Mother–Daughter Correlations of Obesity and Cardiovascular Disease Risk Factors in Black and White Households: The NHLBI Growth and Health Study

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ABSTRACT

Objectives. This study sought to evaluate obesity as a potential explanatory factor for the increased relative risk for cardiovascular disease in Black compared with White women.

Methods. Familial associations for obesity and cardiovascular disease risk factors were assessed in 720 White and 580 Black mother–daughter pairs from the National Heart, Lung, and Blood Institute's Growth and Health Study by using Pearson's chi square, Spearman's correlations, and partial correlations.

Results. Black girls and mothers were significantly heavier and had higher body mass indices than their White counterparts. In each racial group, significant, positive mother–daughter correlations existed for weight, body mass index, and triceps skinfolds, and for all cardiovascular disease risk factors. Obesity measures correlated positively with systolic blood pressure and triglycerides and inversely with high-density lipoprotein cholesterol in girls and mothers of both races. Correlations between mothers and daughters for exercise and ideal body shape were weak and did not explain obesity associations.

Conclusions. Intrafamilial associations of obesity, cardiovascular disease risk factors, and the obesity-cardiovascular disease risk factor relationship support the position that increased cardiovascular disease morbidity and mortality rates in Black women may be linked to excess obesity in Black women compared with White ones. (*Am J Public Health.* 1994;84:1761–1767)

Introduction

The incidence of cardiovascular disease is significantly greater in Black females than in White ones[1,2] and is a matter of public health concern.[3] Formulation of effective intervention strategies depends on accurate identification of contributing risk factors. In assessing putative risk factors for cardiovascular disease, investigators have long used the familial clustering of the disease; factors found with greater frequency or with higher mean levels in families with, for example, myocardial infarction, than in comparison families became potential risk factors and promising candidates for further study. Thus, in a series of case–control,[4–6] parent–offspring,[7–12] and community-based[13–16] household studies, blood pressure, total cholesterol, and low-density lipoprotein cholesterol (LDL-C) were identified as risk factors. Within this frame of reference, since obesity has been implicated as a major factor in the racial differences in cardiovascular disease incidence among females,[17] we examined obesity and cardiovascular disease risk factor data from the National Heart, Lung, and Blood Institute Growth and Health Study on girls and their mothers for evidence of significant intergenerational correlations. The following hypotheses were tested: (1) in both mothers and daughters of each race, measures of obesity correlate with cardiovascular disease risk factors; (2) measures of obesity in the study's girls correlate with the same measures in their mothers; and (3) cardiovascular disease risk factors in mothers and daughters correlate.

Methods and Measurements

The Growth and Health Study has been described previously in detail.[18] Briefly, it is a cohort study of the development of obesity in Black and White adolescent females and of the effects of obesity on cardiovascular disease risk factors,[18,19] which was undertaken at three clinical centers: (1) University of California at Berkeley, (2) University of Cincinnati Medical Center and Children's Hospital Medical Center, and (3) Westat, Inc, in Rockville, Md. The Maryland Medical Research Institute served as the coordinating center. A total of 2379 girls—1213 Blacks and 1166 Whites—were enrolled. Berkeley and Cincinnati recruited participants from public and parochial schools, and Westat recruited subjects from Group Health Association, a health maintenance organization in Washington, DC. As previously reported,[18] 81% of the eligible girls at Berkeley and Westat and 74% of those at Cincinnati enrolled in the study. Although girls aged 9 and 10 years at intake were the primary focus of the study, parents and guardians of the girls were also interviewed and enrolled. In this analysis, only biological mother–daughter pairs were included.

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TABLE 1—Descriptive Statistics for Age, Anthropometric, and Cardiovascular Disease Risk Factor Variables for Growth and Health Study Mothers and Daughters, by Race

	Daughters (Unadjusted)						Mothers (Unadjusted)					
	White			Black			White			Black		
	n	$\bar{X}$	SD	n	$\bar{X}$	SD	n	$\bar{X}$	SD	n	$\bar{X}$	SD
Age, y	720	10.0	0.6	580	10.1	0.6**	720	37.7	5.2	579	35.7	5.5**
Height, cm	720	139.6	7.1	580	143.5	8.0**	720	164.5	6.4	580	163.4	6.3**
Weight, kg	720	35.3	8.6	580	40.6	11.7**	720	68.7	15.9	580	77.1	20.8**
Body mass index	720	18.0	3.3	580	19.5	4.4**	720	25.4	5.9	580	28.9	7.6**
Triceps skinfolds, mm	720	13.4	5.2	580	13.5	6.5	720	21.0	7.8	580	23.6	9.5**
Subscapular skinfolds, mm	719	10.1	6.1	580	11.8	7.8**						
Suprailiac skinfolds, mm	717	9.6	6.2	580	10.3	7.1						
Sum of skinfolds, mm	716	33.2	16.6	580	35.7	20.4*						
Blood pressure, mm/Hg												
Systolic	722	100.6	9.5	577	102.6	8.8**	722	109.6	11.2	577	114.8	14.3**
Diastolic (ks)	695	56.2	13.0	552	57.3	12.0	722	71.3	8.7	576	74.2	10.7**
Lipids, mg/dL												
Total cholesterol	619	170.5	26.2	468	171.3	30.3	619	186.2	35.8	468	186.9	39.3
Triglycerides (all paired subjects)	619	80.2	40.0	468	69.5	30.7**	619	86.7	51.7	468	85.0	48.9
High-density lipoprotein cholesterol	619	53.4	11.3	468	56.3	14.2**	619	55.9	14.5	468	54.2	14.6*
Low-density lipoprotein cholesterol	619	104.8	25.6	468	104.3	28.0	619	116.6	33.9	468	119.2	38.2
Mean triglycerides (fasting ≥ 12 hours)[a]	254	78.0	30.7	192	70.8	30.7	254	87.7	53.8	192	82.6	47.0

Note. Restricted to girls from the Growth and Health Study whose mothers participated in the study. *P* levels for comparisons between race, within generation: **P* ≤ .05; ***P* < .01.
[a]Restricted to subjects in mother–daughter pairs in which both mother and daughter fasted for at least 12 hours.

Measurements of blood pressure, blood lipids and lipoproteins, and body composition, including height, weight, and skinfolds (triceps, subscapular, and suprailiac in girls and triceps in mothers), were obtained for all subjects as previously described.[18-20] Means and standard deviations were calculated for all anthropometric and cardiovascular disease risk factor variables used in these analyses. The distributions for each variable were examined for normality for mothers and daughters separately by race. Student's *t* tests were used to compare means between races when the variables were normally distributed; when preliminary tests suggested unequal variances, however, a modified *t* statistic using Satterthwaite's[21] approximation to adjust the degrees of freedom was used. When the variables were found to be non-normally distributed by the Wilk-Shapiro test for normality,[22,23] a Wilcoxon rank-sum test was used.[24]

Because postprandial triglycerides have been reported to be enhanced over fasting levels, subjects were instructed to abstain from all food and drink except water for 12 hours prior to clinic visit. Some mothers (345 White and 253 Black) and daughters (43 White and 55 Black) reported fasting less than 12 hours prior to phlebotomy. To increase the number of mother–daughter pairs in the analyses, statistical analyses were done several times using (1) all mother–daughter pairs regardless of reported fasting times (ad lib), and (2) only mothers and daughters who reported fasting 12 hours or more. Results for triglycerides are presented for both fasting definitions: ad lib and 12+ hours.

The proportions of Black and White girls and mothers who were at or above the age-sex, but not race, specific 85th percentile of the combined National Health and Nutrition Examination Survey I and II body mass index distributions were computed using tables compiled by Frisancho.[25] Differences in the proportions between the racial groups within cohorts were compared using *z* tests.[26]

Because a number of the variables used in this analysis were not normally distributed, associations between obesity and the major cardiovascular disease risk factor variables were determined separately for mothers and girls by race using Spearman correlations.[24,27] Tests for significant differences in correlation coefficients between racial groups within generations and between generations within racial groups were calculated using Fisher's *z* transformation of the correlations, which were then tested using Student's *t* tests.[28] To assess whether the level of obesity shared between mothers and daughters contributed to their cardiovascular disease risk factor correlations, partial Spearman correlations were calculated for cardiovascular disease risk factors for mothers' and daughters' values, adjusting for their body mass indexes.[29]

To assess the possible influence of cultural and socioeconomic factors shared by mothers and daughters, reported exercise practices and attitudes and ideal body shape were correlated using Pearson correlations. To assess the possible interaction of household income with mother's obesity, daughter's obesity, and the mother–daughter obesity relationships, households were separated by income level as follows: less than $20 000, $20 000 to 40 000, and more than $40 000. The prevalence of obesity associated with income was evaluated for mothers and daughters separately using the Pearson chi square, and the homogeneity of the mother–daughter relationships across income groups was tested using the Breslow-Day test.[30] All analyses were performed with the SAS statistical analysis software.[31]

Results

In total, 733 White mothers (62.9%) and 590 Black mothers (48.6%) participated in the Growth and Health Study clinics. Comparisons of girls who did and did not have mothers in the study were made by race for each of the 14 variables of interest using both *t* tests and Wilcoxon rank-sum tests. Results (not shown) indicate that there were no significant differences in the anthropometry and risk factor profiles of these two groups of girls in either racial group. Therefore, assessment of the obesity–risk factor relationships in these girls, as presented below, has been restricted to those girls whose biological mothers participated.

As can be seen in Table 1, inclusion or exclusion of subjects who reported not fasting had little effect on the mean triglyceride levels of any of the four age-race groups. Mean triglycerides in the ad lib and 12+-hour fasting groups, respectively, were 80.2 and 78.0 mg/dL in White daughters, 69.5 and 70.8 mg/dL in Black daughters, 86.7 and 87.7 mg/dL in White mothers, and 85.0 and 82.6 mg/dL in Black mothers. Information on use of hypertensive medication and oral contraceptives in mothers indicated that 2.1% and 9.8% of White and Black mothers, respectively, use hypertensive medication and that 6.6% and 7.4% of White and Black mothers, respectively, use oral contraceptives. Fifty-three percent of White mothers reported having never smoked compared with 47% of Black mothers, while 20% of White mothers reported never drinking alcohol compared with 38% of Black mothers.

The age difference between Black and White girls was statistically significant (Blacks were older), but the difference in mean age was only 5 weeks (Table 1). Black girls were also taller and heavier, and had greater subscapular and marginally greater ($P \leq .05$) sum of skinfolds, higher systolic blood pressures, and higher levels of high-density lipoprotein cholesterol (HDL-C) and lower triglycerides than White girls. These differences persisted after covariance adjusting for age. Black mothers in the study were about 2 years younger on average than White mothers (Table 1). A positive association was found between age and most anthropometric variables in Black mothers but not in White mothers. No adjustment for age was made because Black mothers were younger as well as heavier. Moreover, tests for heterogeneity of slope between Black and White mothers were significant, indicating that a simple adjustment for age was not possible. Using unadjusted means, Black mothers were heavier and had higher systolic and diastolic blood pressure (all $P < .01$). White mothers had higher HDL-C ($P = .05$).

TABLE 2—Number of Growth and Health Study Daughters and Mothers with Quetelet Indices above and below the Age-Specific 85th Percentile of the Combined NHANES I and II Distributions, by Race

	White: Mother's Body Mass Index			Black: Mother's Body Mass Index		
	<85th, No. (%)	≥85th, No. (%)	Total	<85th, No. (%)	≥85th, No. (%)	Total
All						
Girl's body mass index						
<85th	531 (74)	39 (5)	570	336 (58)	74 (13)	410
≥85th	127 (18)	23 (3)	150	113 (19)	57 (10)	170
Totals	658	62	720	449	131	580
Income ≤ $20 000						
Girl's body mass index						
<85th	50 (57)	9 (10)	59	111 (52)	37 (18)	148
≥85th	24 (27)	5 (6)	29	42 (20)	22 (10)	64
Totals	74	14	88	153	59	212
Income $20 000–$40 000						
Girl's body mass index						
<85th	158 (74)	10 (5)	168	109 (61)	19 (11)	128
≥85th	36 (17)	9 (4)	45	31 (17)	20 (11)	51
Totals	194	19	213	140	39	179
Income > $40 000						
Girl's body mass index						
<85th	307 (77)	19 (5)	326	105 (62)	16 (9)	121
≥85th	62 (16)	9 (2)	71	35 (21)	13 (8)	48
Totals	369	28	397	140	29	169
Common odds ratio		2.105			1.844	
Breslow-Day test for homogeneity		$P = .286$			$P = .224$	

To assess possible height and weight biases resulting from differences in socioeconomic factors and weight between participating and nonparticipating mothers, self-reported height, weight, education, and income data were collected on all mothers of girls in the Growth and Health Study. Participating mothers had more education and came from households with higher incomes. There were no significant differences between participating and nonparticipating White mothers in either reported height or weight. Participating Black mothers reported significantly higher weights than did nonparticipating Black mothers (75.9 vs 70.4 kg, respectively; $P < .001$), but reported heights were not different. In participating Black and White mothers, there were no significant differences between reported height and measured height. Reported weight was significantly lower than measured weight for both groups, but the differences were only 0.95 kg for White mothers and 1.3 kg for Black mothers.

Proportionately more Black girls (170 of 580 [29%]) and mothers (131 of 580 [23%]) were overweight (i.e., body mass index ≥85th percentile) than White girls (150 of 720 [21%]) and mothers (62 of 720 [9%]) (all $P \leq .01$) (Table 2). Comparisons of the prevalence of obesity across income levels within racial groups indicate that obesity was more common in lower income groups among Black ($P = .04$) and White ($P = .03$) mothers and among White ($P = .007$) but not Black ($P = .908$) girls. Overweight White mothers were 1.9 times more likely to have a daughter who was overweight herself (23 of 62 [37%] vs 127 of 658 [19%]; $P < .01$) than White mothers with body mass indexes below the top 15%, while overweight Black mothers were 1.7 times more likely to have an overweight daughter (57 of 131 [44%] vs 113 of 449

TABLE 3—Mother–Daughter Correlations for Obesity Measures, by Race

	White			Black		
	Mother's Obesity Measure			Mother's Obesity Measure		
	Body Mass Index	Weight	Triceps	Body Mass Index	Weight	Triceps
All						
Girl's						
Body mass index	.27[b]	...	...	.30[b]	...	...
Weight	...	.27[b]	...	...	.28[b]	...
Triceps	...	...	.19[b]	...	...	.27[b]
Income ≤ $20 000						
Girl's						
Body mass index	.29[a]	...	...	.27[b]	...	...
Weight	...	.16	...	...	.22[b]	...
Triceps	...	...	.19	...	...	.31[b]
Income $20 000–$40 000						
Girl's						
Body mass index	.28[b]	...	...	.30[b]	...	...
Weight	...	.26[b]	...	...	.36[b]	...
Triceps	...	...	.22[a]	...	...	.26[b]
Income > $40 000						
Girl's						
Body mass index	.24[b]	...	...	.36[b]	...	...
Weight	...	.29[b]	...	...	.28[b]	...
Triceps	...	...	.16[a]	...	...	.21[a]

[a]$P < .01$.
[b]$P < .001$.
All $P > .05$ for comparison of correlations between races.

[25%]; $P < .01$) (Table 2). Results of the Breslow-Day test for homogeneity indicated no difference in the mother–daughter obesity relationships with income; at each income level, overweight mothers were more likely than nonoverweight mothers to have overweight daughters.

Significant, positive mother–daughter correlations existed between the weight and obesity measures of girls in the study and the same measures in their mothers for both races (Table 3). The correlations were slightly but consistently higher in Black mother–daughter pairs; race differences in the mother–daughter correlations were significant only for triceps skinfolds ($P < .05$) (Table 3). There was no consistent pattern of differences in mother–daughter correlations for obesity measures across income groups.

Obesity–systolic blood pressure correlations were positive and significant within each race (Table 4). Obesity–diastolic blood pressure correlations were also in the same direction and generally of similar magnitude for White mothers and daughters, but not for Blacks. The obesity–K5 correlations were not significant in Black girls but were strongly positive in Black mothers. The correlations between obesity and total cholesterol, triglycerides, HDL-C, and LDL-C in White mothers were all significantly stronger than those in their daughters, but this was not the case for Black mothers and daughters. The correlations for body mass index with total cholesterol and triglycerides were stronger in White mothers than in Black mothers. As shown in Table 4, inclusion or exclusion of nonfasting subjects had little effect on the body composition–triglycerides correlations.

Cardiovascular disease risk factor correlations were analyzed before and after adjusting the risk factor levels for body mass index within each group to determine whether the risk factor correlations were in part due to the obesity correlations. After subjects' cardiovascular disease risk factor levels were adjusted for their body mass index, the mother–daughter correlations remained significant (Table 5). As can be seen in Table 5, inclusion or exclusion of nonfasting subjects had little effect on the mother–daughter triglycerides correlations. Mother–daughter correlations for reported physical activity and for beliefs and attitudes about exercise revealed low-order, generally nonsignificant correlations; only the question "I play sports or very active games a lot" was correlated significantly, and this occurred only in White mother–daughter pairs ($r = .10$, $P = .007$). The ideal body images reported by the girls and their mothers correlated significantly in White pairs ($r = .082$, $P = .03$) and marginally in Black pairs ($r = .076$, $P = .057$), but they were weak.

Discussion

The early parent–child studies of cardiovascular disease risk factors were principally of White populations or did not address race differences directly.[8–12] Later, the Princeton Lipid Research Clinics Prevalence Study[32,33] did include Black households, but the number of Black families included in the subsequent Princeton Lipid Research Clinics Family Study was small because of sampling procedures. Nevertheless, significant parent–offspring correlations for lipids and lipoproteins in Black as well as White households were found.[34] The mother–daughter correlation for body mass index, however, was not significant in Blacks. Using a larger sample of Black subjects than the Princeton Family Study, the present study reveals (1) significant clustering of obesity in mother–daughter pairs of both races; (2) significant correlations between obesity and cardiovascular disease risk factors in both mothers and daughters of both races; and, finally, (3) significant correlations between cardiovascular disease risk factor levels in mother–daughter pairs.

Within each race group, mothers with body mass index at or above the 85th percentile were more likely to have daughters also at or above the 85th percentile than were mothers who were below the 85th percentile. Moreover, significant correlations were found between mothers and daughters for each measure of obesity examined. Mother–daughter correlations for obesity measures were "nominally" higher in Blacks than in Whites, ranging between .19 and .27 in Whites and between .27 and .30 in Blacks (Table 3). The obesity correlations in White mother–daughter pairs are similar to those reported by Garn et al.[35,36] and by Khoury et al.[37] These correlations were apparently not strongly influenced

TABLE 4—Obesity–Cardiovascular Disease Risk Factor Correlations with Weight, Body Mass Index, and Triceps Skinfold for Growth and Health Study Daughters and Mothers, by Race

	Daughters						Mothers					
	White			Black			White			Black		
	Weight	Body Mass Index	Triceps	Weight	Body Mass Index	Triceps	Weight	Body Mass Index	Triceps	Weight	Body Mass Index	Triceps
Blood pressure												
Systolic	.32[b]	.28[b]	.21[b]	.41[b]	.36[b]	.28[b]	.32[b]	.33[b]	.26[b]	.40[b]	.37[b]	.30[b]
Diastolic (K5)	.29[b]	.27[b]	.20[b]	.06[d]	.02[d]	.06	.30[b]	.29[b]	.22[b]	.32[bf]	.30[bf]	.21[b]
Lipids												
Total cholesterol	−.07	.02	.01	−.08	−.02	.04	.16[bf]	.22[bf]	.15[b]	.06	.09	.06
Triglycerides	.25[b]	.25[b]	.22[b]	.29[b]	.28[b]	.24[b]	.38[b]	.45[bf]	.25[b]	.36[b]	.33[b]	.21[b]
High-density lipoprotein cholesterol	−.22[b]	−.22[b]	−.21[b]	−.35[b]	−.34[b]	−.31[b]	−.39[bf]	−.43[bf]	−.30[b]	−.39[b]	−.37[b]	−.34[b]
Low-density lipoprotein cholesterol	−.04	.06	.06	.02	.08	.15[a]	.25[bf]	.31[bf]	.22[be]	.15[b]	.18[b]	.16[b]
Mean triglycerides (fasting ≥ 12 hours)[g]	.20[a]	.20[a]	.18[a]	.27[b]	.26[b]	.21[a]	.42[be]	.47[bf]	.31[b]	.41[b]	.37[b]	.28[b]

Note. Given the numbers of subjects, correlations of .07 and greater are significant at the .05 level. Given the number of correlations made, we have chosen to identify only results with $P < .01$ and $< .001$.

P values of correlations: [a]$P < .01$; [b]$P < .001$.

P value of comparison of correlations between races, within generations: [c]$P < .01$; [d]$P < .001$.

P value of comparison of correlations within races, between generations: [e]$P < .01$; [f]$P < .001$.

[g]Restricted to subjects in mother–daughter pairs in which both mother and daughter fasted for at least 12 hours.

by shared cultural beliefs (ideal body shape), shared levels of physical activity, or socioeconomic status.

Despite the obesity correlations with triglycerides and HDL-C, the heavier Black girls had lower triglycerides and higher HDL-C than the White girls. In the mothers, however, HDL-C was higher in Whites, and the difference in triglycerides was not significant. This unexpected finding may reflect the magnitude of the racial differences in weight and adiposity in the mothers compared with girls (body mass index of 28.9 vs 25.4 compared with 19.5 vs 18.0 in Blacks and Whites, respectively). It could also reflect the stronger correlations between these lipid parameters and obesity in the mothers, suggesting that associations between obesity and HDL-C (and triglycerides) may become stronger with age or time. Consistent with this explanation is the finding of a stronger relationship between body mass and HDL-C in White women aged 20 to 44 years than in White girls aged 4 to 11 and 12 to 16 years in the collaborative Lipid Research Clinics Prevalence Study.[38] Speculatively, then, the change in the HDL-C could indicate that Black females start with an HDL advantage that is lost only after a significant increase in the weight differences in adulthood.

TABLE 5—Mother–Daughter Correlations for Cardiovascular Disease Risk Factors with Risk Factor Variables Unadjusted and Adjusted for Mother's and Daughter's Body Mass Index, by Race

	White			Black		
	Unadjusted	Adj[M]	Adj[D]	Unadjusted	Adj[M]	Adj[D]
Blood pressure						
Systolic	.19	.20	.17	.13	.13	.10*
Diastolic (K5)	.16	.16	.16	.13	.17	.14
Lipids						
Total cholesterol	.31	.31	.31	.36	.36	.37
Triglycerides	.20	.20	.18	.25	.25	.24
High-density lipoprotein cholesterol	.31	.30	.30	.30	.29	.28
Low-density lipoprotein cholesterol	.30	.30	.30	.33	.32	.32
Mean triglycerides (fasting ≥ 12 hours)[a]	.20	.22	.19	.24	.22	.19

Note. All correlations $P < .01$ except as noted by * ($P < .05$). Adj[M] is partial correlation adjusted for mother's body mass index. Adj[D] is partial correlation adjusted for daughter's body mass index.

[a]Restricted to subjects in mother–daughter pairs in which both mother and daughter fasted for at least 12 hours.

The triglyceride values reported for the Black and White girls (daughters) in this study are higher than those reported for girls in previous major studies: 69.5 and 80.2 mg/dL compared with, for example, 61.8 and 71.5 mg/dL for 9- and 10-year-old Black and White girls, respectively, in the 1973–1975 Princeton study.[39] Although many girls did not fast the full 12 hours, mean triglyceride levels for the subset of girls who fasted 12 hours and for all daughters were similar, and both sets of means were higher than those previously reported. These differences could be owing in part to a secular trend. If a secular trend is present, one would expect to find increases in body mass index over the same period, given the strong positive correlations between these two factors. And this is what is found. In the Princeton Prevalence Study, mean body mass indexes for 9- and 10-year-old Black and White girls were 17.2 and 17.7, respectively, compared with 19.7 and 17.9, respectively, in the Growth and Health Study. That Black girls had both larger increases in body mass index and smaller increases in triglycerides is consistent with reports from the Bogalusa Heart Study[40] and the CARDIA and ARIC studies,[41] which have reported smaller increases in triglycerides per unit increase in obesity in Black women than in White women. Although the apparent secular trend is an interesting observation, whether these differences are real or partially owing to other factors such as changes in laboratory methods over the past 20 years will have little impact on the cross-sectional correlations presented in this report.

In all mother and daughter groups, the obesity–blood pressure correlations were positive. In White mothers and daughters, the correlations were significant and of similar magnitudes; in Black mothers and daughters, the correlations with systolic blood pressure were significant and of similar magnitude, but the diastolic correlations in Black girls were not. In Black mothers, the diastolic blood pressure correlations with obesity ranged from 0.21 (triceps) to .32 (weight); in Black girls, the correlations ranged from .02 (body mass index) to .06 (triceps and weight). The possibility that the associations between obesity and blood pressure increase with time could explain the lower correlations found in Black girls compared with their mothers. This possibility needs to be further examined.

That adjusting the cardiovascular disease risk factors for body mass index did not alter the mother–daughter correlations suggests that other factors shared between mothers and daughters besides levels of body mass affect cardiovascular disease risk factors and act in concert to produce these mother–daughter correlations.

The findings in this study extend previous findings of parent–offspring correlations of obesity and cardiovascular disease risk factors to Black families, and are consistent with the belief that obesity is implicated as a factor in the increased risk for cardiovascular disease among Black compared with White women. Similar to other adult populations studied previously, Black females were heavier and had greater body mass indexes than White females. In adult women of both races, blood pressure correlated positively and significantly with body mass index; Black women, being significantly heavier, also had significantly higher systolic and diastolic blood pressures. Like their mothers, the Black girls were heavier and taller, had higher body mass indexes than White girls (all $P < .01$), and had higher systolic blood pressure. Given the familial nature of cardiovascular disease and of cardiovascular disease risk factors, it can be argued that if and as these Black girls become more obese, they, like their mothers, will be at greater risk for reduced HDL-C, hypertension, and their sequelae. □

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