JOURNAL OF ADOLESCENT HEALTH 1998;23:7–19

ORIGINAL ARTICLE

Changes in Self-esteem in Black and White Girls Between the Ages of 9 and 14 Years

The NHLBI Growth and Health Study

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Purpose: **We examined changes in self-esteem and feelings of competence with physical appearance and social acceptance over approximately 5 years in 1166 white and 1213 black girls, aged 9 and 10 years at baseline.**

Methods: **Maturation stage and body mass index (BMI) were assessed annually. Biennially girls completed Harter's Self-Perception Profile for Children. Changes were analyzed in the context of race, sexual maturation, BMI, and household income. Longitudinal regression models were used to compare trends with age in global self-worth, physical appearance, and social acceptance.**

Results: **Mean global self-worth showed little change over ages 9–14 years in blacks (p 5 0.09) but decreased in whites ($p < 0.001$). Mean physical appearance scores for both races declined between ages 9 and 14 years (blacks, $p < 0.001$; whites, $p < 0.001$). Mean social acceptance scores increased for both races between ages 9 and 14 years (blacks, $p < 0.001$; whites, $p < 0.001$). For all three scores, these changes differed between blacks and whites (all three p values, $\leq$ 0.002). Adjustment for maturation stage, BMI, and household income did not alter the significance or direction of racial differences in the changes with age in global self-worth and physical appearance scores. Self-worth, physical appearance, and social acceptance scores decreased with increasing BMI. Decreases in physical appearance and social acceptance scores with increasing BMI were smaller in blacks than in whites ($p < 0.05$). After adjustment for maturation stage and household income, racial differences in social acceptance scores depended on BMI ($p < 0.05$) but not on age (p 5 0.08).**

Conclusions: **This article reports the first data on self-esteem scores by age for a large population of black girls aged 9 and 14 years and concludes that self-esteem does not follow the same developmental pattern in black as in white girls. A reason for black girls' higher and more stable self-worth and their greater satisfaction with their physical appearance compared to white girls may be racial differences in attitudes toward physical appearance and obesity.** © *Society for Adolescent Medicine, 1998*

KEY WORDS:
Self-esteem
Blacks
Physical appearance
Social acceptance
Body mass index
Racial differences
Adolescents
Females
Sexual maturation

Adolescence is marked by rapid physical growth, shifting social roles, and changing expectations. Self-esteem and feelings of competence play a critical role

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Manuscript accepted 7 August 1997.

Published by Elsevier Science Inc., 655 Avenue of the Americas, New York, NY 10010
1054-139X/ 98/ $19.00
PII S1054-139X(97)00238-3

in this developmental process (1). However, relatively little is known about the developmental course of self-esteem or competence during early adolescence and its relationship to race, sexual maturation, body mass index (BMI), and household income.

Some attention has been given to gender-related differences in the development of self-esteem during adolescence. Several longitudinal studies of age-related changes in mean levels of self-esteem have found, for boys and girls combined, small, gradual increases in measures of self-esteem during adolescence (2). However, when cross-sectional, age-related differences in self-esteem by gender were studied by Simmons and Rosenberg (3) in a large sample (N = 1988) of Baltimore school children from Grades 3–12, and when Blyth et al. (4) studied longitudinal changes in 6th to 10th graders, both found that self-esteem in girls fell while self-esteem in boys rose during adolescence. In a small longitudinal study of 47 girls and 44 boys at ages 14, 18, and 23 years, Block and Robins (5) found that boys had higher self-esteem scores than girls at every age. Self-esteem tended to increase in boys and decrease in girls over time.

To date, most studies of age-related changes in self-esteem have not been longitudinal, have used small samples, and have failed to pay adequate attention to racial differences or to the possible interaction of race and gender. Block and Robins (5) tested for the effects of race and gender on self-esteem in their sample, which was two-thirds white and one-fourth black. There were no ethnic or social class differences in self-esteem, perhaps because the small sample size limited their ability to detect differences or because most of the age-related decline in white girls' self-esteem had already taken place by age 14 years. Simmons and Rosenberg (3) studied racial differences in self-esteem by gender and age in their larger, cross-sectional sample, which was 63% black. The effects of gender and age on self-esteem were quite different among whites compared to blacks. In late adolescence in particular, white girls showed significantly lower self-esteem than white boys or black girls (51% of white girls and 25% of white boys had low self-esteem). For black children in late adolescence, there was no comparable sharp increase in the gender difference in self-esteem (16% of black girls and 14% of black boys had low self-esteem). These findings did not disappear after adjusting for household income.

In addition to the above problems, previous studies have not measured feelings of competence in the domains most closely related to self-esteem in adolescents, including perceived physical appearance and social acceptance (2–5). They have also not measured other important anthropometric and demographic variables such as BMI, sexual maturation stage, and socioeconomic status which could influence changes in self-esteem and feelings of competence during adolescence (3–5).

This article examines longitudinal changes in self-esteem and related feelings of competence in the areas of physical appearance and social acceptance over approximately 5 years in a group of black and white girls, 9 and 10 years old at entry into the study. Changes in self-esteem and feelings of competence were analyzed in the context of race, age, sexual maturation, BMI, and household income.

Methods

Population

The National Heart, Lung, and Blood Institute Growth and Health Study (NGHS) is a longitudinal study which enrolled a cohort of 2379 girls (1213 black and 1166 white) aged 9 and 10 years in 1987–1988. Girls were enrolled in the study if parental consent and a household information form were obtained, if the family did not plan to move out of the study area for at least 12 months, and if both the girl and her parent/ guardians had the same racial self-identification, either black or white. Girls were measured in school-based or health maintenance organization (HMO) clinics at three clinical centers located in Richmond, California, Cincinnati, Ohio, and metropolitan Washington, DC. Annual measures were obtained on height, weight, and sexual maturation stage; the Harter Self-Perception Profile for Children (6), including global self-worth, physical appearance, and social acceptance scales, was administered biennially. Data on nutrition, physical activity, cardiovascular risk factors, and other psychosocial measures were also collected. Total household income was collected at baseline. Details of the study design have been reported elsewhere (7).

This article examines data from girls between the ages of 9 and 14 years who participated in the baseline NGHS examination (Year 1) or in any of three biennial follow-up examinations (Year 3, 5, or 7). Only 27 14-year-old girls were measured at the Year 7 visit. Girls with complete data on all variables for at least one visit were included in analyses.

Table 1 presents the numbers and percentages of girls used in analyses by race and study visit. Girls missing data at the Year 3 visit did not differ signif-

Table 1. Percentage of NGHS girls aged 9–14 years with global self-worth (SW) data, by study visit and race*

Visit (Age in yr)†	Black (*N* = 1213)		White (*N* = 1166)	
	N with SW Data	% of Cohort	*N* with SW Data	% of Cohort
Baseline (ages 9–10)	1066	87.9	1053	90.3
Visit 3 (ages 11–12)	968	79.8	902	77.3
Visit 5 (ages 13–14)	900	74.2	815	69.9
Visit 7 (age 14)	13	1.1	14	1.2

* Numbers available for physical appearance (PA) and social acceptance (SA) scores differed by less than five cases across all visits.

† Because of variations in timing of repeat visits, age of participants at last birthday may vary slightly from the indicated schedule. Most participants were aged 15–16 years at Visit 7.

icantly from girls with data at Year 3 ($p > 0.05$) on baseline measures of global self-worth, physical appearance, social acceptance, or BMI. Similarly, girls missing data at the Year 5 visit did not differ significantly ($p > 0.05$) from those with Year 5 data on the same four baseline measures.

Variables

Self-esteem and related feelings of competence in the areas of physical appearance and social acceptance were measured using the global self-worth, physical appearance, and social acceptance scores from the Self-Perception Profile for Children (6). The profile was designed to tap children's domain-specific judgments of their competence, as well as an independent global perception of their worth or esteem as a person. The profile was administered to NGHS participants at baseline and biennially thereafter. Scores for the three scales ranged from 1.00 to 4.00 and were computed according to procedures detailed in the Manual for the Self-Perception Profile for Children (8). Raw profile scores were used in analyses. Reliability coefficients (Cronbach's alpha) were computed for each of the three scales by race and visit. Coefficients for the global self-worth scale ranged from 0.66 to 0.75 in black girls and from 0.72 to 0.82 in white girls. Coefficients for the physical appearance scale ranged from 0.66 to 0.80 in black girls and from 0.79 to 0.87 in white girls. Coefficients for the social acceptance scale ranged from 0.63 to 0.71 in black girls and from 0.76 to 0.82 in white girls. In general, reliability coefficients for each scale were higher at the Year 5 visit than at baseline. (Further information is available upon request.)

Measures of body size were taken by trained and certified NGHS data collectors at baseline and annually thereafter as part of the NGHS physical examination (7). Height and weight were measured twice at each examination using standard portable stadiometers and electronic weight scales, with girls barefoot and dressed only in a robe of known weight. Measures were taken a third time if the first two measures differed by more than 0.5 cm for height and 0.3 kg for weight. The average of the two measurements, or of the closest two of three measurements, was used in data analysis. BMI was defined as weight in kilograms divided by height in meters, squared (kg/ m^2).

Girls' sexual maturation stage was a computed score combining Tanner pubic hair staging (9) and Garn–Falkner areolar maturation staging (10) as assessed by trained and certified examiners. Girls were questioned annually to determine the date of onset of menses. For the current analysis, the Tanner and Garn–Falkner stages of sexual maturation were combined with self-reported date of menses onset to define three maturation stages: Stage 1, prepubertal; Stage 2, pubertal but premenarcheal; and Stage 3, postmenarcheal.

Demographic variables measured included the NGHS girl's race, age, and household income. Race (black or white) was defined by the subject's self-identification at baseline. At the baseline visit, parents reported total household income from all sources in 1 of 9 categories which were grouped for the purposes of this analysis into low (< $20,000), middle ($20,000 –39,999), and high (> $40,000) income. Income, rather than education, was used in the analysis to be consistent with earlier studies and because the two variables can be expected to yield similar results (11). Age at each visit was entered into the analysis using 1-year intervals defined by age at the last birthday.

Statistical Methods

Data were included in the current analyses for visits by girls aged 9 to 14 years at which complete participant information was obtained on self-worth or competence scores, BMI, and maturation stage, and for which baseline household income and racial identification were available (Table 1).

To describe the NGHS population of girls, racial comparisons at each age were made on variables to be used in the analysis: BMI, maturation stage, household income, global self-worth, physical appearance, and social acceptance scores. Unadjusted means, percentiles, and standard deviations were used to compare continuous variables, and percent-

Table 2. Physical characteristics and household income, by age and race

Body Mass Index (kg/ m^2)						
	Black			White		
Age (yr)	*N*	Mean	SD	*N*	Mean	SD
9	472	18.5	3.7	558	17.6	3.1
10	607	19.8	4.6	518	18.5	3.5
11	434	20.7	4.4	446	19.1	3.6
12	495	22.2	5.4	435	20.4	4.1
13	469	23.0	5.3	455	21.2	4.3
14	470	24.2	6.3	372	22.2	4.3

Maturation Stage								
			Prepubertal		Pubertal (Premenarcheal)		Postmenarcheal	
Age (yr)	Race	Total *N*	*n*	%	*n*	%	*n*	%
9	Black	472	248	52.5	220	46.6	4	0.8
	White	558	435	78.0	122	21.9	1	0.2
10	Black	607	133	21.9	431	71.0	43	7.1
	White	518	279	53.9	229	44.2	10	1.9
11	Black	434	4	0.9	309	71.2	121	27.9
	White	446	38	8.5	365	81.8	43	9.6
12	Black	495	2	0.4	199	40.2	294	59.4
	White	435	8	1.8	256	58.8	171	39.3
13	Black	469	0	0.0	47	10.0	422	90.0
	White	455	1	0.2	105	23.1	349	76.7
14	Black	470	0	0.0	16	3.4	454	96.6
	White	372	1	0.3	31	8.3	340	91.4

Total Baseline Household Income				
	Black		White	
Income Category	*N*	%	*N*	%
Low (< $20,000)	503	46.3	185	17.2
Middle ($20–39,999)	327	30.1	349	32.4
High (> $40,000)	256	23.6	542	50.4

ages were used to compare categorical measures (Tables 2 and 3).

To investigate longitudinal trends with age among black girls compared to white girls for the dependent variables of interest (global self-worth, physical appearance, and social acceptance scores), longitudinal regression models and the generalized estimating equations (GEE) method of Liang and Zeger (12) were used. The GEE method obtains least-square estimates of model coefficients and uses the residuals from the fitted models to adjust the standard errors of model coefficients accounting for within-individual correlations in repeated measures of the dependent variable. One advantage of GEE compared to other methods is that it requires only one visit with complete data for each girl in the analysis. That visit need not be the baseline visit.

Independent variables used as predictors in these models included age at last birthday as a set of indicator variables with 9 years of age as the reference; maturation stage as indicator variables comparing pubertal to prepubertal and postmenarcheal to pubertal girls; household income as indicator variables comparing the high- to the middle-income category and the middle- to the low-income category; race as an indicator variable with white as the reference category; and BMI used as a continuous variable.

Models were tested separately for each of the dependent variables (global self-worth, physical appearance, and social acceptance scores). The initial model for each dependent variable included predictor variables for race, age, maturation stage, BMI, and household income. The next models tested added predictors for the interaction of race with age, and for the interactions of race with each of the other predictors in a stepwise procedure. Nonsignificant ($p > 0.05$) interactions were deleted from the final

Table 3. Global self-worth, physical appearance, and social acceptance scores, by girls' age and race

Age (yr)	Race	*N*	Mean	SD	Percentiles				
					10	25	50	75	90
Global self-worth score									
9	Black	472	3.11	0.65	2.33	2.58	3.17	3.67	4.00
	White	558	3.17	0.61	2.33	2.83	3.17	3.67	4.00
10	Black	607	3.18	0.63	2.33	2.83	3.33	3.67	4.00
	White	518	3.17	0.60	2.33	2.67	3.17	3.67	3.83
11	Black	434	3.21	0.61	2.33	2.83	3.33	3.67	4.00
	White	446	3.20	0.61	2.33	2.83	3.17	3.67	4.00
12	Black	495	3.21	0.62	2.33	2.83	3.33	3.67	4.00
	White	435	3.10	0.60	2.33	2.67	3.17	3.67	4.00
13	Black	469	3.19	0.67	2.20	2.80	3.20	3.80	4.00
	White	455	2.99	0.66	2.20	2.60	3.00	3.40	3.80
14	Black	470	3.19	0.66	2.20	2.80	3.20	3.80	4.00
	White	372	2.96	0.65	2.20	2.60	3.00	3.40	3.80
Physical appearance score									
9	Black	472	2.94	0.72	2.00	2.50	3.00	3.50	4.00
	White	560	2.88	0.74	1.83	2.42	3.00	3.50	3.83
10	Black	601	2.98	0.68	2.17	2.50	3.00	3.50	3.83
	White	518	2.78	0.73	1.67	2.33	2.83	3.33	3.83
11	Black	436	2.93	0.75	1.83	2.33	3.00	3.50	4.00
	White	448	2.70	0.78	1.67	2.17	2.67	3.33	3.83
12	Black	495	2.84	0.75	1.83	2.33	2.83	3.50	3.83
	White	434	2.53	0.73	1.50	2.00	2.50	3.00	3.50
13	Black	467	2.85	0.75	1.80	2.40	2.83	3.40	3.80
	White	454	2.40	0.74	1.40	2.00	2.40	3.00	3.33
14	Black	472	2.86	0.79	1.80	2.20	3.00	3.60	4.00
	White	371	2.39	0.76	1.20	1.80	2.40	3.00	3.40
Social acceptance score									
9	Black	471	2.86	0.68	2.00	2.33	3.00	3.33	3.83
	White	558	2.91	0.71	2.00	2.50	3.00	3.50	3.83
10	Black	605	2.97	0.67	2.00	2.50	3.00	3.50	3.83
	White	513	2.90	0.69	2.00	2.50	3.00	3.33	3.83
11	Black	434	3.12	0.66	2.17	2.67	3.17	3.67	4.00
	White	449	3.04	0.67	2.00	2.67	3.17	3.50	3.83
12	Black	495	3.19	0.63	2.33	2.83	3.33	3.67	4.00
	White	433	3.03	0.65	2.17	2.50	3.17	3.50	3.83
13	Black	469	3.27	0.59	2.60	2.83	3.40	3.80	4.00
	White	455	3.12	0.62	2.20	2.80	3.20	3.60	3.80
14	Black	473	3.30	0.58	2.60	3.00	3.40	3.80	4.00
	White	371	3.19	0.53	2.60	2.80	3.20	3.60	4.00

multivariate models. Testing for the main effects of age, maturation stage, and income, and for the interaction of these predictor variables with race, was performed using a preliminary global test before testing the significance of any individual predictor. If significant interactions with race were found for a predictor in any of these models, separate estimates of its effect were reported for blacks and whites. Otherwise, a pooled effect estimate was reported.

Results

Physical Characteristics and Income

Distributions of BMI and maturation stage by age and race, and household income at baseline by race are presented in Table 2. On average, black girls began and completed sexual maturation earlier and had a higher degree of adiposity than white girls. Black girls came from lower-income households more often than did white girls.

Correlations Between Global Self-worth, Physical Appearance, and Social Acceptance Scores

In NGHS girls, self-worth and physical appearance scores were moderately correlated between ages 9 and 14 years (r = 0.57–0.68 for black girls and r = 0.47–0.68 for white girls). Self-worth and social acceptance scores also showed moderate correlations (r = 0.46–0.55 for black girls and r = 0.44–0.61 for

Figure 1. *Mean global self-worth scores and 95% confidence intervals, by age and race.*

white girls). In general, the lowest correlations were found at age 9 years and the highest at age 14 years, although the correlation of self-worth and social acceptance scores in white girls decreased with age. (Detailed data are available upon request.)

Global Self-worth, Physical Appearance, and Social Acceptance Scores

Unadjusted means, standard deviations, and percentiles for global self-worth, physical appearance, and social acceptance scores are presented by age and race in Table 3. Unadjusted means with ±95% confidence intervals are presented by age and race in Figures 1–3. Mean global self-worth showed a modest nonsignificant increase from 3.11 to 3.19 ($p = 0.09$) over ages 9 –14 years in black girls, but decreased in white girls over ages 9–14 years from 3.17 to 2.96 ($p < 0.001$). Mean physical appearance scores for both races declined between ages 9 and 14 years, from 2.94 to 2.86 in black girls ($p < 0.001$) and from 2.88 to 2.39 in white girls ($p < 0.001$). Mean social

Figure 2. *Mean physical appearance scores and 95% confidence intervals, by age and race.*

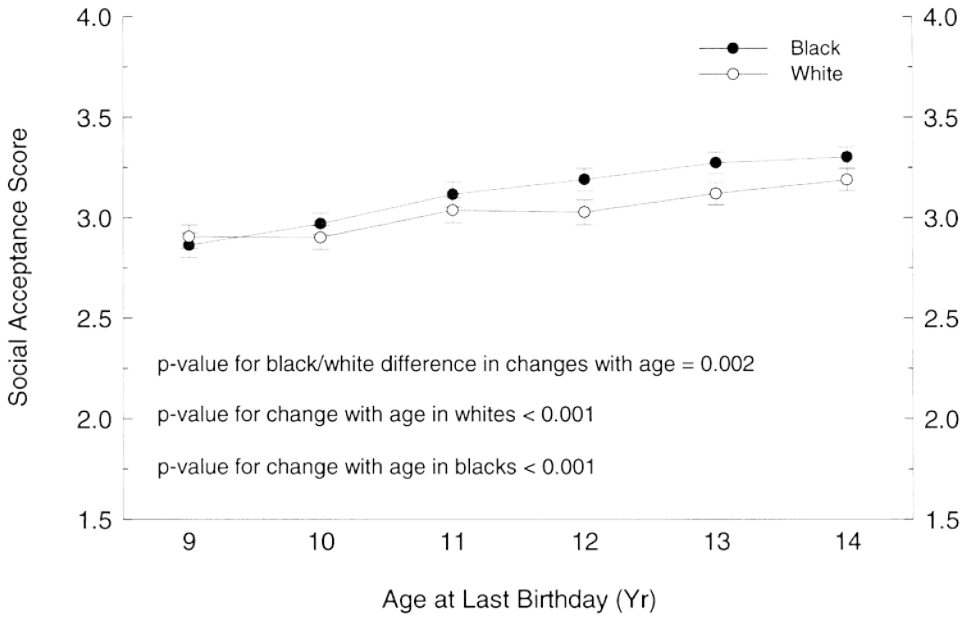

Figure 3. *Mean social acceptance scores and 95% confidence intervals, by age and race.*

acceptance scores increased for both races from age 9–14 years, from 2.86 to 3.30 in black girls ($p < 0.001$) and from 2.91 to 3.19 in white girls ($p < 0.001$). For all three scores, these trends with age were different in blacks and whites (each p value < 0.002), diverging and becoming more positive in blacks.

Prediction of Global Self-worth, Physical Appearance, and Social Acceptance Scores

The effect of age. Results of the final longitudinal regression model for each dependent variable are summarized in Table 4. In multivariate models adjusted for BMI, maturation stage, and household income, the Race by Age interaction terms were significant for global self-worth, indicating significant racial differences in the changes in self-worth between ages 9 and 14 years ($p < 0.05$). For black girls, self-worth was significantly higher for each age from 11 to 14 years compared to age 9 years, while for white girls it was significantly lower at ages 13 and 14 years compared to age 9 years.

After adjustment, Race by Age interaction terms were also significant for physical appearance scores, indicating that blacks and whites differed significantly ($p < 0.05$) in physical appearance score changes between the ages of 9 and 14 years. For black girls, scores were significantly higher at ages 10 and 14 years compared to age 9 years. For white girls, scores were significantly lower at ages 12, 13, and 14 years compared to age 9 years.

Changes in Social Acceptance Score by Race are presented in Table 4. Scores for black girls were significantly higher at ages 11, 12, 13, and 14 years compared to age 9 years, and also higher for white girls at ages 11, 13, and 14 years compared to age 9 years. Race by Age interaction terms were not significant ($p = 0.08$) for changes with age in social acceptance scores. Increases with age in social acceptance tended to be larger for black girls than for whites.

Effects of maturation stage and BMI. After adjustment for age, race, income, and BMI in the final multiple regression models presented in Table 4, mean changes in global self-worth and physical appearance scores did not depend on maturation stage ($p > 0.15$). Average social acceptance scores were not different after adjustment in pubertal compared to prepubertal girls (0.06 ± 0.03, $p = 0.13$), but were higher for postmenarcheal compared to pubertal girls (0.14 ± 0.03, $p < 0.001$). Changes in social acceptance scores with maturation stage did not differ in black compared to white girls.

Sexual maturation has been associated with greater BMI in cross-sectional analyses of NGHS data (7). To explore the joint effects of these two related factors on the global self-worth, physical appearance, and social acceptance scores in black and white girls, unadjusted mean scores for these outcomes were examined for each BMI category separately for each maturation stage and race. Mean

Table 4. Effects of race, body mass index (BMI), maturation stage, and household income on girls' global self-worth, physical appearance, and social acceptance scores

	Global Self-worth Score (N = 5731)		Physical Appearance Score (N = 5728)		Social Acceptance Score (N = 5726)	
Predictors[†]	Coeff.	SE	Coeff.	SE	Coeff.	SE
Intercept	3.41		4.11		3.14	
Black vs. white (at age 9)[a]	-0.01	0.04	0.10**	0.05	0.01	0.05
Household income						
$20–39,999 vs. < $20,000	0.06*	0.03	-0.04	0.03	0.08**	0.03
> $40,000 vs. $20–39,999	0.05*	0.03	0.03	0.03	0.08**	0.03
Maturation stage						
Pubertal vs. prepubertal	0.04	0.03	-0.01	0.03	0.06	0.03
Postmenarcheal vs. pubertal	0.00	0.03	0.04	0.03	0.14***	0.03
Age (yr) by race[b]						
Black						
Age 10 vs. 9	0.07	0.04	0.10*	0.04	0.08	0.04
Age 11 vs. 9	0.12**	0.04	0.07	0.05	0.20***	0.04
Age 12 vs. 9	0.14**	0.05	0.04	0.05	0.23***	0.05
Age 13 vs. 9	0.14**	0.05	0.07	0.05	0.29***	0.05
Age 14 vs. 9	0.16***	0.05	0.13*	0.06	0.31***	0.05
White						
Age 10 vs. 9	0.01	0.04	-0.04	0.04	0.00	0.04
Age 11 vs. 9	0.03	0.04	-0.07	0.04	0.11**	0.04
Age 12 vs. 9	-0.04	0.05	-0.17***	0.05	0.08	0.05
Age 13 vs. 9	-0.14**	0.05	-0.25***	0.05	0.14**	0.05
Age 14 vs. 9	-0.15**	0.05	-0.21***	0.06	0.21***	0.05
BMI (per 10 kg/ m^2)						
Both races combined[b]	-0.19***	0.02	NA	NA	NA	NA
Black	NA	NA	-0.41***	0.03	-0.10***	0.03
White	NA	NA	-0.68***	0.05	-0.21***	0.04

[a] Coefficients reported for black–white differences at age 9 on physical appearance and social acceptance scores are calculated at mean BMI for age 9 (= 18.0) owing to the presence of a significant ($p < 0.05$) Race X BMI Interaction. Black–white differences also depend on age ($p < 0.05$) for self-worth and physical appearance, and possibly for social acceptance ($p = 0.08$).

[b] Separate estimates are reported by race for trends with age for all three scales, and for the effect of BMI on physical appearance and social acceptance scores owing to the presence of significant ($p < 0.05$) Race X BMI interactions. Racial differences in the effect of age on social acceptance were marginally significant ($p = 0.08$) in a global test.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

[†] All main effects were retained. Only statistically significant interactions were retained. NA = not applicable.

global self-worth (Fig. 4) and social acceptance scores (Fig. 5) showed only small changes as BMI increased in black or white girls at each of the three maturation stages. Mean physical appearance scores (Fig. 6) for both races at each maturation stage declined somewhat more as BMI increased, with scores for white girls at each maturation stage declining more than scores for black girls.

After adjustment for income, maturation, and age-related racial differences in the final model, the decrease in global self-worth score per 10-kg/ m^2 increase in BMI was 0.19 ± 0.02 ($p < 0.001$) (Table 4) and was not significantly different in black girls compared to whites ($p = 0.14$). The decreases in physical appearance and social acceptance scores per 10-kg/ m^2 increase in BMI were significantly smaller in black girls compared to whites ($p < 0.01$ for both black–white differences). The physical appearance score decreased with each 10-kg/ m^2 increase in BMI by 0.68 ± 0.05 ($p < 0.001$) in white girls versus 0.41 ± 0.03 ($p < 0.001$) in blacks. The social acceptance score decreased with each 10-kg/ m^2 increase in BMI by 0.21 ± 0.04 ($p < 0.001$) in white girls versus 0.10 ± 0.03 ($p < 0.01$) in blacks. Thus, after adjustment, racial differences in physical appearance and social acceptance scores depended on BMI.

The effect of income. No significant Race–Income interactions ($p > 0.05$) were found in the final multivariate models presented in Table 4 for any of the three dependent variables. After adjustment for age, BMI, and maturation stage, higher income was associated with modest increases in global self-worth and social acceptance scores in both black and white girls. Mean physical appearance scores did not depend on income ($p > 0.05$) in black or white girls.

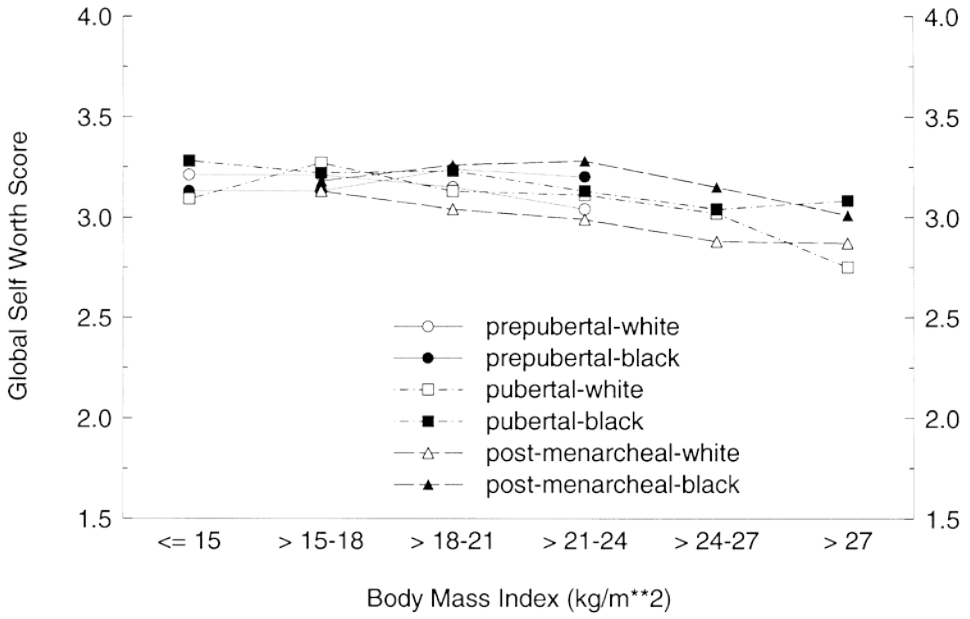

Figure 4. *Mean global self-worth scores and 95% confidence intervals, by BMI category, maturation stage, and race.*

Discussion

Self-worth, Physical Appearance, and Social Acceptance Mean Scores

Unadjusted mean self-worth, physical appearance, and social acceptance scores for NGHS black girls may be the first reported by age for a black population of this size. Mean self-worth and social acceptance scores for NGHS black girls were higher than those of white girls for all girls older than age 9 years. Mean physical appearance scores for NGHS black girls were higher than those of white girls at every age.

Mean self-worth and social acceptance scores for NGHS white girls were similar to or slightly higher than means published by Harter (8) for four school-based samples of white girls in Grades 3–8. Harter's mean (±SD) self-worth scores ranged from 2.66 ± 1.71 to 3.13 ± 0.65; and mean social acceptance scores ranged from 2.56 ± 0.78 to 2.86 ± 0.66. Mean

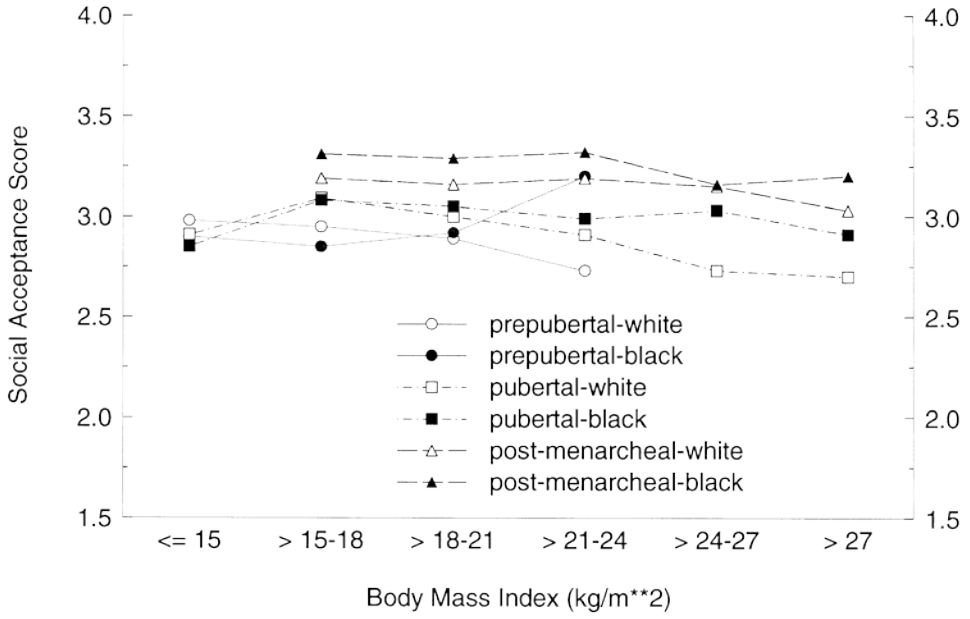

Figure 5. *Mean social acceptance scores and 95% confidence intervals, by BMI category, maturation stage, and race.*

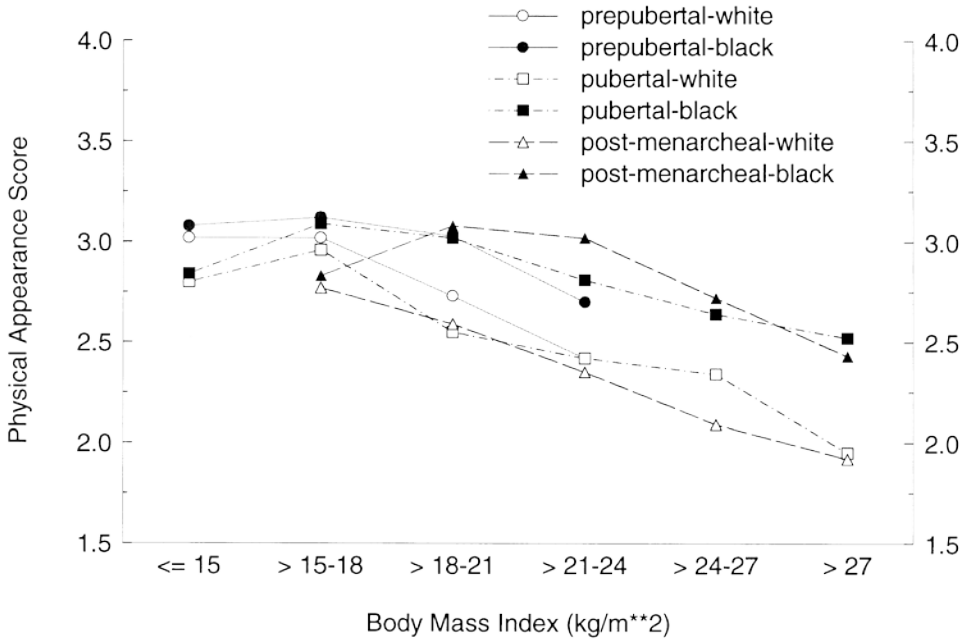

Figure 6. *Mean physical appearance scores and 95% confidence intervals, by BMI category, maturation stage, and race.*

physical appearance scores for NGHS white girls were similar to or slightly lower than Harter's reported means. Harter's mean physical appearance score for white girls in Grades 3– 8 in the same samples ranged from 2.40 ± 0.65 to 2.99 ± 0.94.

Racial Differences by Age in Girls' Self-worth, Physical Appearance, and Social Acceptance Scores

Racial differences by age in NGHS girls' self-worth scores were consistent with the results of previous studies (2,4,5). The earlier cross-sectional findings of Simmons and Rosenberg (3) on age-related racial differences in self-esteem were supported and expanded in our longitudinal sample. Racial differences in NGHS girls' self-worth scores depended on age and were significant after age 11, with black girls scoring consistently higher than white girls. Results also demonstrated that global self-worth was lower among NGHS girls with high BMI or low household income.

The NGHS results have also confirmed earlier cross-sectional findings that differences in physical appearance and social acceptance scores are associated with similar differences in self-worth scores. Harter (1) reported that satisfaction with physical appearance was consistently related to global self-worth at a moderately high level in four samples of white children in Grades 4–8 (r = 0.62–0.73). The largest differences in global self-worth and physical appearance scores among white middle school children were by gender. Compared to white girls, white boys rated themselves as more attractive and liked themselves better. Social acceptance scores were moderately related to self-worth (r = 0.41–0.58) and to physical appearance scores (r = 0.29–0.51). Other cross-sectional studies (13,14) have related physical attractiveness to more general adolescent personality and social functioning among white adolescents. They concluded that young adolescents who were considered physically attractive were also highly rated on other desirable personal and behavioral characteristics (13,14). This article contributes new information by presenting evidence for a similar relationship of physical appearance and social acceptance scores to self-worth scores in black adolescent girls. We have also shown that physical appearance scores in NGHS girls followed a developmental pattern similar to that observed with global self-worth scores. However, black–white differences in physical appearance scores were larger than differences in self-worth, appeared at an earlier age, and depended on both girls' age and their BMI (p < 0.001). This suggests that the cognitive ability to generalize about global self-feelings and attributes may be limited in younger girls (8). For very young girls, physical appearance may be a less abstract and more easily understood personal characteristic than global self-worth.

Declines over Age in White Girls' Self-worth and Physical Appearance Scores

The finding that NGHS white girls' global self-worth and physical appearance scores fell between the ages of 9 and 14 years deserves special attention. The total decline in white girls' mean self-worth score between ages 11 and 14 years was 0.24 points, or 8.0% of its entire range. The drop in mean physical appearance score between the ages of 9 and 14 years was 0.49 points, or 16.3% of its entire range. According to Harter's standards (15), NGHS white girls' mean self-worth scores declined from the moderately high to the moderate range between ages 9 and 14 years. Their mean physical appearance scores declined from the moderate to the moderately low level in the same 5 years.

These results underscore the role of social and psychological factors in the reported declines in white girls' self-esteem, and the need to understand the reasons for these declines and their relationship to depression and eating disorders (16 –18). Our results have confirmed earlier work showing the negligible effect of biological puberty alone on changes in self-esteem (19). A possible explanation for declines in white girls' self-worth, physical appearance, and social acceptance scores based on pubertal timing (20,21) was also eliminated by adjusting for BMI. The complex issue of pubertal timing and its relationship to self-esteem and BMI in NGHS girls is the subject of another manuscript now in preparation. Informed speculation on the social and psychological reasons for reported declines in self-esteem among adolescent white girls has emphasized the importance of girls' sex-role and physical appearance attitudes, and their relationships with family and peers. In 1975, Simmons (3) suggested that white girls were more likely than black girls to grow up in a male-headed household; valued marriage more than black girls; placed a higher priority on being well liked, especially by boys; and cared more about their physical appearance, but were less satisfied with their looks than black girls. More recent discussions of the determinants of white girls' self-esteem (5,16,18,22) have refocused attention on stereotyped female sex-role expectations that women should be more interpersonally oriented and more physically beautiful than men. For women, unlike men, the task of identity development results in the formation of important relationships, rather than in separation and independence. Physical attractiveness contributes to the success of this style of development (18,23). Further investigations are needed of the sex-role attitudes and expectations associated with low self-esteem among white girls, how they are learned, and the role of mass media in the process.

In addition to understanding the reasons for the decline in white girls' self-esteem between the ages of 9 and 14 years, it is important to learn if it occurs only during early adolescence or continues into early adulthood. In 1973, Simmons (24) concluded that declines in global self-esteem for the 1917 boys and girls in her sample (63% black) in Grades 3–12 were confined to early adolescence with some improvement after age 15 years. It should be noted, however, that Simmons' analyses were not carried out by gender or race, that a second measure of self-esteem based on eight specific areas of competence yielded contradictory results, and that estimates of age trends in her cross-sectional design were biased by the loss of data from school dropouts among older adolescents. Subsequent evidence on changes in white girls' self-esteem after age 14 years has been inconclusive. Declines until age 18 years (25) and until age 23 years (5) have been reported. Analysis of NGHS follow-up data on girls from ages 15–19 years may help to answer questions about the duration of this decline and the impact of demographic factors and life transitions on older adolescent girls.

Stability over Age in Black Girls' Global Self-worth and Physical Appearance Scores

In addition to extending the results of earlier studies of self-esteem in adolescent white girls, NGHS has contributed new information on the developmental stability of self-esteem and competence in black girls during adolescence. By Harter's standards (15), self-worth scores for NGHS black girls remained in the moderately high range, and their physical appearance scores remained in the moderate range between ages 9 and 14 years. Physical appearance scores declined less for black girls compared to white girls as BMI increased.

Studies of self-esteem and competence in black populations are rare. In 1975, Simmons (3) suggested that the self-esteem of adolescent black girls in her sample was higher and more stable than that of white girls because the positions of the sexes differs among blacks and whites. In black families, sex roles appear to be more flexible (26). Simmons also suggested that the higher level of self-esteem in black girls might be associated with racial differences in family structure and female role models, i.e., the greater tendency for black girls to grow up in female-

headed households with mothers who work full time. It seems clear that investigations of the effect of family structure, maternal role models, and sex-role expectations on self-esteem within the black community are needed.

Finally, NGHS results have suggested that racial differences in girls' attitudes toward their physical appearance and body mass may be important contributors to racial differences in global self-worth. Physical appearance scores for black girls, compared to white girls, declined less as their BMI increased. Other analyses of the NGHS cohort have also shown racial differences in attitudes toward physical appearance and obesity. Black girls at ages 9 and 10 years were more satisfied with their body build and appearance than whites regardless of their BMI ($p < 0.001$). Their preferred body build and expected adult body size were significantly larger than those of NGHS white girls ($p < 0.001$) (27). Other authors have suggested that support for black girls' body build preferences may be found in subcultural expectations and ideals regarding black womens' appearance and behavior (28,29). These differing standards for acceptable body size in black compared to white girls could have important public health implications if they are directly linked to the greater prevalence of obesity and obesity-related disease (diabetes, hypertension, stroke, and coronary disease) seen in black compared to white adult women (30–32). Future analyses should go beyond longitudinal descriptions to address hypothesized relationships between Self-Perception Profile scores, dietary intake, and eating behaviors in black and white adolescent girls.

Limitations

Two limitations of the analyses presented in this article are associated with the measurement of sexual maturation stage in NGHS girls. The determination of maturation stage in NGHS used the areolar staging system of Garn and Falkner (10). We have previously reported the high correlation between the areolar staging of Garn and Falkner and the breast staging system of Tanner (Spearman correlation coefficient of 0.94) and noted that given the discrepancies between the two systems, the latter tends to overestimate early puberty, particularly in obese girls (10).

In addition, a substantial proportion of NGHS girls aged 9 and 10 years at study entry were already pubertal (33.0% of white girls and 64.4% of black girls) (7). Therefore, we may have missed the impact of early puberty on self-worth, physical appearance, and social acceptance scores in these girls.

This study was presented in part at the Society for Adolescent Medicine meeting, March 23, 1996, Arlington, Virginia.

This research was performed under Contracts NO1-HC-55023 to NO1-55026 of the National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, Maryland.

The authors thank Susan Harter, Ph.D., of the University of Denver, for the use of the Self-Perception Profile for Children.

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