Clinical Study

Social Factors in Childhood and Adulthood Associated with Adult Obesity in African American and White Women

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Background. Few studies have examined how individual and neighborhood poverty in childhood and adulthood influence the likelihood of adult obesity. We used a longitudinal cohort to examine these associations. **Methods.** Our cohort consisted of children born in Baltimore, MD, USA with followup as adults from ages 27 to 33. We used logistic regression to examine the multivariate association between individual and neighborhood poverty in childhood and adulthood and adult obesity, (body mass index ≥ 30), based on self-reported height and weight. **Results.** Of the 986 female respondents, 82% were African American and 18% were White. Both groups had similar rates of adulthood obesity (African American 25% versus Whites 26%, $P = 0.91$), and similar rates of poverty as children and adults. There was no statistically significant association between individual or neighborhood poverty during childhood and the likelihood of adult obesity. Adults at risk for overweight or overweight as children had significantly greater odds of adult obesity (OR 2.8 and 12.1, resp.). **Conclusion.** In this sample of women with high rates of childhood and adulthood poverty, obesity rates were high. Childhood risk for overweight and overweight were strongly associated with adult obesity. Individual and neighborhood poverty in childhood were not independently associated with adulthood obesity.

1. Background

Over two-thirds (67%) of US adults are obese or overweight. The immediate cause of obesity is sustained positive energy balance, where energy intake exceeds energy expenditure. However, a variety of individual and social factors also contribute to obesity. At the individual level, gender, race, and socioeconomic status are important predictors of obesity. For example, women are more susceptible to weight gain [1, 2]. African American, native American, and Hispanic women have a higher prevalence of obesity than their White counterparts [3–6]. In addition, White women show a consistent inverse relationship between weight and socioeconomic status, while for African American women, this relationship is inconsistent or absent [7, 8].

Risks of obesity also vary at the neighborhood level, and poor neighborhoods bear the disproportionate burden. Due to ongoing residential segregation, poor and minority individuals may be clustered in “obesogenic” neighborhoods that

promote and sustain obesity. Neighborhood can influence the likelihood of obesity by influencing behavioral norms, access to food, and opportunities for physical activity [9–11]. Women may get a larger “dose” of neighborhood since women spend more time at home and within the neighborhood due to gender differences in workforce participation and leisure activities [11]. Children growing up in poor families or poor neighborhoods may also be at an increased risk for obesity.

There is a growing body of literature emphasizing the adult health risks of childhood overweight. Children who are overweight are at an increased risk for obesity and its associated conditions such as hypertension, hyperlipidemia, and diabetes [12–15]. Research has not focused on how childhood overweight leads to adult obesity. In poor neighborhoods, children are exposed to more fast food, calorie-dense food options, and fresh fruits and vegetables that are difficult to obtain or afford [16, 17]. Safety concerns and lack of green space limit opportunities for outdoor

play. Childhood experiences influence adult behaviors. As a result, children in neighborhoods that do not encourage physical activity and healthy eating may be at increased risk for overweight in both childhood and adulthood. To examine how childhood social context affects adult obesity, one must disentangle both the effects of childhood and adulthood poverty, and individual versus neighborhood poverty. To date, only a few studies have examined how the neighborhood or family poverty in childhood may be associated with adulthood obesity [18, 19].

We used a unique longitudinal cohort of inner city women and their children in order to determine how socioeconomic factors across the lifespan contribute to adult obesity. Our three aims were (1) to quantify the association between individual and neighborhood poverty and obesity in women; (2) to examine whether individual and neighborhood poverty in childhood influenced the likelihood of adult obesity; (3) to characterize whether these relationships varied between African American and White women.

2. Methods

2.1. Study Population. We used a subset of a longitudinal study, the Johns Hopkins Perinatal Collaborative Study (PCS), and the Pathways to Adulthood (PTA) followup. These studies followed three generations of families initially living in inner city Baltimore. The Perinatal Collaborative Study enrolled 2307 inner-city women (referred to throughout as first-generation mothers [G-1s]) who were selected at the time of their first prenatal visit to a public obstetric clinic at Johns Hopkins Hospital between 1959 and 1965 [20]. The women lived within a 10-block radius of the hospital. The study later collected data on the 2694 children (referred to throughout as second generation [G-2s]) born between 1960 and 1965 to the first-generation mothers. These children were initially studied prospectively with data gathered between birth and age 8 regarding their development, health, and socioeconomic characteristics [21].

From 1992 to 1994, the Pathways to Adulthood Study (PTA) collected additional information from 1758 G-2s (then aged 27 to 33) about their lives from age 9 to present. Followup data included information on education, employment, family composition, health, health care usage, and income [20]. In addition, census data was used for information regarding the neighborhood characteristics of each G-2 at birth, at 11-12 years of age, at 16-17 years of age, and at age of followup (ages 27-33). For the Pathways to Adulthood Study, 75% of G-1s and 67% of G-2s responded between 1992 and 1994. For a full description of sample population and methods, see Hardy et al. [21].

Our final sample included the 986 female G-2s (75%) who provided information (in person or via telephone) for the Pathways to Adulthood Study, had information on self-reported height and weight, and could be linked to the Perinatal Collaborative Study for data on their childhood clinical and sociodemographic characteristics. We excluded women who were pregnant at the time of the interview

($n = 34$), and women whose race by self-report was neither African American nor White ($n = 1$). We obtained the data from the Inter-University Consortium for Political and Social Research. This study was approved by the University of Chicago Medical Center Institutional Review Board (IRB). The study was exempt from full IRB review because the data was preexisting and deidentified.

2.2. Outcome Variable. Obesity was our outcome variable which we defined as a body mass index (BMI) greater than or equal to 30. Information on height (feet and inches) and weight (lbs) was obtained by self-report. First, we calculated BMI as a continuous linear outcome variable according to the formula: $(\text{weight (lbs)}/\text{height (inches)}^2) \times 703$. Then we defined our categorical outcome variable—nonobese versus obese—using cutoffs consistent with those used by the Centers for Disease Control, the World Health Organization, and the National Institutes of Health [22, 23].

2.3. Covariates

2.3.1. Measures in Adulthood

Demographic and Health-Related Characteristics. We adjusted for individual characteristics including demographic (age, race, number of children, age at birth of first child, and marital status) and health related (current smoking status and self-reported health) characteristics.

Socioeconomic Status. As an indicator of socioeconomic status (SES), we used years of education and homeownership. Since little consensus exists in the literature regarding how best to measure SES, we also examined education, income, and assets as potential measures of SES. We treated years of education as a continuous variable and also coded as a binary variable for college graduate or not. Although we had two measures for income, self-reported total household income and personal income, the high rate of missing values precluded their use. We had six measures of assets. We treated assets as a continuous variable ranging from 0 to 6, with one point given for a “yes” response when asked about each of six assets (current personal checking account; current IRA or pension; own house or condo; car, truck, or motorcycle ownership; credit or charge account; current savings account). Homeownership was the most robust asset measure with the largest effect in both magnitude and statistical significance. Therefore, we used homeownership as our additional SES measure.

Neighborhood Characteristics. We derived G-2s adult neighborhood characteristics from the 1990 census data. The PTA data link each respondent's address at the time of the interview to the appropriate census tract. For measures of neighborhood SES, we examined median household income for census tract as a continuous variable and also categorized neighborhoods based on percent of respondents below federal poverty level (nonpoor [less than 20%] and poor [$>20\%$]). We based our categories of percent poverty on previous literature and the Census Bureau definition of

poverty areas as those in which at least 20% of the population lives below the federal poverty line [24]. Neighborhood racial composition was based on percent of African American residents. We created a binary variable for a predominately African American neighborhood [$\geq 90\%$] or not [$< 90\%$]. There is no convention for categorizing neighborhoods based on racial composition; the proportion of residents who are African Americans across neighborhoods is highly skewed [25].

2.3.2. Measures in Childhood

Demographic and Health-Related Characteristics. We used childhood BMI at age 7 as a covariate. BMI was categorized as underweight, normal weight, at-risk for overweight and overweight according to CDC BMI-for-age percentile formulas [26]. We also evaluated whether the G-1 mother was married at G-2s birth, and whether G-2s parents were married when the G-2 was 8.

Socioeconomic Status. Individual childhood poverty status was characterized by a binary variable to indicate whether the individual was ever poor in childhood. In addition, we used parental homeownership as a proxy for assets.

Neighborhood Characteristics. Childhood neighborhood characteristics were based on G-2 report at age 8 and were derived from 1970 census data by the PTA investigators. Categories for neighborhood racial composition and neighborhood poverty were consistent with those mentioned above. We based neighborhood racial composition on percentage of African American residents. There was a binary variable for African American neighborhood [$\geq 90\%$] or not [$< 90\%$]. We also categorized neighborhoods based on percent of respondents below federal poverty level (nonpoor [less than 20%] and poor [$> 20\%$]).

2.4. Analyses. We conducted univariate and multivariate analysis for our outcome variables and our covariates of interest. For univariate analyses, we compared baseline characteristics for African American and White women in childhood and adulthood. Then we conducted a bivariate analysis to compare characteristics of African American and White women by obesity status. We used cross tabulations to compare all categorical variables by race and obesity status. We used chi-square statistics as the corresponding measure of heterogeneity. For continuous variables, we determined summary measures (mean and standard deviation) for each subgroup. We used analysis of variance (ANOVA) to compare mean values across subgroups.

We examined the multivariate associations between obesity status and the covariates of interest using logistic regression. During this process, we considered those in which we had substantive a priori interest based on prior literature. In the final model, we included the covariates that were at least of borderline statistical significance during forward stepwise selection ($P < 0.15$). In a stepwise fashion, we conducted multiple analyses to determine the relative effects.

To examine childhood factors related to adult obesity, we estimated childhood individual effect versus neighborhood effect on adulthood overweight. To examine adult factors, we estimated childhood neighborhood effect versus adult neighborhood effect. Finally, we examine adulthood neighborhood effect versus individual effect on adult obesity. For these analyses, we controlled for marital status, age at first child, and number of children. To account for the multilevel nature of the data, respondents within families within census tracts, we clustered on census tract. All analyses were done using Intercooled Stata (version 11.0; Stata Corporation, College Station, TX).

3. Results

3.1. Baseline Characteristics. A summary of baseline sociodemographic, health, and neighborhood characteristics of the cohort is presented in Table 1. The G-2 female sample was 82% African American and 18% White. As adults, the women had similarly high rates of obesity (26% and 25% resp.). There was no statistically significant difference between the African Americans and Whites in the proportion overweight (36% versus 31%, $P = 0.28$) or obese (25% versus 25%, $P = 0.908$) or mean BMI (26.6 versus 26.1, $P = 0.422$).

Although household income was not significantly different between African American and White women (\$31,825 versus \$35,164, $P = 0.19$), they differed on many other socioeconomic indicators. Compared to their White counterparts, African American women had more years of education (12.8 versus 10.9 for Whites), were more likely to have completed college (15% versus 3%), and had higher personal income (all $P < 0.001$). African American women had a lower mean number of assets than their White counterparts (2.5 versus 3.2, $P < 0.001$). African American women were also significantly less likely to be married (27% versus 59%), which may, in part, account for the differences in both assets and household income. African American and White women did not differ on the number of children or age at first child.

African American and White women also substantially differed by current neighborhood characteristics (Table 1). African American women lived in neighborhoods with an average household income that was significantly lower than Whites (\$25,323 versus \$33,352). The neighborhoods in which the African American study participants lived had a significantly higher proportion of African Americans than their White counterparts ($P < 0.001$).

Both African American and White women experienced similarly high rates of childhood poverty (32% and 33% resp., $P = 0.85$). African American women were more likely to have been born to a single mother, to have parents separate in early childhood, and to have lived in a poor neighborhood as a child (all $P < 0.001$).

3.2. Bivariate Analysis for Obesity. Respondents who were obese were similar to their nonobese counterparts in racial makeup, neighborhood characteristics, and family composition (Table 2). There was no significant difference in age at first child, marital status, or number of children. They differed on two SES measures, personal income and assets.

TABLE 1: Comparison of participant characteristics by race.

	African American females (<i>n</i> = 811)		White females (<i>n</i> = 175)		<i>t</i> -test
	Mean	SD	Mean	SD	<i>P</i> value
Demographic characteristics					
Age, mean (SD)	30.12	1.5	29.93	1.44	0.134
Years of education	12.75	2.07	10.92	2	<0.001
Percentage with college degree or above	14.61	35.34	2.89	16.8	<0.001
Number of assets	2.49	2.16	3.2	2.15	<0.001
Average family income (\$)	\$31,825	\$22,384	\$35,164	\$24,818	0.188
Average personal income (\$)	\$16,077	\$12,194	\$12,235	\$11,993	0.001
Number of children	1.49	1.33	1.59	1.21	0.388
Percentage married	27.18	44.52	59.41	49.25	<0.001
Age at first child's birth	23.61	5.22	23.32	5.07	0.504
Percent below poverty level	32.94	47.04	27.74	44.91	0.216
Health characteristics					
BMI	26.56	6.13	26.13	6.29	0.422
Percent overweight	36.05	48.06	30.95	46.41	0.278
Percent obese	24.58	43.08	25.00	43.43	0.908
Percent current smoker	42.62	49.48	53.18	50.04	0.011
Percent with very good/excellent self-reported health	56.03	49.67	54.12	49.98	0.650
Adult neighborhood characteristics					
Median household income (\$)	\$25,323	\$10,616	\$33,352	\$12,641	<0.001
Percent African American	72.17	31.29	8.06	11.73	<0.001
Percent poor neighborhood	35.42	15.9	24.77	12.48	<0.001
Childhood neighborhood and personal characteristics					
Percent African American	72.8	33.44	8.95	19	<0.001
Mother married at time of birth (%)	66.92	47.08	87.86	32.75	<0.001
Mother married to father at age 8 (%)	60.17	48.98	70.86	45.57	<0.001
Percent not on welfare as child/adult	41.3	49.26	29.71	45.83	0.004
Percent poor neighborhood	22.36	15.49	13.33	11.2	<0.001
Household below poverty level (%)	31.81	46.6	32.57	46.99	0.845
Overweight as child (%)	5.15	22.12	4.65	21.12	0.787
At risk for overweight as child (%)	7.79	26.82	8.72	28.3	0.683

Overall, obese women were more likely to be overweight as a child and to live in neighborhoods with lower median household income. Obese White women were significantly more likely than their normal weight counterparts to live in a poor neighborhood ($P = 0.002$), while that relationship was not found for African American women.

3.3. Multivariate Models

3.3.1. Childhood Factors Related to Obesity in Adulthood. Table 3 examines childhood individual and neighborhood characteristics associated with adult obesity. In adjusted analysis, childhood overweight and at risk for overweight were associated with an increased likelihood of obesity as an adult. Children who were at risk for overweight at age 7

were significantly more likely to be obese as adults (OR 2.8, 95% CI 1.5–5.2). Similarly, children who were overweight at age 7 have significantly greater odds of being obese as adults (OR 12.1, 95% CI 4.9–30.0). Growing up in a poor or predominately African American neighborhood was not associated with an increased risk for adult obesity. Maternal characteristics such as homeownership and marital status were not associated with adult weight.

3.3.2. Adult Factors Related to Obesity in Adulthood. Table 3 examines individual versus neighborhood characteristics associated with adult obesity. Homeownership is associated with a 57% decreased likelihood of obesity (OR 0.43, 95% CI 0.21–0.87). Number of children and age at first child were not associated with adult obesity. However, being married was

TABLE 2: Comparison of participant characteristics by race and obesity status.

	African American females (<i>n</i> = 811)					White females (<i>n</i> = 175)				
	Nonobese (<i>n</i> = 577)		Obese (<i>n</i> = 188)		<i>t</i> -test	Nonobese (<i>n</i> = 126)		Obese (<i>n</i> = 42)		<i>t</i> -test
	Mean	SD	Mean	SD	<i>P</i> value	Mean	SD	Mean	SD	<i>P</i> value
Demographic characteristics										
Age, mean (SD)	30.12	1.52	30.14	1.45	0.827	29.98	1.45	29.75	1.38	0.367
Years of education	12.84	2.09	12.56	2	0.114	11.07	2.12	10.52	1.61	0.127
Percentage with college degree or above	15.94	36.64	10.64	30.92	0.074	3.97	19.6	0	0	0.192
Number of assets	2.63	2.17	2.16	2.05	0.011	3.48	2.2	2.38	1.78	0.004
Average family income (\$)	\$33,085	\$23,203	\$28,672	\$19,923	0.069	\$37,537	\$27,481	\$28,220	\$14,764	0.104
Average personal income (\$)	\$16,535	\$12,442	\$14,734	\$11,405	0.118	\$13,408	\$12,717	\$8,838	\$8,902	0.045
Number of children	1.49	1.37	1.51	1.25	0.859	1.58	1.23	1.62	1.21	0.856
Percentage married	26	43.9	31.38	46.53	0.150	60.32	49.12	54.76	50.38	0.529
Age at first child's birth	23.76	5.26	23.15	5.06	0.166	23.36	5.16	23.25	4.96	0.908
Percent below poverty level	31.94	46.68	35.48	48	0.422	23.89	42.83	40	49.61	0.052
Health characteristics										
BMI	23.75	3.12	35.18	4.94	<0.001	23.2	3.22	34.94	4.85	0.000
Percent current smoker	42.81	49.52	42.02	49.49	0.850	51.59	50.17	59.52	49.68	0.375
Percent with very good/excellent self-reported health	61.18	48.78	42.55	49.57	<0.001	58.73	49.43	42.86	50.09	0.074
Adult neighborhood characteristics										
Median household income (\$)	\$25,838	\$10,938	\$23,886	9566	0.036	\$34,481	\$13,947	\$30,303	\$8,291	0.095
Percent African American	72.08	31.07	73	31.61	0.735	8.02	12.34	7.3	8.22	0.747
Percent poor Neighborhood	35.16	15.97	36.13	15.44	0.485	23.4	11.23	28.86	14.73	0.026
Childhood neighborhood and personal characteristics										
Percent African American	71.97	34.03	75.23	31.58	0.290	8.47	18.36	11.36	22.17	0.483
Mother married at time of birth (%)	67.44	46.9	67.03	47.14	0.919	87.2	33.54	90.24	30.04	0.606
Mother married to father at age 8 (%)	61.7	48.65	60.11	49.1	0.698	71.43	45.36	71.43	45.72	0.999
Percent not on welfare as child/adult	40.9	49.2	46.27	49.99	0.196	27.77	44.96	38.09	49.15	0.210
Percent poor Neighborhood	21.58	15.26	24.29	15.76	0.046	13.16	10.66	14.46	13.49	0.589
Household below poverty level (%)	29.28	45.54	36.7	48.32	0.057	30.95	46.41	33.33	47.71	0.775
Overweight as child (%)	1.4	11.77	17.13	37.78	<0.001	1.63	12.7	11.9	32.78	0.004
At risk for overweight as child (%)	5.44	22.7	15.47	36.26	<0.001	6.5	24.76	16.67	37.72	0.048

associated with an increased risk for obesity (OR 2.2, 95% CI 1.3–3.6). Current residence in a poor or predominately African American neighborhood was not associated with adult obesity.

3.3.3. African Americans Racial Differences in Factors Related to Obesity. and Whites did not differ in the characteristics associated with weight status. Multiple tests for the interaction terms for race were not significant (analysis not shown).

4. Discussion

In this longitudinal cohort of African American and White women from Baltimore, MD, we sought to quantify the association between adult obesity and individual and neighborhood socioeconomic status in both childhood and

adulthood, and to determine whether these relationships varied by race.

We found that rates of obesity were high and similar between the African American and White women. Several things could potentially explain this finding. One possibility is that the number of White respondents was too small to detect a difference if it exists. However, an additional reason is that there is little racial difference in characteristics associated with adulthood obesity due to socioeconomic homogeneity in our cohort. Studies that show differences in obesity rates between African Americans and White women may be unable to fully control for differences in socioeconomic status.

We also found a strong and consistent relationship between childhood overweight at age 7 and adult obesity. Our work supports the importance of identifying and managing overweight in childhood to prevent life-long

TABLE 3: Simple and multiple logistic regression.

	Simple Logistic Regression		(1)		(2)		(3)		MLR-final model ^x	
	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.	OR	95% C.I.
Obese	50.974	0.040	64927	99.328	0.125	79006	26.367	0.122	5678	72421
Age	0.939	0.835	1.056	0.928	0.831	1.036	0.948	0.867	1.035	1.052
African American	1.068	0.249	4.579	1.216	0.635	2.326	0.962	0.524	1.764	2.704
Married	2.575	0.721	9.191	1.973	1.246	3.124	2.156	1.413	3.288	3.627
Underweight at age 7	0.288	0.065	1.283	0.276	0.064	1.191	0.165	0.040	0.683	1.294
At risk for overweight at age 7	2.832	1.524	5.262	2.515	1.363	4.639	4.055	2.420	6.794	5.286
Overweight at age 7	12.039	4.824	30.043	13.343	5.496	32.396	12.326	5.888	25.803	30.046
Number of children	0.678	0.427	1.078	0.833	0.666	1.043	0.895	0.747	1.073	1.006
Age at first child's birth	0.969	0.911	1.031	0.969	0.915	1.026	0.968	0.923	1.015	1.031
Years of education	0.967	0.859	1.090	0.964	0.869	1.069	0.935	0.849	1.029	1.087
Home ownership in adulthood	0.417	0.206	0.844	0.477	0.254	0.896	0.515	0.311	0.854	0.866
>90% African American Neighborhood in Childhood	0.926	0.575	1.493	1.032	0.642	1.660	—	—	—	1.482
>90% African American Neighborhood in adulthood	0.993	0.630	1.564	—	—	—	1.060	0.738	1.522	1.571

TABLE 3: Continued.

	Simple Logistic Regression	MLR-Std model + childhood socioeconomic variables*			MLR-Std model + adult socioeconomic variables [#]		MLR-final model ^x					
Poor neighborhood in childhood (>20% poverty)	0.971	0.625	1.510	0.956	0.633	1.443	—	0.984	0.637	1.522		
Poor neighborhood in adulthood (>20% poverty)	1.089	0.590	2.011	—	—	—	1.217	0.726	2.039	1.089	0.593	2.002
Home ownership in childhood (by parents)	1.212	0.609	2.411	0.967	0.482	1.942	—	—	—	1.187	0.597	2.361
Married X African American	0.825	0.210	3.242	—	—	—	—	—	—	—	—	—
Married X number of children	1.201	0.758	1.902	—	—	—	—	—	—	—	—	—

* Controlled for standard model (age, race, marital status, childhood weight status, age at first child's birth, education, and homeownership in adulthood)+ childhood SES variables (as a child: predominantly African American (>90%) neighborhood, poor neighborhood (>20% poverty), and homeownership by parents); [#] controlled for standard model (age, race, marital status, childhood weight status, age at first child's birth, education, homeownership in childhood) + Adult SES (as an adult: African American (>90%) neighborhood, poor neighborhood (>20% poverty)); ^xControlled for Standard Model (age, race, marital status, childhood weight status, age at first child's birth, education, and homeownership in childhood); childhood SES variables (as a child: predominantly African American (>90%) neighborhood, poor neighborhood (>20% poverty), and homeownership by parents); adult SES (as an adult: African American (>90%) neighborhood, poor neighborhood (>20% poverty)).

morbidity. Children who are overweight are at an increased risk for obesity and its associated conditions such as hypertension, hyperlipidemia, and diabetes [12–15]. The association between childhood overweight and adult obesity increases with age. Adult obesity is strongly associated with adolescent overweight, while overweight infants and toddlers have a lower risk [12, 13, 15, 18]. Our research was consistent with previous literature that showed weight status at early school age (ages 6–9) is predictive of adult weight status [12, 13, 27].

Married women were more likely to be obese than their unmarried counterparts even after controlling for assets and parity. The effects of marriage on obesity did not significantly vary by race. The literature on the effect in marital status and BMI has been mixed. Some studies show married women have increased BMI, while others show mixed or no relationship [28, 29]. Marital status can affect weight through both direct and indirect pathways. Being married can increase one's likelihood of being overweight through decreased leisure and increased prompts for eating [30]. However, marriage also increases SES by increasing assets and household income, which in turn decreases odds of overweight.

One strength of the study is the longitudinal, multilevel nature of the data. Many studies that attempt to measure childhood effects on adulthood health outcomes rely on retrospective data which is subject to recall bias. Our measures were obtained prospectively. Another strength of this study is its use of census data for aggregate neighborhood measures in childhood and adulthood. Studies that aggregate respondents' characteristics to determine community SES may be subject to atomistic fallacy because the study population may not be a representative sample of the population [31].

The pathways to adulthood data had a limited geographic focus, children born in the Johns Hopkins Hospital catchment area. This group had a higher proportion of African Americans, higher poverty rates, and higher obesity rates than the US as a whole for that time period [3]. Within our study population, African American and White women had similar rates of childhood and adulthood poverty. While this homogeneity limits study generalizability, our findings suggest that racial differences in obesity may be due, in part, to differences in socioeconomic status or neighborhood environment. Even within this group where African Americans and Whites had similar rates of poverty in childhood and adulthood, they still differed on markers of SES. African American women had higher education, but lower household income and assets than their White counterparts. Incomplete accounting for SES may explain some residual differences in health outcomes of African Americans and Whites with the similar education or income. In our study population, African American women, regardless of income, were more likely to live in lower income neighborhoods and neighborhoods that were predominately African American. This finding is supported by social science literature that finds that racial segregation still constrains neighborhood choices among African Americans of all income levels [32, 33].

Our study has important limitations. The primary outcome variable, BMI, was calculated through self-reports of height and weight. Several studies have found underreporting of weight, particularly among women and all those of higher weights [34–36]. However, the distribution of obesity was relatively equal among the sample, which would likely lead to nondifferential misclassification. A larger concern is differential misreport of weight by racial subgroup, although prior work suggests that misreporting is similar across different racial groups [37, 38]. A second limitation is that we were unable to exclude women in the postpartum period. The proportion of postpartum women as well as their pregnancy weight gain and weight loss could have varied between the two groups. A third limitation is the age of the data. All data used to make inferences, for example, federal poverty level and national obesity rates, correspond to rates from that time, so the results are internally consistent. However, the data were collected over 17 years ago which limits its current generalizability. An additional limitation, also faced by other researchers studying neighborhood, was characterizing the neighborhood environment solely through some proxy measures based on administrative data. Each neighborhood was characterized largely by the median household income taken from census data. Despite the wealth of census information, other variables that may be more directly associated with obesity were absent [33]. Asset mapping may allow a fuller characterization of neighborhood and a deeper understanding of what factors confer health risks.

In this sample of women with high rates of childhood and adulthood poverty, obesity rates were high. Although living in a poor neighborhood was not an independent risk factor for obesity, poor neighborhoods in our sample had higher rates of adult obesity. Childhood at risk for overweight and overweight was strongly associated with adult obesity. Being married was also associated with obesity. Efforts to combat obesity should be focused not only on individual patients, but also within at-risk and affected families and communities.

Conflict of Interests

None of the authors of this paper has any conflict of interests to disclose related to employment, consultancies, honoraria, stock, expert testimony, patents, royalties, or any other relationships related to this project.

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