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Obesity in Black and White Mothers and Daughters

Some years ago, the National Heart, Lung, and Blood Institute (NHLBI) decided to sponsor a massive, collaborative, semilongitudinal study on the origins of obesity in adolescent girls. Given the early age at menarche in the US population, a starting or entry age of no more than 10 years was deemed necessary (age 9 might have been better). Equal numbers of Black and White girls were envisioned (for statistical comparisons), and since obesity is so obviously familial in nature, their mothers were to be included. Five different study sites were projected, both to attain sufficiently large working samples and to provide regional diversity (although not quite a national probability sampling).

We now have available some of the family-line data for 720 White girls and 580 Black girls, all aged 10 ± 0.6 years, derived from three different locations (Berkeley, Calif; Cincinnati, Ohio; and the Washington-Maryland area).[1] Along with anthropometries and calculated body mass indices for the girls and cooperating mothers, the data include lipid levels (cholesterol, high- and low-density lipoproteins, and triglycerides) and blood pressures, as well as socioeconomic data arranged by income categories.

The interest in these data resides particularly in the differences between White and Black girls in measures of weight, height, and serum lipids as absolute values, as interrelated values, and as correlates with the same measures in the girls' mothers.

Besides providing these initial (first-year) findings on 10-year-old girls and their mothers, this report is also an intriguing comment on the ability of the NHLBI to conceive, advertise, select institutions for, fund, and then macromanage a multicity collaborative study of this type while attending to measurement comparability and data quality. Nearly one third of the mothers of the original sample were uncooperative ("unavail-

Editor's Note. See related article by Morrison et al. (p 1761) in this issue.

able"), and it is not certain whether the remainder were all biological parents (i.e., no serological verification was conducted). Nevertheless, data quality appears to be excellent, and the findings are in accordance with what we have learned from smaller longitudinal samples studied in the past. Some of the most interesting findings, although serendipitous, are indeed welcome additions to our body of knowledge.

The Black–White anthropometric differences are large. Even at age 10, the Black girls in this study were 5 kg heavier, with thicker subcutaneous fat deposits and, of course, higher body mass indices, than the White girls. They were also 4 cm taller, a considerable stature difference that is indicative of a marked developmental advance. The Black mothers, although not taller than the White mothers, were themselves 8 kg heavier, with thicker skinfolds and far higher body mass indices. However calculated, both the Black girls at age 10 and their mothers were more often obese than their White counterparts. These differences are consistent with their lower income levels.

It is useful to have single-age mother–daughter correlations, based as they are on large samples. So often, parent–child correlations reported on in the earlier literature were derived from pooled ages and varied considerably in size because of sampling effects. Mother–daughter correlations for the anthropometric measures of relative fatness approximated 0.25 in both Blacks and Whites alike. They were a tiny bit higher for body mass index than for weight or skinfold since the weighting of body mass indices by lean body mass adds a variable that also contributes to the correlations. The 0.25 mother–daughter correlations for the various measures of adiposity are not so remarkable except that they can be cited as hard values with a very low standard error (±0.05). Similarly, the indication that the obese mothers, as variously calculated, have an excess of obese daughters is also not remarkable except again as hard numbers for this particular age group and sample. One may anticipate even better discrimination when these girls have attained menarche and the later stages of sexual maturation.

The greater stature of the nearly 600 10-year-old Black girls (by 4 cm, or approximately half an SD) merits particular attention for several reasons. First, it suggests that the combined-race growth charts in current use are inappropriate for Black girls of this age. Second, it has no parallel in their fully grown mothers. Third, it is consistent with data from the Ten-State Nutrition Survey, NHANES I, etc.,[2] which accord Black children of both sexes greater size from ages 2 through 14, despite their smaller size at birth and generally lower socioeconomic status. One might argue that the greater adiposity of these Black girls was auxogenic. It is nonetheless intriguing that their more adipose mothers were not similarly characterized by an advantage in stature. If adiposity promotes growth in daughters, should it not have also done so in their mothers? One looks to the stature comparisons at later ages to see how long the stature superiority of this sample of Black girls will persist.

Differences in lipid values were not all as expected. Consistent with greater adiposity, the Black girls and their mothers had slightly higher cholesterol levels than the White girls. Surprisingly, however, their triglyceride mean values were lower by about 10 mg/dL, or 0.3 SD, although this approximation is complicated by the highly skewed nature of all the lipid distributions. One wonders whether the markedly lower triglyceride values in both the Black girls and their mothers reflect a simple leftward shift in the glycerides or the relative absence of hypertriglyceridemics among them. In either case, blood pressures, both systolic and diastolic, were, as expected, a little higher in the Black girls and their mothers, consistent with greater adiposity or (possibly) independent of it.

The data on triglycerides are interesting both for the total sample of matched mothers and daughters and, especially, for the smaller number from whom fasting triglycerides were obtained. Here, as in other reported studies, the Black girls and mothers had lower triglyceride values (by about 7 mg/dL and 5 mg/dL, respectively) despite their greater adiposity and weight. This may be compared with a Black–White triglyceride difference of 14 mg/dL for 20- to 29-year-old women in NHANES II and in earlier reports from NHANES II by some of the same authors.[3] So why were the Black girls and their mothers low in triglycerides although they were 6 to 8 kg heavier, with a comparable total cholesterol level and a 0.3 correlation between adiposity and triglyceride level? Do Blacks consume fewer carbohydrates, whether in the Bay Area or around the Potomac (which is doubtful)? Do they exercise more despite greater female adiposity? Or is there a true racial difference in hemoglobin levels or skeletal mass?

Understandably, all these risk factors are correlated although the actual correlations are on the low side. So adiposity, variously measured, correlates with blood pressure (r = 0.3 to 0.4) and with triglycerides (r = 0.3 to 0.4) (values that slightly affect zero-order correlations among the risk factors and, therefore, the mother–daughter correlations as well). Given the current interest in high-density lipoproteins, however, the systematically negative correlations with these lipoproteins merit comment. For some reason, heavier and fatter girls or mothers have systematically lower high-density lipoproteins (up to r = 0.4); however, it boggles the brain to invent a dietary explanation. Still, with zero-order correlations so low, partial correlations (like those for mother–daughter lipid levels adjusted for body mass index) are not much different than the uncorrected or unadjusted values of r.

What the prime objective of this report might have been is not altogether clear. It would be nice to have data on sexual maturation in both Blacks and Whites alike since nearly all of the 10-year-olds must have at least areolar enlargement and perhaps 10% have reached menarche, with consequent elevations in weight, fat, body mass index, and lipid levels. All the same, this report does provide solid confirmation of results obtained in smaller, less definitive studies as well as offering other findings that were not expected and are not easily explained. □

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