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Life-Course Socioeconomic Position and Hypertension in African American Men: The Pitt County Study

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Objectives. We investigated the odds of hypertension for Black men in relationship to their socioeconomic position (SEP) in both childhood and adulthood.

Methods. On the basis of their parents' occupation, we classified 379 men in the Pitt County (North Carolina) Study into low and high childhood SEP. The men's own education, occupation, employment status, and home ownership status were used to classify them into low and high adulthood SEP. Four life-course SEP categories resulted: low childhood/low adulthood, low childhood/high adulthood, high childhood/low adulthood, and high childhood/high adulthood.

Results. Low childhood SEP was associated with a 60% greater odds of hypertension, and low adulthood SEP was associated with a 2-fold greater odds of hypertension. Compared with men of high SEP in both childhood and adulthood, the odds of hypertension were 7 times greater for low/low SEP men, 4 times greater for low/high SEP men, and 6 times greater for high/low SEP men.

Conclusions. Greater access to material resources in both childhood and adulthood was protective against premature hypertension in this cohort of Black men. Though some parameter estimates were imprecise, study findings are consistent with both pathway and cumulative burden models of hypertension. (*Am J Public Health.* 2006;96:812–817. doi:10.2105/AJPH.2005.076158)

Studies documenting an association between low socioeconomic position (SEP) in childhood—or, alternatively, low SEP in both childhood and adulthood—and increased risk for morbidity and mortality from a variety of chronic diseases in adulthood are growing in number.[1–3] A recent review[4] focused specifically on life-course socioeconomic factors and risk for cardiovascular disease (CVD) concluded that studies provide moderate support for an independent contribution of low SEP in early life and increased CVD risk factors, CVD morbidity, and CVD mortality in adulthood. Though the review found little support for an independent association between CVD risk and social mobility (i.e., movement from one SEP level in childhood to another in adulthood), fairly consistent support was observed for a positive association between lifelong socioeconomic disadvantage and adverse CVD outcomes in adulthood.[4]

Three major conceptual models have been advanced[5,6] to organize the literature on life-course SEP and early versus late emergence of CVD and other chronic diseases in adulthood. The first is the "latency effects" model,[5] also called the "biological chains of risk" model,[6] which posits that early-life SEP can influence adult health independent of intervening changes in SEP. The second is the "pathway"[5] or "social chains of risk" model,[6] which acknowledges the importance of early-life conditions for adult health, but stipulates that important intervening life events (like upward or downward social mobility) can alter health trajectories initiated in early childhood. Finally, the "cumulative burden" model,[5] also called the "accumulation of risk" model,[6] hypothesizes that health-damaging effects of socioeconomic deprivation in both childhood and adulthood aggregate over the life course to significantly undermine health by middle adulthood.

Because of the more widespread availability of epidemiological data on childhood SEP (most commonly measured by father's occupation) in western and northern Europe, the vast majority of studies dealing with life-course SEP and CVD have been conducted on the European continent.[3,4] The number of US-based studies is increasing,[3,4] but, to date, these studies have focused largely on White Americans. Indeed, as others[4] have noted, the paucity of research on life-course SEP and CVD risk in US racial and ethnic minorities represents a significant gap in the literature.

We found only 1 study dealing with life-course SEP and CVD risk in Black Americans. This study,[7] which used data from the National Survey of Black Americans, investigated associations between self-reported hypertension and childhood SEP (father's occupation), adulthood SEP (respondent's education and occupation), and downward intergenerational social mobility (i.e., father's occupation was higher than respondent's). Although adulthood SEP was inversely associated with self-reported hypertension, no associations were observed for childhood SEP or downward social mobility. Thus, neither the latency model nor the pathway effects model was supported in this study.[7] It is not clear to what extent misclassification of respondents on childhood SEP (and, therefore, downward social mobility) or, alternatively, misclassification on hypertension status (because of reliance on self-report data) biased the findings toward the null in this study. Additional research on life-course SEP and hypertension risk in Black Americans that builds upon this initial effort[7] is clearly needed, given the well-documented excess prevalence,[8–10] seriousness,[11–13] and earlier age of onset[8,12] of hypertension in Black Americans. The earlier onset of hypertension in Black adults, relative to Whites, suggests that the origins of the excess risk for this condition among Blacks resides, at least in part, in the problematic social and material life conditions to which numerous Black Americans are exposed in childhood.[14–16]

Using the 3 aforementioned conceptual models[5,6] of the relationship between life-course SEP and health in adulthood to frame the research questions, we investigated the contribution of relative socioeconomic deprivation—during childhood, adulthood, and over the life course—to risk for hypertension in a community probability sample of Black men aged 25 to 50 years.

METHODS

Study Participants

Data for this study come from the 2001 follow-up survey of participants in the Pitt County (North Carolina) Study, a community-based, prospective investigation of risk factors for hypertension and related disorders in Blacks aged 25 to 50 years in 1988, the baseline year. Because a major objective of the Pitt County Study was to investigate differential risk for hypertension between working-class and middle-class Blacks, individuals residing in middle-class neighborhoods were oversampled. The baseline sample, the sampling strategy, and the content of the baseline household interview are described elsewhere.[17,18]

Of the 2225 race- and age-eligible individuals, 1773 (661 men and 1112 women), or 80%, were interviewed in 1988. In 2001, the cohort was reinterviewed to obtain information on the individuals' social and economic resources from early childhood to the date of the interview. The goal was to link this life-course information on socioeconomic resources to major CVD risk factors, such as hypertension, obesity,[19] type-2 diabetes, and cigarette smoking, as recorded in 1988.

Interviews in 2001 were sought with all cohort members believed to be alive, noninstitutionalized, and residing within a 100-mile radius of Greenville, the county's principal city. Of the 1540 individuals (543 men and 997 women) meeting these criteria, 1221 (428 men and 793 women), or 79%, were reinterviewed. Of these, 43 were excluded because of significant discrepancies in birth year (≥2 years) or height (≥2 inches) when comparing 1988 and 2001 values. These exclusions resulted in 1178 individuals (418 men and 760 women), or 77% of the 1540 targeted interviews. This report focuses on the male respondents.

Measurement of Blood Pressure

Approximately 15 minutes into the 1988 baseline survey, trained interviewers used a standard mercury sphygmomanometer to measure 3 sitting blood pressures on the participant's right arm. Blood pressure was subsequently defined by the average of the second and third readings, with the fifth-phase Korotkoff's sound indicating diastolic blood pressure. An individual was classified as hypertensive if any 1 of 3 conditions was met: systolic blood pressure ≥140 mm Hg, diastolic blood pressure ≥90 mm Hg, or current use of antihypertensive medication.

Measurement of Childhood SEP

Data to measure childhood SEP were obtained with the assistance of a computerized Event History Calendar developed expressly for this study. This methodology enhances recall of information stored years or decades in the past by using more easily remembered events (e.g., where one lived and with whom at specific points in time) to stimulate the recall of events less easily remembered.[20–22] Study participants provided a brief description of the main job held by their family's primary breadwinner during their childhood years, defined as birth to 13 years of age. Each job description was coded to fit 1 of 9 categories of the 1990 Census Occupational Classification: 1=managerial and professional; 2=technical, sales, and administrative support; 3=protective services (including military); 4=farm owners; 5=precision production, craft, and repair; 6=service occupations for private households; 7=service occupations, except protective and households; 8=operators, fabricators, assemblers, and laborers; and 9=farm laborers. No code exists for life-long homemakers (i.e., persons who never worked outside the home for pay). In the case of 2 salaried working parents, the higher occupational rank, irrespective of gender, was used.

The above 9 categories were subsequently collapsed into 2 broad job categories: skilled (codes 1–5) versus semi-unskilled (codes 6–8) or farm laborer (code 9), and designated high and low childhood SEP, respectively. Childhood SEP could not be determined for 21 men because 6 were offspring of single (homemaker) mothers, and 15 had missing data on the family breadwinner variable.

Measurement of Adulthood SEP

Our prior work[18,23] indicated that education and occupation, taken alone or in combination, were weak predictors of hypertension in the Pitt County Study population. Therefore, in this study we sought to minimize misclassification of respondents with respect to their "true" socioeconomic standing in the community by creating an index of adulthood SEP on the basis of 4 variables collected in 1988.

The first variable, education, had 4 levels: less than high school, high school, some college, and college graduate. The second variable, occupation, was based on 9 Hollingshead job prestige[24] scores: 1=farm laborer/menial service worker, 2=unskilled worker, 3=machine operator or semiskilled worker, 4=skilled manual worker, 5=clerical/sales worker, 6=skilled technician/small business owner, 7=manager/farm owner (≥150 acres), 8=administrator/registered nurse, and 9=higher executive/major professional. These 9 scores were subsequently collapsed into 2 broad occupational categories: "blue collar" if Hollingshead scores were from 1 to 4; and "white collar" if Hollingshead scores were from 5 to 9. The third variable, current employment status, had 2 levels: employed versus not employed, as did the fourth variable, homeowner: yes or no. Household income was not collected in 1988; hence, employment status and home ownership provided some indirect information on access to income and wealth.

Scores for the adulthood SEP index were produced with the following algorithm: education (less than high school=0, high-school graduate but less than college=0.5, college graduate=1.0), occupation (blue collar=0, white collar=1), currently employed (no=0, yes=1), and home owner (no=0, yes=1). Thus, the highest possible score on the adulthood SEP index was 4.0. To identify individuals who could be plausibly designated as "socioeconomically advantaged," at least relative to other cohort members, persons scoring 3.0 or higher on the adult SEP index were categorized as "high"; those scoring less than 3.0 were categorized as "low."

Measurement of Life-Course SEP

Life-course SEP was determined by combining information on childhood and adulthood SEP. Four nonoverlapping life-course SEP categories were created: low childhood/low adulthood, low childhood/high adulthood, high childhood/low adulthood, and high childhood/high adulthood.

Covariates

Results from earlier papers[17,18,23–25] indicated that the following variables could

account for the association between life-course SEP variables and 1988 hypertension status: age (years), body mass index, waist-to-hip ratio, alcohol consumption (abstainer/drinker), cigarette smoker (yes/no), strenuous physical exercise (physical activity ≥3 times/week, ≥20 minutes per occasion, intense enough to breathe hard and perspire), currently married (yes/no), instrumental support (low/high), emotional support (low/high), perceived stress (low/high), and John Henryism (low/high), defined as a strong behavioral predisposition to engage in high-effort coping with social or economic adversity. These covariates were controlled in all analyses.

Descriptive Variables

Interviewers used the Event History Calendar to collect information on the study participants' material conditions of life during childhood; for example, whether their childhood home(s) had electricity (yes/no) and indoor plumbing (yes/no). In addition, to assess exposure to early childhood nutritional deprivation, interviewers recorded (in inches) respondents' leg length,[26,27] measured as the distance from the bony prominence at the top of the leg to the floor. These 3 descriptive variables were used primarily to assess whether the 4 life-course SEP categories captured differences among respondents concerning exposure to early life material deprivation.

Statistical Analysis

Analyses were weighted to take into account the oversampling of middle-class households in 1988 and nonresponse to both the 1988 and 2001 surveys. Multiple logistic regression was used to test latency effects by contrasting the odds of hypertension among men in the low versus high childhood SEP categories, after control for adulthood SEP and potential confounders. (Main effects for low versus high adulthood SEP, after control for childhood SEP, were also conducted.) When testing for cumulative burden and pathway effects, men in the high/high SEP group, or those "relatively advantaged" over the life course, were used as the referent category. The cumulative burden model was tested by comparing the odds of hypertension for men in the high/high SEP group and men in the low/low (or "chronically disadvantaged") SEP group. Two pathway models were tested. First, the odds of hypertension for men in the high/high SEP group were compared with that for men in the low/high SEP group; and second, the odds of hypertension for men in the high/high SEP group were compared with that for men in the high/low SEP group.

Hierarchical regression models were used to add potential confounders individually or as a block to isolate their unique contributions to the odds for hypertension. For example, when testing main effects for childhood or adulthood SEP, and similarly when testing additive effects for life-course SEP, the fully adjusted model controlled for potential confounders in the following order: age (model 1); body mass index and waist-to-hip ratio (model 2); smoking, alcohol consumption, and physical exercise (model 3); marital status, instrumental and emotional support, perceived stress, and John Henryism (model 4). For parsimony sake, only the results for models 1 and 4 will be presented.

All analyses were performed using SAS, Version 9.12 (SAS Institute Inc, Cary, NC).[28] Weighted estimates of parameters, variances, and 95% confidence intervals were obtained using either linearization or Jackknife Repeated Replication techniques.[29] Analyses were restricted to the 379 men (70% of the initial target number) with no missing values on study variables.

RESULTS

Table 1 summarizes differences in selected background characteristics of the men, stratified by life-course SEP. The overwhelming majority (307 of 379; 81%) grew up in low childhood SEP households, and only 22% (68 of 307) achieved substantial upward social mobility in adulthood. Consequently, most men (239 of 379; 63%) were assigned to the low/low SEP category. Correspondingly, the high/high SEP category had the smallest number of men (25 of 379; 7%).

Comparison of baseline demographic and behavioral characteristics by life-course SEP showed statistically significant differences only for age and marital status: High/low SEP men were youngest and least likely to be married whereas low/high SEP men were oldest and most likely to be married. Comparisons involving the 3 variables believed to reflect

TABLE 1—Differences in Selected Characteristics of Black Men, by Life-Course Socioeconomic Position: The Pitt County (North Carolina) Study, 2001

	Childhood/Adulthood Socioeconomic Position				
	Low/Low (n = 239)	Low/High (n = 68)	High/Low (n = 47)	High/High (n = 25)	P[a]
Mean age (SE)	34.6 (0.51)	37.3 (0.86)	31.5 (0.92)	35.4 (1.28)	<.01
Mean waist–hip ratio (SE)	0.89 (0.00)	0.90 (0.01)	0.89 (0.01)	0.89 (0.02)	.13
Obese,[b] %	20.5	24.8	19.7	10.1	.35
Smoker, %	51.7	33.1	45.3	33.6	.56
Drinker, %	62.6	63.1	70.1	67.7	.98
Strenuous exerciser,[c] %	62.2	61.4	73.9	41.0	.13
Married, %	54.3	87.6	54.5	71.5	.01
Crowded households,[d] %	17.6	4.8	17.0	3.6	.17
Childhood[e] homes lacking, %					
Electricity	12.8	21.0	10.5	3.9	.09
Plumbing	74.1	77.6	48.8	49.9	.04
Mean leg length[f] (SE)	36.8 (0.18)	37.9 (0.41)	37.9 (0.48)	38.0 (0.66)	<.01

Note. Data were weighted for oversampling and nonresponse.
[a]F tests, 2-tailed; all comparisons except age were age adjusted.
[b]Body Mass Index ≥30.0.
[c]Respondent exercises ≥3 times/week, ≥20 minutes per occasion, enough to breathe hard and perspire.
[d]Households with more than 1 person per room, on average.
[e]Childhood was defined as birth to 13 years old.
[f]Distance, in inches, between bony prominence at top of leg and floor.

exposure to childhood material deprivation generally supported the validity of the life-course SEP categories. First, there was a tendency ($P<.09$) for men from slightly more advantaged childhood backgrounds (high/high and high/low SEP groups) to have grown up in homes with electricity. These men were also more likely ($P<.04$) to have grown up in homes with indoor plumbing. Interestingly, men in the low/low SEP group had a significantly ($P<.01$) shorter mean leg length (about 1 inch shorter) than men in the other 3 groups. Furthermore, when mean leg length was compared for men in the low versus high childhood SEP groups, ignoring adulthood SEP, the 372 men in the former group had a significantly ($P<.05$) shorter mean leg length (37.05 inches) than the 72 men in the latter group (37.90 inches) (data not shown).

The unadjusted, category-specific prevalence of hypertension is shown in Table 2. The prevalence was 14.1 percentage points higher (40.9 vs 26.8) among men from low versus high childhood SEP backgrounds, and 11.4 percentage points higher (41.2 vs 29.8) among men in the low versus high adulthood SEP groups. For life-course SEP, the differences were more marked: 42.3% of men in the low/low SEP group were hypertensive compared with 10.9% of men in the high/high SEP group. Interestingly, hypertension prevalence for men in the low/high SEP (35.8%) and high/low SEP (35.1%) categories were virtually identical.

Table 3 presents the odds ratios and 95% confidence intervals for hypertension by childhood, adulthood, and life-course SEP. The odds ratios in the first column are adjusted for age only; those in the second column are adjusted for age plus the indicated covariates. In general, the 2 sets of estimates are very close in value. A modest, non–statistically significant "latency effect" was observed for childhood SEP: Men from low childhood SEP backgrounds had a 60% greater odds of hypertension (multivariable adjusted OR=1.60; 95% CI=0.75, 3.38) than their higher childhood SEP counterparts. In contrast, a fairly robust association for adulthood SEP was observed: Men in the low adulthood SEP category had a 2-fold greater odds (multivariable adjusted OR=2.25; 95% CI=1.15, 4.40) of hypertension than their higher SEP counterparts. (The inclusion of mean leg length as a covariate did not alter the findings for childhood and adulthood SEP; data not shown.) Finally, though the parameter estimate was imprecise, strong support for the cumulative burden model was observed: Men in the low/low SEP group had a 7-fold greater odds of hypertension (multivariable adjusted OR=7.27; 95% CI=1.91, 27.51) than men in the high/high SEP group.

TABLE 2—Unadjusted Prevalence of Hypertension Among Black Men, by Childhood, Adulthood, and Life-Course Socioeconomic Position: The Pitt County (North Carolina) Study, 2001

Socioeconomic Position	n	Percentage Hypertensive[a]	P[b]
Childhood[c]			
Low	307	40.9	<.14
High	72	26.8	
Adulthood[d]			
Low	286	41.2	<.02
High	93	29.8	
Life-course[e]			
Low/low	239	42.3	<.04
Low/high	68	35.8	
High/low	47	35.1	
High/high	25	10.9	

[a]Hypertension = systolic blood pressure ≥140 mm Hg, or diastolic blood pressure ≥90 mm Hg, or currently taking antihypertensive medication.
[b]Likelihood ratio tests, 2-tailed; data are weighted for oversampling and nonresponse.
[c]Low = parent's occupation: unskilled worker/farm laborer; high = skilled worker.
[d]Low = respondent's SEP index score <3; high = SEP index score ≥3.
[e]Low/low = low childhood/low adulthood SEP; low/high = low childhood/high adulthood SEP; high/low = high childhood/low adulthood SEP; high/high = high childhood/high adulthood SEP.

Study findings also pointed to potential pathway effects as indicated, for example, by a nearly 4-fold greater odds (multivariable adjusted OR=3.85; 95% CI=0.91, 16.13) of hypertension among low/high SEP men compared with high/high SEP men. Though sizeable, this odds ratio was actually 47% lower than the odds ratio of 7.27 observed for low/low SEP men, suggesting the potential importance of substantial upward social mobility in mitigating risk for hypertension among Black men who grew up poor. Potential pathway effects are similarly suggested by the multivariable adjusted odds ratio of 5.87 (95% CI=1.25, 27.49) observed for men in the high/low SEP group. Despite having presumably comparable childhood material life conditions, as adults, the high/low SEP men had a 6-fold greater odds of hypertension than their high/high SEP counterparts. Parameter estimates for both pathway models were imprecise, however, because of small sample sizes.

DISCUSSION

Our study findings indicate that socioeconomic conditions in childhood and adulthood, separately and in combination, influenced the hypertension status of Black men aged 25 to 50 years at the time of their enrollment, in 1988, in the Pitt County Study. The somewhat modest (and non–statistically significant) 60% excess odds for hypertension associated with low childhood SEP was nevertheless in the direction predicted by the latency effects model.[5,6]

This study provided stronger support for the cumulative burden model, as evidenced by the 7-fold greater odds of hypertension among men who were relatively disadvantaged in both childhood and adulthood compared with men who were relatively advantaged at both time points. Formal tests of the cumulative burden model, with a specific focus on CVD risk factors, such as hypertension, are still few.[4] Our positive findings for Black men in Pitt County agree with evidence supporting a cumulative burden model of hypertension in British women[30] and Scottish men.[31]

We also found some evidence supporting the pathway model, though relevant associations could not be estimated with precision because of small numbers. Membership in the low/high SEP group, which, in this study, represents substantial upward social mobility, was associated with a 47% reduction in the odds of hypertension compared with men who remained relatively disadvantaged in both childhood and adulthood. Whether this is a solid clue regarding the cardiovascular health benefits of significant upward social mobility for Black men, or a chance finding, is a question for future studies to answer.

Similar reservations apply to the highly suggestive 6-fold greater odds of hypertension

TABLE 3—Relative Odds of Hypertension Among Black Men, by Childhood, Adulthood, and Life-Course Socioeconomic Position: The Pitt County (North Carolina) Study, 2001

Socioeconomic Position	n	Odds Ratios (95% Confidence Interval)	
		Age-Adjusted	Multivariable-Adjusted[a]
Childhood[b]			
Low	307	1.67 (0.82, 3.38)	1.60[c] (0.75, 3.38)
High	72	Referent	Referent
Adulthood[d]			
Low	286	2.02 (1.09, 3.72)	2.25[e] (1.15, 4.40)
High	93	Referent	Referent
Life-course[f]			
Low/low	239	6.52 (1.48, 28.63)	7.27 (1.91, 27.51)
Low/high	68	4.14 (0.86, 19.82)	3.85 (0.91, 16.13)
High/low	47	5.85 (1.14, 29.94)	5.87 (1.25, 27.49)
High/high	25	Referent	Referent

[a]Adjusted for age, body mass index, waist–hip ratio, marital status, alcohol, smoking, strenuous exercise, perceived stress, John Henryism, instrumental support, emotional support; data weighted for oversampling and nonresponse.
[b]Low = parent's occupation: unskilled worker/farm laborer; high = skilled worker.
[c]Also adjusted for adulthood SEP.
[d]Low = respondent's SEP index score < 3; high = SEP index score ≥ 3.
[e]Also adjusted for childhood SEP.
[f]Low/low = low childhood/low adulthood SEP; low/high = low childhood/high adulthood SEP; high/low = high childhood/low adulthood SEP; high/high = high childhood/high adulthood SEP.

among men in the high/low SEP group, relative to their high/high SEP counterparts. Strictly speaking, of course, men in the high/low SEP group are not necessarily downwardly mobile as many of these men may have acquired more socioeconomic resources (e.g., more education and better-paying jobs) in adulthood than the adults who raised them. The only thing that can be said with confidence is that although the high/low SEP men and the high/high SEP men may have had comparable material resources in childhood, the former had fewer such resources in adulthood. The only other known study of intergenerational social mobility and hypertension in Black Americans[7] found no association between downward social mobility and self-reported hypertension. Our study findings cannot be directly compared with that study,[7] however, because of major differences in how the 2 studies defined adulthood SEP.

Though most other studies also report weak childhood SEP main effects on CVD risk factors in adulthood,[4] our study may have underestimated the association between childhood SEP and hypertension status because of either measurement error or limited variation on the exposure variable. Even if the Event History Calendar[20–22] succeeded in improving respondents' recollection of distant life experiences, including the family breadwinner's primary occupation, differences in the material well-being of men from low and high childhood SEP backgrounds in the Pitt County Study population may have been too small to predict larger differences in long-term risk for hypertension. Future studies that include a larger number of Blacks with explicit variation in social class backgrounds will be able to avoid this limitation.

Our adulthood SEP index incorporated information on respondents' home ownership and current employment status as well as their education and occupation. Although respondent occupation (e.g., manual vs nonmanual job) is the most common measure of adulthood SEP used in life-course health research,[3,4,7] some investigators[32] used an index that included income, housing, material possessions, and job security. Incorporating this kind of "economic security" information in indices of adulthood SEP for research with Black populations could be especially important because a growing literature[33–40] indicates that Blacks, even those with college degrees or white-collar jobs, have very little wealth (and therefore little real economic security) as measured by net worth or net financial assets.[35–39] Hence, measures of adulthood SEP that include easily collected wealth data, such as home ownership (the most common form of wealth owned by Blacks)[37–39] could minimize misclassification on adulthood SEP, thereby enhancing the study's validity for Blacks. The robust, 2-fold excess odds for hypertension observed for men in the low as opposed to high adulthood SEP category in the current study contrasts with the weaker education (and occupation) main effects on hypertension in our earlier work.[17,18] This difference is most likely caused by our use of a more informative measure of adulthood SEP for Blacks in this study.

The rather large odds ratios observed for the 3 life-course SEP comparisons were attributable to the unusually low prevalence (10%) of hypertension among men in the high/high SEP group. The prevalence for men in the other 3 groups was comparable to the national average (about 34%) for Black men.[8,9] Though replication is clearly called for, this unusually low prevalence of hypertension for men in the high/high SEP group points to the potential importance of stable access to adequate socioeconomic resources *across the life course* for preventing hypertension in Black men.

Limitations of our study include a small sample size, which decreased the precision of some parameter estimates; an overrepresentation of respondents in low SEP categories, a legacy of the historically high poverty rates among Blacks in the Southeastern United States;[16,40] and our reliance on retrospective childhood SEP data, which, along with limited variation in the childhood SEP measure, could have produced an underestimate of childhood SEP main effects. Although the 30% nonresponse to the 2001 interview is also a limitation, our analyses were weighted to account for nonresponse; thus, the findings apply to all Black men aged 25 to 50 years residing in Pitt County in 1988.

Strengths of our study include the following: It is the first fully integrated[4] examination of latency, pathway, and cumulative burden SEP models of hypertension in a US Black population; the observed associations involving life-course SEP and hypertension status were largely unaffected by known correlates[17,18,23–25] of hypertension in this study population; a computerized Event History Calendar[20–22] was

used to improve respondents' recall of distant life experiences; and, finally, the research utility of an adulthood SEP index that addressed fundamental economic security issues for Blacks was demonstrated.

More research on life-course SEP and CVD risk in Blacks and other US populations of color is clearly needed.[4] However, our success in laying a solid empirical foundation in support of multisectoral interventions to eliminate racial and ethnic inequalities in CVD will likely require the development of research models that are attentive to the unique features of a given group's history and standing in America. ■

About the Authors

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Contributors

S.A. James originated the study, conducted the literature review, and led the writing. J. Van Hoewyk constructed the study variables and conducted the data analyses, with support from T.E. Raghunathan. R.F. Belli, D.S. Strogatz, and D.R. Williams assisted with the writing and interpretation of findings.

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Human Participant Protection

This study satisfied all criteria for the ethical treatment of human participants and was approved by the human subjects institutional review boards of Duke University and the University of Michigan.

References

1. Kuh D, Ben Shlomo Y. *A Life Course Approach to Chronic Disease Epidemiology.* 2nd ed. Oxford, England: Oxford University Press; 2004.

2. Davey Smith G, ed. *Health Inequalities: Lifecourse Approaches.* Bristol, England: The Policy Press; 2003.

3. Galobardes B, Lynch JW, Davey Smith G. Childhood socioeconomic circumstances and cause-specific mortality in adulthood: systematic review and interpretation. *Epidemiol Rev.* 2004;26:7–21.

4. Pollitt RA, Rose KM, Kaufman JS. Evaluating the evidence for models of life course socioeconomic factors and cardiovascular outcomes: a systematic review. *BMC Public Health.* 2005;5:7. Available at: http://www.biomedcentral.com/1471-2458/5/7.

5. Hertzman C, Power C. Health and human development: understandings from life-course research. *Dev Neuropsychol.* 2003;24:719–744.

6. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *Int J Epidemiol.* 2002;31:285–293.

7. Broman CL. Social mobility and hypertension among blacks. *J Behav Med.* 1989;12:123–134.

8. Burt VL, Cutler JA, Higgins M, et al. Trends in the prevalence, awareness, treatment, and control of hypertension in the adult US population. Data from the health examination surveys, 1960 to 1991 [published correction appears in *Hypertension.* 1996;27:1192]. *Hypertension.* 1995;26:60–69.

9. Hajjar I, Kotchen TA. Trends in prevalence, awareness, treatment, and control of hypertension in the United States, 1988–2000. *JAMA.* 2003;290:199–206.

10. Cooper R, Rotimi C, Ataman S, McGee D, et al. The prevalence of hypertension in seven populations of west African origin. *Am J Public Health.* 1997;87:160–168.

11. Lopes AA, Hornbuckle K, James SA, Port FK. The joint effects of race and age on the risk of end-stage renal disease attributed to hypertension. *Am J Kidney Dis.* 1994;24:554–560.

12. Cooper RS, Liao Y, Rotimi C. Is hypertension more severe among U.S. blacks, or is severe hypertension more common? *Ann Epidemiol.* 1996;6:173–180

13. Wong MD, Shapiro MF, Boscardin WJ, Ettner SL. Contribution of major diseases to disparities in mortality. *N Engl Med.* 2002;347:1585–1592.

14. Duncan GJ, Hill MS, Hoffman SD. Has children's poverty become more persistent? *Am Soc Rev.* 1988; 56:538–550.

15. Aber JL, Bennett NG, Conley DC, Li J. The effects of poverty on child health and development. *Annu Rev Public Health.* 1997;18:463–483.

16. Proctor BD, Dalaker J. *Poverty in the United States: 2002.* Washington, DC: US Government Printing Office; 2003. US Census Bureau, Current Population Reports, P60 222.

17. Strogatz DS, James SA, Haines PS, et al. Alcohol consumption and blood pressure in black adults: the Pitt County Study. *Am J Epidemiol.* 1991;133:442–450.

18. James SA, Keenan NL, Strogatz DS, Browning SR, Garrett JM. Socioeconomic status, John Henryism, and blood pressure in black adults: The Pitt County Study. *Am J Epidemiol.* 1992;135:59–67.

19. James SA, Van Howeyk J, Belli RF, Strogatz DS, Williams DR, Raghunathan TE. Life-course socioeconomic position and hypertension in African American men: the Pitt County Study, *Am J Public Health.* 2006; 96:812–817.

20. Freedman D, Thornton A, Camburn D, Alwin D, Young-DeMarco L. The life history calendar: a technique for collecting retrospective data. In: Clogg CC, ed. *Sociological Methodology,* San Francisco: Jossey-Bass; 1988: 37–68.

21. Belli RF. The structure of autobiographical memory and the event history calendar: potential improvements in the quality of retrospective reports in surveys. *Memory.* 1998;6:383–406.

22. Belli RF, Shay WL, Stafford FP. Event history calendars and question list surveys: a direct comparison of interviewing methods. *Public Opin Q.* 2001;65:45–74.

23. Strogatz DS, Croft JB, James SA, et al. Social support, stress, and blood pressure in black adults. *Epidemiology.* 1997;8:482–487.

24. Ainsworth BE, Keenan NL, Strogatz DS, Garrett JM, James SA. Physical activity and hypertension in black adults: the Pitt County Study. *Am J Public Health.* 1991; 81:1477–1479.

25. Croft JB, Strogatz DS, Keenan NL, James SA, Malarcher AM, Garrett JM. The independent effects of obesity and body fat distribution on blood pressure in black adults: the Pitt County Study. *Int J Obes Relat Metab Disord.* 1993;17:391–397.

26. Smith GD, Greenwood R, Gunnell D, Sweetnam P, Yarnell J, Elwood P. Leg length, insulin resistance and coronary heart disease risk: the Caerphilly Study. *J Epidemiol Community Health.* 2001;55:867–872.

27. Wadsworth ME, Hardy RJ, Paul AA, Marshall SF, Cole TJ. Leg and trunk length at 43 years in relation to childhood health, diet and family circumstances; Evidence from the 1946 national birth cohort. *Int J Epidemiol.* 2002;31:383–390.

28. Bergland PA. Analysis of complex sample survey data using the SURVEYMEANS and SURVEYREG procedures and macro coding. In: *Proceedings of the Twenty-Seventh Annual SAS Users Group International Conference.* Cary, NC: SAS Institute Inc; 2002.

29. Kish L, Frankel MR. Inference from complex samples. *J Royal Stat Soc.* Series B, 1974;36:1–37.

30. Lawlor DA, Ebrahim S, Davey Smith G. Socioeconomic position in childhood and adulthood and insulin resistance: cross sectional survey using data from British women's heart and health study [published correction appears in *BMJ.* 2003;326:488]. *BMJ.* 2002; 325:805–807.

31. Smith GD, Hart C, Blane D, Gillis C, Hawthorne V. Lifetime socioeconomic position and mortality: prospective observational study. *BMJ.* 1997;314:547–552.

32. Lynch J, Kaplan GA, Salonen R, Salonen JT. Socioeconomic status and progression of carotid atherosclerosis. Prospective evidence from the Kuopio Ischemic Heart Disease Risk Factor Study. *Arterioscler Thromb Vasc Biol.* 1997;17:513–519.

33. Williams DR, Collins C. US socioeconomic and racial differences in health. *Annu Rev Sociol.* 1995;21:349–386.

34. Collins SM. Black mobility in white corporations: up the corporate ladder but out on a limb. *Soc Problems.* 1997;44:55–67.

35. *Changing America: Indicators of Social and Economic Well-Being by Race and Hispanic Origin.* Washington, DC: Council of Economic Advisers for the President's Initiative on Race; 1998.

36. Blank RM. An overview of trends in social and economic well-being, by race. In: Smelser NJ, Wilson WJ, Mitchell F, eds. *America Becoming: Racial Trends and Their Consequences.* Vol I. Washington, DC: National Academy Press; 2001:21–39.

37. Davern ME, Fisher PJ. *Household Net Worth and Asset Ownership.* Washington, DC: US Census Bureau; 1995. Current Population Reports, Household Economic Studies, Series P70–71.

38. Oliver ML, Shapiro TM. *Black Wealth/White Wealth: A New Perspective on Racial Inequality.* New York, NY: Routledge Press; 1995.

39. Shapiro TM. *The Hidden Cost of Being African American: How Wealth Perpetuates Inequality.* New York, NY: Oxford University Press; 2004.

40. *The State of the South: Fifty Years After Brown v. Board of Education.* Chapel Hill, NC: MDC, Inc; 2004.