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Appropriate Classification of Obesity of Mentally Retarded Adults

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Triceps skinfold thickness and body weight measures were obtained for 44 female and 40 male mentally retarded adults participating in a sheltered workshop setting. Subjects' relative weights and skinfold thicknesses were found to correlate reasonably well for females and males, *r*s = .88 and .59, respectively. Use of only height and weight tables for determining the presence of obesity, however, resulted in 22.5 percent of the males and 13.7 percent of the females being misclassified as nonobese. The distinction between overweight and obesity was discussed. Clinical/research implications of the findings were delineated.

Research has shown that obesity is a prevalent condition among mentally retarded individuals (Fox & Rotatori, 1982). Measurement is a crucial aspect of obesity research in terms of appropriate classification and subsequent treatment of this condition. Yet some confusion remains concerning how obesity is to be defined and measured. For example, the terms *overweight* and *obesity* have been used interchangeably in most clinical settings, although they are not identical (Bray, 1979). Obesity refers to surplus body fat whereas overweight indicates an excess in body weight relative to established height standards. Also, separate measures of excess body weight (such as the Metropolitan Life Insurance, 1977, desirable weight for height tables) and surplus body fat (e.g., skinfold thickness at various body sites) have been developed. Further complicating the situation, a review of the literature reveals a marked tendency for investigators and clinicians to use measures of overweight to describe a condition of obesity. Implicit in this practice is the assumption that measures of overweight correlate strongly with obesity measures.

The purpose of the present study was to test this assumption with a sample of re-

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tarded adults. Failure to find a strong relationship between obesity and measures of overweight would suggest that some individuals may be misclassified and thus not receive treatment for obesity. In a related study with nonretarded subjects, Johnson and Stalonas (1977) found that body weight correlated minimally with triceps skinfold measures, $r = .34$. In the present study we were interested in determining the relationship between relative body weight (or percentage of desirable weight) with an estimate of body fat (as measured by triceps skinfold thickness). Subjects were 40 males and 44 females drawn from two sheltered workshops for mentally retarded adults. The mean age of both males and females was 31 years (standard deviation [*SD*] = 10). Half of the subjects ($n = 42$) were chosen by the staff of one workshop to participate in a separate study. These subjects represented two extremes of the weight continuum (obese and thin). The remaining 42 subjects were randomly selected from a second workshop.

Each subject was weighed (accurate to ½ pound) and measured (accurate to ¼ inch) on a standard medical scale. Desirable weights for subject heights were determined from the Fogarty Center Table (Bray, 1979), which was adapted from the Metropolitan Life Insurance Table. The advantage of the Fogarty Table is that it does not require estimates of body frame size to determine desirable weights for heights. For females between the ages of 18 and 25, one pound was subtracted from the table's desirable weight value for each year under 25. Regression equations were used to establish desirable weights for subjects' heights not included on the Fogarty Table. The relative weight for each subject was calculated as follows:

$$\text{Relative Weight} = \frac{\text{Present Weight} - \text{Desirable Weight}}{\text{Desirable Weight}} \times 100$$

In addition to height and weight data, triceps skinfold thickness was obtained for each subject. In order to facilitate reliable measurement, we used a tape measure to locate and mark the midpoint between the top of each subject's acromion process (at the shoulder) and olecranon process (at the elbow) on the left arm. Using this midpoint, two experimenters independently measured and recorded each subject's triceps skinfold thickness in mm with a Lange skinfold caliper. The caliper was checked for accuracy, using a standard sized metal block, before each measurement session. Analysis of the skinfold data revealed a significant correlation between the measurements by the two experimenters, $r\ (82) = .99$, $p < .001$; the experimenters never deviated from each other's measure by more than 4 mm, mean deviation = 1.4 mm, mode = 1.5 mm.

Relative weight and skinfold data for the subjects by sex is shown in Table 1. The relative weight values and triceps skinfold thicknesses for males correlated $r\ (38) = .59$, $p < .001$; for females, the correlation between these measures was $r\ (42) = .88$, $p < .001$. A correlation of $r\ (82) = .76$, $p < .01$, was found for the entire sample.

Based on established cutoff values for defining obesity (i.e., relative weight value of 20 or more [Robinson, 1972]; skinfold thickness of 18 mm for males and 25 mm for females [Frisancho, 1974]), 16 males and 18 females in the present study would be classified as obese by their relative weight; 22 males and 23 females would be diagnosed as obese based on skinfold measures. Discrepancies found between the relative

TABLE 1

RELATIVE WEIGHT (IN PERCENTAGES) AND TRICEPS SKINFOLD THICKNESS (IN MM) BY SEX

	Relative weight				Tricep skinfold thickness			
Subjects[a]	Mean	*SD*	Mode	Range	Mean	*SD*	Mode	Range
Males	17.3	29.5	10.0	−22.1 to 91.9	20.5	10.4	19.0	5 to 50
Females	25.2	34.9	11.7	−10.8 to 142.9	26.1	11.6	25.5	9 to 54

Note. Relative weight = present weight minus desirable weight divided by desirable weight times 100.
[a] 40 males, 44 females.

weight and skinfold measure resulted from 1 female and 3 males being classified as obese by relative weight and not by skinfold scores; 6 females and 9 males were classified as obese by skinfold and not by relative weight scores. Percentages of subjects classified as obese by each measure alone and the combined measures (i.e., classified as obese by relative weight or skinfold thickness) is shown in Table 2. Based on the percentages of subjects classified as obese using the combined measures, the data in Table 2 indicates that 22.5 percent of the males and 13.7 percent of the females in the sample would be misclassified as nonobese using the relative weight formula alone; 7.5 percent of the males and 2.3 percent of the females would be misclassified as nonobese by the triceps skinfold measure used alone.

TABLE 2
SUBJECTS CLASSIFIED AS OBESE BY VARIOUS MEASURES (IN PERCENTAGES)

Subjects[a]	Relative weight alone	Skinfold thickness alone	Relative weight or skinfold thickness
Males	40.0	55.0	62.5
Females	40.9	52.3	54.6
Total sample	40.5	53.6	58.3

[a] 40 males, 44 females.

Although relative weight and skinfold thickness data were found to correlate reasonably well for our sample, greater errors in classification for a given individual were likely to occur when only the height–weight tables were used for measurement. Errors of misclassification of an obese condition were reduced through the combined use of skinfold thickness and relative weight measures.

It is important to remember that heaviness and corpulence are different concepts; therefore, it is possible for a person to be overweight and underfat or overfat and not at all heavy (Seltzer & Mayer, 1965). Successfully defining overfat (obese) individuals requires using both heaviness and fatness estimates (Le Bow, 1981). In fact, Durnin and Rahaman (1967) recommended several measures be used including multiple skinfold measures at various body sites (e.g., biceps, subscapular) and anthropometric measures (e.g., waist, thigh circumference). Using at least triceps skinfold thickness and relative weight measures in obesity related work should help to ensure that a given individual desiring or in need of treatment for obesity is served. This is potentially important in light of the increased health implications associated with obesity, including cardiovascular disease, respiratory problems, and diabetes (Van Itallie, 1979).

Future investigators should address the reasons for discrepant classification outcomes based on height–weight and skinfold thickness data. For the present, particular syndromes commonly associated with mental retardation (e.g., Down syndrome) did not account for the discrepant findings in the present sample. It is likely that several factors, such as site of skinfold thickness measurement, subject age and sex, and measurement method and errors, contribute to diagnostic discrepancies. These factors require identification in order for professionals to arrive at a valid and reliable classification system for obesity.

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