EXTENDED ABSTRACT

What I Weigh and What I Say: Weight Dissatisfaction and Self-Reporting Bias

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INTRODUCTION

So long as self-reported weight and height are widely used to estimate obesity in social survey data, understanding sources of reporting error will be critical for interpreting obesity rates.[1] Social desirability bias, wherein respondents adjust the weight they report to better reflect their sense of how much they should ideally weigh, is often hypothesized as a key challenge to the validity of self-reported data.[1–6] To the extent that lay understandings of ideal weight influence how respondents self-report, variation in lay weight ideals by categories such as race and sex should also be apparent in misreporting. However, little is known regarding whether lay concepts of ideal weight predict weight reporting error.[3]

The National Health and Nutrition Examination Survey (NHANES) has long fielded measures of both self-reported and measured body weight and height, making it a standard resource for assessing weight misreporting error. For the three survey waves fielded between 2007 and 2012, respondents who reported being dissatisfied with their weight were also asked to report how much they would ideally weigh (in pounds). To better understand how social desirability bias affects obesity estimates derived from self-reported body weight, in this study I assess the relationship between misreporting and weight dissatisfaction, defined as the gap between one's ideal weight and one's measured weight. In addition to yielding intuition for better use of self-reported survey data, understanding how norms of ideal weight differ by social categories such as race and sex are informative for public health efforts to educate Americans regarding what constitutes a healthy body weight.

METHODS

NHANES is a stratified multistage probability sample of the civilian non-institutionalized US population, collected by the Centers for Disease Control and Prevention (CDC) for generating statistics on health measures such as obesity.[11] Data was collected from 1971 through 1994 in three waves; continuous data collection started in 1999, with approximately 5,000 respondents sampled annually. The sample for this analysis includes all non-Hispanic Black, non-Hispanic White, and Mexican-American respondents at or above age 16 for whom weight and height are both measured and self-reported (~90% of the initial respondent population have both measures recorded). As underweight status may also signify an underlying medical condition, underweight respondents (1.7% of the sample) are excluded from the analyses, along with all pregnant respondents and those flagged as having imprecise measurements of body weight. Response rates were at or above 90% for all variables, and item-level missing data were imputed in Stata 13 using 30 imputations.[12]

Key Variables and Analysis

I first code respondents into Center for Disease Control categories of BMI (midweight, overweight, and obese)[13] based on their measured BMI (BMI_M), which is calculated as measured weight in kilograms ($WEIGHT_M$) divided by measured height in meters squared.[14] I then calculate mean ideal BMI (BMI_I) from self-reports of ideal weight ($WEIGHT_I$) and measured height, separately by race, sex, and CDC BMI category. I calculate reporting error in BMI as the

difference between self-reported and measured BMI ($BMI_{SR} - BMI_M$), again separately by race, sex, and CDC BMI category. As social desirability bias reflects a desire to weigh what one perceives to be ideal (and not what one actually weighs), I define weight dissatisfaction as the difference between measured weight and self-reported ideal weight ($WEIGHT_M - WEIGHT_I$).

To the extent that weight misreporting reflects weight dissatisfaction, misreporting would not be expected among those who are satisfied with their weight. I thus begin by regressing both weight misreporting and weight dissatisfaction on measured BMI, separately for men and women, and comparing the BMI at which dissatisfaction and misreporting are eliminated. I then examine ideal BMI directly, asking whether there appear differences by sex, race, and CDC categories of BMI.

Finally, to assess whether the relationship between weight misreporting and weight dissatisfaction can be explained by logical background variables, I estimate a series of OLS regression models in which the outcome is the absolute value of weight misreporting, and the independent variable of interest is the absolute value of weight dissatisfaction. Control variables include indicators for race, black and Mexican-American, with white as the reference category; indicators for the available data releases, each capturing two years of data collection; indicators for roughly every twenty years of age, with 16 through 29 as the reference category; indicators for categories of BMI; and a range of background measures thought to affect misreporting of weight (household income; education; and indicators for whether the respondent is currently employed; is married/cohabiting versus single; has dieted to affect weight in the past year; and has ever been formally diagnosed as overweight by a doctor. I additionally control for error introduced by end-digit preference (the tendency to report weight rounded to numbers ending in a zero or a five). Characteristics of the NHANES population are summarized in table 1.

Models were also run with BMI misreporting rather than weight misreporting as the outcome, and substantive findings remained unchanged. All estimates are weighted to reflect the national population and adjusted for correct variance estimation given the NHANES sampling frame.

RESULTS

Linear approximations of weight misreporting and weight dissatisfaction on measured BMI are presented in figure 1. Women in all weight categories, from midweight through obese, underreport their weight on average. Misreporting is reduced to zero at a BMI of 21.19, the lower end of the midweight category; weight dissatisfaction reaches zero within one point of BMI below that, at a value of 20.27. Women in the lower range of the midweight category report about accurately, with some overreporting at the lower extreme of BMI.

Among men, in contrast, misreporting is reduced to zero at a BMI of 25.72— right above the cutoff defining "overweight." Weight dissatisfaction is reduced to zero at about the same point, a BMI of 24.92. Men in the medically recommended weight range overreport their weight to appear closer to the ideal BMI of ~25, while men defined as "obese" underreport towards that same ideal.

Respondents' reports of ideal BMI also differ by race (Figure 2), as expected from studies of weight status misclassification.[15] Across all weight categories, white respondents report the lowest ideal BMI, while black respondents report the highest. However, while the differences by race are statistically significant ($p<0.01$ in all cases), differences in ideal weight by both BMI category and by sex are larger than differences within those categories by race.

In OLS models regressing weight misreporting on weight dissatisfaction (tables 2 and 3), weight dissatisfaction is a significant predictor of misreporting across all three BMI categories for both men and women. The association is not attenuated in either magnitude or significance after inclusion of the full battery of covariates.

DISCUSSION

With estimates of population obesity regularly derived from self-reported data, understanding sources of reporting error remains critical for correctly interpreting obesity rates. Social desirability bias is often hypothesized as a key driver of weight misreporting, as individuals may adjust the weight they report to better reflect their sense of how much they should ideally weigh.[1–6] The findings here affirm that concern, suggesting that self-reported weight does indeed operate as a barometer of lay understandings of ideal weight.

Contrary to popular intuition that social pressure to be thin is producing a problematically low weight ideal among women[16], only 2% of women report an ideal BMI below the CDC definition of healthy. One plausible explanation for the observed sex differences in ideal BMI is that women simply heed medical advice more readily than do men[17,18]; indeed, the findings presented here suggest that women who have been diagnosed as overweight by a doctor also more accurately report their body weight, whereas a formal diagnosis is not associated with increased reporting accuracy among men. However, alternatively, lay concepts of ideal weight may simply better correspond to CDC definitions among women than among men.

Even among women, lay ideals are not perfectly aligned with medical guidelines: that weight dissatisfaction only reaches zero at the lower end of the midweight category suggests a pressure on women to be thinner than medical definitions necessitate. Aspiring to a healthy ideal also does not negate the detrimental effects of excessive pressure to achieve that weight.[19] At the opposite extreme, efforts by the medical community and policymakers might aim to educate men in particular regarding what constitutes a healthy weight, specifically targeting negative stereotypes against men being small.

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Table 1. Characteristics of Respondents in the National Health and Nutrition Examination Survey (NHANES), 1999-2012— *Means and Proportions (Standard Errors in Parentheses)*

	Full n=13666	White n=7363	Black n=3751	Mexican n=2552
Reporting error (lbs)	1.246	1.145	1.597	1.615
$abs(BMI_{SR} - BMI_M)$	(0.019)	(0.024)	(0.036)	(0.038)
Social Desirability (lbs)	4.248	4.103	5.086	4.280
$abs(BMI_M - BMI_I)$	(0.065)	(0.086)	(0.113)	(0.110)
BMI (measured)	28.682	28.333	30.405	29.190
	(0.092)	(0.132)	(0.159)	(0.210)
BMI (self-report)	28.022	27.660	29.701	28.701
	(0.084)	(0.122)	(0.142)	(0.211)
Education	3.588	3.740	3.330	2.649
	(0.034)	(0.046)	(0.036)	(0.041)
Household Income (arsinh)	11.392	11.541	10.844	10.903
	(0.031)	(0.036)	(0.081)	(0.084)
Age				
16-29	0.232	0.210	0.287	0.347
30-49	0.348	0.335	0.367	0.430
50-69	0.307	0.328	0.275	0.181
70+	0.112	0.127	0.071	0.042
End Digit Preference	0.660	0.664	0.636	0.666
Employed	0.618	0.624	0.557	0.649
Married or Cohabiting	0.694	0.706	0.596	0.736
Diet last year	0.621	0.617	0.638	0.629
Diagnosed Overweight	0.332	0.331	0.358	0.303
Female	0.504	0.504	0.540	0.452
White	0.779	1.000	0.000	0.000
Black	0.131	0.000	1.000	0.000
Mexican	0.090	0.000	0.000	1.000

Figure 1. Weight misreporting and Weight Dissatisfaction, by BMI
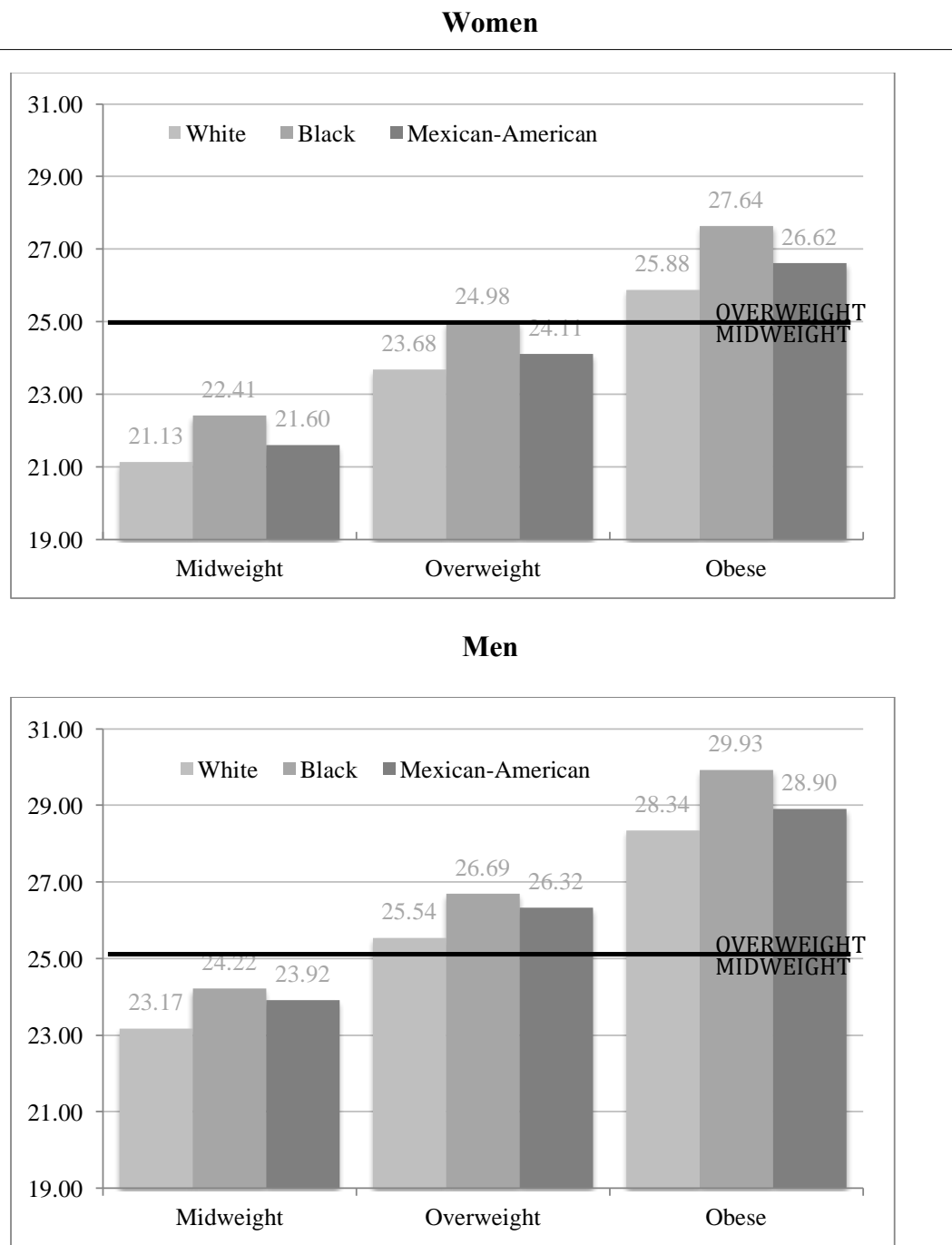
Women
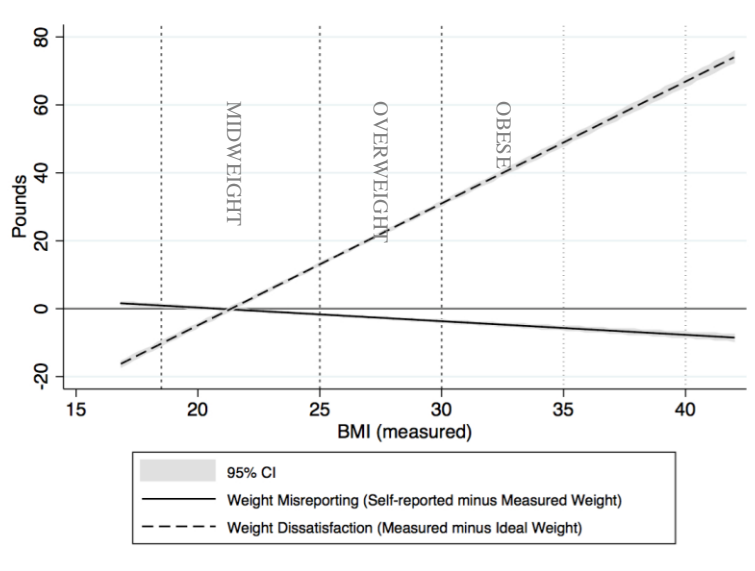
Men
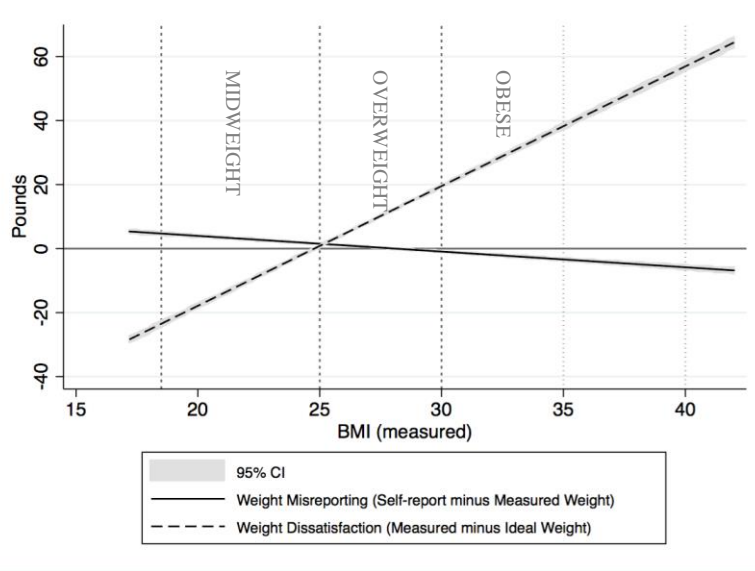
Figure 2. Mean Ideal BMI, by race and sex

Women

Men

Source: NHANES continuous sample, 2007-2012; calculated from measured height and reported ideal weight. Differences by sex, race, and BMI category are statistically significant at p<0.01.

Table 2. OLS Regression Models: Weight reporting error on weight dissatisfaction (Women)
NHANES continuous sample, 2007-2012

	Midweight		*Overweight*		*Obese*	
	Model 1	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*
Weight Dissatisfaction	0.338***	0.348***	0.266***	0.291***	0.118***	0.126***
	(0.020)	(0.021)	(0.025)	(0.025)	(0.018)	(0.018)
Black	0.205***	0.138**	0.451***	0.391***	0.406***	0.379***
	(0.051)	(0.050)	(0.093)	(0.086)	(0.089)	(0.099)
Mexican-American	0.212***	0.148***	0.445***	0.331***	0.671***	0.511***
	(0.041)	(0.042)	(0.085)	(0.095)	(0.142)	(0.141)
BMI (measured)	-0.013	-0.006	-0.068**	-0.063**	-0.000	0.008
	(0.008)	(0.009)	(0.022)	(0.022)	(0.014)	(0.014)
Year	0.016*	0.015*	0.073***	0.077***	0.027	0.037
	(0.007)	(0.006)	(0.017)	(0.017)	(0.025)	(0.024)
30s-40s		-0.001		0.052		-0.285
		(0.032)		(0.097)		(0.164)
50s-60s		-0.014		-0.045		-0.254
		(0.035)		(0.089)		(0.185)
70+		0.121*		0.270**		0.013
		(0.052)		(0.085)		(0.232)
End Digit Preference		0.014		0.137*		0.661***
		(0.027)		(0.052)		(0.080)
Education		-0.068***		-0.095***		-0.119**
		(0.013)		(0.027)		(0.043)
Employed		-0.018		-0.120*		-0.121
		(0.029)		(0.054)		(0.089)
Income (IHS)		-0.007		-0.025		-0.016
		(0.013)		(0.021)		(0.032)
Married/ cohabiting		-0.026*		-0.037		0.004
		(0.013)		(0.036)		(0.117)
Dieting		0.171***		0.235***		0.305**
		(0.035)		(0.059)		(0.097)
Diagnosed Overweight		-0.140		-0.186**		-0.600***
		(0.076)		(0.066)		(0.113)
Constant	-31.997*	-29.772*	-144.843***	-151.759***	-53.762	-73.418
	(13.755)	(11.849)	(33.448)	(34.145)	(50.529)	(48.023)
R^2	.281	.321	.197	.262	.103	.168
N	2426	2426	2040	2040	2752	2752

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

Table 3. OLS Regression Models: Weight reporting error on weight dissatisfaction (Men)
NHANES continuous sample, 2007-2012

	Midweight		*Overweight*		*Obese*	
	Model 1	*Model 2*	*Model 1*	*Model 2*	*Model 1*	*Model 2*
Weight Dissatisfaction	0.365***	0.362***	0.320***	0.328***	0.141***	0.156***
	(0.051)	(0.051)	(0.032)	(0.031)	(0.019)	(0.021)
Black	0.008	-0.022	0.331***	0.248***	0.399***	0.282**
	(0.056)	(0.056)	(0.049)	(0.049)	(0.083)	(0.084)
Mexican-American	0.224***	0.176**	0.473***	0.368***	0.454***	0.227*
	(0.058)	(0.066)	(0.049)	(0.054)	(0.089)	(0.093)
BMI (measured)	0.030	0.031*	-0.058**	-0.049**	0.002	0.007
	(0.015)	(0.015)	(0.018)	(0.018)	(0.015)	(0.014)
Year	0.015	0.017*	0.034**	0.031**	0.019	0.014
	(0.009)	(0.008)	(0.010)	(0.009)	(0.023)	(0.022)
30s-40s		0.116**		-0.077		-0.376**
		(0.043)		(0.055)		(0.127)
50s-60s		0.155**		-0.133**		-0.488***
		(0.048)		(0.046)		(0.124)
70+		0.182***		-0.010		-0.160
		(0.050)		(0.069)		(0.128)
End Digit Preference		0.053		0.057		0.289***
		(0.044)		(0.031)		(0.065)
Education		-0.068***		-0.051**		-0.096**
		(0.016)		(0.016)		(0.036)
Employed		0.023		-0.141***		-0.106
		(0.041)		(0.039)		(0.076)
Income (IHS)		-0.004		-0.023		-0.019
		(0.013)		(0.016)		(0.031)
Married/ cohabiting		0.003		-0.048		-0.062
		(0.018)		(0.033)		(0.087)
Dieting		0.042		0.212***		0.223**
		(0.064)		(0.045)		(0.083)
Diagnosed Overweight		-0.011		-0.112*		-0.382***
		(0.087)		(0.045)		(0.082)
Constant	-30.780	-34.193*	-66.354**	-59.889**	-37.034	-26.127
	(17.034)	(15.688)	(20.857)	(18.653)	(46.435)	(44.457)
R^2	.347	.359	.261	.300	.163	.217
N	2398	2398	2844	2844	2451	2451

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