Incidence of Obesity Among Mentally Retarded Children

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Abstract: Incidence of obesity was determined for a sample of 337 mentally retarded children drawn from a population attending a large urban school system. An obese condition was identified in over 22 percent of the sample. Presence of obesity was not related significantly to sex, age, mental retardation level or race. Based on available comparative data, obesity does show a higher incidence among retarded children than nonretarded children. The present sample closely resembled the population from which it was selected allowing some generalization of the findings.

Obesity is one of the most common and refractory health problems occurring today (Brownell and Stunkard, 1978). In American society, 24 percent of women and 14 percent of men between the ages of 20 and 74 are obese (Abraham and Johnson, 1979). Obesity is also prevalent among the adult mentally retarded population. From a sample 1152 subjects across four setting, Fox and Rotatori (1982) found that 25.1 percent of adult retarded females and 15.6 percent of the males were obese. Wallen and Roszkowski (1980) reported an overweight incidence of 45 percent for females and 26 percent for men from a sample of 149 institutionalized retarded adults. Of interest in both studies was the common finding that excess weight is more common in mild to moderately retarded persons than those in the severe to profound range.

Obesity in children has recently attracted considerable attention (Brownell and Wadden, 1984). Part of the concern for this younger population relates to the evidence that overweight children have a high probability of becoming overweight adults (Abraham and Nordsieck, 1960). Stunkard and Burt (1967) estimated that the odds against an overweight child, who does not attain normal weight during adolescence, becoming an average weight adult are 28 to 1. Researchers have also turned to younger populations for study because of the persistent problems that arise when treating an obese condition in adults. For example, in programs for obese retarded adults, high inter-individual variability in weight loss during program implementation and relatively poor long term maintenance of weight loss once treatment has terminated continue to challenge researchers working with this population (Fox, Haniotes and Rotatori, 1984). Research (Epstein, Masek and Marshall, 1978) has begun to focus treatment efforts on younger obese populations to prevent obesity from becoming a life-long condition and potential health hazard.

A logical beginning point for the study of obesity among children is to determine the extent of this condition in this population. Studies with infants cite obesity prevalence figures ranging from six to 35 percent (Myres and Yeung, 1979). Raugh, Schumsky and Witt (1967) estimated obesity occurs in ten percent of children; Huse, Branes, Colligan, Nelson and Palumbo (1982) found obesity ranging from approximately nine to 15 percent in elementary school children. Brownell and Stunkard (1978) reviewed the literature and stated that 25 percent of all children are obese. Only two studies could be found relative to obesity in mentally retarded children. Chumlea and Cronk (1981) analyzed data from three large growth studies of children with trisomy 21 and concluded that their results "strongly suggest that overweight is characteristic of children with trisomy 21 up to the adolescence period and that probably it begins in late infancy or early childhood around two to three years of age" (p. 179). Yokoyama (1983) studied an institutionalized...
A sample of mentally retarded children in Japan that included 443 boys and 250 girls. For males, seven to 17 percent were considered obese in relation to standard weight tables from the Ministry of Education in Japan; 11 to 31 percent of females were obese. In a nonretarded control sample of 339 boys and 302 girls in the same study, obesity was reported to range from six to seven percent for both sexes.

Although limited data pertaining to the treatment of obesity in mentally retarded children and adolescents is available (Fox, Switzky, Rotatori, and Vitkus, 1982; Jackson and Thorbecke, 1982), currently no survey data regarding obesity in retarded children in America has been reported.

This study was designed to obtain a representative sample of a population of mentally retarded children attending a public school system in a large urban city. The purpose was to measure each child within the sample to generate incidence figures for obesity in retarded children by age, sex, and mental retardation level.

Procedure

Subjects and Design

A large urban Midwestern city with a total population of 636,000 was the site for this study. Data provided by the city’s public school system indicated that from a school population of 89,000, approximately 1500 students were enrolled in programs for the mentally retarded. For this study we chose to focus on children between the ages of 5.5 to 15.4 years (representing the elementary and middle school populations); 709 retarded children were in this age range. Of the 33 schools providing programs for these children, 27 agreed to participate in the present study. Letters describing the study and permission forms were sent to parents through the children's special education teachers. A total sample of 337 subjects (180 males, 157 females) was obtained representing 47.5 percent of the original population (N = 709). Each subject’s school file was reviewed to obtain the child’s birthdate and mental retardation level. The latter were taken from psychological reports that were updated in the schools every three years.

For this study, subjects were stratified by sex, age-group and mental retardation level. Two age groups were used: 5.5 to 10.4 years and 10.5 to 15.4 years; two mental retardation levels were used: mild; moderate to profound. The number and percentage of subjects from the original population (N = 709) and our sample (N = 337) for each stratified variable are shown in Table 1. As shown in Table 1, the percentages of subjects in the sample for each of the stratified variables were reasonably close to that of the original population.

<table>
<thead>
<tr>
<th>Sex</th>
<th>Age-group</th>
<th>MR Level</th>
<th>Population (N = 709)</th>
<th>Sample (N = 337)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N</td>
<td>Percent</td>
</tr>
<tr>
<td>M</td>
<td>Younger</td>
<td>Higher</td>
<td>101</td>
<td>14.2</td>
</tr>
<tr>
<td>M</td>
<td>Younger</td>
<td>Lower</td>
<td>52</td>
<td>7.3</td>
</tr>
<tr>
<td>M</td>
<td>Older</td>
<td>Higher</td>
<td>172</td>
<td>24.3</td>
</tr>
<tr>
<td>M</td>
<td>Older</td>
<td>Lower</td>
<td>54</td>
<td>7.6</td>
</tr>
<tr>
<td>F</td>
<td>Younger</td>
<td>Higher</td>
<td>75</td>
<td>10.6</td>
</tr>
<tr>
<td>F</td>
<td>Younger</td>
<td>Lower</td>
<td>38</td>
<td>5.4</td>
</tr>
<tr>
<td>F</td>
<td>Older</td>
<td>Higher</td>
<td>171</td>
<td>24.1</td>
</tr>
<tr>
<td>F</td>
<td>Older</td>
<td>Lower</td>
<td>46</td>
<td>6.5</td>
</tr>
</tbody>
</table>

* Younger, 5.5–10.4 years; Older, 10.5–15.4 years.

* Higher, mild MR; Lower, moderate to profound MR.
Ipsing the stratified variables revealed that 53.5 percent of the original population were male compared to 55.4 percent of the sample; for females the figures were 46.5 percent and 46.6 percent, respectively. For the population, 73.2 percent were mildly retarded, 26.8 percent were moderately to profoundly retarded; for the sample, the percentages were 68.3 and 31.7, respectively. Younger subjects (5.5 to 10.4 years) comprised 37.5 percent of the population and 35.0 percent of the sample; 62.5 percent of the population were in the older category (10.5 to 15.4 years) compared to 65.0 percent for the sample. While not of the direct interest in the design of the present study, data regarding the racial background of the subjects were also collected. Comparative percentages for the population and study sample, respectively, were: Black (62.1, 59.1), White (31.3, 34.4) and Hispanic (5.3, 6.5).

Measurements
All measurements were taken by trained examiners in the subjects’ schools. For all measures, children were clothed without shoes. Each child was measured separately by two independent examiners. Comparisons of data recordings between observers that were beyond the established error limits for each measure (see below) lead to a second measuring. Weight was measured to the nearest 0.5 kg using a Detecto Digital Scale (Model 70291). At each school, the scale was calibrated using a 5 kg standard weight. Given that the scale provided an easily-read, illuminated digital figure, examiners were required to agree exactly on the weight measure. Height was measured to the nearest 0.5 cm using a height rod attached to the Detecto Scale. The height rod included a sliding horizontal plate that was placed on the top of the subject’s head. Care was taken to insure that the subject stood erect with eyes forward and with the horizontal plate parallel to the floor. Again no inter-examiner variance on the height measure was permitted. Triceps skinfold thickness is one of the best indexes of the amount of fat in the body (Seltzer and Mayer, 1965). Heaviness (based on height and weight) and corpulence (estimated from skinfold measures) are different concepts; therefore it is possible for a person to be overweight and underfat or overfat and not at all heavy. The triceps measure was included to address specifically the fatness issue that height and weight measures only indirectly assess. Tricep skinfold thickness was measured using a Lange Skinfold Caliper. The caliper was calibrated for accuracy at each school with a precision-made, steel standard block measuring from ten to 50 mm at ten mm intervals. In order to insure an accurate skinfold measurement site, a tape measure was used to locate and mark the midpoint between the tip of each subject’s acromion (at the shoulder) and olecranon process (at the elbow) on the left arm. An acceptable error range of three mm was used between examiners.

Results

Relative Weight
The relative body weight of each child was calculated using the weight-for-length index (WLI):

\[
WLI = \frac{A}{B} \times 100
\]

Where: \( A = \) actual weight (kg) and \( B = \) weight (kg) for age 50th percentile expected

\[
50th \text{ percentile expected height (cm) for age}
\]

The 50th percentile, standard height and weight for age data were taken from the National Center for Health Statistics Growth Charts (1976). DuRant and Linder (1981) concluded that the WLI was the most accurate measure of relative body weight for children of five popular indexes studied. The validity of WLI for relative body weight is its low correlation with height and age (DuRant, Martin, Linder, and Weston, 1980). In the present sample, WLI and height values correlated at \( r = -0.01 \); the correlation found between WLI and age was .28. Interpretation of WLI scores is straightforward: 90–109 represents the normal range with 100 the ideal score; 89 and below indicates the child is underweight; 110 to 119 is considered overweight and obesity is defined as scoring 120 or more. The relative body weight was computed for each subject.
in our sample. The number and percentage of subjects classified by the WLI as underweight, normal weight, overweight and obese are shown in Table 2.

Based on the data in Table 2, a number of Chi-square analyses were performed. A significant relationship was found ($\chi^2(3, N = 337) = 18.9, p < .001$) between sex and relative weight category (underweight, normal weight, overweight and obese). Contributing to this significant finding was the greater incidence of overweight among females (17.2 percent) compared to males (5.6 percent), and the greater incidence of underweight among males (35.6 percent) compared to females (19.1 percent). Similar percentages were found between the obese category for males (22.2 percent) and females (22.9 percent). A significant relationship was also found between relative weight category and age group (younger, older) for females only ($\chi^2(3, N = 157) = 8.3, p < .05$). A greater percentage of older females were overweight (20.4 percent) compared to younger females (9.1 percent); more younger females (31.8 percent) were underweight than older females (14.2 percent). Obesity was present at similar levels in younger (25.0 percent) and older females (22.1 percent). A significant relationship between weight category and age was not found for the females ($p = .37$). In terms of relative weight categories, 18.9 percent of the younger males and 24.5 percent of the older males were underweight than moderately retarded males in the same weight category ($p = .26$). 20.2 and 21.1 percent of the mildly retarded girls were overweight and obese, respectively; for moderate to profoundly retarded girls, percentages were 10.4 and 27.1, respectively. No significant relationships were found between relative weight and race (black, hispanic, white) for either sex. In the sample, 21 children (12 males, 9 females) had Down syndrome; three of these children (2 males, 1 female) were overweight (14.5 percent) and six (4 males, 2 females) were obese (28.6 percent).

### Triceps Skinfold

Based on a sample of 16,895 white and 12,799 black participants (ages 1 through 80 years) from the Ten-State Nutrition Survey of 1968–1970, Garn and Clark (1976) developed a normative table of triceps fatfold. Separate values are given for triceps measures (in mm) at different percentile intervals for persons between 1 and 17 years of age with decade groupings used for older age groups. Using a recommended cutoff value of the upper 15% of fitness to define an obese condition (i.e., above the 85 percentile), the number and percentage of mentally retarded subjects in our sample classified as obese and nonobese by age group are shown in Table 3. Two subjects refused to participate with the skinfold measure. Combining all males, the mean skinfold thickness was 18.7 mm (SD = 7.97); for females the mean value was 21.0 mm (SD = 7.7). Chi-square analyses of the skinfold data revealed only one significant finding. A relationship was found between skinfold category (obese, nonobese) and sex ($\chi^2(1, N = 335) = 7.3, p < .01$). Contributing to this finding was a greater percentage of males (67.0 percent) than females (52.6 percent) with skinfold thicknesses above the 85th percentile. Correlations were computed between the weight-for-length index and the triceps skinfold data yielding significant r values ($p < .001$) of .73 for males and .68 for females.

### Discussion

The present study gathered preliminary data regarding the incidence of obesity among retarded children between five and 15 years of age in a large, urban public school system. The findings indicated that obesity is a com-
### TABLE 2

Relative Body Weight (WLI) by Sex, Age Group\(^a\) and Mental Retardation Level\(^b\) for the Sample (N = 337)

<table>
<thead>
<tr>
<th></th>
<th>Males (N = 180)</th>
<th>Females (N = 157)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Higher MR</td>
<td>Lower MR</td>
</tr>
<tr>
<td></td>
<td>Younger</td>
<td>Older</td>
</tr>
<tr>
<td>WLI</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>48</td>
<td>100</td>
</tr>
<tr>
<td>Lowest-89</td>
<td>14</td>
<td>29.2</td>
</tr>
<tr>
<td>90-109</td>
<td>25</td>
<td>52.1</td>
</tr>
<tr>
<td>110-119</td>
<td>3</td>
<td>6.3</td>
</tr>
<tr>
<td>120-over</td>
<td>6</td>
<td>12.5</td>
</tr>
</tbody>
</table>

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\(^a\) Younger = 5.5 to 10.4 years; Older = 10.5 to 15.4 years

\(^b\) Higher MR = mild; Lower MR = moderate to profound
TABLE 3

Triceps Skinfold by Sex and Age Group* for the Sample (N = 335)

<table>
<thead>
<tr>
<th></th>
<th>Younger</th>
<th>Older</th>
<th>Younger</th>
<th>Older</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>100</td>
<td>105</td>
<td>100</td>
</tr>
<tr>
<td>Obese</td>
<td>54</td>
<td>73.0</td>
<td>66</td>
<td>62.9</td>
</tr>
<tr>
<td>Nonobese</td>
<td>20</td>
<td>27.0</td>
<td>39</td>
<td>37.1</td>
</tr>
<tr>
<td>Females (N = 156)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Younger</td>
<td>25</td>
<td>56.8</td>
<td>57</td>
<td>50.9</td>
</tr>
<tr>
<td>Older</td>
<td>19</td>
<td>43.2</td>
<td>55</td>
<td>49.1</td>
</tr>
</tbody>
</table>

*Younger = 5.5 to 10.4 years, Older = 10.5 to 15.4 years

mon condition among retarded children. Over 22 percent of males and females in our sample were obese based on the weight-for-length index. Using the same relative weight index with 1830 children between 2 months and 18 years of age from low-income families, DuRant et al. (1980) reported that 8 percent of Black males and 10.3 percent of Black females were obese and 10.8 percent of white males and 10.4 percent of white females were obese. Given this limited comparative base, it appears that obesity may occur more frequently in retarded than nonretarded children.

Within our sample of students with retardation, overweight was greater among females than males. This sex difference has also been reported for adults who are mentally retarded (Fox and Rotatori, 1982). For females, overweight was observed more in older than younger children. Neither obesity nor overweight were found to be significantly related to mental retardation level. However for the females, there was a trend for more mildly retarded girls to be overweight than those in the moderate to profoundly retarded range. Measures of triceps skinfold thickness indicated that more males than females were above the 85th percentile for age.

Although underweight was not the thrust of this study, we found that 35.6 percent of males and 19.1 percent of females had relative weight indexes at or below the cutoff value for underweight. DuRant et al. (1980) reported that 17.4 percent of Black females and 22.6 percent of white females in their sample were underweight; 16.7 percent of the Black males and 20.7 percent of the white males were underweight. Comparing this data base with our own, underweight appears to be more common among mentally retarded males than nonretarded males. This same trend does not seem to be true for females.

While subjects in this study were not chosen randomly, the resulting sample did closely resemble the population from which it was drawn in terms of sex, mental retardation level, age-group, and race. Also as the majority of available schools participated in the study (82 percent), it seems reasonable to conclude that our sample was fairly representative of this larger retarded population. Whether these findings can be generalized to other large school systems will require further study. Certainly the distribution of races in our sample (e.g., 59.1 percent Black) will not be representative of many large urban school systems in the United States. However race was not found to be significantly related to obesity in the present study. Another variable, related to the question of generalizability, is the relationship between socioeconomic status (SES) and obesity in retarded children. After analyzing the Ten-State Nutrition Survey, Garn and Clark (1975) felt the data indicated "a compelling need to define fatness standards in terms of a socioeconomic reference" (p. 307). Future studies examining obesity in children with retardation should control this variable.

For now it is clear that obesity does occur frequently in retarded children. Consequently future efforts that address this potentially life-long condition are warranted. More studies are needed at the basic research level. Investigations on the individual characteristics of the obese retarded child (e.g., eating and activity patterns) as well as potential familial
factors (such as obese parents) are examples of such needed research. Only after this data base is established can the complex issue of etiology be adequately addressed. However while the basic research continues, active steps need to be taken now for retarded children who are obese. The treatment technology and curriculum materials developed by Rotatori and his colleagues (Rotatori and Fox, 1981; Rotatori, Fox, Litton, and Wade, 1985) should be useful for teachers and other professionals interested in designing a program for obese retarded children. The work published on nonretarded obese children may also have application potential (Winick, 1975).

References


