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Master of Public Health Research Project

Weight perception and the use of unhealthy weight loss tactics among adults in the United States: A Cross-Sectional study of NHANES data, 2000-2006.

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I. Abstract

Introduction: Weight dissatisfaction and misperception are widespread problems in the United States as are unhealthy weight loss practices. These negative body image issues can lead to eating disorders which have serious health and quality of life consequences.

Objective: To evaluate the extent to which the prevalence of distorted body image and unhealthy dieting tactics exist in adults in the US and how these are related.

Methods: Data from NHANES 2000-2006 on adults aged 20-59 was used. Weight perception was assessed with the physical exam measurements of weight status and the weight history questionnaire item asking if the person considered him or herself to be underweight, normal weight or overweight. Weight loss techniques were assessed with the weight history questionnaire items asking what methods they used if they tried to lose weight. Respondents were classified as having a weight perception discord if their perception was greater than actual weight status, and as having a concord in all other cases.

Results: The total sample was 6,022. 10% had a perception discord and 15% used unhealthy weight loss practices. After adjustment, a significant relationship between a perception discord and behaviors was not found--this held true for both men and women.

Discussion and Conclusion: Our results were similar overall to past studies; our inability to find a relationship could have been hampered by stigma associated with the subject matter. There are clearly other factors related to the adoption of unhealthy weight loss behaviors, which need to be determined.

II. Introduction

2.1 Weight Dissatisfaction in Children

The number of people who are dissatisfied with their weight is staggering.^{1,2} This dissatisfaction is not limited to under and overweight individuals who need to gain or lose weight to improve their health. Rather, it frequently extends to normal weight individuals who are in no medical need of weight loss to improve health.^{1,3,5} Weight dissatisfaction is commonly thought to be a problem of adolescents and young adults, but weight concerns are present in young children. A study of children in grades 3 through 6 found that 45% wanted to lose weight, 37% had already tried to lose weight and that 6.9% scored in the range of eating pathology seen in patients with eating disorders.¹ Of adolescents who participated in NHANES III, 52% of girls who considered themselves to be overweight were actually normal weight, and 25% of boys who considered themselves to be overweight were normal weight.² In a study of adolescent girls, while the mean weight of the girls was in the healthy range, approximately one in four girls expressed a desire to lose weight.⁴

2.2 Weight Dissatisfaction in Adults

This problem is not confined to children and adolescents—it extends to adults, too. A nationally representative study of people in the United States found that in women surveyed in the third National Health and Nutrition Examination Survey (NHANES III), 38.3% of normal weight women considered themselves to be medically overweight.³ In a representative sample of adult men and women in Britain, 28.3% of normal weight

women and 14% of normal weight men rated their weights as being overweight.⁵ In a group of middle aged British men and women 87% of women and 59% of men had ever tried to lose weight and only 10% of women and 13% of men were happy with their current weight.⁶

2.3 Body Image Perception and Eating Disorders

Body image disturbance or a discrepancy between a person's perceived weight/shape/size and their actual weight/shape/size has been defined as a symptom of clinical eating disorders.^{7,8} In addition, this symptom is also common among individuals with subclinical eating disordered behavior.⁹ Moreover, longitudinal studies have found that weight concerns—whether they are warranted or not—are predictive of the development of eating disorders.¹⁰ This finding has also held true in college students¹¹ and in younger girls.⁷ In addition, individuals who desire to lose weight are more likely to diet.¹² People who diet are more likely than non-dieters to eventually develop an eating disorder.^{10,13} Such findings have led some authors to suggest that dieting in and of itself may be a risk factor in the development of eating disorders.¹⁴ Eating disorder symptoms exist on a continuum and a person can progress from fewer, less severe symptoms to greater and more severe symptoms. Thus, it is important to evaluate both clinical and subclinical forms of eating pathology.

Most of the literature focuses on the weight concerns, eating pathology and dieting practices of women.¹⁶⁻²² Although women may disproportionately be affected by such concerns, men are not immune to these problems. At least one in ten individuals

with eating disorders are men²³ and the prevalence of eating disorders among men appears to be increasing. A study of Australian adolescents found that, after adjustment for psychiatric comorbidities, one in four new cases of eating disorders were in males.¹⁰ Sepulveda and colleagues (2008) found that among Spanish university 20.8% of females and 14.9% of males were at risk of developing an eating disorder.²⁴ Further, although the prevalence of weight misperception was higher in women, it was also present among men.

2.4 Consequences of Eating Disorders

Eating disorders are an often under-acknowledged, though serious and growing health concern in the United States. The prevalence of diagnosable eating disorders—which does not even count the many sub-clinical and threshold cases—in the United States is estimated to be approximately 10.1%.²³ Eating disorders significantly decrease a person's quality of life--their symptoms are related to the sufferer's happiness and feelings of self-worth. They have been associated with increased depression^{9,25,26} and anxiety.^{21,27,28} Another issue frequently seen in conjunction with eating disorders is low self-esteem.^{17,19,27,29,30,31} Not only is depression common among the eating disordered but so are elevated levels of anger and aggression, including anger expression problems and self-directed anger.³²⁻³⁶ People with eating disorders are also prone to drug^{37,38} and alcohol abuse.¹⁸

Moreover, the outcomes of eating disorders are poor. Not only do eating disorders damage quality of life but also they can shorten a person's life. Of all mental disorders,

eating disorders have the highest mortality rates. Between 6-15% of people suffering from anorexia nervosa (AN) die from complications related to their eating disorder, including suicide and cardiac problems.¹³ The mortality rate associated with AN is twelve times higher than the death rate of all causes of death for females ages fifteen to twenty-four.³⁹ Women with anorexia were 58 times more likely to commit suicide than women without an eating disorder.⁴⁰ There are also significant economic costs associated with eating disorders. For example, eating disorders cost employers vast amounts of money both treating their employees but in lost productivity as well. The overall medical and mental health costs to U.S. businesses in 2001 for all eating disorders totaled to more than \$3.8 billion. Forty percent of women with eating disorders function poorly at work and one-third are frequently absent from work. Binge Eating Disorder (BED)-related obesity in women costs businesses approximately \$2.5 billion annually in lost productivity, lost work, restricted and bed days.⁴⁰

However, eating disorders are preventable and effective treatments exist. As with any other illness or condition, to prevent eating disorders, one needs to identify their risk factors and warning signs to be able to identify those most likely to develop eating disorders. Although the discord between perceived body image and actual weight has been established as a hallmark in people already diagnosed with an eating disorder, it is possible that the identification of this discord, as well as attendant characteristics of people with this discord, could be used as a mechanism to screen for and/or prevent eating disorders. Additionally, because partial syndromes are associated with the

subsequent development of clinical eating disorders,⁷ then identifying individuals with partial syndrome could help prevent the condition from worsening.

2.5 Objectives

Our purpose is to evaluate the extent to which discrepancies between a person's perception of weight status and actual weight increases the prevalence of unhealthy weight loss tactics. We believe that because such discrepancies and unhealthy weight loss tactics are not only present in individuals with eating disorders they can also be predictive of future eating disorder development.

III. Methods

3.1 NHANES

This study uses data from the National Health and Nutrition Examination Survey (NHANES), 2000-2006. NHANES is administered by the National Center for Health Statistics (NCHS). NHANES was mandated by the National Health Survey Act of 1956 to collect information and statistics on the extent and nature of illness and disability in the United States as well as health determinants, use of health care and costs, impact of illness, and the incidence and prevalence of various conditions. NHANES also monitors the health and nutritional state of adults and children in the US via both self-report questionnaire, and physical examination in mobile examination centers (MEC). The questionnaire is composed of demographic, socioeconomic, dietary and health related questions. NHANES has been planned and conducted as a continuous annual survey

since 1999 and represents noninstitutionalized, US civilians above the age of two months.

3.2 Sample

We included NHANES 2000-2006 respondents between the ages of 20 and 59 who were not pregnant. We decided to exclude adolescents sixteen through nineteen years old even though weight history data is collected for them as there is already a plethora of literature regarding weight-loss habits and eating disorder presence and epidemiology of this cohort.^{1,2,4} We also excluded those older than 60 because complete data was not collected on all the desired variables in people older than 60. Because there are concerns regarding the accuracy of self-reported weight and given that accurate measurement of weight is crucial to validity of this study we only included those participants who completed the physical exam portion in addition to the questionnaire. The final sample size was 6,022.

3.3 Determinants

The determinants we examined were the presence of a discord between a person's actual weight and his or her perceived weight status. For example, a discord would be present if a person thought he or she was overweight when he or she was actually of normal weight. To measure actual weight status we used data from the examination portion of NHANES which documents the participant's weight in kilograms and height in meters to calculate body mass index (hereon referred to as BMI). BMI is calculated by dividing the weight in kilograms by the height in meters squared. In agreement with past

literature, a BMI of less than 18.5 was considered underweight, a BMI of 18.5-24.9 was considered normal weight and a BMI over 25.0 was overweight.^{41,42} To assess perception of weight we used two items from the Weight History Questionnaire segment. These items asked: 1) if the participant felt he or she was overweight, underweight or about the right weight, and 2) if the participant wanted to weigh more, less or stay the same.

3.4 Outcomes

The outcome variables assessed were items from the Weight History Questionnaire which asked whether in the past year if the person had tried to lose weight as well as what methods he or she had employed to attempt to lose weight. We categorized eating less food, eating foods with fewer calories, eating less fat or carbohydrates, exercising, eating “diet” foods, joining a weight loss program, taking diet pills prescribed by a doctor and drinking a lot of water as healthy. Following a fad diet, skipping meals, taking medicine not prescribed by a doctor, smoking cigarettes, and taking laxatives or vomiting (purging) were categorized as unhealthy. Previous studies indicate that these categorizations of healthy and unhealthy behavior are appropriate.⁴³ Unfortunately, there is not a consensus in the literature as to how much exercise or water are considered “excessive” so we did not include overexercise or excessive water drinking in the current analysis of unhealthy tactics. Rather, because, overall, exercise and water drinking are healthier ways of weight control we included them with the healthy options.

3.5 Potential Confounders

Gender and age have been associated with unhealthy weight loss tactics; thus we considered these as potential confounders. Specifically, individuals who are female and are younger are more likely to engage in unhealthy weight loss tactics.^{9,10,13,17,38} We also considered factors known to be related to unhealthy weight loss tactics including ethnicity, education level and income. Age (range 20-59) was categorized by decade. Consistent with the categories provided by NHANES ethnicity was defined as Caucasian, African American, Hispanic and all other ethnicities. Caucasian ethnicity is a confounder here. We categorized education as less than 9th grade, 9th through 11th grade, high school graduate, some college, or a college degree and beyond where higher education is a confounder. We chose to use the family income variable rather than the household income variable since this variable captures information on a more specific level and has fewer missing observations. Income was categorized into the following groups: \$0-19,999, \$20,000-44,999, \$45,000-64,999, and \$65,000+. Some studies show that a diagnosis of diabetes is associated with eating disorder diagnosis so we considered this a potential confounder.^{44,45} If the person reported they had ever received a diagnosis of diabetes from their doctor they were categorized positively for diabetes.

We have also included two behavioral confounders—drug and heavy alcohol use. Heavy alcohol use was defined as either drinking three or more drinks on the days they drank, or that they had five or more drinks on one occasion at least once a year. Drug use was defined as whether the person had ever smoked marijuana or used cocaine in any form or used heroin or methamphetamine. Information regarding substance use was

collected in face to face interview in the MEC setting, using audio computer-assisted self-interviewing (Audio-CASI) capabilities in order to maximize accuracy and minimize bias.

3.6 Analysis

We obtained raw and weighted frequencies and percentages for the number of people in each weight perception category and compared the distributions of the potential confounders by presence of a weight perception discord. We developed a logistic regression model to estimate the effect of weight perception discord on unhealthy weight loss tactics while controlling for potential confounders. In building the logistic regression model, we considered all potential confounders identified above and kept only those that altered the odds ratios by 10% or more. We estimated odds ratios (OR) and corresponding 95% confidence intervals (CI) from the final model. All analyses took into consideration the complex sampling and design of the NHANES survey and data. Additionally, all computations were performed using SAS software, version 9.1.

IV. Results

Approximately 10% of the weighted study population had some kind of weight perception discord and were either underweight yet perceived themselves as normal or overweight or were normal weight yet perceived themselves as overweight. Table 1 shows the distribution of potential confounders by weight perception. Approximately half of the study population (52.4%) were women yet 85% of the discord population were

women while only 15% were men. Most (71.8%) of the study population was Caucasian—81% of the discords were Caucasians as compared with 3% of African Americans, 9% of Hispanics and 6.9% of other races. While both weight perception discords and concords were relatively evenly distributed among age groups measured (see Table 1), those people in the 40-49 age group had slightly elevated percentages in all areas. As education levels rose, so did the prevalence of weight perception discord. A plurality (38%) of the discords had a college education or more whereas only 26% of the concord population had attained this level. A similar pattern was present for income. Specifically, although only 15% of the discord group earned less than \$20,000, 21% of the concords fell in the bracket; similarly, 41% of the discord group earned more than \$65,000 compared to 35% of the concord group. Drug use has slightly higher in those with a weight perception discord—21% of those with a discord reported using drugs whereas 20% of those without a discord reported drug use. A higher proportion of those with a perception concord reported heavy alcohol use as opposed to the discord group. There was about four times as much reported diabetes in the perception concord group relative to the discord group.

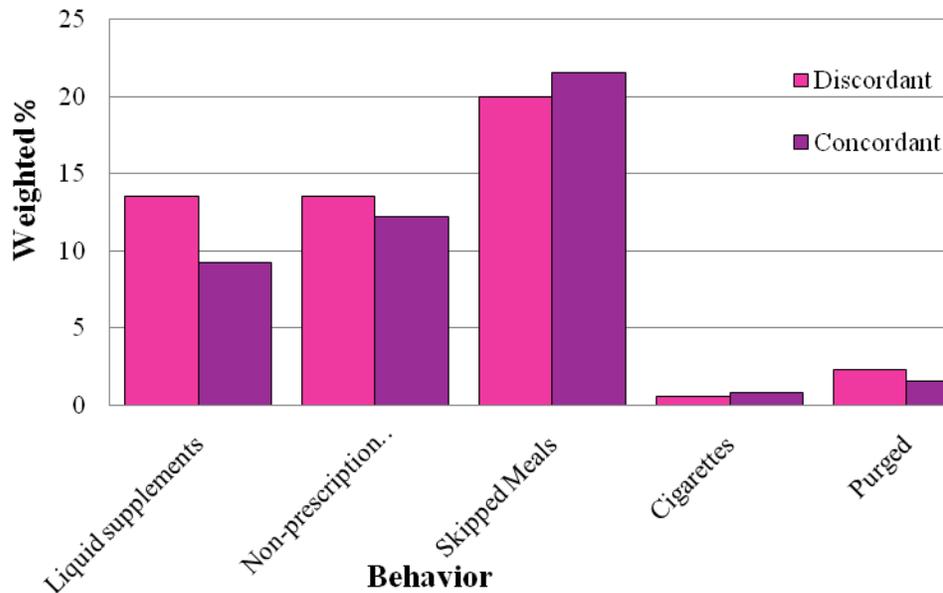
Of the discord population 89% wanted to lose weight and 49% attempted to do so; of the concord group 67% wanted to lose weight and 41% attempted to do so. The discord group reported higher adoption of both healthy and unhealthy weight loss behaviors. With respect to weight status, 42% of underweight people presented a perception discord whereas only 22% of the normal weight people presented with a perception discord.

Table 1: Characteristics by Discordant Perception

Characteristics	Discordant	Concordant	Total
	weighted %	weighted %	weighted %
Gender			
Male	14.9	51.3	47.6
Female	85.0	48.7	52.4
Ethnicity:			
Caucasian	80.9	70.7	71.8
African American	3.1	11.4	10.6
Hispanic	9.0	12.5	12.1
Other	6.9	5.4	5.6
Age:			
20-29	25.3	23.2	23.4
30-39	22.3	25.9	25.5
40-49	30.3	29.4	29.5
50-59	22.1	21.6	21.6
Education Level:			
<9th grade	0.9	4.4	4.0
9-11th grade	5.9	11.2	10.6
High School	21.7	25.5	25.1
Some College	33.5	33.0	33.0
College	38.0	26.0	27.3
Household Income:			
\$0-19,999	15.4	20.7	20.2
\$20,000-44,999	23.8	27.4	27.0
\$45,000-64,999	19.8	17.0	17.3
\$65,000+	41.0	34.9	35.5
Drug Use			
Yes	21.2	19.9	20.0
No	78.8	80.1	80.0
Heavy Alcohol Use			
Yes	33.4	39.0	38.4
No	66.6	61.0	61.6
Diabetes			
Yes	1.1	4.3	4.0
No	98.9	95.7	96.0

Figure 1 shows the distribution of specific weight loss strategies by weight perception group. The weight loss tactics considered unhealthy in this study were using liquid meal supplements, using non-prescription diet pills, skipping meals, smoking cigarettes, and vomiting or taking laxatives. Of these tactics, skipping meals was the most commonly used tactic which was used by 20% of the discord group and 21.6% of the concord group. Next most frequent were the use of non-prescription diet pills (13.5% of discords and 12% of concords) and the use of liquid meal supplements (13.5% of discords and 9% of concords). Interestingly, the least frequently used methods were the unhealthiest ones—while 0.84% of the concord group used cigarette smoking as a means of weight loss 0.6% of the discord group used smoking. Disturbingly, many people use purging—taking laxatives or using self-induced vomiting-- as a means to lose weight—2.3% of the discord and 1.6% of the concord group. It is worthwhile to note that in several of the more extreme tactics—liquid meal supplements and taking non-prescription diet pills and purging, the discord group had a higher prevalence of use.

4.2 Figure 1: Unhealthy Behaviors by Weight Perception Group



Before adjustment, those with a weight perception discord were slightly more likely, though not to a significant degree, to use unhealthy weight loss methods (OR=1.21, 95% CI: 0.92, 1.50). After adjusting for gender, the odds for the discord group to use unhealthy weight loss tactics fell, and did not reach significance yet tended in the direction of an association (OR=0.95, 95% CI: 0.72, 1.24) (see Table 2). To determine what effect may have been present between the two genders we stratified by gender. For both men and women none of the potential confounders proved to alter the association significantly. The odds for men of using unhealthy behaviors were in fact reduced by having a discord (OR=0.53, 95%CI: 0.17, 1.61). For women the odds did not reach statistical significance but also tended in the direction of an association (OR=1.00, 95%CI: 0.76, 1.32).

4.3 Table 2: Likelihood of Using Unhealthy Behaviors

	Total Population					
	Crude OR	95% CI		Adjusted OR*	95% CI	
Discord	1.21	0.92	1.60	0.95	0.72	1.24
Concord	Ref	--	--	Ref	--	--
	Men			Women		
	OR	95% CI		OR	95% CI	
Discord	0.53	0.17	1.61	1.00	0.76	1.32
Concord	Ref	--	--	Ref	--	--

*Adjusted for gender

V. Discussion and Conclusion

We found that weight perception discord was not significantly related to using unhealthy weight loss behaviors in a population-based sample of US adults once gender was taken into consideration. Our data were consistent with previous studies which have demonstrated that more women possess a weight perception discord than men.^{2,5,6} Additionally, this study found a higher prevalence of perception discord in Caucasians, which is in line with the literature.^{46,47} Also similar to the literature, this study found a higher prevalence of discord in those with more education¹⁶ and higher income.⁴⁸ This study supports that unwarranted weight loss attempts, weight perception discords and the use of unhealthy weight loss tactics are common among adults in the United States.

The current findings must be considered in light of several important limitations. First, the data, except weight, were primarily based on self-report. Because there is considerable stigma associated with unhealthy weight loss tactics^{22,50} it is likely that respondents underreported use of unhealthy weight loss tactics. Nevertheless, this type of

misclassification is likely to have attenuated any associations being that it would have made less the number of people categorized as using unhealthy behaviors. A second limitation is that we were unable to operationalize excessive exercise for this study. There is no consensus in the literature as to what constitutes excessive water drinking or excessive exercise. Although excessive water drinking and excessive exercise are not healthy means of weight loss and are symptoms of eating disorder, due to the difficulty in measurement and definition, for the purposes of this study all water drinking and exercise were considered healthy. This source of error may have led to an underestimation of the effect of weight perception discord on unhealthy weight loss tactics. Despite these limitations, the data were from a nationally representative survey and, as such, the findings can be extrapolated to the general population.

Regardless of the true effect of weight perception on weight loss tactics, it is important to note that 15% of the individuals in this sample reported using unhealthy weight loss tactics over the course of one year, which is in line with the literature. In a study of college-age females 9% reported smoking cigarettes to control weight and one third reported skipping meals to control weight.⁵¹ Additionally, the current study highlighted the fact that a good number of people using unhealthy weight loss tactics do not have a weight perception discord. The factors other than weight perception that are motivating these people to use unhealthy weight loss tactics warrant further study. These kinds of unhealthy behaviors can become ingrained in a person and it is generally agreed that there are biological factors influencing vulnerability to eating disordered behaviors which, along with other psychological and social etiological variables, might explain why

people sustain these unhealthy behaviors in absence of a weight perception discord.^{16,20,49,51,52} Another question worthy of further investigation is why such a high proportion of people in the underweight category have a perception discord compared to those in the normal weight category. It is possible that this could be related to eating disorder or unhealthy weight loss behavior. For example, perhaps some of these people already display eating disorder symptoms and/or being underweight or malnourished could predispose one to a discord (e.g., dieting can disrupt or impair weight perception).⁵²

Health should be the objective of all people whether they need to lose weight or not, and should they need to lose weight, promoting adoption of healthy techniques needs to be a priority. This study demonstrates that the use of unhealthy weight loss tactics is not limited to those with a weight perception discord, to the young, Caucasian, the well educated, the wealthy or those using drugs and alcohol—people from every sphere of life are susceptible. The unhealthy tactics described in this study have potentially lethal consequences including malnutrition, gastrointestinal dysfunction, edema, depression, inability to concentrate, hormonal imbalance, osteoporosis, hypotension, bradycardia, hypoglycemia, stroke, cardiac arrest and even death.^{9,25,26,39,40,53} Despite the vast and extremely severe consequences eating disorders can bring about, these are frequently downplayed to superficial weight loss in the popular media and glamorized.⁵⁴ Body image and weight satisfaction should not have to come at the cost of physical and psychological functioning and health. Body acceptance, accurate perception and counseling on healthy means of weight loss need to be taught and promoted.

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