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Segregation and Mortality: The Deadly Effects of Racism?[1]

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Elevated rates of mortality for African Americans compared to whites, coupled with the persistence of high levels of racial residential segregation, have directed attention to the structural manifestations of racism as potentially important pathogens for health. Using national mortality and census data for 1990 and a measure of black social isolation from whites, we examine the association between residential segregation and mortality in 107 major U.S. cities. Our analyses revealed that black social isolation tended to predict higher rates of mortality for African American males and females, although the strength of the association varied by cause of death. Socioeconomic deprivation explained a modest part of this association for black males but not for black females. Our analyses also found that a positive association between social isolation and mortality was more pronounced, for both blacks and whites, in cities that were also high on the index of dissimilarity. These findings highlight the need for research to identify the specific mechanisms and processes that link residential environments to adverse changes in health status.

KEY WORDS: racism; residential segregation; mortality; African American health.

INTRODUCTION

It has long been documented that African Americans or blacks have higher rates of death, disease, and disability compared to the rest of the

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United States population (U.S. Department of Health and Human Services, 1985). In recent years, these racial disparities in health have been widening due to smaller improvements in health for the black than the white population for some health status indicators and absolute decline in the health of African Americans for others (National Center for Health Statistics, 1994; Williams and Collins, 1995). However, the factors underlying the elevated rates of ill health for the African American population are not well understood. There is growing awareness that health is embedded in the social conditions under which groups live and work. In particular, numerous researchers have called for more systematic attention to understanding the ways in which racism affects the health of the African American population (Cooper *et al.,* 1981; Hummer 1996; Krieger *et al.,* 1993; LaVeist, 1996; Williams, 1996b, 1997). Residential segregation is a primary mechanism by which racism has operated in American society (Jaynes and Williams, 1989; Massey and Denton, 1993) and it is generally recognized that segregation has had pervasive adverse consequences for the socioeconomic status (SES) and social mobility of the African American population. However, inadequate attention has been given to the ways in which segregation can have deleterious consequences for health. This paper uses national data to examine the extent to which residential segregation is associated with major causes of death for blacks and whites.

RACISM AND SEGREGATION

A distinctive characteristic of residential patterns in the United States is the high degree of clustering of households based on race. Both the origins and persistence of residential segregation in the United States reflect the successful implementation of individual and institutional discrimination rooted in racism. A key characteristic of racial prejudice is an explicit desire to maintain social distance from defined outgroups (Pettigrew and Meertens, 1995). Cell (1982) traces the development of deliberate policies that would create racial residential segregation and shows that the desire to avoid social contact with blacks, driven by an ideology of black inferiority, was a driving force behind the development of deliberate policies that would create racial residential segregation. A complex web of discrimination involving cooperative efforts by the real estate industry, federal housing policy, banking institutions, and vigilant neighborhood organizations ensured that blacks were restricted in housing choices to the least desirable residential areas. Although other racial minority populations and white ethnic groups have experienced some degree of residential segregation in the United States, no other group has experienced the high degree of segregation that African Americans have (Massey and Denton, 1993).

The Civil Rights Act of 1968 made discrimination in the sale or rental of housing units illegal in the United States. In addition, some evidence indicates that there has been dramatic positive changes in the racial attitudes of whites toward blacks, especially with regard to the endorsement of principles of equality (Schuman *et al.,* 1997). At the same time, other evidence suggests that the commitment of whites to these norms is relatively superficial. First, in spite of the strong commitment to principles of equality, whites nonetheless show much less support for policies that would implement them (Schuman *et al.,* 1997). Second, nontrivial proportions of the white population continue to indicate a desire to maintain social distance from blacks in multiple contexts such as intermarriage, housing, and education (Schuman *et al.,* 1997). Third, recent national data reveal that whites display widespread acceptance of negative stereotypes of blacks and great reluctance to endorse positive ones. For example, more than half of whites believe blacks are prone to violence, prefer to live off welfare, and lack the motivation or willpower to pull themselves up out of poverty (Kinder and Mendelberg, 1995). Similarly, only 17% of whites believe blacks are hardworking, 15% believe blacks are not prone to violence, 21% believe blacks are intelligent, and 12% believe blacks prefer to be self-supporting.

Within this context of negative attitudes, it is not surprising that research reveals that the physical separation of the races persist. There has been only very minimal declines in segregation over time, especially in the large industrial cities of the Northeast and Midwest (Farley and Frey, 1994; Massey and Denton, 1993). Studies reveal that explicit discrimination in housing persists in the United States (Clark, 1993; Courant, 1978; Yinger, 1986). In addition, in more subtle ways, blacks are still discouraged from residing in white residential areas and whites continue to move out of communities when the black population increases (Shihadeh and Flynn, 1996).

RESIDENTIAL SEGREGATION AND RACIAL INEQUALITY

Segregation is likely to adversely affect African American health because it has been an important institutional mechanism by which racial inequality has been created and reinforced. Economic inequality is one of the strongest known determinants of variations in health status (Adler *et al.,* 1993; House *et al.,* 1990; Krieger *et al.,* 1993; Krieger *et al.,* 1997; Williams, 1990). Segregation affects socioeconomic mobility in multiple ways. First, because residence determines access to schools, residing in

undesirable neighborhoods translates into access to schools of inferior quality. Compared to whites, blacks have higher rates of high school dropout; those who do complete high school are exposed to a less demanding curriculum, lower teacher expectations, and have lower levels of skills and knowledge compared to their white peers (Jaynes and Williams, 1989). Second, segregation has restricted employment opportunities and reduced income for African Americans. Over the course of this century, the combination of rapid urbanization, industrialization, and immigration have led to reduced access to employment opportunities for blacks (Kasarda, 1989; Wilson, 1987). Although this pattern may not have occurred in every metropolitan area (Cohn and Fossett, 1996), in general, the exodus of blacks from the South to the industrialized centers of the Northeast and Midwest has been followed by the selective out-migration of whites and some middle-class blacks from the cities to the suburbs, and the movement of high-pay, low-skilled jobs to the suburbs. In addition to the central role played by the spatial mismatch between urban black residents and good-paying jobs, a mismatch of skills may also have made an incremental contribution to black joblessness (Moss and Tilly, 1991). That is, in city centers where African Americans live, a decline in low-skilled jobs has been coupled with growth in high-skilled managerial, professional, and technical jobs (Kasarda, 1993).

This spatial mismatch of jobs has reduced earnings and employment opportunities for blacks and has led to an increase in racial disparities in the labor market. In addition, some white employers use racial group membership and residence in segregated neighborhoods as criteria for refusing to hire urban residents (Kirschenman and Neckerman, 1991). These forces have led to the dramatic concentration of poverty in segregated areas where African Americans live. The number of African Americans living in concentrated poverty in urban centers has markedly increased in recent decades. Among persons living in concentrated urban poverty in 1980, 67% were black, 20% Hispanic, and 12% white (Hajnal, 1995). Recent research shows that the structural forces linked to migration, urbanization, and industrialization have operated similarly in both Canada and the United States as the fundamental causes of the development of concentrated urban poverty (Hajnal, 1995). However, although there is still heated debate over the role of racial factors in the creation of inequality, recent evidence from both Canada and the United States suggest that racial discrimination has heightened the underlying patterns of concentrated poverty even though racial considerations were not the primary underlying factors (Hajnal, 1995).

The concentration of economic deprivation has had far-reaching consequences for the quality of life in segregated areas. Research has long documented a strong positive association of rates of marriage with employment

opportunities and income for males (Bishop, 1977). Not surprisingly, high rates of black male unemployment in segregated urban areas has led to increases in the rates of female-headed households (Testa *et al.*, 1993; Wilson and Neckerman, 1986). In turn, the combination of high rates of concentrated poverty, male unemployment, and female-headed households has created distinctive ecological environments of concentrated disadvantage in the black community (Sampson and Wilson, 1995).

Third, because of residential segregation, African Americans receive smaller returns on their investment in real estate. The growth in housing equity over time (a major source of wealth for the average American family) has been smaller for blacks who were restricted to the least desirable residential areas than for other racial groups with more housing options (Logan and Alba, 1993; Oliver and Shapiro, 1997). Research indicates that even when higher income blacks move to integrated suburbs, they are likely to move to communities that are lower in SES and resources than those of whites of comparable SES (Logan and Alba, 1993). Similarly, even whites with limited economic resources can successfully stay away from suburbs that have a high number of minority residents (Alba and Logan, 1993).

Fourth, residence in segregated neighborhoods has led to unequal access to the broad range of services provided by municipal authorities (Alba and Logan, 1993). The selective migration of city residents to the suburbs has reduced the urban tax base and the ability of cities to provide a broad range of supportive social services at the very time when poverty and its related problems were increasing (Shihadeh and Ousey, 1996). Because poor persons are also less active politically (Shihadeh and Flynn, 1996), political leaders are more likely to cut spending and services in black neighborhoods as they are less likely to encounter vigorous political opposition (Wallace, 1990, 1991). This disinvestment of economic resources in cities in general, and African American neighborhoods in particular, have led to the decline of the quality of life in those communities, which has further worsened the social fabric and led to an increase in crime rates and other social ills.

Fifth, the isolation and concentrated poverty created by residential segregation can limit social mobility by isolating blacks in these communities from both role models of stable employment and social networks that could provide information about employment opportunities (Wilson, 1987). The structural conditions in segregated residential environments may also induce cultural responses that weaken the commitment to norms and values that may be important for socioeconomic success. More specifically, it has been suggested that the structural conditions of concentrated poverty can undermine values of hard work, devalue formal education, remove the

social stigma of incarceration, as well as, of educational, social, and economic failure (Shihadeh and Flynn, 1996).

RESIDENTIAL SEGREGATION AND HEALTH

Prior research clearly indicates that, because of their effects on SES, the concentrated poverty and social isolation linked to high levels of residential segregation in urban areas has a broad range of social consequences. There are high rates of teenage pregnancy, high school dropout, crime, and unemployment in communities characterized by concentrated poverty (Jargowsky and Bane, 1991; Jencks and Mayer, 1990; Wilson, 1987). Political alienation and powerlessness, as well as limited development of cognitive skills, are also associated with the concentrated poverty of highly segregated areas. Importantly, these neighborhood effects tend to exist even after controls are introduced for individual-level measures of SES. However, prior research has given inadequate attention to the health consequences of living in areas of concentrated urban poverty. At the same time, the research literature on SES and health has recently emphasized the importance of using neighborhood-based measures of socioeconomic conditions because these variables characterize aspects of living conditions that are not captured by individual or household-based measures (Krieger *et al.,* 1997). Studies in Great Britain have found a robust relationship between area-based measures of social deprivation and mortality (Carstairs and Morris, 1989; Townsend *et al.,* 1988). Similarly, American studies have found that area characteristics are associated with mortality, independent of individual indicators of SES (Haan *et al.,* 1987; Krieger, 1991).

Health researchers have also identified several specific mechanisms linked to the concentration of poverty and social isolation through which segregation can adversely affect health. Poverty can lead to poorer nutrition, less access to medical services, and higher levels of stress (Roberts, 1997). Social support, an important determinant of variations in health status, may also link segregation to disease. There is an inverse relationship between the quantity and quality of social relationships and a broad range of indicators of morbidity, as well as mortality (House *et al.,* 1988), but levels of membership and participation in churches and other organizations are lower in segregated, concentrated poverty areas than in other areas of the city (Shihadeh and Flynn, 1996). Economic difficulties can also weaken the fabric of families and social support systems (Roberts, 1997). Segregation can also lead to the neglect and deterioration of the physical environment. Redlining by banks can result in the disproportionate representation of undesirable land uses (deserted factories, warehouses, landfills, housing

projects, and vacant garbage-strewn lots) in segregated areas. The withdrawal of fire and police services from such areas can trigger further population outflow and the migration to the area of arsonists, crack dealers, and the homeless (Greenberg and Schneider, 1994). In addition to adverse neighborhood conditions linked to close proximity to undesirable land uses, segregated neighborhoods can also adversely impact health through disproportionate exposure to environmental toxins and poor quality housing (LeClere *et al.,* 1997).

The racial composition of a neighborhood (a crude measure of racial segregation) has been one area characteristic linked to health. A recent Chicago study found that neighborhood characteristics (poverty and unemployment, median rent, median family income, median adult education, percent black, percent of young residents, and crowded housing rate) all predicted higher rates of low birth weight. Importantly, percent black was the strongest predictor of low birth weight in the multivariate model (Roberts, 1997). Another recent study found that adverse neighborhood characteristics predicted higher levels of psychiatric illness among adolescents (Aneshensel and Sucoff, 1996). LeClere *et al.* (1997) linked interview data from the Health Interview Survey with the National Death Index and found that the concentration of African Americans in residential areas was positively related to mortality rates.

To date, one study has examined the association between a standard measure of residential segregation and overall adult mortality. Polednak (1993) found that the index of dissimilarity was positively related to all cause mortality for blacks but inversely related for whites between the ages of 15 and 44 in 38 standard metropolitan statistical areas (SMSAs). Several studies have also examined the association between segregation and infant mortality. LaVeist (1989) found that, independent of poverty, the index of dissimilarity was positively related to black infant mortality rates, but inversely related with white infant mortality in 176 U.S. cities. In a study of 38 SMSAs, Polednak (1991) found that the dissimilarity index was positively related to the black–white difference in infant mortality in 1980. However, the findings are not uniform. Using 1990 census data and infant mortality rates, Polednak (1996) found that residential segregation was unrelated to both black and white infant mortality rates in 38 SMSAs.

Several studies have also examined the association between segregation and homicide. Logan and Messner (1987) found that residential segregation was positively related to homicide in the suburban rings of 54 metropolitan areas in 1980 but not in 1970. Rosenfield (1986) examined the association between the index of dissimilarity and homicide rates in 196 SMSAs and found a positive association between segregation and homicide rates. In an analysis of 27 metropolitan areas, Potter (1991) found that the

black isolation index was positively related to black–white differences in homicide rates. Similarly, Peterson and Krivo (1993) found a strong positive relationship between segregation and black homicide rates for 125 central cities in 1980. In contrast, in an analysis of 55 U.S. cities, Sampson (1985) found that the index of dissimilarity was positively related to homicide rates for whites but not for blacks. Recently, Shihadeh and Flynn (1996) utilized both the measure of black isolation from whites and the index of dissimilarity, and examined the extent to which these different measures of segregation might affect black homicide rates in 151 U.S. cities. They found a positive association between segregation and black homicide. Importantly, they also documented that the black isolation index was more important than the index of dissimilarity in predicting variations in homicide rates.

Several major issues remain unresolved based on prior research. First, researchers have given inadequate attention to the conceptualization and measurement of residential racial segregation. Most prior research has used the index of dissimilarity. This is a measure of unevenness in the population distribution of blacks and whites. However, Massey and Denton (1988) indicate that there are multiple conceptually and empirically distinct forms of residential segregation. Isolation is another measure of segregation that attempts to capture the extent to which minority group members come into contact with only other members of their group. As noted earlier, much residential segregation is premised on the need to avoid social contact with African Americans and the degree of isolation experienced by blacks is distinctive. Among the 10 largest cities in the U.S. in 1980, the average black lived in a neighborhood that was more than 80% black, while most African Americans lived in neighborhoods that were all black (Shihadeh and Flynn, 1996). Isolation is thus a theoretically relevant dimension of residential segregation, and the geographic isolation of African Americans from mainstream society may be the key mechanism by which African Americans are separated from employment opportunities, as well as other goods and services in society (Shihadeh and Flynn, 1996; Wilson, 1987). When levels of segregation are very high, both the isolation index and the index of dissimilarity would give the same results (Shihadeh and Flynn, 1996). However, when levels of segregation are intermediate between complete integration and total segregation, the indices can often produce different results. Recently, Shihadeh and Flynn (1996) demonstrated that the social isolation index predicts rates of black homicide independent of the index of dissimilarity and that social isolation largely accounted for the association between the index of dissimilarity and homicide.

Second, prior research has given inadequate attention to the specificity of the association between segregation and different types of mortality.

Krivo and Peterson (1996) found that neighborhood characteristics were differentially related to different types of crime with the association between neighborhood characteristics and crime being stronger for violent crime than for property crime. At the present time, we do not know the extent to which segregation differentially impacts various types of mortality. Third, previous research has also given inadequate attention to gender differences in the effects of segregation. Much prior research on socioeconomic status and health finds weaker effects for women than for men. LeClere *et al.* (1997) also found that racial segregation appears to impact mortality differently for men versus women.

Fourth, the consequences of segregation, if any, for the health of whites are not well understood. The impact of segregation on whites has been hotly debated. Massey and Denton (1993) argue that racial residential segregation would benefit whites who reside outside of segregated areas. In contrast, some empirical evidence suggests that segregation is costly for whites on a broad range of dimensions (Roisman, 1995). The extent to which ill health is a cost of segregation for the majority population has received little systematic attention in prior research and the available evidence from prior studies of mortality and homicide is unclear. Some prior studies have found that segregation was unrelated or inversely related to mortality for whites (LaVeist, 1989; Polednak, 1991, 1993, 1996). At the same time, Sampson (1985) found that segregation was positively related to homicide rates for whites but not for blacks. Others have argued that residents of highly segregated cities, regardless of race, are in "communities of fate" since many inequalities are rooted in structural conditions within communities (Alba and Logan, 1993). Some evidence is consistent with this perspective. Research in criminology reveals that the sources of crime are invariant across race and rooted in the structural conditions of particular communities (Krivo and Peterson, 1996; Sampson and Wilson, 1995). In a similar vein, LeClere *et al.* (1997) found that residence in segregated areas predicted higher mortality rates for blacks as well as for whites.

This paper seeks to fill some of the gaps in the literature on segregation and health. It will analyze national demographic and health data to assess the extent to which racial residential segregation is linked to multiple indicators of mortality for blacks and whites. It will examine how social isolation, a theoretically relevant measure of segregation, considered singly and in combination with the widely used index of dissimilarity affects variation in mortality. We will also give attention to the mechanisms by which segregation affects mortality by evaluating the contribution that area-based indicators of concentrated poverty and occupational status make to the observed associations. It has been emphasized that SES is not merely a confounder of the relationship between racism and health, but it is part

of the causal pathway that links race to individual outcomes (Cooper and David, 1986; Hummer, 1996; Williams, 1997). Race and racism are antecedents and determinants of SES with SES levels reflecting, in part, the impact of discrimination produced by societal structures such as segregation.

METHODS

Data and Sample

This analysis combines data from two sources. Mortality data were extracted from the United States Mortality Detail Files for 1990 that have been compiled by the National Center for Health Statistics. All independent demographic variables come from the 1990 U.S. Census. They were extracted from the STF-1A and STF-3C Census Summary Tape Files and published reports. The units of analysis are cities in the United States with (1) a population of at least 100,000 in 1990, and (2) a black population of at least 10%. These criteria yielded a sample size of 107 ($N = 107$) cities. Only the mortality rates for persons who were between the ages of 15 and 64 at the time of death were analyzed.

Measures

The dependent variables in this study are the adult mortality rates for blacks and nonblacks per 100,000 population. Mortality rates were adjusted for the age distribution of the 1990 U.S. population using direct standardization techniques to obtain race- and gender-specific age-standardized mortality rates. All race-specific information obtained from the U.S. Census corresponds with the racial categories of the mortality data. Race was defined as either black or nonblack. The nonblack category includes Asian and Pacific Islanders and American Indians, but 95.6% of persons in the nonblack category are white. Hispanics are regarded as an ethnic category in U.S. government statistics with most persons of Hispanic descent being white. Throughout this paper, the terms *African American* and *black,* as well as *nonblack* and *white* are used interchangeably. This race classification captures two racial categories that are measured with good precision. Considerable misclassification of other racial groups as white in national mortality data leads to the inflation of mortality rates for whites (Hahn, 1992; Sorlie *et al.,* 1992; Williams, 1996a). We utilize four indicators of mortality: deaths from all causes, the two leading causes of death in the United States (heart disease and cancer), and homicide. Of the fifteen leading causes

of death in the United States, homicide shows the largest black–white differential and this health outcome has been often used in prior research on segregation.

Isolation is the primary measure of racial residential segregation utilized. Following the recommendation of Massey and Denton (1988), black isolation from nonblacks is calculated using an interracial exposure measure, the interaction index ${}_xP^*_y$. It captures the degree to which blacks have potential contact with nonblacks. Values of ${}_xP^*_y$ were reversed so that a high value on the isolation index represents a high level of residential segregation. To facilitate ease of interpretation, we will consistently refer to the index as a measure of social isolation. The scores on the index range from zero to 100. They represent the probability that a randomly drawn black person in the city interacts with a nonblack person. Using the U.S. Census STF-1A files, the isolation index was calculated based on block-group level data (collections of data representing contiguous blocks) instead of census tract-level data. Both census tract and block-group boundaries demarcate populations that are relatively homogenous, particularly with regard to race, but block-groups tend to be more homogenous than census tracts and are thus likely to give a more "sensitive or truthful picture of residential segregation" (Farley and Frey, 1994; Taueber and Taueber, 1965; U.S. Bureau of the Census, 1993a).

Mathematically,

$$ {}_xP^*_y = \sum_{i=1}^{n} [x_i/X]*[y_i/t_i] $$

where x_i is the number of blacks in census block-group i, X is the total number of blacks in city, y_i is the number of whites in census block-group i, and t_i is the total population of block-group i.

The index of dissimilarity, the conventionally used measure of residential segregation, was also calculated based on block-group data. It measures the degree of spatial distribution of blacks and nonblacks (the majority of whom are white Americans) across neighborhoods in a given city (Duncan and Duncan, 1955; Massey and Denton, 1988, 1989; Taueber and Taueber, 1965). Values of the index of dissimilarity represent the proportion of African Americans or whites who would have to move out of their neighborhood (block-group) to achieve an even distribution or complete integration. Values of the dissimilarity index range from zero to 100. It takes on the maximum value of 100 in a situation in which the racial composition of all block-groups is completely homogeneous, some all-black, others all-white. The value approaches the minimum of zero when blacks and whites are randomly distributed across all census block-groups within a given city (Massey and Denton, 1988). It is important to note that the index of

dissimilarity is not influenced by the relative proportion of each group examined (blacks vs. nonblacks). One might assume that cities with a large black population have high levels of racial residential segregation, but this is not necessarily the case for the index of dissimilarity given that it is not influenced by the relative size of each group. The dissimilarity index (D) is calculated using the following formula:

$$D = .5 * \sum_{i=1}^{n} |(x_i/X) - (y_i/Y)| * 100$$

Population size was utilized as a control variable in all of the analyses. Population size varies across cities, and the natural logarithm of the total population size of each city is included in the regression models. Race-specific measures of low occupational status and poverty were used as indicators of socioeconomic deprivation. Occupational status was measured by the proportion of persons who are not employed in managerial and professional positions. Poverty was measured by the proportion of persons below the federal poverty line (measured in 1989 dollars). Since blacks are more likely than whites to be low in SES, it is expected that there will be a positive relationship between the socioeconomic deprivation measures and mortality for blacks.

Analysis

Simple descriptive analyses were used to present the distribution of the central variables of interest. Multiple regression equations were used to estimate the size and statistical significance of the association between racial residential segregation and mortality for each race- and gender-specific subgroup using ordinary least-squared techniques. In the first stage of our regression analyses, for each subgroup, the relationship between social isolation and mortality was examined. Two models were analyzed for each health outcome. The first model shows the association between segregation and mortality adjusted for population size. The second model considers the extent to which our two indicators of SES can explain the association between segregation and mortality. In the second stage of our analyses, we add the index of dissimilarity to the regression models to examine the relative contribution of both measures of segregation. We performed standard diagnostics for ordinary least regression models including tests for multicollinearity, outliers, and influential observations.

RESULTS

Table I presents the means, standard deviations and intercorrelations for the variables used in the analyses. As expected, mortality rates for all causes and for heart disease, cancer, and homicide are higher for black men and women compared to their white counterparts. Table I also indicates that relatively high levels of residential segregation are evident in major U.S. cities. The index of dissimilarity (D) reveals that the two racial groups are distributed considerably unevenly in urban areas. On average, almost two-thirds (63.5) of all black residents in major cities would have to change their residence to achieve an even distribution between blacks and whites. The isolation index indicates that the probability that a randomly chosen black person will be socially isolated from whites in a given city is .60. It also reveals that there is a higher degree of variation across the entire sample of cities (SD = 18.4), compared to the dissimilarity index (SD = 12.0). About one-third of the total sample (35) displayed isolation index (P^*) values of 70 or higher, which reflect extreme levels of black isolation for a substantial proportion of the cities analyzed.

Table I also presents the distributions of the two socioeconomic deprivation indicators by race. As expected, African Americans are more likely than whites to be low in SES. Blacks are 1.2 times more likely than whites not to be employed in professional or managerial occupations and are almost four times as likely as whites to be poor. Twenty-eight percent of African Americans live below the poverty line, compared to almost 8% of whites. For whites, poverty rates ranged from 2 to 20%. That is, there was not one city in the entire sample where the poverty rate for whites exceeded the average poverty rate for blacks.

Social Isolation and Mortality

Table II presents the results of ordinary least squares regression analyses that examine the association between segregation and mortality for black and white males. The top panel of the table shows that adjusted for population size, the measure of segregation, black social isolation, is positively related to all of the indicators of mortality for black males. Cities characterized by high levels of black isolation from whites have higher death rates than those with less segregation. Consideration of the measures of socioeconomic deprivation in the second model reduces the association between segregation and mortality, but all of these relationships remain significant except heart disease. A different pattern emerges for nonblack

Table I. Zero-Order Correlations[a] and Descriptive Statistics of Variables in Study (n = 107)[b]

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Mean	SD
1. All causes—B	—	.49[e]	.53[e]	.43[e]	.39[e]	.08	.23[d]	.28[e]	.31[e]	.35[e]	.15	.16	.16	.32[e]	.05	1642.3	327.4
2. Heart disease—B	.48[e]	—	.16	.15	.04	.11	−.01	.04	.21[d]	.22[d]	.08	.19[d]	.15	.17	−.00	396.4	112.5
3. Cancer—B	.61[e]	.42[e]	—	.18	.11	−.01	.23[d]	.06	.21[d]	.22[d]	−.02	.11	.14	.18	.12	432.0	158.4
4. Homicide—B	.21[d]	.11	.14	—	.37[e]	.02	.15	.45[e]	.29[e]	.38[e]	.44[e]	.16	.05	.11	−.13	120.7	61.5
5. All causes—W	.40[e]	.14	.18	.07	—	.28[e]	.46[e]	.60[e]	.13	.20[d]	.19[d]	.18	.09	.57[e]	.21[d]	1035.7	285.4
6. Heart Disease—W	.28[e]	.09	.05	.13	.78[e]	—	.16	.15	−.05	−.04	−.07	.05	−.13	.26[e]	.04	303.7	192.5
7. Cancer—W	.29[e]	.12	.17	.08	.76[e]	.40[e]	—	.09	.23[d]	.28[e]	.12	.14	.15	.27[e]	.16	279.3	119.0
8. Homicide-W	.06	.11	.05	.03	.24[d]	.14	.15	—	−.03	.12	.33[e]	−.04	−.07	.40[e]	.17	24.3	23.3
9. Dissimilarity	.17	.14	.23[d]	.14	.08	.08	.09	.12	—	.83[e]	.42[e]	.39[e]	.36[e]	.15	.07	63.5	12.0
10. Isolation	.30[e]	.22[d]	.30[e]	.17	.14	.05	.18	.11	.83[e]	—	.30[e]	.30[e]	.36[e]	.15	.04	60.3	18.4
11. Population[c]	.13	.09	.17	.09	.08	.04	.11	.30[e]	.42[e]	.30[e]	—	−.02	−.11	.04	−.11	429148	819608
12. Poverty—B	.04	.08	−.00	−.03	.18	.16	.10	.06	.39[e]	.30[e]	−.02	—	.45[e]	.43[e]	.32[e]	28.3	7.1
13. Occupation—B	.09	.16	−.08	−.04	.17	.26[e]	.04	.08	.36[e]	.36[e]	−.11	.45[e]	—	.29[e]	.59[e]	82.5	3.5
14. Poverty—W	.32[e]	.11	.08	.06	.59[e]	.63[e]	.32[e]	.07	.15	.15	.04	.43[e]	.29[e]	—	.62[e]	7.5	3.6
15. Occupation—W	.04	−.04	−.16	−.17	.39[e]	.54[e]	.17	.00	.07	.04	−.11	.32[e]	.59[e]	.62[e]	—	68.4	8.3
Mean	809.8	207.7	240.7	20.5	512.7	104.8	250.2	6.0	63.5	60.3	429148	28.3	82.5	7.5	68.4		
SD	157.3	59.2	75.5	12.2	121.2	43.0	64.9	4.7	12.0	18.4	819608	7.1	3.5	3.6	8.3		

[a]Correlations for males are presented above the diagonal and females are below the diagonal.
[b]B = blacks; W = whites; SD = standard deviation.
[c]The original metric is shown. Natural log transformed in the analysis.
[d]$p \leq .05$.
[e]$p \leq .01$.
[f]$p \leq .001$.

Table II. Unstandardized (and Standardized) Regression Coefficients for the Association of the Social Isolation Index, Population Size, and Socioeconomic Deprivation to Mortality for Men (Ages 15–64), 1990

	All causes		Heart disease		Cancer		Homicide	
	I	II	I	II	I	II	I	II
				Blacks				
1. Isolation Index	5.89[e]	5.24[e]	1.34[b]	.98	2.16[b]	1.93[b]	.92[e]	.87[e]
	(.33)	(.30)	(.22)	(.16)	(.25)	(.23)	(.27)	(.26)
2. Population (log)	21.91	29.01	1.27	4.79	−19.55	−16.91	27.88[e]	27.87[e]
	(.05)	(.07)	(.01)	(.03)	(−.10)	(−.08)	(.35)	(.35)
3. Black poverty	—	2.39	—	2.04	—	.48	—	1.02
		(.05)		(.13)		(.02)		(.12)
4. Black occupation	—	4.19	—	1.19	—	1.99	—	−1.07
		(.05)		(.04)		(.04)		(−.06)
Constant	1015.50[b]	553.39	299.91[a]	121.83	544.39[b]	347.32	−280.23[e]	−217.84
R^2	.12	.13	.05	.07	.06	.06	.26	.27
				Whites				
1. Isolation Index	2.50	1.18	−.25	−.71	1.69[e]	1.46[b]	3.5E-02	−4.1E-02
	(.16)	(.08)	(−.02)	(−.07)	(.26)	(.23)	(.03)	(−.03)
2. Population (log)	51.87	43.36	−14.99	−21.77	6.64	7.11	9.51[e]	9.28[e]
	(.14)	(.12)	(−.06)	(−.09)	(.44)	(.05)	(.32)	(.31)
3. White poverty	—	53.66[e]	—	21.74[e]	—	7.56[a]	—	2.87[e]
		(.67)		(.40)		(.23)		(.44)
4. White occupation	—	−6.55†	—	−4.98†	—	.24	—	−.20
		(−.19)		(−.21)		(.02)		(−.07)
Constant	504.88[a]	792.71[b]	504.88[a]	792.71[b]	95.01	29.41	−95.77[e]	−96.45[b]
R^2	.06	.38	.01	.10	.08	.13	.11	.26

[a]$p \leq .10$.
[b]$p \leq .05$.
[e]$p \leq .01$.

males in the lower panel of Table II. Black social isolation is positively related only to cancer deaths for white men. This association is reduced modestly but remains significant after adjustment for SES.

Table II also shows that population size tends to be unrelated to mortality for both black and white men. The exception to this pattern is homicide where there is a positive association between population size and rates of homicide for men of both racial groups. Death rates for homicide are higher in larger cities. Although the coefficients are positive, our indicators of SES are not significantly related to mortality for African American males. In contrast, poverty is positively associated with mortality for white males. In addition, there is a marginally significant inverse association of white occupational status with both heart disease and overall mortality. With the exception of homicide, the set of variables included in our second model tends to explain more of the variation in mortality rates for whites than for blacks.

Table III presents the findings for women. The association between segregation and mortality observed for black females is generally consistent with that observed for black males. Adjusted for population size, black social isolation is positively related to all cause, heart disease and cancer mortality, and unrelated to homicide mortality for black women. Unlike the pattern for black males, the addition of the SES variables in the second model does not reduce the association between segregation and mortality. Instead, there is evidence of a slight suppression effect with the coefficients for isolation becoming larger after adjustment for socioeconomic deprivation. In addition, black social isolation is now significantly (marginally) related to homicide mortality. SES is less strongly linked to mortality for black women compared to black men (see Table I) and the failure to consider SES tends to conceal the true relationship between segregation and mortality. While for white women, the isolation index is unrelated to all types of mortality.

Similar to the findings for men, population size is unrelated to variations in mortality rates, except for homicide. However, the pattern of association with homicide is different for women than for men. Population size was associated with higher rates of homicide for black and white men. In contrast, population size is associated with elevated rates of homicide only for white women. The association between socioeconomic deprivation and mortality is also stronger for white females than for their black counterparts. The white poverty rate is positively related to all cause, heart disease, and cancer mortality for white females. In addition, occupation is positively associated with heart disease for nonblack women. In contrast, poverty is unrelated to mortality for black women, and there is only a marginally significant inverse association between occupation and cancer for black

Table III. Unstandardized (and Standardized) Regression Coefficients for the Association of the Social Isolation Index, Population Size, and Socioeconomic Deprivation to Mortality for Women (Ages 15–64), 1990

	All causes		Heart disease		Cancer		Homicide	
	I	II	I	II	I	II	I	II
					Blacks			
1. Isolation Index	2.41[c]	2.50[c]	.67[b]	.53	1.12[c]	1.49[c]	.11	.14[a]
	(.28)	(.29)	(.21)	(.16)	(.27)	(.36)	(.16)	(.22)
2. Population (log)	9.25	8.78	2.33	4.27	7.98	3.24	.59	.14
	(.05)	(.04)	(.03)	(.06)	(.08)	(.03)	(.04)	(.22)
3. Black poverty	—	−1.26	—	−.21	—	−.22	—	−9.1E-02
		(−.06)		(−.03)		(−.02)		(−.05)
4. Black occupation	—	.87	—	2.05	—	−4.24[a]	—	−.33
		(.02)		(.12)		(−.20)		(−.10)
Constant	550.11[b]	514.02	138.57		74.35	466.76[b]	6.82	39.77
R^2	.09	.09	.05	.06	.10	.13	.03	.04
					Whites			
1. Isolation Index	.87	.30	9.9E-02	−.11	.56	.41	4.9E-03	3.0E-03
	(.14)	(.05)	(.04)	(−.05)	(.16)	(.12)	(.02)	(.01)
2. Population (log)	5.66	7.21	1.62	3.60	5.21	5.06	1.74[c]	1.75[c]
	(.04)	(.05)	(.03)	(.07)	(.06)	(.06)	(.29)	(.29)
3. White poverty	—	18.36[c]	—	5.73[c]	—	5.64[c]	—	6.5E-02
		(.54)		(.48)		(.31)		(.05)
4. White occupation	—	.87	—	1.31[c]	—	−.17	—	1.5E-03
		(.06)		(.25)		(−.02)		(.00)
Constant	390.34[b]	207.26	78.71	−65.88	151.58	131.94	−15.86[b]	−16.38[a,b]
R^2	.02	.35	.00	.43	.04	.12	.08	.09

[a] $p \leq .10$.
[b] $p \leq .05$.
[c] $p \leq .01$.

females. Similar to the pattern in Table II, the variable included in these analyses also explain considerably more of the variance in mortality for white women than for their black counterparts.

Social Isolation, Social Unevenness, and Mortality

In an additional series of analyses, we attempted to assess the joint contribution of the isolation index and the index of dissimilarity. This is a difficult task given that the correlation between the two indices is 0.83. We performed three sets of analyses. First, in analyses not shown, we reestimated the models in Tables II and III using the dissimilarity index instead of the isolation index. There were fewer significant associations. The index of dissimilarity was positively related only to overall mortality for black males and cancer mortality for black females and white males (marginally significant). Second, we added social isolation to the models that included the dissimilarity index, population size, and the two indicators of socioeconomic deprivation (analyses not shown). The addition of the social isolation index resulted in a significant increase in variance explained for overall and homicide mortality for males of both races. There was also a significant R^2 increase for overall, heart disease, and cancer mortality for black women, and for cancer mortality only for white women. However, multicollinearity between the two segregation measures was a problem in these analyses.

Third, we examined the association of the isolation index with mortality at both high and low levels of the index of dissimilarity. Based on Massey and Denton's (1989) designation of a dissimilarity index value of 60 or higher as high segregation, we used 60 as the dividing line to classify our sample of cities into high or low segregation. Sixty-nine cities had a dissimilarity index score of 60 or higher, and 38 cities had scores under 60.[5] Four patterns are possible: (1) the isolation effect could vanish within the levels of unevenness (dissimilarity), suggesting that the originally observed association was spurious; (2) the isolation effect becomes stronger within levels of unevenness, suggesting a suppressor effect; (3) the isolation effect is evident at both high and low levels of unevenness, suggesting an independent effect; or (4) the isolation effect is stronger within one level of unevenness, suggesting an interaction effect. Prior research suggests that the two latter options are both plausible. In support of an interaction effect, Massey and Denton (1993) indicate that when segregation is high on multiple

[5]We were concerned about the possibility that differences in size of the two subsamples would affect the likelihood of finding statistically significant relationships in the larger group. Accordingly, we re-ran the models using a median split on the dissimilarity index. The pattern of results in Tables IV and V were unchanged.

indicators, its effects become intensified. On the other hand, one recent study demonstrated that the association between social isolation and homicide was relatively similar at both low and high levels of the index of dissimilarity (Shihadeh and Flynn, 1996).

Table IV presents the results of the regression analyses for males of the association between social isolation and mortality at both high and low levels on the index of dissimilarity (uneveness). The top panel shows the analyses where the index of dissimilarity is low while the lower panel presents the associations for cities that are high on segregation (as defined by the dissimilarity index). The top panel of the table indicates that there is only one marginally significant association between isolation and mortality. Under conditions of low unevenness, black social isolation from whites tends to be associated with higher rates of heart disease for African American males. Given the relatively small sample size, it is worth noting that the direction of the association between social isolation and mortality is positive in seven out of the eight tests in the top panel of Table IV.

The lower panel of Table IV presents a stronger pattern of association between the isolation index and all cause mortality and cancer mortality (marginally significant) for black and white males. It is also positively associated with homicide mortality for black males and heart disease mortality (marginally significant) for nonblack males.

Table V presents analyses of the association between social isolation and mortality in varying contexts of unevenness for women. The top panel indicates that social isolation is unrelated to all types of mortality for both black and white women when the level of unevenness is low. There is only one exception to this pattern. A marginally significant inverse association exists between social isolation and heart disease mortality for nonblack women only. However, the lower panel reveals that, under conditions of high unevenness, isolation is strongly related to higher mortality rates for both black and white women. Replicating the pattern in Table IV, isolation predicts overall and cancer mortality for both racial groups, homicide for blacks only and heart disease (marginally significant) for whites only. This pattern of findings for blacks and whites, males and females, suggest that social isolation has fairly uniform pernicious health consequences in cities where the index of dissimilarity is also high.

Thus, in contrast to Shihadeh and Flynn (1996), we do not find that the effects of the social isolation index are indepedent of the index of dissimilarity. Instead, our findings suggest that there is an interaction between the two indices. The social isolation and dissimilarity indices capture different dimensions of racial segregation (Massey and Denton, 1993). The index of dissimilarity captures unevenness, the overrepresentation of blacks in some residential areas, and the underrepresentation in others. The social

Table IV. Unstandardized Regression Coefficients for the Association of Social Isolation, Population Size, and Socioeconomic Deprivation to Mortality for Black and White Men (Ages 15–64), at Two Levels of Unevenness (D) in Spatial Distribution

	All causes		Heart disease		Cancer		Homicide	
	Black	White	Black	White	Black	White	Black	White
				Low-D (0–59)				
1. Isolation Index	4.46	.93	2.24[b]	−3.60	1.03	.48	.29	.41
2. Population log	−15.34	224.61[c]	−.17	−139.60	−66.11	31.43	39.45[b]	9.34
3. Poverty rate[a]	9.85	82.97[d]	5.30	33.65[b]	−.22	13.29[c]	1.62	4.32[d]
4. Occupational status[a]	2.93	−3.63	.12[c]	−11.08[b]	1.50	−.83	−2.09	9.4E-02
Constant	1107.98	−2066.04	149.06	2652.90	1043.30	−187.45	−260.78	−142.32
R^2	.11	.48	.22	.16	.08	.23	.13	.33
				High-D (60+)				
1. Isolation Index	12.01[d]	5.05[d]	1.65	1.24[b]	3.09[b]	2.46[b]	1.73[d]	2.4E-02
2. Population (log)	66.67	30.64	17.56	8.46	.82	2.87	24.25[d]	13.80[d]
3. Poverty rate[a]	−3.45	44.56[d]	−.20	10.15[d]	1.71	4.97	.10	2.01[d]
4. Occupational status[a]	10.12	−11.49[d]	3.42	1.69	3.76	.99	−.11	−.43
Constant	−750.42	755.56	−215.25	−94.44	−147.92	−17.90	−285.81	−138.40
R^2	.28	.54	.07	.41	.08	.10	.29	.47

[a] Race-specific measures were utilized to correspond with race-specific mortality.
[b] $p \leq .10$.
[c] $p \leq .05$.
[d] $p \leq .01$.

Table V. Unstandardized Regression Coefficients for the Association of Social Isolation, Population Size, and Socioeconomic Deprivation to Mortality for Black and White Women (Ages 15–64), at Two Levels of Unevenness (D) in Spatial Distribution

	All causes		Heart disease		Cancer		Homicide	
	Black	White	Black	White	Black	White	Black	White
				Low-D (0–59)				
1. Isolation Index	−.71	−1.22	.85	−.72[b]	.41	.54	−4.4E-02	−3.2E-02
2. Population (log)	.74	12.35	23.47	−13.92	−4.89	34.89	−2.93	−.23
3. Poverty rate[a]	−4.19	28.94[d]	−.96	4.02[b]	−1.75	12.36[c]	−.53	.21
4. Occupational status[a]	.20	−.59	3.20	1.72[c]	−8.60[b]	.15	.25	−6.1E-02
Constant	893.90	240.40	−351.02	156.52	1001.16	−293.56	49.39	11.97
R^a	.04	.34	.08	.44	.17	.21	.08	.02
				High-D (60+)				
1. Isolation Index	5.96[d]	2.25[d]	.83	.51[b]	1.95[d]	1.12[d]	.27[d]	2.7E-02
2. Population (log)	15.64	12.24	6.81	6.13	8.53	5.88	.75	2.25[d]
3. Poverty rate[a]	1.18	12.32[d]	.88	5.70[d]	1.28	3.09[b]	.32	−8.7E-02
4. Occupational status[a]	3.27	2.10	1.81	1.24[b]	.20	−.85	−.77[b]	−7.2E-02
Constant	−93.13	−33.66	−109.33	−137.88	−46.16	134.63	47.09	−28.14
R^2	.30	.52	.08	.52	.25	.25	.16	.15

[a] Race-specific measures were utilized to correspond with race-specific mortality.
[b] $p \leq .10$.
[c] $p \leq .05$.
[d] $p \leq .01$.

isolation index captures the physical separation or isolation of African Americans from neighborhoods where whites reside. Consistent with Massey and Denton (1993), we find an intensification of the adverse association between segregation and mortality in cities that are high on both indices. Instructively, the conditions associated with being high on both indices of segregation are predictive of higher mortality rates of African Americans as well as whites.

DISCUSSION

Racial residential segregation has long been known to adversely affect the quality of life for African Americans (Crane, 1991; Jencks and Mayer, 1990). The findings reported here provide additional evidence to a small but growing body of research that indicates that residential segregation predicts higher death rates for African Americans. Apparently, residence in highly segregated neighborhoods is associated with a range of pathogenic risk factors that increase susceptibility to illness and death. Prior research has given inadequate attention to the ways in which segregation adversely affects white Americans. Our analyses document that, at least under some conditions, racial residential segregation was negatively related to the health of whites as well as blacks. In general, the pattern of association was weaker for whites than for blacks. Among whites, in the full sample, segregation was related only to cancer mortality and only for males. However, in cities that are high on both the index of dissimilarity and the isolation index, segregation is adversely related to multiple indicators of mortality for both racial groups. This pattern of findings suggests that there may be some structural characteristics of highly segregated cities that have an adverse impact on all persons who reside there. Future research must seek to identify the specific pathogenic characteristics captured by different indices of segregation. We need to understand the extent to which different patterns of segregation reflect variation in structural characteristics, resources and organizations.

Prior research indicates that even in segregated cities, whites live in neighborhoods that are qualitatively better than those of African Americans (Wilson, 1987). These better living conditions may provide them with protection from some of the negative characteristics of life in segregated cities. At both the individual (Williams and Collins, 1995) and the ecological levels (Krivo and Peterson, 1996), poor black households are not equivalent to white ones in terms of SES. For example, public housing and its associated higher rates of neighborhood crime is one factor that distinguishes poor black neighborhoods from those where whites live. Explicit government

policies led to the development of public housing projects only in black neighborhoods (Krivo and Peterson, 1996). Nonetheless, our findings also suggest that the living conditions for whites are not uniform in segregated cities. Whites in cities high on both of our indices of segregation fare worse than those in cities high only on one indicator.

In an insightful discussion of the ways in which racism can affect health, Cooper and colleagues (1981) noted that the factors affecting the health of minority populations are the same forces on a less intensive scale that affects the health of the overall population. Similarly, Wallace and Wallace (1997) have shown how health and social ills that are initially confined to segregated central city areas eventually spread to more affluent areas. The findings reported here are consistent with this perspective, but they suggest that some threshold of poor living conditions are a prerequisite to the operation of these processes. Nonetheless, our analyses suggest that investments that will improve the social conditions of marginalized populations can have long-term positive health and social consequences for other groups in society. At the same time, given the cross-sectional nature of our analyses, it is possible that the findings for whites may reflect a selection effect. National data reveal that blacks and whites who live in cities are more likely to have higher levels of ill health than those who live in suburbs (Ries, 1990). This probably reflects, in part, the out-migration of high SES persons to the suburbs. As the proportion of African Americans increase in a given residential area, most whites, who are able to, move from central cities to suburban areas. In the process of "white flight", persons of higher income are more likely to migrate to the suburbs than their lower SES counterparts. Thus, it is quite possible that the whites who remain in central city areas are distinctive: they are more likely to be older, of lower SES, and consequently, in poorer health than those who migrated.

Our analyses also documented an intriguing pattern of variation in the association between black isolation from whites and specific types of mortality. We found the most consistent pattern of association for cancer mortality. Segregation was positively associated with cancer death rates for black and white males and for black females. Moreover, for all of these groups, this association was significant after adjustment for SES. In contrast, the expected positive association between segregation and heart disease mortality existed only for African American males. Our measures of socioeconomic deprivation accounted for this association. This pattern may reflect differences in the underlying mechanisms by which segregation affects health. The potentially modifiable underlying risk factors for coronary heart disease include cigarette smoking, diet (fat and cholesterol), physical inactivity, obesity, stress, and other chronic diseases such as high blood pressure and diabetes. These risk factors tend to be patterned by SES (Lantz *et al.*,

1998; Williams, 1990). The underlying risk factors for cancer differ considerably depending upon the particular type. The leading types of cancer deaths for men include lung, prostate, and colorectal cancer, while for women they are breast, colorectal, lung, and uterine cancer. It is possible that differences across cities in coronary heart disease rates reflect differences in underlying health practices while differences in cancer mortality may reflect differences in exposure to carcinogens in the physical environment and/or differences in access to medical care, especially preventive screenings.

Future research on the association between segregation and mortality needs to devote more explicit attention to identifying the specific factors linking residence in particular neighborhoods to health. We found that the association tended to remain significant after consideration of our measures of socioeconomic deprivation. It is possible that the role of socioeconomic deprivation was underestimated in our models due to suppression effects from other unmeasured factors. It is likely that multiple mechanisms are related to but distinct from objective socioeconomic deprivation that may be pathogenic. Social disorganization theory predicts that there are community-level structural characteristics and processes (such as residential mobility, family disruption, housing density, and deficits in social support) that can adversely affect health (Sampson, 1992). These conditions and processes may inhibit and constrain certain behavioral regularities in terms of the general rountinization and moderation of daily patterns of work, play, and social interaction that appear to be some of the key determinants of health (Mechanic, 1990). Tobacco use and alcohol abuse are the most important preventable causes of death in the U.S. population (McGinnis and Foege, 1993). Our measures of socioeconomic deprivation did not capture the overrepresentation of tobacco and alcohol advertising and retail outlets for the sale of these substances in poor and minority neighborhoods (Hacker *et al.*, 1987; Rabow and Watt, 1982; Singer, 1986).

Research is needed that would develop and empirically examine direct measures of the theoretically identified intervening mechanisms between place of residence and health status. Research of this kind can help to establish whether the effects of segregation are largely mediated through the presence of negative characteristics or through the absence of positive resources (Krivo and Peterson, 1996). In addition, such research can outline the specific pathogenic characteristics and provide the basis for intervening on those variables that adversely affect health. At the same time, a growing body of evidence suggests that improvements in health outcomes will ultimately be contingent not on modifying intervening mechanisms but by addressing the fundamental underlying structural causes by which health is affected (House *et al.*, 1990; Link and Phelan, 1995; Williams, 1990, 1997).

An important limitation of the analyses reported here is their cross-sectional nature. Massey and Denton (1993) indicated that black social isolation has increased over the course of this century in the United States. There is need for longitudinal research that would examine the relationships between residential segregation and mortality over time. Importantly, such research would provide not only additional information on the causal priorities in the observed relationships, but might also identify the lag time between the onset of exposure to adverse living conditions and changes for particular types of health outcomes.

Alba and Logan (1993) emphasize that all measures of segregation using aggregate data assess the residential proximity of white to black residents but not the actual social contact. Future research seeking to identify the intervening mechanisms might also want to give greater attention to assessing the actual contact across racial and ethnic lines. Wilson (1987) has also indicated that social isolation reflects not only the lack of contact between races but also the absence of interaction between social classes as well. The relative contribution of racial segregation and class segregation should also be addressed in future research. Future research should also address the subjective component of living in deprived neighborhoods. Recently, Aneshensel and Sucoff (1996) found that the subjective rating of one's neighborhood as dangerous predicted mental health status among African American adolescents independent of objective SES characteristics of the neighborhood. Research is needed to identify how the subjective perceptions of one's neighborhood relates to its objective realities and how these two risk factors combine to affect health.

In sum, the research reported here suggests that health is importantly embedded in the larger social conditions in which individuals and groups live and work. It calls for more explicit attention to identifying the mechanisms and processes by which large-scale macrosocial forces, including racism, create particular living environments that not only affect life chances but the quality and length of life.

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