



RACIAL DIFFERENCES IN FUNCTIONAL STATUS AMONG ELDERLY U.S. MIGRANTS FROM THE SOUTH

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Abstract—This study describes patterns of functional status among older blacks and whites by their history of birth in and migration out of the South. We used multivariate regression to analyze data on functional status of US-born non-Hispanic blacks ($N = 1868$) and whites ($N = 13\,469$) age 60 years or above. In general, the functional status of blacks who were born in the South and migrated was similar to that of blacks born outside the South and better than those born in the South who did not migrate. Whites who migrated from the South had functional status similar to those who did not migrate and worse than those born outside of the South. Socioeconomic status did not explain differences by race and migration history. These results differ sharply from mortality studies, which have found a consistent pattern of high mortality among black migrants from the South. Differences among race groups by migration history vary across health measures. Selective migration and selective survival may account for the complex patterns of racial differences in geographic distributions of function and health. © 1998 Elsevier Science Ltd. All rights reserved

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INTRODUCTION

By many measures, African American elderly experience worse health than white elderly (Manton *et al.*, 1987; Gibson, 1991; Smith and Kington, 1997), and delineating the underlying causes for the differences has become an important area of aging research. This research effort is warranted both because of the practical implications of addressing the health care needs of an increasingly racially diverse elderly population in the U.S. (Angel and Hogan, 1994) and because understanding the causes for these differences furthers scientific knowledge of the basic causal pathways that effect health in old age for everyone. All health research aimed at understanding differences among elderly populations must recognize that health in old age is a function of a lifetime of exposures, behaviors, and experiences. This fact is particularly important for understanding black–white differences in health because the current populations of black and white elderly on average have had very different life courses. One of the most important historical and social events that distinguishes the lives of the populations of blacks and whites born in the first half of this century in the United States was the so-called “Great Migration”, the massive movement of blacks out of the South between 1920 and 1970

(Farley and Allen, 1989; Marks, 1989; Lemann, 1991). In what was the largest mass migration of any single ethnic group in this nation’s history, over 5.5 million African Americans left the South between 1920 and 1970. The migration of blacks from the South to other regions of the country grew from 722 000 between 1910–1920 to 1.5 million between 1950–1960. Only in the mid 1970’s did the pattern of net outmigration of African Americans from the South begin to reverse.

A growing body of research has described higher mortality rates for African American migrants from the South (Mancuso and Redmond, 1975; Greenberg and Schneider, 1992; Greenberg and Schneider, 1995; Fang *et al.*, 1996; Schneider *et al.*, 1997). This literature is related to a larger body of migration research that addresses differences in the health of migrants between and within other countries (Hull, 1979; Kasl and Berkman, 1983; Marmot *et al.*, 1984; Bentham, 1988; Strachen *et al.*, 1995; Elford *et al.*, 1990). The literature on international comparisons of health based on migration status, though limited by a number of conceptual and methodological problems, has been used to suggest the relative influence of genetics versus environment as etiologic factors in disease causation.

In this study we analyze data on blacks and whites at or above age 60 from the 1994 National Health Interview Survey to study racial differences

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in several dimensions of functional status and in self-reported general health status. In particular, we address the following study questions: Do elderly blacks and whites who were born in the South have worse functional status and general health than their counterparts born outside of the South? Do southern natives who migrated exhibit a different pattern of function compared to their counterparts who remained in the South? Are there racial differences in the relationships between birth in the South and migration history and functional status? Finally, if there are racial differences, does socioeconomic status explain them?

METHODS

Data

This study is based on data from the 1994 National Health Interview Survey (NHIS) (Adams and Marano, 1995). The NHIS is a national household survey of the civilian non-institutionalized population of the U.S. conducted annually by the National Center for Health Statistics that collects information on personal, socioeconomic, and health characteristics of family members and unrelated individuals in surveyed households. The NHIS follows a multi-stage probability design with continuous weekly sampling, and areas with higher populations of blacks were oversampled. In 1994, the sample consisted of 45 705 households interviewed resulting in data on 116 179 persons. The overall response rate among eligible households was 94%. In this study, we have restricted the sample to non-Hispanic black and white persons ages 60 years or older who were born in the U.S., resulting in a total sample size of 15 337.

Functional status

To assure the robustness of our findings across different dimensions of function and health, we analyzed several measures of functional status defined by the NHIS. A broad measure of functional limitations was based on the report of any limitation in the respondent's major activity due to health. For this measure, respondents were classified based on responses to questions asked according to reported primary activity and age. Respondents ages 60–69 who reported "working" as their primary activity were asked: Does any impairment or health problem now keep (you) from working at a job or business? Respondents who reported their primary activity as "keeping house" were asked: Does any impairment or health problem now keep (you) from doing any housework at all? All respondents in this age group were also asked: (Are you) limited in any way in any activities because of an impairment or health problem? A "yes" response to any of these questions lead to a respondent being labeled as functionally limited. For respondents who were

aged 70 or older, functional limitations were based on report of the need for help in personal care needs such as eating, dressing or getting around the house or for other routine needs such as household chores or shopping, due to any impairment or health problem. Any reported limitation led to a respondent being classified as functionally limited.

A second measure of functional limitations was based only on the report of the need for help in personal care needs. This measure used responses to the same questions across age groups and across reported primary activity. Personal care needs included eating, dressing or getting around the house or other routine needs such as household chores or shopping. By this measure, a functionally limited person was any person who reported needing help in any of these activities. Thus, persons aged 70 or above were classified as limited for this and the previous measure based on the same responses, while for those age 60–69, functional limitations took into account reported primary activity.

Finally, we analyzed both the number of restricted activity days, a measure used by the Surgeon General to set goals for reducing functional limitations in *Healthy People 2000* (Department of Health and Human Services, 1990), and the number of bed days. Respondents were asked about the number of bed days and restricted activity days (RADs) in the two weeks preceding the interview. Bed days are days in which a person spent at least half of the day in bed due to illness or injury. RADs were defined as days in which an individual spent over half of the day in bed, home from work or school, or cutting down on usual activities because of illness or injury. RADs have been demonstrated to be highly correlated with measures of physical health status, with functional limitation measures, and with common chronic medical conditions (Scholes *et al.*, 1991; Kosorok *et al.*, 1992).

General health status

General self-reported health status was based on the standard question that asked the respondent to rate his or her general health as excellent, very good, good, fair or poor. The responses were dichotomized into fair or poor versus excellent, very good, or good. The response to this question has been shown to be predictive of mortality and future disability even after controlling for standard demographic, socioeconomic, and health risk factors (Mossey and Shapiro, 1982; Kaplan and Camacho, 1983; Kaplan *et al.*, 1988; Idler and Angel, 1990; Idler and Kasl, 1995).

Migration history

We created indicators of migration history based on the response to questions about state of birth, current state of residence, and duration of residence in current state. Our groupings were based on a variation of the NHIS public-release tape classifi-

cation of regions. In the NHIS classification, Maryland, the District of Columbia, and Delaware, all common destinations for Northern-migrating blacks from the deep South, are classified as part of the South. We created a separate category including Maryland, the District of Columbia, Delaware, and Pennsylvania, called the Mid-Atlantic region, which allowed us to include as out-migrants from the South persons who migrated to Maryland, D.C., and Delaware. Otherwise, the state classification for the other regions is identical to that in the public release version of the NHIS data (see Appendix A).

To account for possible return migration of persons in old age to their region of birth or migration to other regions, possibly related to health status, all models were estimated with a variable indicating duration of residence in the current state of residence of less than 15 years. Among African Americans, 94% had lived in their current state of residence for 15 years or more. Among whites, 91% had lived in their current state of residence for 15 years or more.

Sociodemographic factors

Sociodemographic measures assessed in the study included: age, gender, marital status, education, and income. Age was grouped into three categories: 60–69, 70–79, 80 + . Marital status was grouped into four categories: married, divorced or separated, widowed, and never married. Education was grouped into the following categories: <9 years, 9–11 years, high school graduate, more than high school. The household income variable was based on the response to a single question indicating whether total household income was more or less than \$20 000. Income was defined as total household income in the 12 month period preceding the interview including wages, salaries, government payments, pensions, rent from properties, and help from relatives. Although more detailed categories for household income followed this question, the non-response rate to these questions was over 30%.

The Great Migration out of the South was also typically a migration from a rural to an urban setting. To assess the potential impact of urban residence, we controlled for residence in Central City MSA in each multivariate analysis. Because persons whose responses were from a proxy may be more likely to be in worse health, all multivariate analyses also included a variable indicating whether all or part of the individual's responses were from a proxy report.

Statistical analysis

All statistical analyses were estimated using STATA (R) software (Release 5) to calculate standard errors corrected for sampling design effects. Because of the multi-stage sample design employed by the NHIS, all analyses were weighted using weights calculated by the National Center for

Health Statistics to account for the probability of selection into the sample along with adjustments for non-response and post-stratification. Logistic regression was used to estimate equations predicting the dichotomous variables. Counts of RADs and bed days were converted to dummy variables indicating one or more days. Observations missing any variable were dropped in multivariate models. For all multivariate models presented in this paper, the *P* value associated with each equation's *F*-test was less than 0.0001.

We explored differences in function and health outcomes by migration history for both African Americans and whites. Although our primary interest is the relationship between migration history and health for African Americans, by exploring these relationships for both whites and blacks we assess whether the patterns for blacks are distinct or are part of a general pattern for the entire population. We fitted a single model estimating coefficients for dummy variables indicating the following groups: blacks who were born in the South and reside in the South, blacks born in the South who migrated, blacks born outside of the South, whites born in the South who reside in the South, and whites who were born in the South but migrated. The omitted reference group was whites born outside of the South. We did not separately study the relative health of blacks and whites who were born outside of the South and later migrated to the South for two reasons. First, 98% of the blacks in the study who lived in the South were born in the South, and therefore, the number of blacks in this category was too small to analyze as a separate group. Second, the causal factors influencing migration to the South and the stage in the life course of the move are certainly different from those related to the Great Migration. For example, a large amount of the migration to the South is likely to be retirement migration. Among the 907 persons who were born outside of the South but lived in the South at the time of the interview, about 40% had lived in their current state for less than 15 years. For the entire sample, less than 10% had lived in the current state of residence for less than 15 years. This finding suggests that many older migrants to the South migrated later in life.

To test for differences between subgroups we compared pairs of coefficients from the logistic regression. We calculated adjusted Wald statistics for the significance of the combinations of coefficients. For example, to determine the significance of the difference between blacks born in the South who migrated and those born in the South who still reside there, we calculated adjusted Wald statistics for the null hypothesis that the difference between the coefficients for these two variables equals zero.

Table 1. Sociodemographic and health characteristics by race and migration history

	African American			White		
	born South/ resides South	born South/ migrated	born outside South	born South/ resides South	born South/ migrated	born outside South
	<i>N</i> = 880	<i>N</i> = 677	<i>N</i> = 311	<i>N</i> = 3187	<i>N</i> = 678	<i>N</i> = 9604
% within racial group	49%	34%	17%	24%	5%	71%
Age—mean years ^{cd} (SD)	70.7 (7.80)	70.6 (7.7)	68.7 ^a (6.4)	70.9 (7.9)	70.6 (7.6)	71.4 (7.8)
Female ^b	62% ^a	55%	58%	57%	55%	56%
Married	44% ^a	43% ^a	40% ^a	63%	62%	63%
< HS graduate ^{b,c,d}	69% ^a	57% ^a	43% ^a	41% ^a	42% ^a	28%
Income < \$20K ^{b,d,e}	78% ^a	63% ^a	57% ^a	49% ^a	42%	40%
Central city ^{b,c,d}	50% ^a	81% ^a	73% ^a	23%	29%	24%
	Health and function measures					
Activity limitations ^{b,c}	52% ^a	39% ^a	46% ^a	42% ^a	43% ^a	35%
Need help with personal care ^{b,d}	37%*	28%	30%	28% ^a	30% ^a	25%
Restricted activity days	1.94*	1.68 ^a	1.99 ^a	1.46 ^a	1.60 ^a	1.08
Bed days	1.04*	0.79 ^a	0.95 ^a	0.59 ^a	0.60 ^a	0.39
General health fair/poor ^{b,d}	48%*	36% ^a	35% ^a	34% ^a	34% ^a	21%

Significance based on logistic regression coefficients for model with only race/migration dummy variables.

^a*p* < = 0.05 for difference relative to whites born outside of the South.

^b*p* < = 0.05 for adjusted Wald statistic *F* (1, 186) for the difference between regression coefficients for “black born South/migrated” and “black born South/resides South”.

^c*p* < = 0.05 for adjusted Wald statistic *F* (1, 186) for the difference between regression coefficients for “black born South/migrated” and “black born outside South”.

^d*p* < = 0.05 for adjusted Wald statistic *F* (1,186) for the difference between regression coefficients for “black born South/resides South” and “black born outside of South”.

^e*p* < = 0.05 for adjusted Wald statistic *F* (1,186) for the difference between regression coefficients for “white born South/migrated” and “white born South/resides South”.

RESULTS

Table 1 presents the sociodemographic characteristics and mean function and health measures for the six groups of persons included in the study: Southern-born African Americans who still reside in the South, Southern-born African Americans who reside outside of the South, and African Americans born outside of the South and the three analogous categories for white Americans. The distributions of region of birth for blacks and whites were strikingly different: over 80% of African Americans were born in the South, while only about 30% of whites were born in the South. The migration histories from the South were also different: 34% of African Americans were born in the South and currently reside outside of the South, while only 5% of whites were born in the South and currently reside outside the South.

Overall, compared to whites, blacks were less likely to be married, more likely to have less than a high school education, and more likely to have a household income less than \$20 000. However, there were significant unadjusted differences within the black population based on migration history. As noted in other research, black migrants from the South were better educated than blacks who remained in the South but less educated than blacks who were born outside of the South. Black migrants also had higher incomes than blacks who remained in the South, but the difference in incomes between black migrants from the South and that of blacks born outside of the South was not significant.

Overall, blacks reported worse function and health than whites, and whites born in the South had worse function and health than whites born outside of the South. For the outcomes “activity limitations”, “needs help with personal care”, and “fair/poor general health”, blacks who migrated from the South reported better function and health than those blacks who remained in the South.

In no case did blacks who migrated report significantly worse function or health than those who were born outside of the South, and for the outcome “activity limitations”, black migrants from the South reported better function than blacks born outside of the South. The overall similar pattern of function and health of African American migrants from the South and their counterparts born outside the South is all the more striking because the migrants were less educated. In terms of their function and health, there were no significant differences between whites who were born in the South and migrated and those who remained in the South compared to whites born outside of the South.

To estimate the relative influence of socioeconomic status on the racial differences by migration history, we first estimated equations predicting each health and function outcome controlling for age, sex, a proxy reporting, residence in a central city, and race/migration history dummy variables. We then estimated the equations adding educational status and income.

Table 2 presents the logistic regression coefficients for equations predicting each of the functional status and general health outcomes for the specification including education and income. As expected,

Table 2. Logistic regression coefficients and standard errors equations predicting poor functional status and general health

	activity limitations	needs help personal care	restricted activity days (≥1)	bed days (≥1)	fair/poor general health
Black-South born/resides	0.388 ^b (0.093)	0.408 ^b (0.090)	0.354 ^d (0.153)	0.451 ^c (0.146)	0.856 ^b (0.096)
Black-South born/migrated	-0.068 (0.097)	0.008 (0.126)	0.307 ^d (0.133)	0.502 ^b (0.141)	0.506 ^b (1.09)
Black-born outside South	0.428 ^c (0.145)	0.261 (0.193)	0.655 ^b (0.191)	0.767 ^b (0.200)	0.667 ^b (0.149)
White-South born/resides	0.265 ^b (0.062)	0.161 ^c (0.057)	0.178 ^d (0.071)	0.212 ^d (0.093)	0.526 ^b (0.064)
White-South born/migrated ^a	0.338 ^b (0.089)	0.273 ^c (0.098)	0.409 ^b (0.126)	0.334 (0.170)	0.599 ^b (0.086)
Age 70-79	-0.172 ^b (0.043)	1.172 ^b (0.056)	-0.008 (0.061)	-0.009 (0.086)	0.158 ^c (0.055)
Age 80+	0.337 ^b (0.062)	1.711 ^b (0.067)	0.006 (0.079)	-0.002 (0.108)	0.254 ^b (0.063)
Female	-0.108 ^c (0.039)	0.050 (0.046)	0.106 (0.057)	0.232 ^c (0.079)	-0.052 (0.040)
Widowed	0.294 ^b (0.055)	0.255 ^b (0.058)	0.084 (0.074)	0.261 ^c (0.089)	-0.209 ^b (0.063)
Divorced/separated	0.512 ^b (0.076)	0.434 ^b (0.084)	0.431 ^b (0.101)	0.600 (0.125)	0.071 (0.079)
Never married	0.088 (0.095)	0.104 (0.113)	-0.158 (0.148)	0.114 (0.184)	0.070 (0.103)
High school graduate	-0.398 ^b (0.058)	-0.275 ^b (0.061)	0.179 ^d (0.074)	-0.203 ^d (0.095)	-0.600 ^b (0.064)
High school+	-0.516 ^b (0.062)	-0.385 ^b (0.065)	-0.263 ^c (0.087)	-0.122 (0.114)	-1.022 ^b (0.065)
Income < \$20 k	0.427 ^b (0.046)	0.260 ^b (0.050)	0.308 ^b (0.062)	0.377 ^b (0.084)	0.554 ^b (0.055)
Proxy	0.025 (0.042)	0.263 ^b (0.053)	0.165 ^d (0.068)	0.666 ^b (0.076)	0.208 ^b (0.052)
Residence ≤ 15 years	0.129 (0.087)	0.179 ^d (0.090)	0.124 (0.111)	0.032 (0.132)	-0.078 (0.099)
Central city residence	0.015 (0.047)	0.011 (0.051)	-0.044 (0.069)	-0.108 (0.069)	-0.072 (0.056)
Constant	-0.598 ^b (0.066)	-2.043 ^b (0.079)	-0.2100 ^b (0.099)	-3.261 ^b (0.130)	-1.082 ^b (0.073)

^aOmitted: whites born outside South.
^b $p < = 0.001$ for t statistic of coefficient.
^c $p < = 0.01$ for t statistic of coefficient.
^d $p < = 0.05$ for t statistic of coefficient.

for the entire sample, accounting for differences in demographic and socioeconomic characteristics did not eliminate the patterns of function and general health revealed in the unadjusted scores. Whites born in the South who reside there and whites born in the South who migrated had worse function and health than their white counterparts born outside the South in every case except for the outcome “bed days” for whites who migrated. Furthermore, for each outcome, blacks who were born in the South and still reside there had worse function and health than whites born outside of the South. For two of the outcomes (“activity limitations” and “needs help personal care”), blacks who were born in the South and migrated were not significantly different from whites born outside of the South, while for the remaining three outcomes, their health

and function was worse. Blacks born outside the South also had worse function and health than their white counterparts with the exception “needs help with care”.

Table 3 presents the differences in coefficients in Table 2 predicting function and health by race and migration history. While the coefficients for the race/migration dummy variables in Table 2 illustrate only adjusted differences between each race/migration group and the omitted reference group, whites born outside of the South, Table 3 presents evidence of adjusted differences between pairs of the various subpopulations by race and migration history. For example, the number in the first row of the first column is the value of the coefficient for blacks who were born in the South and reside in the South minus the coefficient for those who were

Table 3. Differences in coefficients predicting poor function and health by race and migration history

	activity limitations	needs help personal care	restricted activity days (≥1)	bed days (≥1)	fair/poor general health
	Black				
South born/resides- South born/migrated	0.456 ^b	0.400 ^c	0.047	-0.051	0.350 ^c
South born/migrated- born outside South	-0.496 ^c	-0.253	-0.348	-0.265	-0.161
South born/resides- born outside South	-0.040	0.147	-0.301	-0.316	0.189
	White				
South born/resides- South born/migrated	-0.073	-0.112	-0.231	-0.122	-0.073
South born/migrated- born outside South ^a	0.338 ^c	0.273 ^f	0.409 ^e	0.334	0.599 ^e
South born/resides- born outside South ^a	0.265 ^c	0.161 ^f	0.178 ^g	0.212 ^g	0.526 ^e

^a“White born outside South” is the omitted group in the logistic regressions. The values of the coefficients from Table 2 (fifth and sixth rows) are included again here for completeness of the comparisons of pairs of race/migration history subpopulations.
^b $p < = 0.001$ for adjusted Wald statistic $F(1,186)$ for difference between coefficients.
^c $p < = 0.01$ for adjusted Wald statistic $F(1,186)$ for difference between coefficients.
^d $p < = 0.05$ for adjusted Wald statistic $F(1,186)$ for difference between coefficients.
^e $p < = 0.001$ for t statistic of logistic coefficient.
^f $p < = 0.01$ for t statistic of logistic coefficient.
^g $p < = 0.05$ for t statistic of logistic coefficient.

born in the South and migrated. The outcome is the reported presence of activity limitations. A positive number indicates that blacks who were born in the South and still reside there were more likely to report activity limitations compared to blacks who migrated out of the South, and this difference was statistically significant at $p < = 0.001$. Similarly, the negative number in the second row of the first column indicates that blacks who migrated out of the South were less likely to report an activity limitation compared to blacks who were born outside of the South.

To summarize the most important findings in Table 3, we focus on several comparisons, especially the difference between those born in the South and residing there and those born in the South who migrated for whites versus blacks. For three of the outcomes ("activity limitations", "needs help with personal care", and "fair/poor general health"), blacks who remained in the South had worse function than those who migrated (first row). In contrast, among whites, there were no significant differences between those born in the South who migrated and those born in the South who continue to reside there (fourth row). Furthermore, there was little difference between those blacks who were born outside the South and either those born in the South who migrated or those who still reside there (second and third rows). The one exception was for the outcome "activity limitations" in which case, blacks born in of the South who migrated had significantly better function than those born outside of the South (second row, first column).

The variable measuring length of residence of less than 15 years ("residence < 15 years" in Table 2) was included in all multivariate analyses as a proxy for return migration and retirement migration. The coefficient for this variable was a significant predictor of health status only in the equation estimating the need for help with personal care ($p = 0.048$), and its positive sign suggests that persons who had changed their state of residence within 15 years of 1994 had worse function by this measure. In all equations estimating health and function with the exception of the equation for activity limitations, having all or part of the questions answered by a proxy, as expected, was associated with worse health and function ($p < 0.001$). Residence in a central city in 1994 was not associated with worse health or function in any equation.

In summary, our analyses demonstrate three important points. First, whites who were born in the South and either migrated or remain there reported worse function than those whites born outside of the South. Furthermore, there is no difference in function between southern-born whites who migrated and those who stayed in the South. Second, in contrast, blacks who were born in the South and remained there tended to report the worst function among blacks, while those who

migrated tended to report better function and health compared to those blacks who stayed in the South and function comparable to those who were born outside of the South. Finally, blacks who were born in the South and migrated report function similar to whites born outside of the South on some outcomes. The latter had the best function and health of all groups.

DISCUSSION

Epidemiological studies have suggested that African Americans born in the South who migrated and those still in the South experience worse health compared to African Americans born outside of the South as indicated by several measures of mortality (Mancuso and Redmond, 1975; Greenberg and Schneider, 1992; Greenberg and Schneider, 1995; Fang *et al.*, 1996). One of the early studies on the health differences by migration history in the U.S. was an analysis of mortality rates in Ohio between 1960 and 1967, which found that blacks born in the South who had migrated to Ohio had higher death rates compared to those born in other regions (Mancuso and Redmond, 1975). Several more recent studies have found similar results. In an analysis of national 1980 Census data, Greenberg and Schneider found that blacks born in the South had the highest mortality rates among blacks, and blacks born in the South who migrated had mortality rates similar to those of Southern-born blacks who stayed in the South (Greenberg and Schneider, 1992). For cancer-related deaths the story is somewhat different. Blacks born in the South have been found to have higher death rates compared to blacks born elsewhere, but Southern-born blacks who migrated had cancer-related death rates higher than both those born in the South who stayed in the South and those who were born elsewhere (Greenberg and Schneider, 1992).

Fang and colleagues, in a recent study of death rates from cardiovascular causes in New York, also found higher death rates among those born in the South and noted that much of the black-white difference in death rates was due to the excess death rate of those born in the South (Fang *et al.*, 1996). The implication drawn by Fang and colleagues was that racial comparisons masked large differences within racial groups based on place of birth. Schneider and colleagues recently analyzed national mortality data and found that blacks born in the South had a higher risk of mortality from circulatory disease whether they stayed in the South or migrated compared to blacks who were born outside of the South (Schneider *et al.*, 1997). The authors placed this study in the context of the growing literature relating adult health to early life experiences (Schneider *et al.*, 1997; Vagero, 1997).

Our study presents a different pattern of health status by race and migration history. We found

that, in contrast to the mortality studies, African Americans who migrated reported better overall function and general health than their counterparts who were born in the South and still reside there. For several measures, they reported health and function levels that were nearly equal to or even better than African Americans who were born outside the South, despite having less education. The pattern of relative health and functional status for whites who migrated compared to other whites differed from the pattern among blacks. Whites born in the South who migrated had worse health status than their counterparts born outside of the South, and usually their health was similar to their southern-born counterparts who still reside in the South.

Our findings raise a number of important questions about the relationships between race, migration history, socioeconomic status, and health. First, what accounts for the general pattern of worse health status for whites and blacks born in the South who remain there? There is a large body of literature suggesting that lower socioeconomic status in early life is associated with worse health in adulthood (Forsdahl, 1978; Power, 1991; Preston and Elo, 1992; Wannamethee *et al.*, 1996). The pattern of worse function and health for those born in the South may reflect the long-term impact of a less healthy social and physical environment during early life in the South on later health (Schneider *et al.*, 1997; Vagero, 1997).

Second, within the African American population, is it plausible that migrants have better health status relative to those born outside the South? We believe it is. Studies in the economics and sociology literatures suggest that African American immigrants from the South were relatively successful in a number of ways that might also be associated with better health. For example, compared to their Northern-born black counterparts, black migrants from the South, though less well educated, worked longer hours, were less likely to be unemployed, were more likely to be married, and were somewhat better at translating education into earnings (Jaynes and Williams, 1989). (Migrants were relatively better educated compared to Southern-born blacks who did not migrate (Jaynes and Williams, 1989)). Among blacks but not among whites, our findings are consistent with a "healthy migrant" phenomenon (Marmot *et al.*, 1984). Alternatively, the finding of both higher mortality rates for black migrants and better function among surviving migrants may be explained by selective survival of relatively healthier and hardier black migrants. Unfortunately, these data do not allow us to address this possibility.

Finally, why are the patterns of health and function by birth and migration history different for African Americans compared to whites? The factors motivating migration for blacks and whites from

the South were different (Fligstein, 1981) and may have led to different types of selection and degrees of selection among blacks versus whites. For example, the profound degree of entrenched racial discrimination and segregation in almost all social and economic spheres in the South played a major role in motivating blacks to move out of the South (Marks, 1989). Although discrimination affected blacks across all socioeconomic lines, the majority of blacks in the South were in the most vulnerable economic positions, and thus blacks as a whole were more likely than whites to be affected by factors such as changes in the market for cotton, an important part of the Southern economy (Fligstein, 1981). Among whites, the reasons for migration did not include discrimination. Because whites did not face the barrier of racial discrimination and segregation, there were more options available to them in rural and urban areas in the South as the agricultural economy changed, and the availability of more options in the South may have influenced the composition of the population of whites who migrated and those who stayed. Furthermore, blacks and whites had different experiences after migration, which might also affect the current patterns of health and function. The Northeast and the Midwest, the primary destinations for black migrants from the South, may have presented greater improvements in economic and social opportunities compared to those available to white migrants. The different circumstances in terms of motivating factors for migration and relative opportunities and experiences after migrating may have each contributed to the different racial patterns found in our data.

The studies of racial differences in health status among blacks and between blacks and whites based on region of birth and migration history thus far have had several important limitations that we attempted to address. Most important is the dearth of analysis of the role of socioeconomic status as a potential underlying cause of health differences by region of birth or migration history. This limitation is especially noteworthy because the broader literature on racial differences in health suggests that much of the racial difference is explained by socioeconomic status (Mutchler and Burr, 1991; Keil *et al.*, 1992; Rogers, 1992; Guralnik *et al.*, 1993; Menchik, 1993; Williams and Collins, 1995; Kington and Smith, 1997). Moreover, socioeconomic status appears to explain different amounts of the racial difference in functional status across geographic regions (Mendes de Leon *et al.*, 1995). The limited research on the role of socioeconomic status in explaining differences by migration history and region of birth is particularly noteworthy because one of the primary underlying causes for the Great Migration was the search for better social and economic opportunities (Farley and Allen, 1989; Marks, 1989). As previously noted, African

American migrants from the South who did not return to the South were on average relatively successful by several social and economic measures, which suggests greater physical and psychological hardiness (Jaynes and Williams, 1989). Our findings also suggest that socioeconomic status does not completely explain the differences in functional status and general health demonstrated across groups by race and migration history. This was not surprising given our finding that black migrants had similar or better health compared to blacks born outside of the South despite their lower education. As noted previously, mortality studies consistently describe worse health for black migrants from the South. Lower socioeconomic status may explain more of this pattern of disadvantage for African American migrants from the South compared to blacks born outside of the South.

The studies of race, migration, and health within the U.S. have been limited in other ways. For example, few studies have assessed whether whites who migrated from the South also have poorer health outcomes. During the period of maximum migration, the South trailed the rest of the country along many dimensions of social well being, affecting the social and physical environment and therefore the health status of both whites and blacks, and many whites also migrated out of the South during the period of the Great Migration, although at lower rates and for different reasons (Fligstein, 1981). Our findings are consistent with a long-term impact of residence at birth in the South for whites on function and health in old age irrespective of migration history.

Most of the studies of race and migration history in the U.S. have been based on information only on place of birth and place of residence at the time of death, and thus have not been able to account for "return migration", i.e., the return of persons in old age to the place of birth in later life. This phenomenon has been well described among older blacks and may be related to health status in a way that might influence results of studies of racial differences in health and migration (Longino and Smith, 1991). For only one outcome did our results suggest that those elderly who have moved between states within fifteen years on average have worse function. However, our measure of duration of residence did not capture migrations between or within regions prior to 15 years before the survey.

Finally, the cohorts that experienced the bulk of the Great Black Migration are now largely elderly, and yet, no study to our knowledge has addressed racial differences by migration history in measures of health-related quality of life. These measures, especially functional status, describe dimensions of health that are especially important in late life. Moreover, the extent to which socioeconomic status accounts for racial differences in health varies across different dimensions of health status

(Kington and Smith, 1997). Our results reinforce the importance of studying a range of health outcomes in assessing differences across racial and ethnic groups.

Our findings must be interpreted in light of the limitations of our study. First, these are cross-sectional data, and our ability to draw strong causal inferences is limited (see discussion in Smith and Kington, 1997). The absence of longitudinal data also limits the precision of our estimate of migration history. For example, the data would not have indicated if a person lived outside of the South for 30 years prior to moving back and living in the South for the past 15 years. Second, we were restricted to the use of only one measure of economic status, namely a crude indicator of low household income, and we had no data on wealth. Racial differences in wealth greatly exceed racial differences in income (Oliver and Shapiro, 1995; Smith, 1995). Especially among the elderly, wealth may be a better measure of long-term economic status and may have a distinctive relationship with health (Kington and Smith, 1997). Nevertheless, education alone as a measure of socioeconomic status has been found to account for most of the functional differences between blacks and whites (e.g., Guralnik *et al.*, 1993). Third, we used a slightly different definition of the South than other studies of migration, but this affected a relatively small number of the observations. Finally, this analysis did not account for other potential factors which may underlie the health differences observed such as dietary habits, health attitudes and behaviors, health care access, and quality of health care.

CONCLUSIONS

These results have important implications for studying differences in health and function in old age. Over the past century, populations across the world have become increasingly mobile, and international and intranational crises continue to lead to large movements of populations. Migrations may be highly selective by ethnic, socioeconomic, demographic, cultural, and health factors. In this study, we have shown that in the U.S. population, the large shifts in the Black population out of the South between 1920 and 1970 may have a significant effect on the estimation of racial differences in health and function in different regions of the country, and these differences may vary across dimensions of health status. It will be important for future studies to investigate the long term health and functional status effects of outmigration from the inner-cities, a growing phenomenon among blacks, as well as migrations within and between other countries. Both of these phenomena may have important long-term effects on the patterns of health and function among the elderly.

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APPENDIX A

Northeast: Maine, Vermont, New Hampshire, Massachusetts, Connecticut, Rhode Island, New York, New Jersey.

Mid-Atlantic: Maryland, Delaware, District of Columbia, Pennsylvania.

Midwest: Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, Nebraska.

South: West Virginia, Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Oklahoma, Arkansas, Texas.

West: Washington, Oregon, California, Nevada, New Mexico, Arizona, Idaho, Utah, Colorado, Montana, Wyoming, Alaska, Hawaii.