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Protective Misperception? Prospective Study of Weight Self-Perception and Blood Pressure in Adolescents With Overweight and Obesity



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 A B S T R A C T

Purpose: Underestimating one's weight is often seen as a barrier to weight loss. However, recent research has shown that weight underperception may be beneficial, with lower future weight gain and fewer depressive symptoms. Here, we examine the relationship between adolescent weight underperception and future blood pressure.

Methods: Using data from the National Longitudinal Study of Adolescent to Adult Health, we obtained a nationally representative sample of 2,463 adolescents with overweight and obesity (students in grades 8–12 in 1996). We used multivariable linear regression to prospectively examine the relationship between weight self-perception in adolescence and blood pressure in adulthood (year 2008; follow-up rate 80.3%), controlling for age, gender, race/ethnicity, smoking, alcohol consumption, education level, household income, and body mass index. Additional analyses were stratified by gender and race/ethnicity.

Results: Youth with overweight/obesity who underperceived their weight had lower blood pressure in adulthood than those who perceived themselves to be overweight. The decrease in systolic blood pressure was -2.5 mm Hg (95% confidence interval: $-4.3, -0.7$; $p = .006$). Although the interaction by gender was statistically insignificant ($p = .289$), important differences appeared upon stratification by gender. Young men showed no significant difference in adult blood pressure related to weight self-perception. Conversely, in young women, weight underperception was associated with an average decrease in systolic blood pressure of -4.3 mm Hg (95% confidence interval: $-7.0, -1.7$; $p = .002$).

Conclusions: Contrary to conventional wisdom, weight underperception is associated with improved health markers in young women. The observed differences in blood pressure are clinically relevant in magnitude, and interventions to correct weight underperception should be re-examined for unintended consequences.

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 IMPLICATIONS AND CONTRIBUTION

It is widely assumed that knowing your weight is essential to weight control and good health. But might underperceiving your weight actually benefit your health? This study shows that adolescent girls with overweight and obesity who perceive themselves as normal weight end up with lower blood pressure as adults.

Conflicts of Interest: The authors have no conflicts of interest to disclose.**Disclaimer:** The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Aging or the National Institutes of Health.

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Childhood obesity is widely regarded as a public health crisis in the U.S., and numerous studies have shown that individuals with overweight or obesity in childhood are at higher risk for hypertension and other adverse cardiovascular events in adulthood [1,2]. These findings have spurred efforts to inform parents when their children are overweight and to provide weight loss interventions at an early age [3,4]. Obesity also has psychological consequences: children and adolescents with overweight or obesity are more likely to be teased by their peers and experience low self-esteem, body dissatisfaction, depressive symptoms, and suicidal ideation [5,6]. These psychosocial factors impact the health trajectories of affected youth, including their future weight and risk of eating disorders [7,8].

Weight self-perception provides a window to study the interplay of these psychosocial and physical consequences. Despite efforts to inform youth of their weight status, between 20% and 80% of American youth with clinical overweight/obesity perceive themselves to be normal weight [4,9,10]. This incongruence between clinical weight category and self-perception, referred to as weight misperception, is often assumed to be detrimental to health maintenance [11–13]. Indeed, numerous studies have found that adolescents with overweight/obesity who underperceive their weight are less likely to report that they are exercising, dieting, and trying to lose weight [9,14]. At the same time, self-perception as overweight is associated with binge eating and eating disorder psychopathology [15,16].

While multiple studies have examined the relationship between weight misperception and self-reported health behavior, investigators have only recently begun examining the relationship between weight misperception and measurable health markers. The results are intriguing: two recent longitudinal cohort studies showed that, contrary to common belief, people with overweight/obesity who underperceive their weight go on to gain significantly less weight in the future than those who perceive themselves as overweight [17,18]. Given the known relationships between weight and blood pressure, psychosocial stress and blood pressure, and weight stigma and psychosocial stress, we hypothesized that weight self-perception might similarly affect future blood pressure [5,19,20]. We further hypothesized that the relationship between weight self-perception and future blood pressure might be mediated by the known relationship between weight self-perception and future body mass index (BMI). Finally, given the increased weight stigma that women encounter, higher levels of body dissatisfaction among white (as compared to black) women, and known variation in rates of weight misperception and weight control behaviors by gender and race/ethnicity, we hypothesized that the relationship between weight misperception and blood pressure might be modified by gender and race/ethnicity [10,21–23].

Current clinical practice relies, in part, on the assumption that making patients aware of their weight status will eventually benefit their long-term health. In this study, we sought to test this assumption by examining the relationship between weight self-perception in adolescence and blood pressure in young adulthood.

Methods

We used data from the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally

representative, longitudinal survey of adolescents in grades 7–12 in the school year 1994–1995 (wave I). The survey was approved by the institutional review board at the University of North Carolina Chapel Hill, and the interviewers obtained informed assent from the participants and informed consent from their parents in wave I [24]. Secondary analysis was approved by the Boston Children's Hospital institutional review board. Our analysis uses data from wave II (the first wave with measured height and weight), conducted in 1996 with 14,738 participants, and wave IV, conducted in 2008 with a follow-up rate of 80.3% [25]. Participants were between the ages of 24 and 32 years in wave IV [24].

We calculated BMI in wave II using height and weight measured by the interviewer, and adolescents were categorized as underweight, normal weight, overweight, or obese based on BMI for age cutoffs recommended by the Centers for Disease Control in the U.S. [26]. The initial sample of participants with available data and sample weights for waves II and IV had 9,421 individuals [27]. We limited our analysis to individuals with overweight/obesity in adolescence, excluding 6,482 individuals with normal weight or underweight and 149 individuals who were missing BMI data. We determined weight self-perception in wave II using participants' response to the question, "How do you think of yourself in terms of weight?" (possible responses: very overweight, overweight, normal weight, underweight, and very underweight). Those who perceived themselves as normal weight (despite having a BMI in the clinically overweight/obese range) were termed "underperceivers." Those who perceived themselves as underweight or very underweight (71 individuals) were excluded from the sample, as the sample size of these "extreme underperceivers" was too small to analyze. To investigate the possibility of selection bias, we calculated the percentage of our sample population that switched into the normal weight category between waves II and IV, stratified by weight self-perception.

For outcome data, we used systolic and diastolic blood pressure (DBP) data gathered in wave IV. These blood pressure measurements were taken by trained Add Health interviewers using an automatic oscillometric monitor approved by the British Hypertension Society (BP 3MC1-PC_IB; MicroLife USA, Inc., Dunedin, FL) [28]. Three blood pressure readings were taken, 30 seconds apart, while the participant was seated at rest for at least 5 minutes. The last two readings were double entered and averaged to obtain the reported measure. Since blood pressure changes during pregnancy, we excluded 86 women who were pregnant and 4 women who did not report their pregnancy status, as well as 112 individuals with missing blood pressure data.

We analyzed the longitudinal relationship between weight self-perception in adolescence and blood pressure in adulthood using linear regression, controlling for BMI in wave II, age in wave IV, race/ethnicity (white, black, Latino/a, Asian, or other), smoking in wave IV (dichotomized based on self-report of smoking at least once in the past 30 days), frequent alcohol consumption in wave IV (dichotomized based on self-report of drinking an average of three or more times per week), education level in wave IV (categorized as less than high school, high school degree or equivalent, some college, and college degree or higher), and wave I household income (as a percentage of the federal poverty level, imputed when missing; wave I data were used because household income information was not gathered in wave II). We did not control for income in wave IV because it was poorly correlated to other measures of socioeconomic status, most likely

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