# Weight Overestimation as a Predictor of Disordered Eating Behaviors among Young Women in the United States*

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## Abstract

In this paper we examine the association between weight overestimation and symptoms of disordered eating behaviors using a nationally representative sample of young women. We compare self-reported weight to measured weight among normal weight women (ages 18-24) using data from the National Longitudinal Study of Adolescent Health (n = 2,805). We find that women who over report their weight by at least five-percent are significantly more likely than those who either under report or accurately report their weights to exhibit symptoms of disordered eating behaviors. We argue that weight over-estimation, together with other important information regarding women's nutrition, exercise, mental health, and health-related behaviors, should be treated as an additional risk factor when considering an eating disorder diagnosis among young normal weight women.

## Introduction

Most research on the discrepancy between self-reported and measured weight and height has focused on issues of validity and reliability related to obesity screening (Brener et al. 2003; Elgar, Roberts, Tudor-Smith and Roberts 2005; Goodman, Hinden and Khandelwal. 2000). Within this literature, the primary concern is that weight underestimation may lead to problems in the identification of overweight and obese individuals (Goodman et al. 2000) and small differences in subjective and objective weight status among individuals may have a significant impact on estimates for the prevalence of obesity in the population. For example, Elgar et al. (2005) found that relying on self-reported weight led to an underestimation of the overweight and obese populations by 4.8% and 1.6%, respectively

Because over estimation of weight is less common, little work has focused on the consequences of over estimating weight for population health estimates, and almost no work has explored the meaning of over-reporting physical weight among young adult women. Abraham and Luscombe (2004) found that while weight underestimation increased as actual weight and BMI increased but individuals with lower BMIs were more likely to overestimate their weight. While under-estimators may be reporting their ideal weight, it is worth exploring whether over-estimators are reporting an ideal weight or whether their inaccuracy is due to some other factor, such as a distorted body image. This is of particular concern because weight overestimation has been identified as a risk factor for disordered eating behaviors (Doll and Fairborn 1998). This paper is the first paper to focus on the prevalence of weight over estimation and to establish a link between over-estimation and symptoms of eating disorders.

**Weight estimation and eating disorders**

While some have found little or no relationship between disordered eating behaviors and accuracy in self-reported weight (Doll and Fairburn 1998), others suggest that individuals with eating disorders tend to be more accurate than the general population because of a preoccupation with both weight and size (Masheb and Grilo 2001; Shapiro and Anderson 2002). However, Doll and Fairborn (1998) find that compared to the general population, women diagnosed with anorexia are more likely to overestimate their weights.

There are two reasons to believe that weight overestimation among normal weight women may indicate a potential risk of an eating disorder. First, among anorexics, over-reporting could be related to body image distortion, as they may view themselves as being in a higher weight category than they actually are (Cash et al. 1989; Masheb and Grilo 2001). Thus, weight overestimation among normal women may indicate a cognitive distortion relative to body size. Numerous studies have established a relationship between body size overestimation and disordered eating behaviors (see Farrell, Lee and Shafran, 2005 for a review of this literature), though very few have examined actual self-reported weight overestimation in conjunction with disordered eating as a function of a distorted body image.

Second, it is also possible that overestimating weight is an effort among women with disordered eating behaviors to conceal their low weights, thereby avoiding drawing attention to their unhealthy eating behaviors. Walsh, Wheat, and Freund (2000) suggest that individuals who engage in disordered eating behaviors or who have been diagnosed

with an eating disorder may intentionally over-report their weights in an attempt to avoid treatment or hospitalization. Courtier and Lock (2006) found that many individuals who have been diagnosed with an eating disorder will attempt to deny or conceal their disordered eating behaviors and low weight status. Despite this, a large number of eating disorder screening measures utilize self-report data. Thus, a discrepancy between reported weight and measured weight may highlight attempts to conceal unhealthy eating behaviors, particularly among normal weight females who will not be identified as at-risk based on their BMI status alone.

The current study examines this suggested relationship between weight overestimation and disordered eating behavior. It is hypothesized that increased weight overestimation is associated with disordered eating behaviors among normal weight females, as it may indicate the presence a distorted body image, an attempt to conceal unhealthy eating behaviors, or both. Thus, weight overestimation may serve as an important predictor for disordered eating behaviors which should be examined in conjunction with known risk-factors in screening individuals at-risk for an eating disorder.

**Data and Measures**

All data used in these analyses come from Wave III of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a school-based study of youth originally in grades 7 through 12. All high schools that included an $11^{th}$ grade (and their respective feeder schools) with an enrollment of at least 30 students were included in the population of schools. These schools were then stratified by region (Northeast, Midwest, South, West), urbanicity (urban, suburban, rural), school size (<126 students, 126-350

students, 351-775 students, or >775 students), school type (public, private, parochial), percentage of Whites (0, 1-66, 67-93, 94-100), percentage of blacks (0, 1-6, 7-33, 34-100), grade span (K-12, 7-12, 9-12, 10-12), and curriculum (general, alternative, special education, or vocational/technical). In total, 90,118 students from 80 high schools and 52 middle schools were interviewed in their schools between September 1994 and April of 1995. More detailed information was then collected from 20,745 adolescents (Wave I) during in-home interviews from April to December of 1995. Researchers returned to adolescents' homes from April to August of 1996 to collect follow up data, using the same measures for 14, 738 adolescents (Wave II). On average, the duration between Wave I and Wave II interviews was roughly 12 months. Six years later, between July 2001 and April of 2002, researchers returned to interview a sample of 15, 197 Wave I respondents (Wave III) who were able to be located.

After restricting the sample to normal weight females (those with an observed BMI of 20-25) and complete information for all independent variables in Wave III including sampling weight, a total of 2,858 respondents are used in these analyses. All data are weighted using the grand sample weights for Wave III to reflect the complex sampling design employed in the Add Health study (Chantala and Tabor 2004). Sampling weights, which describe the inverse of the probability that a particular observation is included owing to the sampling design, are recalculated for the reduced sub-sample considered here.

Respondents were asked to respond to the question, "What is your current weight in pounds?" in section 33 of the Wave III interview, and each respondent's weight was then measured by the researcher in section 34 of the Wave III interview. The discrepancy

between measured and estimated weight was calculated by subtracting measured weight from estimated weight. Individuals who over or underestimated by greater than 40 pounds in either direction were dropped from the sample. In The weight overestimation variable is dummy coded “1” for those that overestimate by at least five percent of their measured body weight and “0” for those that underestimate their weight or overestimate within five percent of their measured body weight. In total, 99 respondents (3.43%) were coded as over estimating their weights. We also include a measure of Body Image coded from 1-5 that asks women if they consider themselves to be (1) “Very underweight” to (5) “very overweight”. In total 22.31% of the normal weight women perceived themselves to be overweight.

In section 9 of the Wave III interview, participants were asked, “What are you currently doing about your weight?” Possible responses included a) trying to lose weight, b) trying to gain weight or bulk up, c) trying to stay the same weight, or d) not trying to do anything about weight. Respondents who indicated that they were trying to lose weight or maintain the same weight were asked a set of questions about disordered eating behaviors they had engaged in over the past seven days. All respondents were then asked about binge eating, restricted dieting, and eating disorder diagnoses. Responses to these questions were coded as either “0” or “1”, and dependent variable *Disordered Eating* was created if respondent indicated “yes” to one or more of these questions (see appendix A). In total, we identified 369 respondents (12.89%) who exhibited disordered eating behaviors. We also include a measure of Body Image coded from 1-5 that asks women if they consider themselves to be (1) “Very underweight” to (5) “very overweight”.

The *Diploma* variable, which serves as a measure of socioeconomic status, is coded "1" if respondents had received a high school diploma or GED at the time of the Wave III interview and "0" if they had not. Age is measured in years and recorded as the respondent's age at the time of the interview. Racial and ethnic identification is measured using self-reports. As with recent changes in the decennial census, the Add Health study does not place any limits on the number of racial categories that respondents are able to report. Accordingly, there are a number of multiracial respondents, though the bulk of respondents listed only one racial identity. Respondents who reported more than one racial identification were then asked, "Which category best describes your racial background?" Respondents were then classified into five racial categories according to their responses.

In line with previous research on eating disorders, all multivariate models include controls for the following factors that are associated with disordered eating behaviors: a) depression (Kaplan, Busner and Pollack. 1988); b) substance use and abuse (Bolton-Smith et al. 2000; Jarry et al. 1998; Holderness, Brooks-Gunn and Warren. 1994); and c) impulsivity (Fahy and Eisler. 1993) (see appendix A).

**Findings**

Table 1 presents average weight discrepancy estimates for a nationally representative sample of young adult women in the United States. On average, women tend to report weights that are one and a half pounds lighter than their actual physical weight. As shown elsewhere (Abraham and Luscombe 2004) we find the average weight discrepancy increases with increasing measured weight. On average, those with BMIs

between 20 and 21 did not report significant weight discrepancies but those with BMIs between 24 and 25 reported weights that were nearly 3 pounds lighter than their observed weights. The second column in Table 1 presents the estimates for those who overestimate their weight a percent of their observed weight. Among over-estimators, self-reported weight status averages 2.7% higher than measured weight status and it is fairly consistent across the weight categories except the lowest BMI category where the average over-estimator reported weights that were 3.71% higher than their observed weights.

[Table 1 about here]

[Table 2 about here]

Table 2 presents descriptive statistics for all variables used in the analyses. According to these numbers, roughly 13% of the population of young women in the United States has one or more symptoms of disordered eating behaviors and 3.4% overestimates their physical weight by at least 5%. To describe the association between weight overestimation and disordered eating behaviors, we present results from two logistic regression models in which the dependent variable is the dummy variable for one or more disordered eating behaviors and the primary independent variable is weight overestimation. According to these results, weight overestimation by at least five percent increases the risk of disordered eating behaviors by 98%. This association is statistically significant ($p<.05$) and more importantly, it persists despite a thorough array of control variables including socio-demographic and socioeconomic differences and three mental health characteristics that are known correlates of eating disorders (e.g., depression, drinking behaviors, and impulsivity). This difference is presented graphically in Figure 1 which presents the estimated probability of one or more disordered eating behaviors for

those who over report their weights by at least 5% ( p = .19 [13, .29]) compared to those who under-report or accurately their weights (p = .11 [09, .13]).

[Table 3 about here]

[Figure 2 about here]

The second model in Table 3 is designed to evaluate the meaning for the association between over-estimating weight and presenting symptoms of eating disorders. Accordingly, we control for responses to a question that asks respondents to describe their perceived weight (e.g., underweight, normal weight, or over weights). If over-porting among those with eating disorder symptoms is a function of distorted body image, then this control should significantly reduce or eliminate the association between over-estimation and eating disorders. As expected, this variable is strongly and positively associated with eating disorder symptoms, however the inclusion of this covariate did not change the estimated effect of over-estimation. That is, weight over-estimation and body image appear to act independent of one another as predictors of disordered eating behaviors. These results suggest that over-estimation of weight by at least 5% is associated with symptoms of eating disorders because those with one or more symptoms of eating disorders may be more likely than those without any symptoms to purposely report a weight that is higher than their known weight.

**Discussion**

Among females with a normal BMI, a self-reported weight overestimation of at least five percent of one's body weight significantly predicts disordered eating behavior, even when other known risk factors for eating disorders are accounted for. A number of

studies have established the reliability of self-reported weight and height (Brener et al. 2003; Goodman, Hinden and Khandelwal 2000; Jeffery 1996). These studies have produced correlations between self-reported and measured physical size as high as .95. However, some argue that methods of determining the accuracy of self-reports may be concealing a systematic bias (Shapiro and Anderson 2002). Specifically, self-reported weight is typically underestimated, regardless of gender (Elgar et al. 2005). All 34 studies in a 2003 review on the accuracy of self-reported weight found that weight is underreported (Engstrom et al. 2003). While both genders underreport, females generally underreport by larger amounts than males (Engstrom et al. 2003; Goodman, Hinden and Khandelwal 2000) and error in reporting increases with weight and body mass index (BMI) (Abraham et al. 2004).

Typically, gender and dieting are controlled for in analyses of self-reported weight accuracy, but body image distortion and body dissatisfaction are often overlooked. Elgar et. Al (2005) suggests that self-perception of body size predicts inaccuracies in self-reported weight better than dieting status. Strauss (1999) found that in a national sample of adolescents, 52% of girls and 25% of boys who considered themselves to be overweight were actually classified as normal weight using BMI measures. Furthermore, he found that self-perceived weight status was strongly associated with attempts at weight loss. One common explanation for weight underestimation is the social desirability bias: perhaps individuals are reporting their ideal weight rather than their actual weight, particularly in the case of females who receive more pressure to conform to a thin ideal than their male counterparts (Cash et al. 1992; Elgar et al. 2005; Shapiro and Anderson 2002). Underreporting is more common

among dieters than non-dieters and among obese and overweight individuals than among normal or underweight individuals (Jeffery. 1996; Shapiro and Anderson 2002). Some researchers suggest that dieters or individuals for whom weight (and specifically weight loss) is more salient than others may be more accurate in their weight estimation, perhaps because they weigh themselves more frequently (Doll and Fairburn 1998; Engstrom et al. 2003). In contrast, socioeconomic status is negatively related to accuracy in weight estimation, and it is suggested that this may be due to infrequent access to scales, particularly among adolescents in lower socioeconomic groups (Brener et al. 2003).

Given that weight underestimation is the norm for this population, this relationship between self-reported weight overestimation and disordered eating behaviors is particularly meaningful. Weight overestimation context may be a useful indicator in the identification of populations at-risk for eating disorders.. This may be particularly helpful in screening for disordered eating behaviors among females who are of normal weight status and may not otherwise be identified as at-risk.

Additional findings will be discussed at the time of presentation.

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**Table 1.** Weight discrepancies in self-reported and measured weight by BMI status among Young Adult Women in the United States.

| Measured BMI | Average Discrepancy between Self-Reported and Measured Weight in Pounds | Percent Weight Discrepancy among those with Positive Weight Discrepancies | Sample Size |
|---|---|---|---|
| 20-20.9 | -0.07 (-0.73, 0.58) | 3.71 (2.66, 4.74) | 568 |
| 21-21.9 | -0.88 (-1.41, -0.34) | 2.47 (1.86, 3.09) | 614 |
| 22-22.9 | -1.74 (-2.19, -1.28) | 2.18 (1.78, 2.58) | 597 |
| 23-23.9 | -2.49 (-3.00, -1.98) | 2.27 (1.86, 2.69) | 559 |
| 24-24.9 | -2.81 (-3.59, -2.03) | 2.62 (2.15, 3.09) | 520 |
| Total | -1.57 (-1.89, -2.03) | 2.71 (2.33, 3.09) | 2858 |

Note: Data obtained from Wave III of the Add Health Study. Cell entries represent the average weight discrepancy in pounds and 95% confidence intervals in parentheses.

**Table 2.** Descriptive statistics for all variables used in the analyses.

| Variable | Mean/% | (SD)/N |
|---|---|---|
| One or more symptoms related to eating disorders | 12.89 | 355 |
| Overestimate weight by at least 5% | 3.43 | 99 |
| Self-perceived overweight | 22.31 | 625 |
| Observed BMI | 22.45 | (1.40) |
| Race/ethnicity | | |
| Non-Hispanic White | 71.60 | 1643 |
| Hispanic | 9.63 | 399 |
| Non-Hispanic Black | 11.33 | 514 |
| Asian American | 4.80 | 238 |
| Native American | 2.63 | 64 |
| Received high school diploma | 92.15 | 2661 |
| Age (years) | 21.63 | (1.78) |
| Recently quit smoking | 16.31 | 392 |
| Depression | 4.57 | (4.19) |
| Drinking behaviors | 2.56 | (3.61) |
| Impulsivity | 11.77 | (7.85) |

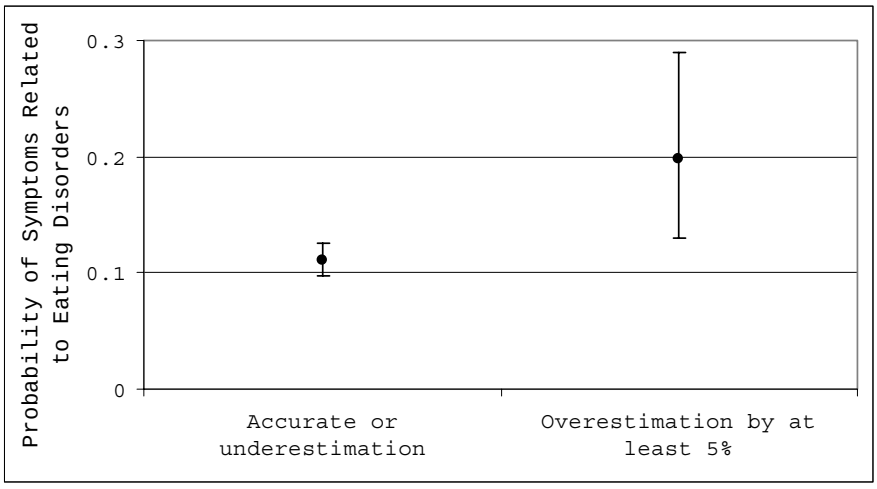
Note: Data obtained from Wave III of the Add Health Study (n=2858).

**Table 3.** Logistic regression estimates: weight overestimation and the risk of disordered eating behaviors.

| | Odds Ratio | 95% CI | | Odds Ratio | 95% CI | |
|---|---|---|---|---|---|---|
| Weight difference [ < +5%] | | | | | | |
| Overestimate >= 5% | 1.984 | ( 1.170 , | 3.365 ) | 1.904 | ( 1.114 , | 3.254 ) |
| Perceived overweight | | | | 1.549 | ( 1.045 , | 2.295 ) |
| Observed BMI | 0.969 | ( 0.830 , | 1.130 ) | 0.907 | ( 0.777 , | 1.058 ) |
| Sociodemographic Controls | | | | | | |
| Race/Ethnicity [Non-Hispanic White] | | | | | | |
| Hispanic | 0.504 | ( 0.271 , | 0.937 ) | 0.497 | ( 0.270 , | 0.914 ) |
| Non-Hispanic Black | 0.768 | ( 0.436 , | 1.353 ) | 0.810 | ( 0.460 , | 1.427 ) |
| Asian | 1.101 | ( 0.715 , | 1.696 ) | 1.094 | ( 0.714 , | 1.674 ) |
| Native American | 1.492 | ( 0.718 , | 3.100 ) | 1.519 | ( 0.752 , | 3.069 ) |
| Completed High School [ No ] | | | | | | |
| Yes | 0.820 | ( 0.483 , | 1.394 ) | 0.812 | ( 0.478 , | 1.381 ) |
| Age (years) | 1.061 | ( 0.913 , | 1.234 ) | 1.063 | ( 0.916 , | 1.234 ) |
| Confounding Characteristics | | | | | | |
| Recently quit Smoking [ Yes ] | | | | | | |
| No | 1.361 | ( 0.875 , | 2.115 ) | 1.386 | ( 0.891 , | 2.155 ) |
| Depression | 1.498 | ( 1.299 , | 1.727 ) | 1.464 | ( 1.267 , | 1.692 ) |
| Drinking behavior | 1.145 | ( 1.015 , | 1.293 ) | 1.156 | ( 1.023 , | 1.306 ) |
| Impulsivity | 1.202 | ( 1.011 , | 1.428 ) | 1.189 | ( 0.997 , | 1.418 ) |

Note: All estimates obtained using the SURVEY commands in STATA 9.1 to adjust for the complex sampling design of the Add Health Study.

**Figure 1.** Estimated probability of symptoms of disordered eating behaviors as a function of weight over-estimation.




Note: estimates derived from Model 2 of Table 3. Point estimates reflect the adjusted probability and bars reflect the 95% confidence interval. All estimates weighted and adjusted for the design effects of the Add Health study.