

Investigating Perceived vs. Medical Weight Status Classification among College Students: Room for Improvement Exists among the Overweight and Obese

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Abstract

The American College Health Association estimated that 31% of college students are overweight or obese. It is important that students have a correct perception of body weight status as extra weight has potential adverse health effects. This study assessed accuracy of perceived weight status versus medical classification among 102 college students. Perceived weight status was determined by responses to these questions, as part of a health questionnaire, "Are you overweight?" and "Which of the following best describes you?" (obese, overweight, normal weight, under weight). Medical classification was indicated from body mass index (using researcher-recorded weight and height) based on World Health Organization standards. Seventy eight percent of participants (n = 80) correctly assessed their weight status with significantly more females (79%, n = 45 of 57) than males (53%, n = 24 of 45) correctly assessing their status (p < 0.01). All participants who misclassified their weight (n = 33) under classified their status as compared to the medical classification. Participants who correctly classified their status were, on average, 0-10 pounds overweight whereas those who misclassified were 11-20 pounds overweight. Among college students, nutrition education strategies should focus on students correctly identifying their weight status and health implications associated with an overweight/obese condition.

Key Words: human, body mass index, body image, obesity, male, female

Introduction

In spite of increased media attention and public awareness of the national obesity epidemic, the prevalence of overweight and obesity among Americans continues to rise. Results from the National Health and Nutrition Examination Surveys indicated that approximately one-third of the population is overweight and another one-third is obese [1]. Data from college population showed similar trends with the prevalence of overweight increasing from 20% to 21% among overweight and 7% to 10% among obese college students from 2000 to 2006 [2,3]. These findings are of concern, as excess weight gain in adolescence and young adulthood increase the risk for obesity and subsequent cardiovascular disease and type 2 diabetes later in life [4].

The increased prevalence of overweight and obesity among college students has occurred despite large-scale health campaigns across college campuses, such as the American College Health Association's Healthy Campus 2010 promotion, that aim to promote healthy body weight among college students [5]. The demands and stress associated with college life and the abundance of unhealthy food options on campuses may be partial contributors to the divergence between the increased prevalence of overweight and obesity versus the efforts of campus health promotion, including maintenance of a healthy body weight [6]. Conflicting attitudes regarding weight standards and weight appropriateness may also play a role [7]. Various studies have explored differences between self-classification of weight status (i.e. underweight, normal weight, overweight, or obese) and medical weight classification among adolescents as well as adults [7-12]. Medical weight classification is based on body mass index (BMI) as follows: < 18.5 kg/m² underweight, 18.5-24.9 normal weight, 25.0-29.9 overweight and > 30.0 obese [13]. Results from this line of research indicated deviation between self versus medical classification (referred to as body weight perception) regarding weight status between sexes, ethnicities, and education and income levels [7-12].

Regarding sex, males tend to underestimate weight status while females overestimate theirs [7-12]. Further, overweight males are more likely to perceive themselves as normal weight or underweight while normal weight females perceive themselves as overweight [7-9]. Body weight perception, rather than

body weight per se, has been correlated with negative emotional and behavioral effects in both sexes [9,10]. Whereas it is popular among males to engage in dietary behaviors (e.g., eating high protein, nutrient dense foods) and exercise to promote muscle gain, females tend to practice dieting behaviors and exercise to promote weight loss [14]. Among both sexes, an incorrect body perception has been associated with engaging in exercise to increase physical attractiveness [15]. When taken in context of the Health Belief Model [16], the perception of students regarding the future health ramifications of their BMI's seems to be minimal. At the late adolescent/early adult stage, college students showed little deference to health risk susceptibility of higher BMI's and were much more concerned with physical attractiveness and athletic performance [9,10,14].

College campuses also present a distinct, competitive environment where college students are often evaluated by their physical appearance [17]. Additionally, the college years represent a unique time when life-long health habits are formed [6]. Accurate weight perception may be important among college students as the transition from high school to the college environment has been proposed to result in weight gain and unhealthy weight management practices [18]. While research exists regarding body satisfaction and self-esteem among the college population [17-21], there is a lack of research regarding college students' self-classification of body weight status in comparison to medical weight classification. The purpose of this study was to assess the correctness of self-classification of body weight status among a diverse sample of college students. Specifically, the research aims were to evaluate the correctness of self versus medical classification of body weight status, including differences by sex, relative frequency of overweight level (i.e. pounds greater than normal weight BMI) among overweight and obese participants, among participants who did not correctly identify that they were overweight, and among those who correctly identified that they were overweight.

Methods

Study Population

This study is part of a larger study that investigated health behaviors and attitudes among college students. A sample of convenience (N = 130), consisting of freshman through graduate students

(mean age=21±3), was generated from a common campus location (student union), at a single southern university. The location and timing of the study limited the population to students on campus during working hours (9-5). This study was approved by the Institutional Review Board at the institution at which the data collection took place. Participants signed a written consent form after receiving verbal and written information regarding the objectives of the study, and steps to be taken (written survey followed by anthropometric data collection), and the expectations of the subject prior to participation. The written survey was performed first so that anthropometric data was not available to any subject with prior knowledge of BMI classifications.

Survey Instrument

Two of the questions from the researcher-developed survey that were used in the present study were designed to evaluate participant perceptions of their body weight status. This first question asked “Are you overweight?”, and the nominal response items were “yes” or “no”. The second question asked “Which of the following best describes you?” and the response items included “obese”, “moderately overweight”, “overweight”, “normal weight”, “underweight”, and “severely underweight”. For analysis, the categories of “moderately overweight” and “overweight” were combined due to lack of objective distinction between these classifications on the survey.

Anthropometry

To collect anthropometric data, research assistants recorded height and body weight measurements. Weight was measured to the nearest lb (*MedWeigh* digital scale, model MS-3200), height to the nearest 0.5 in (*Seca* portable stadiometer, Leicester, England). Shoes, but no clothing items, were removed for these measurements. Height and weight were used to calculate BMI (kg/m^2) and participants were classified into BMI groups. If participants classified as overweight or obese, they were further categorized by level of overweight. The body mass index table published by the NIH/National Heart, Lung, and Blood Institute was used to calculate the number of pounds overweight or obese individuals were, above maximum “normal weight” BMI limit ($24.9 \text{ kg}/\text{m}^2$) [22]. The number of pounds above maximum “normal weight” was used for overweight level analysis in which each participant was assigned an overweight score. This method was used versus

“BMI over normal”, as it negated the subjects requirement of a prior knowledge of BMI and used a common language that was more appropriate for the sample population as per previous research by Malinuaskus, et.al. [18] Overweight scores were established as follows:

- 0 = not overweight
- 1 = 1-5 lbs overweight,
- 2 = 6-10 lbs overweight
- 3 = 11-15 lbs overweight
- 4 = 16-20 lbs overweight
- 5 = 21-25 lbs overweight
- 6 = 26-30 lbs overweight
- 7 = 31-35 lbs overweight
- 8 = 36-40 lbs overweight
- 9 = 41-46 lbs overweight
- 10 = 46-50 lbs overweight
- 11 = ≥ 51 lbs overweight

For data interpretation and graphing purposes, levels were stratified as: 0-10 lbs, 11-20 lbs, 21-30 lbs, 31-40 lbs, 41-50 lbs and ≥ 51 lbs overweight. Twenty-eight participants were removed from the data set due to missing or ambiguous survey responses which created a final sample size of 102 participants.

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 15.0 [23]. Data were expressed as mean \pm SD. Other descriptive statistics included frequencies (n , %). Pearson Chi-Square analysis was used to evaluate correct body weight perception between males and females. Further analysis included independent samples t-tests to compare means between males and females and between participants with correct body weight perceptions versus those with incorrect body weight perceptions. Statistical significance level was set at $p < 0.05$.

Results

Evaluation of the correctness of self-classification of body weight status

Participants were 102 college students (45 males/44%, 57 females/56%), mean (\pm SD) age 21 \pm 3 years (95% CI, 19.9, 21.2), attending a university located in the Southeastern region of the U.S. By ethnicity, 80% of participants were Caucasian, 10% African-American, 3% Asian American, 2% Hispanic, and 5% classified as “Other.” In

comparison, the U.S. Department of Education (2009), states the average college student is 23 years old, 56% female and 44% male, 62.3% white, 14.3% African American, 6.5% Asian/Pacific islander, 12.5% Hispanic, and 1% Native American. Overall, 28% of participants were overweight and 17% were obese. By sex, a greater proportion of males (51%) than females (39%) presented with overweight or obese conditions ($p < 0.01$).

In regard to the first research aim, evaluating the correctness of self versus medical classification of body weight status, 78% of participants correctly identified whether or not they were overweight (Table 1). When compared by grade level, 44% of underclassmen ($n = 13$ of 60) incorrectly identified their weight status while 47% ($n = 8$ of 37) of upperclassman incorrectly identified theirs. No graduate student ($n = 4$) incorrectly identified their weight status. Overall, the mean BMI of participants who were incorrect in classifying their body weight status was significantly greater than those who correctly identified their status ($p < 0.05$).

As reported in Table 1, all participants who were underweight or normal weight correctly identified their weight status, whereas 49% of overweight or obese participants were incorrect in identifying theirs. Among participants who incorrectly classified their body weight status, the mean BMI was 27.2 ± 2.7 kg/m² (95% CI, 26.0, 28.4) whereas the mean BMI of participants who were correct was 24.4 ± 6.7 kg/m² (95% CI, 23.3, 26.2). Of participants who were overweight or obese yet failed to classify themselves as such ($n = 22$), 86% had a BMI of 25 to 28 kg/m², the remainder ranged 33 to 34 kg/m². See Table 1 for accuracy of self-versus medical classification of body weight status.

Evaluation of body weight status by sex

Table 2 provides results pertaining to the second research aim, evaluating correctness of self- versus medical classification of body weight status by sex. A significantly greater percent of overweight and obese females (91%, 20 of 22) than males (22%, 5 of 23) correctly classified themselves as presenting with an overweight condition ($p < 0.01$). In regard to obese participants only ($n = 17$, 4 males, 13 females), no obese males reported that they were obese, two of the four reported being overweight or moderately overweight, and two of the four reported being normal weight. Thirty-one percent of obese females (4 of 13) reported that they were obese and 69% (9 of

13) overweight or moderately overweight. In regard to overweight participants only ($n = 28$, 19 males, 9 females), 84% of overweight males (16 of 19) incorrectly classified themselves as normal weight, whereas 78% of overweight females (7 of 9) correctly classified themselves as overweight or moderately overweight. Regardless of sex, no participant classified their weight status in a category greater than their medical weight classification. Further, all participants who incorrectly reported their weight status chose a category lower than their medical weight classification.

Evaluation of body weight status by level of overweight

The results for the third research aim, to identify the relative frequency of overweight among overweight and obese participants ($n = 45$), are reported in Figure 1. The maximum normal weight was body weight, expressed in pounds, corresponding to the “normal weight” BMI (24.9 kg/m²) for each participant. The majority of participants (53%, $n = 24$) were ≤ 20 pounds greater than the maximum normal weight BMI; 20% ($n = 9$) were ≥ 51 pounds above. Refer to figure 1.

Evaluation of level of overweight by correct body weight perception

The final research aim was to evaluate the relative frequency of overweight among participants who incorrectly identified that they were overweight ($n = 22$, Figure 2) and among those who correctly identified that they were overweight ($n = 23$, Figure 3). Participants who correctly identified themselves as overweight were a mean of 0-10 pounds overweight (mean overweight score 2.0 ± 3.7 , 95% CI 1.2, 2.8) whereas those who incorrectly identified themselves as overweight were a mean of 11-20 pounds overweight (mean overweight score 3.3 ± 3.1 , 95% CI 1.9, 4.7). The distribution of overweight among participants who incorrectly identified that they were overweight exhibited a skewed distribution; the majority (54%, 12 of 22) were ≤ 10 pounds over the maximum normal weight BMI and 9% ($n = 2$) were ≥ 51 pounds over. The distribution of overweight among participants who correctly classified themselves as overweight was more symmetrical, although 31% (9 of 23) were ≥ 51 pounds over. Refer to figures 2-3.

Discussion

The purpose of this study was to investigate if college students' are correct in classifying their weight status, to identify differences in correctness between sexes, and disparities between body weight classification among overweight students who correctly versus incorrectly classified their weight status. With the obesity epidemic spreading throughout all age and education levels [24], it is important that college students have a realistic view of their body weight.

In the current study, 44% of participants were overweight or obese, which is nearly three times the goal set by the Healthy Campus 2010 initiative. This initiative strives to maintain the prevalence of overweight and obesity among college students at 16% and lower [5]. While 78% of participants in the present study correctly identified if they were overweight, 42% of males were incorrect in identifying their weight status, whereas only 5% of females were incorrect. Further, regardless of sex, all individuals who were incorrect under-classified their weight status. The fact that the overwhelming majority of females were aware of their weight status may be due to the appearance driven culture and media in the U.S. [7]. More than ever before, today's media culture greatly influences the public's perception of ideal female body type. Popular television shows that revolve around females and their body shape or size likely influence the degree to which females are aware of their body size and weight status [24]. Recent educational efforts to dispel the "ideal" female body and encourage females to be accepting of their body at any size may explain the results of females viewing themselves in lower weight status levels rather than in higher weight status levels, an apparent new trend [26]. Previous studies have found large percentages of females classifying themselves as overweight, regardless of their weight status [7-10, 21]. Conversely, the high percentage of males under classifying their weight status is consistent with current literature [7-10, 21]. These findings, that college students perceived themselves to fall into lower weight categories, regardless of an overweight condition, are of concern because students may not engage in any healthy preventative or corrective weight control measures if they do not believe themselves to be overweight or obese.

An important finding from this study that deserves further investigation was that the mean BMI for those who correctly identified their weight status was

within the normal weight range, whereas for those who were incorrect, had a mean BMI in the overweight range. Further research should evaluate more comprehensively if college students who are more aware of their body weight status are more likely to be normal weight. Our findings would suggest that this is the case. Additionally, those who were correct in their body weight classification were less overweight (mean of 0-10 pounds) than those who were incorrect (mean of 11-20 pounds). Recognition of overweight at low overweight levels is a positive finding, but it is concerning that greater body weight in the overweight occurred in participants who incorrectly classified their weight status. Although participants who incorrectly classified their overweight status exhibited a mean of 11-20 pounds greater than recommended, 54% were a maximum of 10 pounds greater than the maximum normal weight corresponding to a BMI of 24.9 kg/m². Presenting with moderate excess weight while not classifying oneself as overweight, which was found in the present study, may suggest changing norms in our nation regarding socially-acceptable body weight status among young adults indicating that the new "normal" weight is now overweight [21]. This emerging trend represents a slippery slope in that greater acceptance of larger body shapes and sizes in the general public may allow individuals to become comfortable with their body weight at levels that may compromise their health status. Research from prospective studies on females indicated that risks for cardiovascular disease and diabetes are increased in individuals considered normal weight or with weight gain as little as 10 pounds [27, 28]. Risks for cardiovascular disease and overall mortality appeared to be further increased if as little as 20 pounds are gained past the age of 18[27, 29].

Results from the present study suggest that there is great room for improvement in college students' body weight perception, especially among males. Given that those who were aware of their weight status had a lower average BMI, educational interventions that instruct individuals on what is considered a correct "normal" body weight may help decrease the proportion of students that misclassify their own weight in regard to a compromised health status. Particularly among college students who incorrectly classify their weight status, educational strategies designed to aid students in identifying their weight status and identify the possible health consequences associated with an overweight or obese condition are warranted. Intervention strategies based on the health belief model and other appropriate approaches to identify college students at unhealthy

body weights and to aid students in achieving a healthy body weight may provide these young adults the knowledge required to make personal judgments and choices regarding health behaviors, such as diet and exercise patterns, that they will continually make throughout their lives [30].

While the findings from this study contribute to the understanding of body weight perceptions among college students, there are limitations that deserve mention. The study sample was a convenience sample and therefore optimal diversity was not achieved. Heights and weights were researcher recorded, thereby avoiding errors in participant reporting, but wrist circumference was not measured. Wrist circumference, an indirect measurement of bone frame size, is a determinant in acceptable body weight limits. Weighing participants with their clothes on may have also contributed to inconsistencies between perceived and actual weight status. Finally, BMI measurements do not take into account body composition assessment (muscle and fat mass) which individuals likely took into account when evaluating their weight classification. This may be of specific importance among college males as males typically have a greater proportion of muscle mass than females [8]. Thus, it is not known how many males from the present study who were classified as overweight had large amounts of muscle, but not fat mass, and thus their high body weight would not put them at increased health risk. Future research should employ body composition assessment, such as bioelectrical impedance analysis, to more accurately assess actual body composition. By distinguishing between fat mass and muscle mass, a body composition assessment may explain some of the discrepancy between perceived body weight status and medical body weight status.

It is becoming more obvious that measures are needed to help reduce the prevalence of overweight in order to preserve the health of our nation. Identifying the correctness of young adults' body weight classification may help health professionals further understand our society's overweight phenomenon. These identifications represent a starting point from which tailored interventions can be constructed in order to help curb excess weight gain in the college years and subsequently reduce overall rates of overweight and obesity and their associated comorbidities.

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Table 1 Accuracy of self- versus medical classification of body weight status

Self-classification of body weight status ^a		
	N = 102	
Medical classification of body weight status	Accurate	Inaccurate
Obese (n =17)	82 (14)	18 (3)
Overweight (n = 28)	32 (9)	68 (19)
Normal weight (n = 56)	100 (56)	0 (0)
Underweight (n = 1)	100 (1)	0 (0)

Values are expressed as % (*n*)

^a In response to the question “Are you overweight?”

Table 2 Self versus medical classification of body weight status from body mass index

Medical classification	Self-classification of body weight status			
	Obese	Overweight or moderately overweight	Normal weight	Underweight
Males (n = 45)				
Obese (n = 4)	--*	50 (2)*	50 (2)	--
Overweight (n = 19)	--	16 (3)*	84 (16)	--
Normal weight (n = 22)	--	--	96 (21)	4 (1)
Underweight (n = 0)	--	--	--	--
Females (n = 57)				
Obese (n = 13)	31 (4)*	69 (9)*	--	--
Overweight (n = 9)	--	78 (7)*	22 (2)	--
Normal weight (n = 34)	--	--	58 (33)	3 (1)
Underweight (n = 1)	--	--	--	3 (1)

*Values are expressed as % (n).

* $P < 0.001$, independent samples t-test; A significantly greater percent of overweight and obese females (91%, 20 of 22) than males (22%, 5 of 23) correctly classified themselves as presenting with an overweight condition ($p < 0.001$).

Figure 1

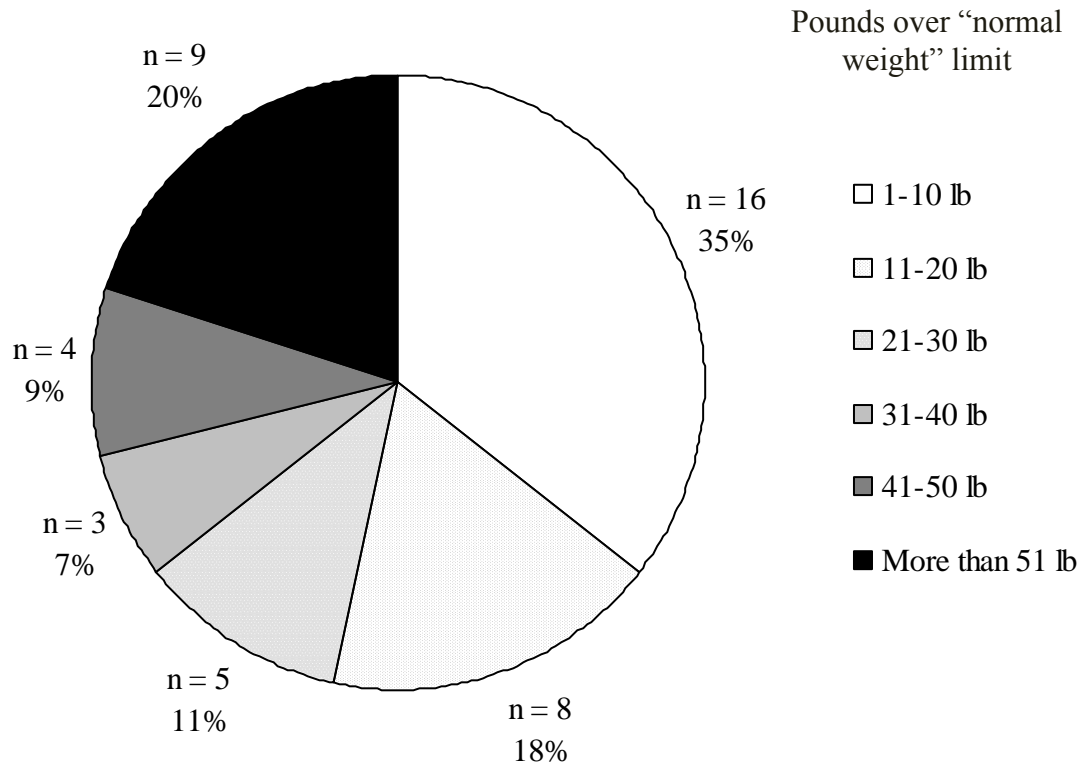


Fig. 1. Relative frequencies of overweight levels in overweight and obese participants (n = 45) based on maximum "normal weight" BMI^a (24.9 kg/m²). The body mass index table published by the NIH/National Heart, Lung, and Blood Institute was used to calculate the number of pounds overweight or obese individuals were, above maximum "normal weight" BMI limit (24.9 kg/m²) [22]. Participants' pounds over "normal weight" were found by subtracting the maximum pounds allowed for a BMI of 24.9 kg/m² from researcher-recorded participant weight in pounds.

^a Body mass index

Figure 2

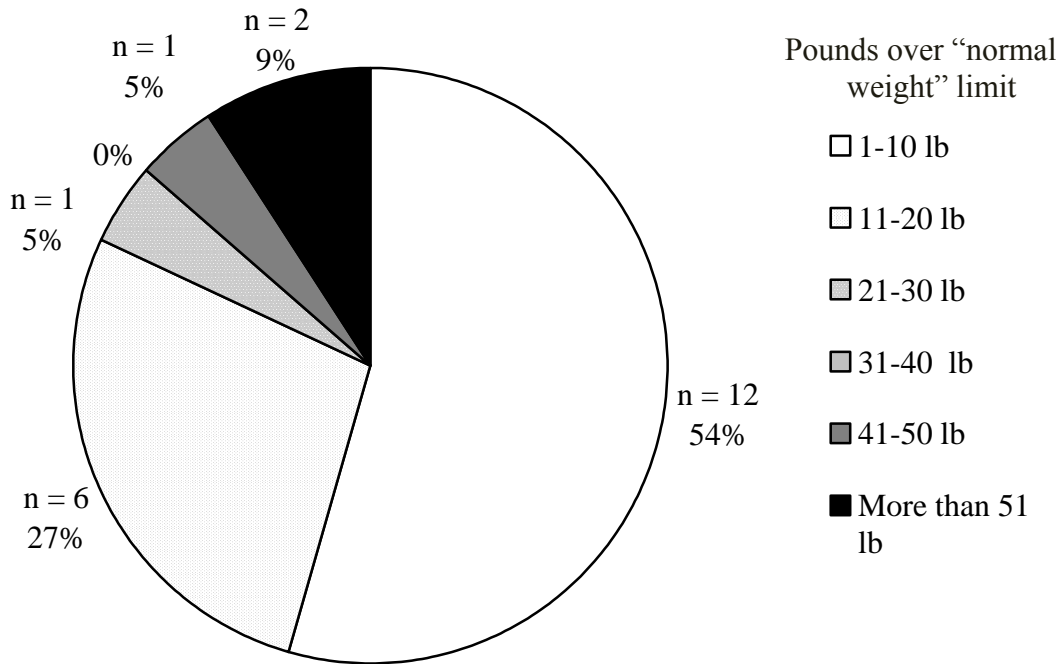


Fig. 2. Relative frequencies of overweight levels in participants who did not correctly identify that they were overweight (n = 22) based on maximum "normal weight" BMI^a (24.9 kg/m²). The body mass index table published by the NIH/National Heart, Lung, and Blood Institute was used to calculate the number of pounds overweight or obese individuals were, above maximum "normal weight" BMI limit (24.9 kg/m²) [22]. Participants' pounds over "normal weight" were found by subtracting the maximum pounds allowed for a BMI of 24.9 kg/m² from researcher-recorded participant weight in pounds.^a Body mass index

Figure 3

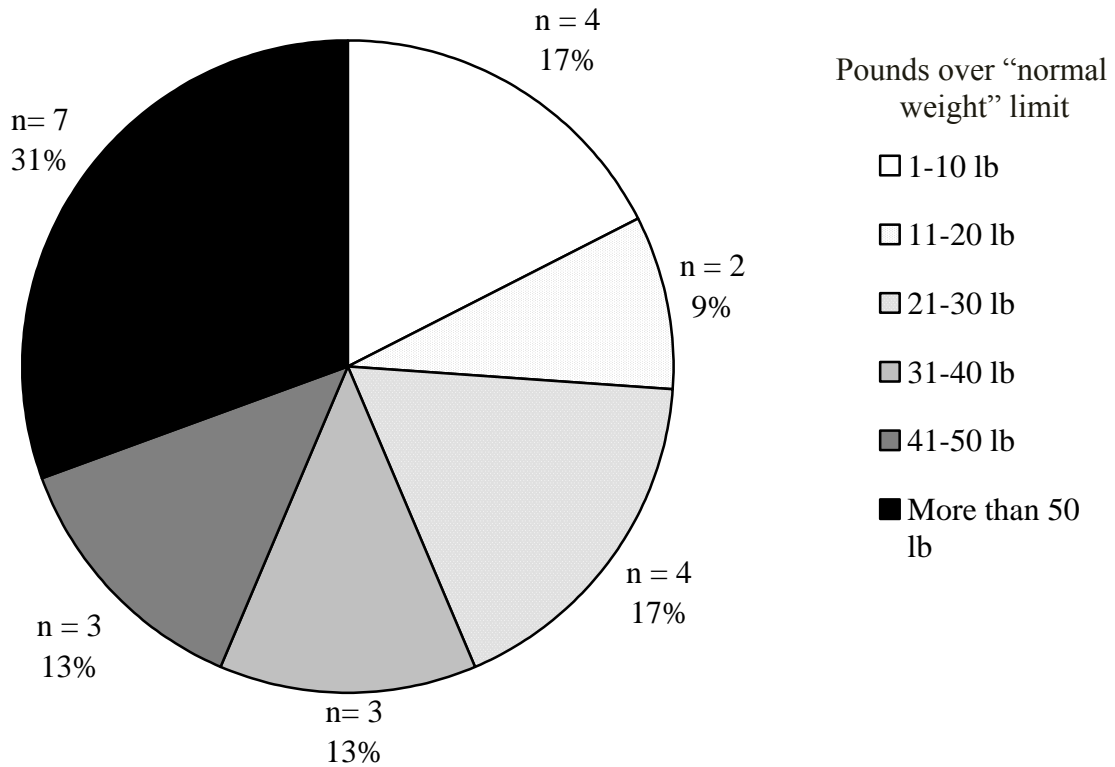


Fig. 3. Relative frequencies of overweight levels in participants who correctly identified that they were overweight (n = 23) based on maximum "normal weight" BMI^a (24.9 kg/m²). The body mass index table published by the NIH/National Heart, Lung, and Blood Institute was used to calculate the number of pounds overweight or obese individuals were, above maximum "normal weight" BMI limit (24.9 kg/m²) [22]. Participants' pounds over "normal weight" were found by subtracting the maximum pounds allowed for a BMI of 24.9 kg/m² from researcher-recorded participant weight in pounds.^a Body mass index