk behaviors.

A meta-analysis by Zhao and colleagues (2012) found that macrosomic or high birth weight was significantly associated with adult overweight or obesity status. However, Zhao and colleagues (2012) did not find an association between low birth weight and adult overweight or obesity status, which suggests that birth weights may put people on weight trajectories that persist across the life course. Conversely, Rooney, Mathiason, and Schauberger (2011) found that the relationship between birth weight and early life course obesity status was much more complicated. In their study, Rooney, Mathiason, and Schauberger (2011) found that maternal obesity status, regardless of offspring's birth weight, was the strongest predictor of early adult obesity for their children after controlling for pregnancy context, smoking during pregnancy and health status during infancy.

In addition to associations between individual weight trajectories and mother's weight, other studies have found that extreme birth weights can persist across generations. Specifically, Cnattingius and colleagues (2012) found that women who were born low birth weight were at higher risk of having a high birth weight babies especially if they were obese before pregnancy. This finding aligns with research by Barker (1995) and Sapolsky (2004), which suggests that the relationship between birth weight, metabolism, and adult health is complicated and may vary based on the context surrounding the pregnancy- before, during, and after.

Subjective vs. Objective Measures of Weight

Given that the perception of what is a normal weight classification varies, it is important to examine the ways trends regarding who holds discordant views vary based on which measure is used to define weight classifications. Recent literature regarding *subjective weight*, or respondent determined weight classification and assessment, generally focuses on discordant opinions where individuals overestimate their weight classification in such a way that it may be indicative of an eating disorder such as anorexia nervosa or bulimia nervosa (Conley and Boardman 2007; Burke et al. 2010). While discordant weight perception that results in overestimation may indeed be suggestive of eating disorders, discordant perceptions that result in underestimated weight classifications are often neglected in such studies. In the studies that do address both under and over estimation of weight perceptions, it is common for analyses to be performed on self-reported measures of height and weight (Park 2011). Testing more comprehensive assessments of weight classifications at both extremes is vital for understanding the potential impact of incongruent weight perceptions. However, using self-reported measures can impede our understanding of the meaning of incongruent weight perceptions without a valid measure for comparison. For example, if the accuracy of self-reports vary across respondents and that difference is related to another characteristic such as gender, race, or depressive affect, this can introduce measurement error that may underestimate the prevalence of holding incongruent weight perceptions that is missed by using only self-reported assessments (Conley and Boardman 2007; Mikolajczyk et al. 2010, Frisco et al. 2010).

In this regard, subjective weight is uniquely different from *objective weight*, which is defined as an actual measured weight on an instrument, such as a scale, that is verified by another individual. The distinction between these measures is critical when studies assess the accuracy of subjective and objective measures using self-reported height and weight to calculate Body Mass Index (BMI) measures for adults (Pritchard et al. 1997; Mikolajczyk et al. 2010). Several studies have indicated that self-reported height and weight measures and the resulting calculated BMI measures from them are not only frequently inaccurate, but inaccurate to differing degrees among groups more inclined to misreport (Larsen et al. 2008; Gorber et al. 2007). This association is particularly clear in studies involving meta-analyses such as the work of Gorber and colleagues (2007), and cross-national studies such as the study by Mikolajczyk and colleagues (2010), which assessed different weight perceptions in seven European countries. Each of the aforementioned studies illustrated a variety of specific groups that were prone to misreports of either height, weight, or both to varying degrees based on unique cultural conditions such as norms related to attractiveness, cultural representations in the media, or the combination of race, class, and gender.

Weight as a Component of Identity

The combination of an individual's racial identity, gender, and socioeconomic status are critical both in the development of an individual's subjective assessment of their weight and in the accumulation of risk factors for unhealthy weight statuses. What is perceived to be "beautiful" or "normal" varies across the axes of identity (Bay-Cheng et al. 2002). Moreover, certain attitudes have been shaped regarding what is beautiful in a cultural context in response to restrictive social norms that impose perceptions beauty that are inconsistent with racial minority features such as skin tone, hair type, or body shape (Crenshaw 1991). Cultural understandings of weight as it pertains to femininity can lead to pride in having a shapely or curvaceous figure, which can yield positive mental health effects for those who adopt this perspective (Ristovski-Slijepcevic et al. 2010). For example, overweight or obesity weight classifications are disproportionately common among African Americans, but particularly among African American women, however social sanctions related to being overweight or obese within this community are low (Zajacova and Burgard 2010, Pritchard et al. 1997; Park 2011). It follows then that if weight stigma is lessened in non-white women, subjective assessments of weight may also differ for non-white women because they may not perceive overweight or obese weight statuses in the same way or recognize them as unhealthy.

Views about the body are shaped by race and gender, social class, and symbolic social interactions around how our bodies are viewed by others and ourselves. Research by Averett and Korenman (1999) found different economic penalties for African American and white women who were obese. Although socioeconomic penalties for being obese such as lower wages and lower rates of marriage are present across racial groups, the penalties are lower for obese African American women, Averett and Korenman (1999) argue, due to a combination of differences in self-esteem and marriage markets for obese African American and white women. They find that on average, obese white women have lower self-esteem than their African American and normal weight counterparts, but the socioeconomic status disadvantage for obese white women primarily results from differences in the marriage market not the self-esteem differential. However, expected social norms regarding beauty and expressions of gender are stratified across race, gender, and social class, expressions of increased confidence and self-esteem may make obese African American women more attractive companions on the marriage market. Conversely, obese white women who do marry, on average, have husbands with lower earnings if they marry at all, possibly due to lower expectations from the marriage market due to their weight.

The relationship between social stratification and obesity is complex. Research by Zajacova and Burgard states, “Body weight is both a consequence and cause of social stratification. The prevalence of obesity has been increasing steadily for decades, but not equally for all social groups.” (2010, 93). That is, differential prevalence rates of obesity exist across groups, while at the same time being obese can *cause* further social stratification for those already experiencing other forms of disadvantage. This may, in part, be due to *stigma*, defined as the systematic persecution, separation, negative attention, or isolation associated with occupying a status (Goffman 1963). In this case, overweight or obesity status, or fear of it, can lead to additional stigma beyond the existing social stigma related to race, gender, or social class, which conforms to the arguments made by Averett and Korenman (1999) regarding the financial penalty associated with the stigma of obesity for white women.

Other components of identity, such as family background shape perceptions, beliefs, practices, and behaviors of individuals as they mature (Chen, James, and Wang 2007). Parent backgrounds can provide insight into the early life conditions of respondents by describing the family resources available in the respondent’s adolescence, but also may provide context to weight trajectories regarding birth weight, parent obesity status, and weight accumulation across the early life course (Rooney, Mathiason, and Schauberger 2011; Zhao et. al 2012). Several studies have acknowledged that identity formation surrounding weight, specifically with regard to gender, is pronounced among non-Hispanic white individuals. Specifically, non-Hispanic white males are less likely to report discordant views regarding their personal weight statuses, in either direction, while non-Hispanic white women are highly susceptible to overestimating their weight classification by failing to identify what is a normal weight for their height. Conversely, non-white women are more likely to underestimate their weight statuses compared to both non-white men and white women (Larsen et al. 2008; Gorber et al. 2007; Park 2011).

Theoretical Frameworks

Health Congruency Theory

Health congruency is defined as "the degree to which objective and perceived health statuses match" (Frisco et al. 2010: 218). Health congruency theory suggests that there are three classes of individuals- health optimists, health realists, and health pessimists, where so called "health optimists" have overly positive views of their health, which contrasts with "health pessimists" who have overly negative assessments of their health and "health realists" who hold accurate assessments. Although health congruency theory was first associated with studies of elderly individuals (Chipperfield 1993), Frisco and colleagues (2010) applied this theory to adolescents comparing perceived weight and depressive affect. While Frisco and colleagues (2010) added to the literature regarding health congruency theory by exploring the mental health effects of discordant weight perceptions, the current study seeks to build off this line of research to explore the possible physical health implications of discordant views.

Congruence between subjective weight classification and observed BMI classification may be critical for understanding health behaviors and one's ability to determine poor health. If a respondent is able to correctly identify whether his or her weight status as problematic, this could have positive implications for his or her health maintenance behaviors. Those who fail to identify extreme weight statuses, however, may be at risk for poor health maintenance behaviors due to misperceptions regarding their weight. Using Chipperfield's (1993) terms, those who overestimate their weight statuses would be considered health pessimists whereas those who underestimate would be health optimists. If respondents cannot assess their weight status accurately, they may make health decisions based on these incorrect beliefs, which can lead to negative health outcomes later in the life course because behaviors and choices about health are dictated by perceptions of health. For example, if someone is normal weight or underweight, but perceives themselves as being overweight, they may diet unnecessarily, which can harm their health and/or put them at risk for nutritional deficiencies. Conversely, if someone is overweight or obese, but perceives their weight as normal or underweight, they may engage in eating or exercise practices that may harm their health by resulting in additional weight gain particularly if the weight gain is around the midsection thereby increasing the risk of cardiovascular and metabolic conditions (Reaven 1988).

Social Comparison Theory

While health congruency theory provides a meaningful explanation of the processes through which one's discordant health perceptions results in subsequent behaviors associated with such perceptions, it is less helpful in explaining the processes that could lead to discordant views. As such, it is helpful to use an additional theory to explain these processes. S*ocial comparison theory* posits that perceptions of the world are shaped through social interactions and comparisons to those around us (Burke, Heiland, and Nadler 2010). Burke, Heiland, and Nadler (2010) used social comparisons to establish how individuals perceive their weight relative to others. Establishing an appropriate point for social comparison is vital when analyzing social behavior. While many studies note observed differences among certain groups, not enough attention is paid to the acculturation processes that result from these different identities or the context surrounding the *social comparisons* individuals make based on their social location. A critical finding of Burke, Heiland, and Nadler's (2010) study regarding the definition of a new normal is that the concept of “normal weight” has changed a result of both increased fat acceptance and an actual observed trend toward increased mean BMI in the population. However, other studies, such as Averett and Korenman (1999) demonstrate that acceptance and penalties for obesity are not universal, which may provide context for the social comparisons people make regarding weight perceptions. In relation to health, this can have divergent outcomes as increased acceptance of one’s body image can have positive mental health effects (Frisco et al. 2010), but may also be a precursor to accumulating negative health conditions related to obesity such as diabetes, hyperlipidemia, hypertension, or cardiovascular disease (Zajacova and Burgard 2010).

Hypotheses

This research is focused on identifying the meaning associated with how subjective weight classifications are developed by testing two potential pathways of subjective weight classification formation through social comparison and health congruency theories. We posit that social comparison does serve as a mechanism for developing subjective weight classification, and propose that we should see differences across racial identification, gender, and/or socioeconomic status. Further pursuant to health congruency theory, we believe that self-awareness of overall health status is also a key mechanism for developing subjective weight classifications. It follows then that we should see people who tend to be health optimists or pessimists in regard to their weight classifications carry this trend over into other subjective health assessments like self-rated health.

Taken together, we hypothesize that: H1.) Differences between subjective and objective weight assessments will be observed across race, gender, and social class due to cultural meanings tied to weight perceptions. This proposition is grounded in prior research suggesting that race, gender, and socioeconomic status each affect how individuals understand their individual weight statuses (Alwan et al. 2010; Larsen et al. 2008; Gorber et al. 2007; Burke, Heiland, and Nadler 2010). H1a.) We hypothesize there will be differences across race and gender groups and that the processes leading to subjective assessments of weight versus objective measured BMI classification will also differ across race and gender groups. Findings by Zajacova and Burgard (2010) regarding stratification, inform the hypothesis that the perception of one's weight will be the result of *social location*, encompassing race, social class, and gender, and respondent subjective of health knowledge.

Further, in accordance with health congruency theory, we hypothesize that H2.) Discordant views will be more likely if respondents adopt other indicators of discordant health perceptions. Moreover, if this theoretical model holds, persons who have other diagnosed health conditions potentially related to their weight should more accurately perceive their weight as problematic if they actually have a non-normal BMI classification and H2a.) those who have diagnosed conditions should be more likely to have concordant weight perceptions because those with objective reminders of poor health should be more aware of their poor health as seen with health realists (Frisco et al. 2010; Chipperfield 1993). Our final hypothesis is H2b.) If there are different levels of congruence between subjective and objective weight classifications, then health maintenance based on the altered health perceptions should also vary. Said another way, the perception of having relatively normal weight when a respondent is significantly overweight (or significantly underweight) should alter behaviors and choices the respondent will make regarding health maintenance based on this erroneous belief.

Data and Methods

Data

This study uses waves I, III, and IV of the National Longitudinal Study of Adolescent Health (Add Health). The Add Health study includes a nationally representative sample of 20,745 young men and women aged 11 to 21 who were in grades 7-12 in the U.S. when they were first surveyed during 1994 and 1995 (http://www.cpc.unc.edu/projects/addhealth/design /designfacts). Respondents were re-interviewed in 1996, 2001/2, and 2008/9. The sample design for this study was a complex area probability sample of students, clustered at the school level, and stratified to take into account school type (public, private, or parochial), school size, region of the country, urbanicity, and the racial makeup of the student population (Chantala and Tabor 1999). Initial screening surveys were administered in school to the students and selected respondents had follow-up interviews in their homes using Computer-Assisted Personal Interview (CAPI), with some self-administered sections. During the first wave of data collection, respondent parents or resident guardians (17,670) were also interviewed to provide additional information about the core respondents. The analytic sample for this study is comprised of 9,421 individuals from the core sample who participated in the anthropometric data collection component of Wave IV and answered the question related to subjective weight status and had longitudinal probability weights.

Sampling weights were used to take into account the complex survey design features of the study including-clusters, stratification, and differential probabilities of selection. Specifically, there are weights for overall probabilities of selection, additional weights available for each of the oversamples (e.g. twins, racial oversamples, etc.), and variables identifying clusters and strata capable of being used with statistical data analysis programs. The individual probability weight used in these analyses was the post-stratified untrimmed longitudinal probability weight from the fourth wave of the study in 2009. This weight accounted for varying participation, attrition, and overall probabilities of respondent selection in the first wave.

Analytic Plan and Missing Values

Multinomial logistic regression was used to test what factors predict respondent perceptions of their weight, what factors predict BMI classifications, and what factors predict discordant perceptions of weight classifications. Given the complex survey design of the Add Health study, complex survey weights addressing the strata, clustering, and overall probability of respondent selection and retention were applied to the sample analyses to make inferences to the American young adult population. Stata 11.0 was used for these analyses to incorporate both the complex survey design and multiple imputation analysis. Ten imputed datasets were created using the multiple imputation analysis command "ice" in Stata (Royston 2004; 2005) to handle missing data as opposed to listwise deletion because some key independent variables and background demographic variables from the Wave-I parent survey had more than 5% missing values (Allison 2001; Raghunathan et al. 2001). Further, as is common practice, listwise deletion was used only for missing values on dependent variables, but any missing data on independent variables was imputed and analyzed using multiple imputation (von Hipple 2007).

Measures

<u>Dependent Variables</u>

Subjective Weight Perceptions and Observed BMI Classification

To assess agreement between subjective and objective measures of respondents weight status, we utilize we utilized both the respondent's subjective assessment of their weight and the objective assessment of their actual observed body mass index (BMI) classification in Wave IV. Subjective weight classification was measured by the question, "How do you think of yourself in terms of weight?" This question had five response choices, "very underweight," "slightly underweight," "about the right weight," "slightly overweight," and "very overweight."

Observed BMI classification was provided as a calculated variable in the Add Health wave-IV data, verified using the raw measures. The calculated measure was derived using the formula measured weight in kilograms divided by measured height in meters squared. The BMI classifications used the following thresholds, persons with BMI values between 0-18.49 were coded as "*underweight*," persons with BMI values between 18.5 and 24.9 were coded as "*normal*," persons with BMI values between 25.0-29.9 were coded as "*overweight*." Persons with BMI values between 30.0-34.9 were coded as "Obese Class I," persons with BMI values between 35.0-39.9 were coded as "Obese Class II," and persons with BMI values above 40.0 were coded as "Obese Class III."

In order to capture congruence between subjective and objective measures, respondents who perceived themselves as either being "very underweight" or "slightly underweight" were coded as perceiving themselves as "*underweight*." This coding was chosen because there were few responses in the "very underweight" category[1] and the corresponding value in the observed BMI classifications only had one category for "underweight." Persons who listed their weight as "about the right weight" were operationalized to have concordant classifications if they had an observed "*normal*" BMI. Persons who characterized their weight as "*slightly overweight*" were operationalized to have a congruent assessment between their subjective and objective classifications if they had an observed "overweight" BMI. Persons who stated "*very overweight*" as their weight classification were operationalized to have a congruent assessment between their subjective and objective classifications if they had an observed BMI greater than 30.0, which

[1] One hundred eighteen respondents perceived themselves as being "very underweight" out of 15,701 respondents.

aggregated the three classes of obesity into one category for *generalized obesity*. Although the wording of the subjective question does not perfectly align with the wording of the BMI classifications, conceptually, these measures are roughly equivalent.

Discordant Weight Perceptions

This operationalization provides four distinct subjective categories and four corresponding objective measures for respondent weight leading to three possible outcomes for perception matching- *concordance, overestimation, or underestimation*. Respondents whose subjective assessment matched their objective BMI weight classification were coded as having "concordance" on the two measures. Persons who saw their weight classification as being greater than their observed BMI classification were coded as "overestimating" their weight category. Conversely, persons who believed their weight classification was less than their observed BMI classification were coded as "underestimating" their weight category.

Social Comparison Theory Measures

Respondent Demographics

Several respondent demographic variables were included in the analyses to address the social location of respondents. These variables included respondent gender, respondent age at interview in 2009, respondent single-category racial identification, and nativity status. In these analyses, gender was coded as '1' for females and '0' for males. Respondent single category racial identification was included with options for non-Hispanic white, non-Hispanic black, Hispanic, Asian, and other racial identification. Non-Hispanic white was omitted as the reference category in all analyses. Respondent nativity status was also included to control for immigration status.

Family Background

During the first wave of data collection, a respondent parent or guardian was interviewed in addition to the respondent. The parent interviews provided information including parent marital status, parent achieved education and information on parent income. Parent marital status was operationalized as whether the interviewed parent or was married or not at Wave I. Parent achieved education was operationalized into five categories including (1) the parent did not graduate from high school, (2) graduated from high school, (3) had some college or vocational training, (4) graduated from college, or (5) had advanced professional training. Graduating from high school was omitted as the reference category because it was the modal category for parent education. Parent income was originally reported in thousands of (1995) dollars. This measure was transformed into the natural logarithm of parent income to adjust for the skewed distribution of parent income in its raw metric.

Respondent Socioeconomic Status

Respondent achieved education was operationalized into five categories including (1) the respondent did not graduate from high school, (2) graduated from high school, (3) had some college or vocational training, (4) graduated from college, or (5) had advanced professional training. Some college or vocational training was omitted as the reference category because it was the modal education category for respondents. Respondent income was originally reported in thousands of (2009) dollars. Like the parent measure, this measure was transformed into the natural logarithm of respondent income to adjust for the skewed distribution of income in its raw metric.

Health Congruency Measures

Current Health Status

To test the health congruency theory, measures of respondent health were incorporated to gauge respondent global health. Respondent prior health was measured using respondent self-rated health and measures of diagnosed cardiovascular disease risk factors commonly associated with weight problems. *Self-rated health* was measured from "poor" to "excellent" by the respondent. Respondent current self-rated health values were reverse coded such that better self-rated health yielded higher values. Four cardiovascular disease risk factors associated with obesity were included in these analyses including *diagnosed hypertension (high blood pressure)*, *diagnosed hypercholesterolemia (high cholesterol)*, *diagnosed or treated diabetes*[2], and *diagnosed depression*. *Current pregnancy* was also controlled for in these models. Each of these risk factors was coded to indicate the presence or absence of each respective condition per respondent report of a prior diagnosis.

Health Behaviors

Since one of the mechanisms we wish to test health congruency theory with is whether repeated exposure to medical professionals increases the accuracy of health assessments, we included a measure for *seeing a doctor in the past three months* and an indicator of whether the *respondent had health insurance*. The utilization measure was coded such that seeing a doctor in the past three months was coded as '1' and '0' otherwise. The health insurance variable was coded as no health insurance equals '1' and '0' otherwise. The health risk variables used were *fast food and sugary drink consumption*, *regular smoking*, and *regular drinking*, which were all mean centered in the analyses.

Weight History Control Measures

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[2] Diabetes status is measured multiple ways with the Add Health data. For continuity sake, we operationalized diagnosed diabetes to include any individual with a stated prior diagnosis of diabetes or any individual being medically treated for diabetes.

We included several controls for respondent weight history over time. These measures included current weight status and body composition as well as weight fluctuations and birth weight extremes. *Current body weight status* was addressed by controlling for current body mass index in its raw metric. *Body fat composition* was controlled for using an indicator for whether the respondent had a waist circumference exceeding 35 inches, a clinical marker for obesity and metabolic risk (Reaven 1988). In order to assess weight fluctuations, indicators for whether their *current BMI classifications* had *increased, decreased, or matched* the objective weight classification in Wave 3 to control for possible weight changes between waves. These values are change scores that reflect moving up or down a BMI classification since 2001. Matching was omitted category in the models in order to see if increasing or decreasing a class affected one's perception of his or her weight across waves.

In addition to these measures, the parent interview also included parent reported questions regarding the focal respondent's birth weight and the obesity status of the respondent's biological parents. Respondent birth weight and parent obesity status were included as additional measures to predict both weight status and the perception of what was normal for the respondent. Research indicates that some individuals who start off with low (microsomic) or high (macrosomic) birth weights have altered weight trajectories in adulthood (Lynch and Davey Smith 2005; Seo & Li 2012). Further, parent weight has also been shown to influence child weight through biological and social mechanisms, which may also alter weight perceptions (Borchard 1995; Sapolsky 2004; Rooney Mathiason, and Schauberger 2011).

Gender Interactions

Prior research motivated the inclusion of a race by gender interaction to assess moderation effects related to the joint combination of respondent race and gender to test social comparison theory (Larsen et al. 2008; Gorber et al. 2007; Park 2011). The moderating effect of gender on the relationship between race and the perception of one's weight classification was operationalized by creating race by gender interactions. Both the main effects and the interactions had the racial category for non-Hispanic white omitted as the reference category with non-Hispanic black, Hispanic, Asian, and other racial identification as components of the interactions with female gender.

An additional interaction effect was included to test health congruency theory to see if *women with waist circumferences exceeding 35 inches*, who were not pregnant, would be more likely to provide concordant weight assessments. This interaction was created by multiplying the variable for female by the indicator for having a measured waist circumference exceeding 35 inches and then recoding currently pregnant women to be excluded from the interaction. Excluding pregnant women from the female by high waist circumference flag is important because women who are currently pregnant are likely to have waist circumferences exceeding 35 inches due to pregnancy that may not increase their overall BMI classification.

Results[3]

As discussed in the methods section, the analyses used in this study were calculated using multinomial logistic regression (MLR). MLR is an analytic method that enables the researcher to compare the likelihood of being in a series of nominal categories relative to an omitted reference category. The model predicting subjective weight perceptions omits "about the right weight" as the reference category. The model predicting BMI classifications omits normal BMI (18.5-24.9)

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[3] It is important to note that each of our reported models had significant F-statistics based on the Rao-Scott correction with the Satterthwaite approximation for degrees of freedom used in Stata 11.0. Model fit statistics for multinomial logistic regression with imputed complex survey data have not yet been developed. All three models presented in these analyses had p-values equal to 0.000 for the calculated F-statistics, which indicate that the likelihood of observing these values by chance was exceedingly small.

as the reference category. The model predicting weight classification matching omits matching the subjective and objective assessments as the reference category.

The coefficients reported in tables 2-4 are values relative to the respective reference categories. These values have been exponentiated to provide relative risk ratios. Values greater than one indicate that respondents were more likely to fall into a given category, relative to the omitted category, if they possessed a specific trait. Conversely, values lower than one indicate that respondents were less likely to fall into a given category, relative to the omitted category, if they possessed a specific trait. Values exactly equal to one indicate equal likelihood of being in the reference category as the selected category.

Descriptive Statistics

Table 1 displays the descriptive statistics for this sample. As mentioned earlier, 67.4% of the sample respondents have non-normal BMI classifications with roughly 2% underweight, 29% overweight, and 37% obese. The average BMI for the sample was 29.07, on the high end of overweight. Roughly, 8% of the sample perceived themselves as being underweight to some degree, 42% as “slightly overweight,” and only 13% as ”very overweight.” In total, approximately half of respondents were able to match their weight classifications (51.4%), however 48.6% of respondents held discordant views with 42.0% underestimating, and 6.6% overestimating their weight classes.

Table 1 About Here

<u>Subjective Weight Classification</u>

Table 2 displays the results of multinomial logistic regression analysis predicting respondent subjective weight classification with *“about the right weight”* as the reference category.

Table 2 About Here

Demographics

African Americans were significantly less likely to perceive their weight as "slightly overweight" ($RRR=0.49$, $P<0.001$) or "very overweight" ($RRR=0.28$, $p<0.001$) relative to "about the right weight." However, aside from African Americans, none of the other race/ethnic categories significantly predicted weight perceptions. Immigrants displayed an increased likelihood to perceive themselves as "very overweight" ($RRR=2.06$, $p<0.05$). Women in general were more likely to perceive themselves as "slightly overweight" ($RRR= 4.32$, $p<0.001$) or "very overweight" ($RRR=14.33$, $p<0.01$) categories and far less likely to select into the underweight category ($RRR=0.14$, $p<0.001$) than the "about the right weight" category. However the race x gender interactions indicate that this trend is not universal, Hispanic ($RRR=6.25$, $p<0.001$), Asian ($RRR=3.18$, $p<0.05$), and other race ($RRR=4.60$, $p<0.05$) women were significantly more likely to report being underweight compared to white women while African American women were not significant on any category compared to reporting concordant weight.

Family Background

Few variables associated with family background significantly predicted weight perceptions. Respondents whose parents were unmarried had a lower likelihood of perceiving themselves as "slightly overweight" ($RRR=0.74$, $P<0.01$). Respondents whose parents had less than a high school education ($RRR=0.61$, $p<0.05$) or a college degree ($RRR=0.61$, $p<0.05$) relative to a college degree were less likely to perceive themselves as underweight relative to "about the right weight." Parent income in adolescence, parents with some college or advanced degrees displayed no statistical significance in predicting weight perceptions.

Respondent Socioeconomic Status

Any post-high school education for respondents increased the likelihood of selecting into the "slightly overweight" ($0.001<p<0.05$) or "very overweight" ($p<0.001$) categories with only those with advanced degrees showing a decrease in selecting into the underweight category ($p<0.05$). Respondents with a college degree (RRR=1.42, $p<0.05$) increased the likelihood of perceiving their weight as "very overweight" relative to those with some college. Respondent current income had no statistical effect on weight perceptions.

Current Health

Better self-rated health reduced the risk of falling into all the perceived non-normal weight classifications ($p<0.001$) relative to the "about the right weight" category. Having a diagnosis of high cholesterol increased the odds of perceiving either "slightly overweight" (RRR=1.46, $p<0.01$) or "very overweight" classifications (RRR=1.93, $p<0.01$) versus "about the right weight" comparisons while having a diagnosis of depression (RRR=1.38, $p<0.05$) increased the risk of selecting into the "very overweight" category relative to "about the right weight."

Weight History Controls

Current BMI followed a predictable pattern for increased BMI increasing selection into the "slightly overweight" (RRR=1.41, $p<0.001$) or "very overweight" (RRR=1.39, $p<0.05$) category compared to the concordant category. Having a macrosomic birth weight increased selection into the underweight category (RRR=2.84$p<0.05$). Having a waist circumference exceeding 35 inches increased the likelihood of respondents believing they are "slightly overweight" (RRR=2.39, $p<0.001$) and decreased the likelihood of believing they are underweight (RRR=0.54, $p<0.01$) relative to "about the right weight." However, non-pregnant women with waist circumferences exceeding 35 inches were more likely to select into the underweight category (RRR=8.39, $p<0.001$).

Objective Weight Classification

Table 3 displays the results of multinomial logistic regression analysis predicting respondent objective weight classification with normal (BMI 18.5-24.9) as the reference category.

Table 3 About Here

Demographics

With regard to demographic characteristics, unexpectedly, African Americans are not more likely to be identified as outside of the normal BMI range relative to whites while Hispanics (RRR 2.02, $p<0.01$; RRR=1.67, $p<0.05$) and Asians (RRR=2.37, $p<0.01$; RRR=2.21, $p<0.05$) were more likely to be both overweight and obese relative to normal weight. Unlike the subjective model, gender did not significantly predict BMI classification. However, when gender interactions were included, African American females were more likely to be reported as overweight (RRR=2.33, $p<0.01$) or obese (RRR=4.26,$p<0.001$) than normal range as compared to white females. Asian American females were at a lower risk of being identified as overweight (RRR=0.32, $p<0.01$) or obese (RRR=0.19, $p<0.001$) relative to normal range compared to white women. Increased age decreased the likelihood of underweight BMI (RRR=0.81, $p<0.01$) relative to normal weight. Immigrant status did not significantly predict BMI classification.

Family Background and Respondent Socioeconomic Status

Only one family background variable, parent marital status (RRR=0.78, $p<0.05$) predicted BMI classification by reducing the risk of being overweight relative to normal weight. Parent income and education did not significantly predict respondent BMI classification. Respondent income and education had some predictive value with increased respondent income reducing the risk of being underweight (RRR=0.93, $p<0.05$) and having a college (RRR=0.74, p<0.05) or advanced degree (RRR=0.49, p<0.001) was associated with a lower risk of being obese relative to normal weight.

Current Health

Similar to the subjective categories, respondents reported to better self-rated health had lower odds of being objectively measured as overweight (RRR=0.84, p<0.01) or obese (RRR=0.54, p<0.001) versus normal BMI status. However, only high cholesterol and hypertension shared similar patterns to subjective identification with diagnosed high cholesterol, with high cholesterol elevating the odds of being classified as overweight (RRR=2.04, p<0.01) or obese (RRR=2.61, p<0.001) relative to normal status and hypertension being associated with a higher odds of being obese (RRR=2.33, p<0.001). Diagnosed depression, diagnosed diabetes, and current pregnancy did not significantly predict BMI classification.

Health Behaviors

Fast food consumption was lower for both overweight (RRR=0.93, p<0.001) and obese (RRR=0.95, p<0.01) individuals compared to those with normal BMI classifications. Sugary drink consumption was higher for underweight (RRR=1.03, p<0.001) and lower for obese (RRR=0.99, p<0.01) relative to normal weight individuals. Underweight individuals were less likely to walk for exercise (RRR=0.57, p<0.05) and obese individuals were less likely to drink regularly (0.62, p<0.001) than normal weight individuals. Regular smoking, recent doctor visits, and lack of health insurance did not significantly predict BMI classifications.

Weight History Controls

Birth weight status shows evidence for life-long weight trends as those who were microsomic at birth were at higher of being classified as underweight during adulthood (RRR=2.87, p<0.05), while respondents who were macrosomic at birth were at higher risk of being categorized as overweight (RRR=2.15, p<0.01) or obese (RRR=2.16, p<0.05) than normal. Respondents whose BMI increased between waves were substantially more likely to be identified as overweight (RRR=21.13, p<0.001) or obese (RRR=15.55, p<0.001) than normal weight. Finally, having a waist circumference higher that 35 inches was associated with being overweight (RRR=14.38, p<0.001) or obese (RRR=206.44, p<0.001), but less likely to be associated with being underweight (RRR=0.00, p<0.001). Parent obesity significantly predicted respondent overweight (RRR=1.63, p<0.001) or obese (RRR=2.87, p<0.001) BMI classification relative to normal weight classification. The female by waist circumference interaction was not statistically significant for predicting BMI classification.

Perception Matching

The information displayed in Table 4 shows the results of multinomial logistic regression analysis predicting the match between respondent reported subjective weight classification and their measured body mass index weight classification. It was possible for respondents to fall into one of three distinct categories- correctly match their weight classification, overestimate their weight classification, or underestimate their weight classification. For the purposes of these analyses, *concordance* between classifications was used as the omitted category.

Table 4 About Here

Demographics

In general, African Americans were more likely to underestimate (RRR=1.54, p<0.001) their weight status than to report concordant statuses relative to whites. In addition, females were less likely to underestimate (RRR=0.16, p<0.001) and more likely to overestimate (RRR=2.99, p<0.001) than to report concordant status relative to males. However, in the race by gender interactions, African American (RRR=1.59, p<0.01) and Hispanic (RRR=1.89, p<0.01) females are at a higher risk of underestimating their weight status, relative to Caucasian females.

Parent Background and Respondent Socioeconomic Status

No parent background variables significantly predict discordant weight perceptions. However, educational status of respondents is salient, with respondents who have less than a high school degree being at a higher risk of underestimating (RRR=1.41, p<0.05) and at a lower risk of overestimating (RRR=0.38, p<0.01) relative to reporting concordant weight status. Moreover, respondents with a high school degree are at a lower risk of overestimating their weight (RRR=0.58, p<0.05) while respondents with an advanced degree (RRR=0.73, p<0.05) are at a lower risk of underestimating their weight status.

Current Health

Relative to matching one's subjective weight classification to their observed weight classification, certain factors significantly predicted overestimating ones' weight classification. Among health conditions, high self-rated health increased the relative risk of underestimating (RRR=1.14, p<0.01) relative to having concordant reports while it lowered the risk of overestimating health (RRR=0.79, p<0.01). In addition, having hypertension lowered the risk of underestimating weight status (RRR=0.75, p<0.05) versus having concordant reports. Those who were currently pregnant were more likely to underestimate (RRR=3.80, p<0.001) than have concordant reports. Neither diagnosed diabetes, high cholesterol, nor depression significantly predicted having discordant weight perceptions.

Health Behaviors

The only health behavior variable that predicted discordant weight perceptions was fast food consumption, which increased the likelihood of overestimating (RRR=1.05, p<0.05).

Walking for exercise, regular smoking, regular drinking, and sugary drink consumption did not increase the likelihood of concordant weight perceptions. Furthermore, health insurance access and recent doctor visits also did not alter the likelihood of concordant weight perceptions.

Weight History Controls

Higher BMI elevated the risk of underestimating weight status (RRR=1.03, $p<0.001$) and lowered the risk of overestimating status (RRR=0.83, $p<0.001$) relative to reporting concordant status. While birth weight was not significant, changes in weight did reflect meaningful patterns. Specifically, people whose BMI decreased between Waves III and IV, were at a lower risk of underestimating their weight (RRR=0.45, $p<0.001$), but at a higher risk of overestimating their weight (RRR=2.17, $p<0.001$). Moreover, those whose BMI increased between waves were at a higher risk of underestimating their weight (RRR=2.18, $p<0.001$) and at a lower risk for overestimating their weight (RRR=0.34, $p<0.001$). Finally, people with waists of 35 inches or more were *more* likely to underestimate their weight (RRR=1.50, $p<0.001$) than to report concordant weight. Interestingly women with 35 inch or more waist circumference were more likely to report *both* underestimations (RRR=1.91, $p<0.001$) and overestimations of their weight (RRR=2.20, $p<0.05$).

Discussion

This study demonstrates that many factors predict weight perceptions, BMI classifications, and respondent ability to match the two by revealing different patterns for each outcome. Further, this study provides support for both health congruency theory and social comparison theory as plausible pathways explaining differences in identifying discordant weight perceptions. Moreover, key contributions of this study include- (1.) identifying the high prevalence of mismatching (48.6%) for young adults, (2.) demonstrating that perceptions develop independently from extreme weight status risk factors, and (3.) health status variables are associated with mismatching weight classifications.

This study addressed several key research questions concerning both how and why people misidentify their weight classifications. Specifically, this study finds that subjective assessments of weight classification do not uniformly map on to actual BMI classifications, which suggests that all three lines of research regarding- subjective assessments, objective assessments, and the match between them- are worthy of sociological exploration due to stark differences by race, gender, and social class. Moreover, the patterns identified here support health congruency theory, which could mean that those who hold discordant views may be at risk for worse health later in life if their health maintenance behaviors are altered by misperceptions identified here. Finally, this study reveals that misidentifying weight perceptions is the result of complex patterns that relate to cultural and social norms, which must be addressed if future policy interventions are attempted.

There are some methodological limitations to this study, which should be noted. The analytic method used in this study, multinomial logistic regression, while appropriate for this analysis, does not yet have measureable model fit statistics for use with complex survey data. When appropriate fit statistics are developed, this study should be replicated to see if these results hold. Further, the measure for subjective weight classification may have measurement error related to respondent understanding of the question used to capture subjective weight classification, which may yield conceptual differences between how the subjective measure was understood by respondents and how it was used in this study. If different data sets contain additional measures of subjective knowledge regarding weight classification in the future that specifically use the terms “overweight” and “obese,” these measures should be used to retest these findings. Finally, this study may suffer from omitted variable bias if additional covariates affecting subjective and objective weight classification matching are found in future literature. If future studies uncover additional covariates to potentially explain this relationship, these covariates should be included in a replication study.

Despite these limitations, this study has added knowledge to the field of medical sociology regarding weight perception formation for young adults. Health congruency theory was supported with the findings that increased self-rated health reduces the risk of overestimating one's weight classification relative to matching their weight classification, which would be expected for individuals who adopt a "health pessimist" viewpoint compared to those who underestimated who were more likely to report higher than expected self-rated health consistent with a "health optimist" pattern (Chipperfield 1993). Health congruency theory was further supported by the finding that diagnosed high blood pressure reduced the odds of underestimating relative to matching one's weight classification in addition to predictable patterns associated with current BMI as would be expected for "health realists." Together, these findings suggest that self-rated health, awareness of BMI status, and the presence of diagnosed health conditions affect the likelihood of correctly identifying one's observed weight classification.

Health congruency theory would argue that the presence of diagnosed health conditions requires increased interaction with healthcare professionals, which could serve to make patients more cognizant of problematic weight statuses because of this increased interaction with healthcare professionals. Interestingly, the variable measuring the effect of seeing a doctor in the past three was not significant in any model used in this analysis. Analyses not shown also tested whether using doctor visits in the past year had an effect on weight perceptions, but also yielded no significant effects related to health care utilization. However, the model predicting weight perceptions did show that those without health insurance were less likely to self-select into the "slightly overweight" or "very overweight" categories despite no statistical difference in BMI categorization by health insurance status, findings that could support health congruency theory in that not having access to care may decrease the likelihood of seeking care thereby decreasing access to doctors which can result in people becoming out of touch with components of one's health such as weight status.

Additionally, these findings support prior research suggesting a moderating effect of racial identification on the relationship between gender and weight classification particularly for African American and Hispanic women. Hispanic women were more likely to select into the underweight category and African American women were more likely to actually be overweight or obese, leading both groups to have significant interaction effects for underestimating in the comprehensive model tested here. The highly significant effects suggesting women are much more likely than men to overestimate their weight classifications and African American are significantly more likely to underestimate their weight classifications are cause for concern because these are incongruent health beliefs that support social comparison theory, but moreover they may be indicative of future health risk based on discordant perceptions. An implication of these findings is that the meaning of subjective weight classification develops differently, perhaps as a product of socialization and developed cultural meaning, by gender, race, and level of education, which should be addressed by those proposing future health interventions.

Given findings supporting both health congruency theory and social comparison theory, culturally sensitive targeted interventions should be developed focused on populations predicted to have increased odds of a mismatch between subjective weight classification and observed weight classification in order to help create congruent health beliefs. Interventions such as this could be valuable for both people who underestimate and those who overestimate their weight statuses. Given research regarding the effects of negative body image and the overwhelmingly increased odds for women to overestimate their weight classification relative to men, it is important to look at both groups with incongruent weight perceptions instead of only focusing on those who are overweight or obese or perceive themselves as such. There must be an acknowledged middle ground between the physical health risk of unacknowledged overweight or obesity status and the mental health risk of negative body image seen with overestimation.

Conclusions

This research has identified factors affecting the probability of concordance between subjective weight classifications and observed body mass index calculation that are independent of subjective weight perception formation or observed BMI classification. Moreover, these findings suggest that health congruency theory can be applied to additional settings outside of Chipperfield's original use regarding health assessments among the elderly. Further research should focus on establishing health interventions to increase the likelihood of matching subjective weight classifications with observed body mass index classifications. Given the likelihood of discordant views by race and gender, additional studies should also focus on the long-term effects of incongruent health perceptions in these groups across the life course because of other factors putting them at risk of future health disparities across the life course. Furthermore, additional research should address whether having incongruent weight perceptions predicts having incongruent perceptions about other health conditions such as diabetes, hyperlipidemia, or hypertension that are undiagnosed because each of these conditions is associated with problematic weight statuses and may go undiagnosed if individuals do not perceive their health to be at risk. It is possible that creating congruent health assessments could be a critical piece to the puzzle for disentangling health disparities by promoting health awareness early in the life course, which may lead to increased overall health maintenance behaviors.

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Tables

Table 1. Sample Descriptive Statistics on Imputed and Complex Survey Design Adjusted Data N=9300

Variable	Mean or Proportion	Variable	Mean or Proportion
Dependent Variables		*Respondent Socioeconomic Status(Continued)*	
Weight Perceptions		Respondent Some College	0.42
Believes Underweight	0.08	Respondent College Degree	0.20
Believes Normal Weight	0.36	Respondent Advanced Degree	0.11
Believes Overweight	0.42	*Gender by Race Interactions*	
Believes Obese	0.13	African American Female	0.08
BMI Classification		Hispanic Female	0.06
BMI Underweight	0.02	Asian Female	0.02
BMI Normal Weight	0.33	Other Race Female	0.01
BMI Overweight	0.29	**Health Congruency Theory Key Covariates**	
BMI Obese I-III	0.37	*Current Health*	
Perception Matching		Self-Rated Health	3.66
Underestimated Weight Class	0.42	Diagnosed Depression	0.16
Matched Weight Class	0.52	Diagnosed Diabetes	0.02
Overestimated Weight Class	0.06	Diagnosed High Cholesterol	0.07
Social Comparison Theory Key Covariates		Diagnosed Hypertension	0.11
Demographics		Currently Pregnant	0.03
Age at Interview	28.54	*Health Behaviors*	
Caucasian	0.66	Mean-Centered Fast Food Consumption	0.00
African American	0.15	Mean-Centered Sugary Drink Consumption	0.00
Hispanic	0.12	Walks for Exercise	0.55
Asian	0.04	Regular Drinker	0.38
Other Race	0.03	Regular Smoker	0.29
Female	0.50	Recent Doctor Visit	0.78
Male	0.50	No Health Insurance	0.23
Not US Born	0.04	*Weight Controls*	
Family History and Socioeconomic Status		BMI Class Decreased	0.05
Parents Not Married (1995)	0.27	BMI Class Stayed the Same	0.59
Natural Logarithm of Parent Income (1995)	3.44	BMI Class Increased	0.35
Parent Less than High School	0.16	Body Mass Index	29.08
Parent High School	0.32	Microsomic Birth Weight	0.05
Parent Some College	0.29	Normal Birth Weight	0.92
Parent College Degree	0.14	Macrosomic Birth Weight	0.02
Parent Advanced Degree	0.09	Parent Obese	0.24
Respondent Socioeconomic Status		Waist 35+ Inches	0.68
Natural Logarithm of Respondent Income (2009)	9.23	*Gender by Waist Circumference Interaction*	
Respondent Less than High School	0.09	Female with Waist 35+ Inches	0.29
Respondent High School	0.17		

Table 2. Relative Risk Ratios Predicting Weight Perception Relative to Concordance N=9421

	Believes Underweight	Believes Overweight	Believes Obese		Believes Underweight	Believes Overweight	Believes Obese
Social Comparison Theory Key Covariates				**Health Congruency Theory Key Covariates**			
Demographics				*Current Health*			
Age at Interview	1.05	1.02	1.07	Self-Rated Health	0.65 ***	0.62 ***	0.37 ***
African American	1.41	0.49 ***	0.28 ***	Diagnosed Depression	1.00	1.21	1.38 *
Hispanic	0.67	0.78	1.01	Diagnosed Diabetes	1.15	0.62	0.65
Asian	0.77	1.28	1.04	Diagnosed High Cholesterol	0.84	1.46 **	1.93 **
Other Race	1.06	1.09	1.67	Diagnosed Hypertension	0.66	1.08	1.48
Female	0.14 ***	4.32 ***	14.33 **	Currently Pregnant	1.62	0.09 ***	0.10 *
Not US Born	1.20	1.04	2.06 *	*Health Behaviors*			
Family Background				Mean-Centered Fast Food Consumption	1.04	1.03	1.00
Parents Not Married (1995)	0.92	0.74 **	0.82	Mean-Centered Sugary Drink Consumption	1.00	1.00	1.00
Natural Log of Parent Income (1995)	0.99	1.00	1.01	Walks for Exercise	0.80	1.04	1.02
Parent Less than High School	0.61 *	0.94	1.09	Regular Drinker	0.76	0.85	0.78
Parent Some College	0.82	0.99	1.02	Regular Smoker	1.34 *	1.03	1.30
Parent College Degree	0.61 *	1.00	0.89	Recent Doctor Visit	1.07	1.16	1.06
Parent Advanced Degree	1.22	0.92	0.89	No Health Insurance	0.83	0.79 *	0.67 *
Respondent Socioeconomic Status				*Weight Controls*			
Natural Log of Respondent Income (2009)	0.98	1.02	1.01	Body Mass Index	0.84 ***	1.36 ***	1.65 ***
Respondent Less than High School	1.31	0.45 ***	0.35 ***	Microsomic Birth Weight	0.83	0.87	0.97
Respondent High School	0.84	0.66 **	0.46 ***	Macrosomic Birth Weight	2.84 *	1.42	0.99
Respondent College Degree	0.99	0.97	1.42 *	BMI Class Decreased	1.08	1.25	1.16
Respondent Advanced Degree	0.64 *	0.91	1.36	BMI Class Increased	1.08	1.41 ***	1.39 *
Gender by Race Interactions				Parent Obese	0.72	0.95	1.16
African American Female	1.67	1.06	0.82	Waist 35+ Inches	0.54 **	2.39 ***	3.77
Hispanic Female	6.25 ***	1.31	0.76	*Gender by Waist Circumference Interaction*			
Asian Female	3.18 *	1.11	1.12	Female with Waist 35+ Inches (non-pregnant)	8.39 ***	1.07	1.26
Other Race Female	4.60 *	1.29	0.44	Constant	63.03 **	0.00 ***	0.00 ***

* p<0.05, ** p<0.01, *** p<0.001

* p<0.05, ** p<0.01, *** p<0.001

Table 3. Relative Risk Ratios Predicting BMI Classification Relative to Normal BMI (18.5-24.9) N=9300

	Underweight	Overweight	Obese
Social Comparison Theory Key Covariates			
Demographics			
Age at Interview	0.81 **	1.05	1.06
African American	1.04	1.36	1.35
Hispanic	0.58	2.02 **	1.67 *
Asian	0.67	2.37 **	2.21 *
Other Race	0.62	1.72	1.82
Female	1.50	0.68	0.85
Not US Born	1.46	0.72	0.78
Family Background			
Parents Not Married (1995)	0.70	0.78 *	0.89
Natural Log of Parent Income (1995)	1.13	0.89	0.89
Parent Less than High School	0.87	0.82	0.91
Parent Some College	1.22	0.97	0.94
Parent College Degree	1.80	1.21	1.26
Parent Advanced Degree	2.05	1.00	0.91
Respondent Socioeconomic Status			
Natural Log of Respondent Income (2009)	0.93 *	1.00	1.00
Respondent Less than High School	0.63	1.18	0.95
Respondent High School	0.92	1.21	1.13
Respondent College Degree	0.70	1.09	0.74 *
Respondent Advanced Degree	0.66	0.73	0.49 ***
Gender by Race Interactions			
African American Female	1.50	2.33 **	4.26 ***
Hispanic Female	2.60	1.15	1.37
Asian Female	1.54	0.32 **	0.19 ***
Other Race Female	0.33	0.73	0.46

* p<0.05, ** p<0.01, *** p<0.001

	Underweight	Overweight	Obese
Health Congruency Theory Key Covariates			
Current Health			
Self-Rated Health	0.86	0.84 **	0.54 ***
Diagnosed Depression	1.13	0.86	0.86
Diagnosed Diabetes	1.23	0.77	1.34
Diagnosed High Cholesterol	1.24	2.04 **	2.61 ***
Diagnosed Hypertension	0.42	1.32	2.33 ***
Currently Pregnant	0.31	0.63	0.74
Health Behaviors			
Mean-Centered Fast Food Consumption	1.03	0.93 ***	0.95 **
Mean-Centered Sugary Drink Consumption	1.03 ***	0.99	0.99 **
Walks for Exercise	0.57 *	1.16	1.22
Regular Drinker	1.07	0.83	0.62 ***
Regular Smoker	1.09	0.81	0.79
Recent Doctor Visit	0.91	1.05	1.11
No Health Insurance	1.08	0.92	1.00
Weight Controls			
Microsomic Birth Weight	2.87 *	0.71	0.78
Macrosomic Birth Weight	0.00	2.15 **	2.16 *
BMI Class Decreased	12.67 ***	1.15	0.00 ***
BMI Class Increased	0.00	21.13 ***	15.55 ***
Parent Obese	0.54	1.63 ***	2.87 ***
Waist 35+ Inches	0.00 ***	14.38 ***	206.44 ***
Gender by Waist Circumference Interaction			
Female with Waist 35+ Inches (non-pregnant)	10.90	1.56	1.66
Constant	27.97	0.05 **	0.02 ***

* p<0.05, ** p<0.01, *** p<0.001

Table 4. Relative Risk Ratios Predicting Weight Classification Relative to Matching N=9300

	Underestimated		Overestimated			Underestimated		Overestimated	
Social Comparison Theory Key Covariates					**Health Congruency Theory Key Covariates**				
Demographics					*Current Health*				
Age at Interview	1.02		1.00		Self-Rated Health	1.14	**	0.79	**
African American	1.54	***	1.08		Diagnosed Depression	0.89		1.15	
Hispanic	0.87		0.62		Diagnosed Diabetes	1.06		0.96	
Asian	0.97		0.69		Diagnosed High Cholesterol	0.81		0.94	
Other Race	0.94		1.61		Diagnosed Hypertension	0.75	*	0.95	
Female	0.16	***	2.99	***	Currently Pregnant	3.80	***	0.47	
Not US Born	1.09		1.41		*Health Behaviors*				
Family Background					Mean-Centered Fast Food Consumption	1.02		1.05	*
Parents Not Married (1995)	0.99		0.84		Mean-Centered Sugary Drink Consumption	1.00		0.99	
Natural Log of Parent Income (1995)	0.98		1.01		Walks for Exercise	1.02		1.20	
Parent Less than High School	0.88		1.23		Regular Drinker	0.95		1.00	
Parent Some College	0.98		0.94		Regular Smoker	1.13		0.81	
Parent College Degree	0.98		1.06		Recent Doctor Visit	1.08		1.24	
Parent Advanced Degree	0.95		0.80		No Health Insurance	1.07		0.87	
Respondent Socioeconomic Status					*Weight Controls*				
Natural Log of Respondent Income (2009)	1.00		1.00		Body Mass Index	1.03	***	0.83	***
Respondent Less than High School	1.41	*	0.38	**	Microsomic Birth Weight	0.79		0.68	
Respondent High School	1.15		0.58	*	Macrosomic Birth Weight	1.46		1.10	
Respondent College Degree	0.85		0.71		BMI Class Decreased	0.45	***	2.17	***
Respondent Advanced Degree	0.73	*	0.85		BMI Class Increased	2.18	***	0.34	***
Gender by Race Interactions					Parent Obese	0.91		0.95	
African American Female	1.59	**	0.51		Waist 35+ Inches	1.50	***	1.17	
Hispanic Female	1.89	**	1.44		*Gender by Waist Circumference Interaction*				
Asian Female	1.21		1.51		Female with Waist 35+ Inches (non-pregnant)	1.91	***	2.20	*
Other Race Female	1.78		0.43		Constant	0.14	**	15.08	*

* p<0.05, ** p<0.01, *** p<0.001

* p<0.05, ** p<0.01, *** p<0.001