



The Relationship of College Students' Perceptions of Their BMI and Weight Status to Their Physical Self-Concept

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ABSTRACT

Background: Limited research has investigated the relationship between individuals' perceptions of their weight status and their physical self-concept. **Purpose:** The purpose of this study was to examine the accuracy of college students' Body Mass Index (BMI) scores (i.e. based on actual and self-reported data), and whether students' physical self-concept scores differed according to their perceived weight status classification. **Methods:** Undergraduate students (N=192) completed the Physical Self-Description Questionnaire and self-reported their height, weight and weight status classification. Actual height and weight measurements were also obtained. **Results:** Analysis using t-tests revealed females had significantly higher actual than self-reported BMI scores ($t = 2.16$, $df = 125$, $P < 0.05$), but not males. ANOVA analyses revealed a significant difference for both females and males in physical self-concept scores based on their weight status category. **Discussion:** Results suggested that males, but not females, accurately reported their height and weight scores, but neither gender tended to accurately identify their weight status. Females and males who perceived themselves to be of normal weight reported the highest physical self-concept scores. **Translation to Health Education Practice:** To understand and assess students' health risks better, health educators should provide students information about (1) accurately identifying and understanding their BMI scores, (2) their weight status implications, and (3) the effects that weight status may have on physical self-concept.

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BACKGROUND

Obesity is described by the U.S. Surgeon General as the fastest-growing cause of death and disease in the U.S.¹ Over half the population is considered overweight or obese, based on Body Mass Index (BMI) scores. BMI is an anthropological measure that is currently used by health and medical professions as a marker of obesity.² Surprisingly, researchers have found only 22% of individuals perceive themselves as having a weight problem. For some people, a disconnect exists between their perceived and actual weight and weight status.³ For the purposes of this study, weight

status refers to the Quetelet BMI categories (i.e. underweight, normal, overweight, obese).⁴ If individuals who are overweight or obese do not recognize their actual weight status, they may be unaware of the health risks and less receptive to strategies that would support a healthier lifestyle. In a similar vein, if healthy weight individuals perceive they are overweight or obese, they may engage in weight loss behaviors that are not needed and/or unhealthy. Also of concern is the negative association between individuals' perceptions of their weight status to their physical self-concept that

has emerged in research with adolescents.⁵ Therefore, the purpose of this study was to examine the accuracy of college students'

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BMI scores (i.e., based on actual and self-report data) and the relationship between students' perceived weight status to their physical self-concept.

To estimate body weight and composition, BMI has been used as a standard indicator of health-related risks.⁶ Although BMI has limitations, research has found a positive association between BMI and diabetes, heart disease, hypertension, gallbladder disease and some forms of cancer. Therefore, the measure has been used to place individuals in broad weight status categories, allowing healthcare professionals to identify those considered overweight and obese who are at greater risk for major health concerns.⁷

Across studies, BMI is calculated based on either self-report or actual height and weight. Self-reported height and weight is often used for weight status classification, and this is of concern because self-report measures of BMI have consistently revealed poor validity.^{8,9} Researchers have identified common trends of under-reporting weight and BMI and over-reporting height, two problems that can skew individuals' perceptions of themselves.⁵⁻¹¹ Thus, actual measurements and analysis of body composition are necessary for future studies conducted in this area if results are to be valid.

Some populations are likely to over-report their weight status, identifying themselves as overweight when in actuality they are not.¹⁰⁻¹² Adolescent females (11-16 year olds), in particular, tend to underestimate their specific weight yet overestimate their weight status. Researchers have found that when asking female adolescents to report their specific weight, they tended to identify too low a number.^{5,13} Yet, when asked whether they were overweight or normal weight, female adolescents were more likely to report being overweight, even when they were not.^{5,13,14}

The tendency to overestimate weight status has an impact on self-concept,⁵ potentially leading to damaging weight-management techniques and a negative self-image. Harter, a developmental educational psychologist, has defined self-concept as "an overall evaluation of one's worth or

value as a person"^{15(p5)} and described the important functions self-concept plays for individuals. Self-concept is critical in terms of learning to set and pursue goals, strive for self-improvement, increase and maintain favorable attributes, maximize pleasure and minimize pain. Appropriate social behavior and self-regulation skills are also learned as these different functions of self-concept are developed.¹⁵

In a study of high school students, perceptions of a normal weight status were associated with a positive self-concept, while perceptions of having an overweight status were negatively associated with self-concept.¹⁶ Having an overweight status has also been associated with self-concept. Overweight perceptions of the body, unfortunately, may contribute to a lack of self-confidence and negative self-esteem later in life.⁵

A more relevant measure of self-concept when considering individuals' health and well-being may be physical self-concept. Self-concept has been described in terms of a hierarchical model with global self-esteem at the top, and domain specific self-conceptions (i.e., physical, academic, social) at the next level.¹⁷ Each sub-domain area is represented by specific constructs that predict global self-esteem and these specific constructs become increasingly important as individuals advance in their cognitive development. This hierarchical model has been embraced because research has revealed that individuals' self-concept is strongly influenced by their views about themselves with regard to specific areas of their lives.

For example, physical self-concept represents individuals' feelings about their physical appearance, abilities, and fitness components. Marsh found the relationship between weight status and physical self-concept stronger than weight status to global self esteem.¹⁸ Examining how adolescents, particularly females, develop a tendency to perceive themselves as overweight and whether the association between weight status and physical self-concept continues into young adulthood is an important area of inquiry.

Pritchard et al. conducted a large scale study examining the relationship between self-reported BMI, perceived weight status and physical self-concept among adolescents. Data from the High School and Beyond (HSB) study allowed the investigators access to over 33,000 high school students. While a small number of males incorrectly described themselves as overweight, females were four times as likely to indicate they were overweight than would be suggested by their BMI scores. Regardless of true BMI, students who perceived themselves as overweight were more likely to respond to physical self-concept measures as if they were overweight. Female adolescents tended to negatively associate a higher weight status with lower physical self-concept. Predictors of a positive physical self-concept included the perception of falling into a normal weight status, lower self-reported BMI and being male.¹⁶ The Pritchard et al. findings are similar to studies that sampled pre-adolescent groups.^{19,20} Overall, these results suggest that perceptions of weight status are key to the healthy development of physical self-concept for adolescents during this important period of psychosocial and sexual development.

Health practitioners must understand how individuals' perceptions of weight and weight status are influenced during critical periods of development such as adolescence and young adulthood, if they are to be intentional in maximizing individuals' health and well-being. The current literature has not revealed whether adolescents moving into young adulthood become more accurate at judging their weight status or if young adults' weight status impacts their physical self-concept. Knowledge in this area can be of significant value as health providers and educators strive to help young adults develop healthy lifestyles and optimize their emotional and psychological well-being.

PURPOSE

The purpose of this study was to examine the accuracy of college students' BMI scores (i.e., based on actual and self-reported data). A limitation of previous research is the reliance on participants' self-reported



height and weight rather than clinically measured values. Since the validity of self-reported BMI is poor,⁹ actual height and weight measurements were taken and BMI measures were calculated based on these measurements for this study. A second purpose of this study was to examine whether students' physical self-concept scores differed according to their perceived weight status classification.

METHODS

Sample

Full and part-time college students (N = 192; n = 66 males and 126 females, X age = 22 years) enrolled at a large Mid-Southern university who chose to participate in a Health Fitness Assessment at the University Recreation Center were recruited. The Recreation Center was free and open to all students; in addition, fitness assessments were free of charge to all students. African American students comprised 51.6% of the sample and 42.2% of the students were Caucasian. The researchers obtained permission to conduct the study from the Institutional Review Board at their university. Informed consent was sought of participants prior to survey distribution.

Procedure

Students were asked to complete the survey before they completed their fitness assessments. The survey took approximately 10 minutes to complete and was administered by the Fitness Assessment coordinator or principle investigator. The students were asked to seal their questionnaires in an envelope when they finished. This increased the students' awareness of privacy as well as their comfort level at revealing potentially sensitive information. Sealing the survey also prevented students from changing any information as a result of measurements.

Instrument

Demographic information included age, race and gender. In addition, the Quetelet BMI was employed to assess actual and perceived weight status. The Quetelet BMI guide was developed in 1832 by a Belgian statistician as a practical index to measure

relative body weight.⁷ Participants were asked to identify their perceptions of their weight status with the following statement: I am (1) underweight, (2) desirable weight, (3) overweight, or (4) obese. These four statements reflect the categories found in the Quetelet Body Mass Index (BMI) guide. Since its creation, several studies have established the validity of the Quetelet BMI guide.^{21,22} It is widely used in the healthcare field.⁷

Measurements of height and weight were taken by trained staff at the University Recreation Center. All participants were measured without shoes, and weight was measured on a beam-scale. The actual height and weight was reported on the students' envelope and was used to calculate actual BMI. Training on BMI measurement was conducted prior to data collection to insure reliability of the measurements. A BMI of less than 18.5 is considered underweight, 18.5-24.9 normal, 25-29.9 overweight, and 30 and above as obese.²³ Self-reported BMI was calculated from height and weight provided in the demographic information. Self-reported information was collected prior to measurement by testing personnel. After calculating BMI, students were also assigned a weight-status classification based on their score, using the Quetelet Body Mass Index guide (i.e., underweight, desirable weight, overweight and obese). This was considered their actual weight status.

The Global Physical Scale, a 6-item scale that utilizes a 6-point true-false response format, was used. It is a portion of the Physical Self-Description Questionnaire (PSDQ), developed by Marsh, Richards, Johnson, Roche and Tremayne.²⁴ All items

are simple declarative statements, designed for adolescents 12 years of age or older. The Global Physical scale includes items such as, "I am satisfied with the kind of person I am physically" and "I feel good about the way I look and what I can do physically." The scale score is computed by averaging the responses to the 6 items. Some of the items require reverse scoring due to negative wording. Validity and reliability of the PSDQ has been supported with college students.²⁵ The Cronbach alpha coefficient in the current study was .94.

Data Analysis

Means and standard deviations for students' self-reported and actual BMI scores were calculated. In addition, t-tests analyses were employed to compare participants' BMI scores (i.e., based on actual vs. self-reported height and weight data). Chi-square analyses were conducted by gender to determine whether students' perceived weight status was independent of their actual weight status. Finally, the mean and standard deviation of students' physical self-concept scores were calculated, and an ANOVA was employed to consider whether there were significant differences in students' physical self-perception scores across the perceived weight status groups (i.e., those who perceived they were underweight, normal weight, overweight, and obese). Reliability of the PSDQ scale was examined by calculating the Cronbach alpha coefficient.

RESULTS

Participants' self reported and actual height and weight measurements were taken in order to calculate self-reported and actual BMI scores. These values are reported in

Table 1. Means and Standard Deviations for Participants' BMI and Global Physical Self-Concept Scores

Variables	Females		Males	
	M	SD	M	SD
Actual BMI	25.75	5.81	24.21	4.45
Self-Reported BMI	25.36	5.50	24.29	4.54
Phys Self-Concept	4.17	1.31	4.94	1.07



Table 1. Analysis by gender using *t*-tests was employed to examine participants' actual and self-reported BMI scores. No significant differences emerged for males between their actual and self-reported BMI scores ($t = -.35$, $df = 65$, $P = 0.73$); however, females had significantly higher actual BMI scores than self-reported BMI scores ($t = 2.16$, $df = 125$, $P < 0.05$). This suggests that females were less accurate than males in reporting height and weight scores that result in accurate BMI classification.

Results of the participants' actual and perceived weight status classification (i.e., based on BMI scores) for males and females are presented in Table 2. Perceived weight status was determined by participants indicating whether they felt they were underweight, desirable weight, overweight, or obese. Females gave responses that placed them towards the desirable weight classification. Specifically, females with higher actual BMI scores tended to report a lower perceived weight classification, while females with lower actual BMI scores were more likely to report a higher perceived weight classification. Males with higher actual BMI scores also tended to underreport their perceived weight classification resulting in overweight and obese males demonstrating a tendency to perceive their weight status as normal.

Chi-square analyses were employed to look at the distribution of actual and perceived weight status scores (see Table

3). These analyses were run for males and females and there was a large percentage of the cells with expected values less than five (66.7% for males and 62.5% for females) indicating that the results did not approximate a chi-square distribution very well. As a result, the likelihood ratio chi-square is reported for each analysis.

For males, the likelihood ratio ($\chi^2 = 27.41$, $df = 6$, $P < 0.001$) revealed that their perceived weight status was not independent of their actual weight status. While 35% of the males were actually overweight or obese, only 14% accurately placed themselves into the overweight category and none perceived they were in the obese category. Interestingly, 11% of them were actually obese. In terms of underreporting their weight, 67% of the males who were actually underweight classified themselves as underweight. In summary, 56% of the males were accurate in reporting their weight status, while 4.5% overestimated and 39% underestimated their weight status.

The likelihood ratio ($\chi^2 = 67.46$, $df = 9$, $P < 0.001$) for females was also significant revealing that their perceived weight status was not independent of their actual weight status. Approximately half (51.5%) of the females placed themselves into the overweight or obese categories but only 45% were actually overweight or obese. Important to note is that 21% of the women were obese, but only 2% placed themselves into the obese category. When underreporting their weight,

2% of the females placed themselves into the underweight category while 6% were actually underweight. Overall, 56% of the women were accurate in reporting their weight status while 18% overestimated and 25% underestimated their weight status.

In summary, individuals' perceived weight category was not independent of their actual weight category. Examination of the cell frequencies indicated that the tendency to be accurate held most strongly for individuals whose actual weight was in the desirable or overweight categories. Individuals whose actual weight was in the underweight category were more likely to classify themselves as having a desirable weight, while individuals in the obese category were more likely to classify themselves as overweight.

To determine the association between perceived weight status and physical self-concept, separate ANOVAs were conducted for males and females, respectively. For males, the ANOVA was significant, $F(2,65) = 11.60$, $P < 0.001$. A follow-up Bonferroni post-hoc test revealed that males who perceived they were in the normal weight category reported significantly higher physical self-concept than those males who perceived they were in the overweight category. Further, males who perceived they were in the underweight category reported significantly higher physical self-concept scores than the perceived overweight males.

For females, the ANOVA was also signifi-

Table 2. Percentages of Participants in Weight Status Categories

	Perceived weight status							
	1		2		3		4	
	n	%	n	%	n	%	n	%
Females	3	2.38	58	46.00	62	49.20	3	2.38
Males	9	13.60	46	69.70	11	16.70	0	0.00
	Actual weight status							
	1		2		3		4	
	n	%	n	%	n	%	n	%
Females	8	6.30	61	48.40	30	23.80	27	21.40
Males	3	4.55	40	60.06	16	24.20	7	10.60

Note. N = 192; Weight Status 1 = Underweight; 2 = Desirable Weight; 3 = Overweight; 4 = Obese



Table 3. Comparative Weight Status of Males and Females

	Females					
	Perceived weight status					
	1	2	3	4	Total count	
Actual	1	2	6	0	0	8
Weight	2	1	44	16	0	61
Status	3	0	6	23	1	30
	4	0	2	23	2	27
Total count		3	58	62	3	126
	Males					
	Perceived weight status					
	1	2	3	4	Total count	
Actual	1	2	1	0	0	3
Weight	2	6	32	2	0	40
Status	3	1	12	3	0	16
	4	0	1	6	0	7
Total count		9	46	11	0	66

Note. N = 192; Weight Status 1 = Underweight; 2 = Desirable Weight; 3 = Overweight; 4 = Obese

cant, $F(3,124) = 16.74, P < 0.001$. A follow-up Bonferonni post-hoc analysis revealed that females who perceived they were in the normal weight category had a significantly higher physical self-concept score than those females who perceived they were in either the overweight or obese categories. In addition, there was no statistically significant difference between the physical self-concept score of perceived underweight females and the other weight status categories. In summary, both males and females who perceived they were in the normal weight status category reported the highest scores on physical self-concept (Table 4).

DISCUSSION

One purpose of this study was to examine the accuracy of college students' BMI scores (i.e., based on actual and self-reported data). These results suggest that male, but not female, college students are able to accurately report their height and weight. However, neither gender was accurate in placing themselves in a weight status classification suggesting that college students may not recognize the implications of their

BMI score.

Individuals' misclassification of their weight status can have many health ramifications. Approximately 42% of the students in this study were actually overweight or obese (i.e., according to BMI scores) but perceived they were in the desirable weight category. By assuming they are of a desirable weight, those students may be unaware that they are candidates for weight related diseases and health problems such as Type-II diabetes, cardiovascular disease, high blood pressure and high blood cholesterol levels. Cancer can also be more prevalent in the morbidity of obese people than for normal weight people.²⁶ Obese females die more often than lighter weight females from cancer of the uterus, breast, ovaries, and gallbladder and obese males from cancer of the colon, prostate and rectum.²⁷ Overweight individuals who do not believe they are overweight may be more likely to engage in risky behavior (e.g., not controlling their weight) and are at risk of becoming obese.¹⁴ This suggests that it is not enough for health fitness professionals to insure that college students are provided accurate information with regard to their

height and weight; students also need to be educated about the health implications for their specific weight status categories.

Whereas there is clear reason to be concerned about individuals who inaccurately underestimate their weight status, there is also cause for concern for individuals who overestimate their weight status. Approximately 9% of students in this study were actually in the desirable weight category but perceived they were overweight or obese. Normal weight individuals who erroneously believe they are overweight may be more prone to participate in dangerous behaviors, such as unnecessary dieting and binge eating.¹⁴

This study adds to the growing body of literature on individuals' accuracy in reporting their height, weight, and weight status. The results differ slightly from other studies targeting college students. For example, Sciacca, Melby, Hyner, Brown and Femea compared undergraduate students' perceived weight and weight status with actual measurements and found that females were over twice as likely to report themselves as overweight, while males were only

**Table 4. Means for Physical Self-Concept by Gender and Weight Status**

	Underweight	Normal	Overweight	Obese
Females	3.83 ^{ab}	4.91 ^a	3.54 ^b	2.61 ^b
Males	4.69 ^a	5.22 ^a	3.73 ^b	

Note. The subscripts refer to significant differences within each gender (i.e., by row only) across the weight status categories (i.e. a groups are significantly different from b groups).

No males perceived they were obese and thus the cell is blank.

slightly more likely to identify themselves as overweight.¹¹ In contrast, results from this study revealed that college females were slightly more likely to report themselves as overweight/obese, while college males were less likely to identify themselves in the overweight/obese categories.

Research with high school students has revealed different trends for females. A study conducted with Australian adolescents that utilized self-report height and weight data as well as actual measurement, found that 19% of the females and 25% of the males were actually measured as overweight or obese.²⁵ When self-reported numbers were used, the percentage of females and males who believed they were overweight or obese dropped to 12% and 18%, respectively. A comparison of this study's results reveal that college students are more likely than high school students to be classified as overweight or obese. In addition, college females are more prone to perceive that they fall into a higher weight status category than they do, while high school males and females and college males have a greater tendency to categorize themselves in a lower weight status category than they actually are. Future research might focus on college females in particular and consider why they do not follow the same pattern as their male counterparts and younger students when considering their weight status.

In addition to considering college students' accuracy in reporting their weight status classification, a second purpose of this study was to examine whether students' physical self-concept scores differed according to their perceived weight status classification. Females who perceived they were at a normal weight reported a significantly

higher physical self-concept than females who perceived they were overweight or obese. Males who perceived their weight as normal also reported significantly higher physical self-concept scores than males who perceived themselves as overweight. Further, males who perceived themselves as underweight scored significantly higher on physical self-concept than those who perceived themselves as overweight. Interestingly, no males perceived themselves as being obese. Harter and her colleagues' extensive research with individuals across the lifespan has demonstrated that physical self-concept accounts for the greatest portion of variance in global self-esteem.¹⁵ All together, these results suggest that those who do not perceive their weight as normal are less likely to view their physical appearance and capabilities in a positive manner. Consequently, this has negative implications for their global self-esteem.

Several limitations of this study should be noted. This study included a college student population and therefore these results should not be generalized to non-college populations. In addition, these individuals were comfortable enough to enter a fitness center making them a unique population. Finally, there is some degree of error associated with measuring BMI, particularly with regard to children, the elderly, pregnant women and individuals who have higher levels of muscle mass.^{24,28} All together, the results of this study encourage future research that examines college students' perceptions of their weight and actual measurements.

In terms of examining students' accuracy in judging their weight status, the present study had several strengths that have not been apparent in previous research. First, a

strength of this study is that the four classifications used in the Quetelet body mass index (e.g., underweight, desirable weight, overweight, obese) were used as opposed to the forced yes/no question format (Are you overweight?) utilized by other studies such as Pritchard et al.¹⁶ This approach provides a more comprehensive understanding of how individuals perceive their weight status. A second strength was that actual BMI scores were based on height and weight measurements taken by trained health professionals whereas some studies have considered individuals' self-reported height and weight as appropriate values used to calculate actual BMI.^{12,16,29}

TRANSLATION TO HEALTH EDUCATION PRACTICE

In conclusion, results from this study suggest that a significant portion of college students fell into the at-risk weight status categories. While males were able to recognize their actual height and weight, males were less likely to perceive that they were in a higher weight status category than were females. It is important that people who are in the higher weight categories be informed of potential health risks and available resources (e.g., fitness assessment, exercise facilities and classes, information about nutrition). In the case of individuals who participated in this study, such resources are available free of charge to all students enrolled at their university. However, a very small percentage of students at this university take advantage of these resources which suggests that health professionals need to be creative and intentional in promoting these services.

Results from this study also revealed that those who perceived themselves in the normal weight category reported the highest physical self-concept. This highlights how perceptions of being overweight or obese make individuals more likely to have a negative view of their physical characteristics. This study was not designed to assess students' understanding of or feelings about their risk factors associated with being in a higher weight category, their views about their physical self-concept scores, or their



awareness of available resources that support healthy lifestyles. Future research might consider students' knowledge and perceptions of critical aspects of health and wellness such as their emotional and cognitive responses to information regarding their weight status. In addition, considering how individuals' activity levels impact perceptions of their weight status may be another worthwhile area of future inquiry. Individuals who are more physically active may be more likely not only to report more accurate perceptions of their weight status, but also to understand the ensuing implications for their health and well-being. Further, this study was limited to undergraduate students. Future research might expand to include individuals in later stages of adulthood (e.g., early adulthood; middle age; seniors) and examine the relationships between their accuracy in reporting their BMI and weight status, as well as perceptions of their physical self-concept. To date, research has focused on adolescents with very limited attention on college-aged individuals, although it may benefit health professionals to understand what is occurring across the lifespan with individuals during specific stages of life.

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