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Neighborhood racial residential segregation and changes in health or death among older adults

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ABSTRACT

We assessed relationships between neighborhood racial residential segregation (RRS), individual-level health declines and mortality using Health and Retirement Study data. We calculated the census-tract level Location Quotient for Racial Residential Segregation (LQRRS), and estimated adjusted relative risks (ARR) of LQRRS for declines in self-reported health or death 1992–2000, controlling for individual-level characteristics.

Of 6653 adults, 3333 lived in minimal, 2242 in low, 562 in moderate, and 516 in high LQRRS tracts in 1992. Major decline/death rates were: 18.6%, 25.2%, 33.8% and 30.4% in minimal, low, moderate and high tracts, respectively. Adjusting for demographic characteristics, residence in low, moderate and high LQRRS census tracts was associated with greater likelihood of major decline/death compared to minimal LQRRS. Controlling for all variables, only moderate LQRRS predicted major decline/death, $ARR = 1.31$ (95% CI 1.07, 1.59; $p < .05$).

1. Introduction

Large disparities in health and high levels of racial residential segregation (RRS) are pervasive realities for many African Americans in the United States when compared to non-Hispanic whites (Massey and Denton, 1993; Williams, 1996, 1997, 1999). Several studies demonstrate a potential link between RRS and individual and community level health outcomes that may partially explain the basis for these disparities. For example, areas with higher levels of racial residential segregation are associated with higher rates of infant and adult mortality (LaVeist, 1993; Fang et al., 1998; Geronimus et al., 1996, 1999), cardiovascular disease (Diez Roux et al., 2001; Cooper, 2001), and poorer mental health (Aneshensel and Sucoff, 1996; Schulz et al., 2001), and these associations remain after controlling for individual level characteristics of residents such as socioeconomic status and health behaviors. Additionally, LaVeist found racial segregation to be associated with greater odds of death for African Americans and that older African American adults are more likely than other age groups to live in neighborhoods disadvantaged by racial segregation (LaViest, 2003).

What do we mean by segregation and how does RRS effect health outcomes? In the most general sense, segregation is the geographical separation of people on the basis of ethnicity or race (Kaplan and Holloway, 1998). Measures of RRS may capture exposure to factors deleterious to health, including higher levels of poverty, crime, incivility and social disorganization; poorer educational and occupational opportunities (Williams et al., 2010); poorer housing and the built environment, as well as poor role models for health behaviors. Notwithstanding what we know about the association of RRS and health outcomes, previous empirical work studying this relationship has notable gaps (White and Borrell, 2011). For example, the majority of studies investigating the relationships between segregation and health outcomes have focused on mortality outcomes including adult all-cause and infant mortality (White and Borrell, 2011; Fang, et al., 1998; Geronimus, et al., 1996, 1999).

However, explanatory factors may not be uniform in their impact on different health outcomes, and therefore expanding outcomes to include declines in subjective health status may

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strengthen our understanding of the relationship between segregation and health.

Segregation is a phenomenon that can be meaningful at several geographic levels, such as counties, metropolitan areas, cities or neighborhoods. Traditional operational measures of segregation most prevalent in the health literature are calculated for large geographic areas (e.g., metropolitan areas, cities) and are typically used in the investigation of aggregate outcomes—e.g., rates of mortality and rates of low birth weight (White and Borrell, 2011). However, neighborhood factors have been suggested as particularly important determinants of health for older adults (Yao and Robert, 2008). Hence, these large area measures tell us relatively little about the extent to which *individuals* are exposed directly to segregation and how local areas or neighborhoods characterized by segregation might affect individual level health outcomes. Lastly, the use of cross-sectional analyses limits the ability of many studies to understand the explanatory importance of individual variables influencing health. For example, cross-sectional studies cannot discern whether disparities in outcomes have decreased or increased over time (Yao and Robert, 2008).

We designed our study to help address these important gaps. We assess the relationship between racial residential segregation and self-reported major declines in health or death in older adults using a small area measure of segregation, the Location Quotient for Racial Residential Segregation (LQRRS). The LQRRS measure can be considered as examining the hypothesis of relative deprivation (one's position relative to others in society is a health determinant) as put forth by Robert Merton (1938). He claimed that individual differences could be better studied by examining relative, rather than absolute differences. More recently, Wilkinson and Pickett (2007) have argued that social inequalities (including health status and mortality) are best studied by comparing the degree of relative differences between individuals and groups, rather than simply comparing absolute levels of social indicators. Following Merton (1938) we introduce a segregation measure that accounts for relative differences by comparison of smaller neighborhood units relative to the larger metropolitan area.

Fig. 1 presents the conceptual model guiding this investigation. First, we conceptualize racial residential segregation and the three demographic variables of age, sex and race/ethnicity to be exogenous covariates and their unanalyzed association is indicated by a curved double arrowed connection. This model suggests racial residential segregation and demographics affect health outcomes both directly and indirectly, where the effects are mediated to some degree by individual level factors including socioeconomic status (educational attainment, income, health insurance coverage, net worth), health behaviors (smoking and alcohol consumption patterns), and health status (self-reported overall health, chronic health conditions). These individual factors are more proximate determinants of health declines and death (Link and Phelan, 1995). Our model also suggests that not all of the effects of segregation and demographics are mediated by individual level factors and we allow for direct effects of segregation and demographics on health.

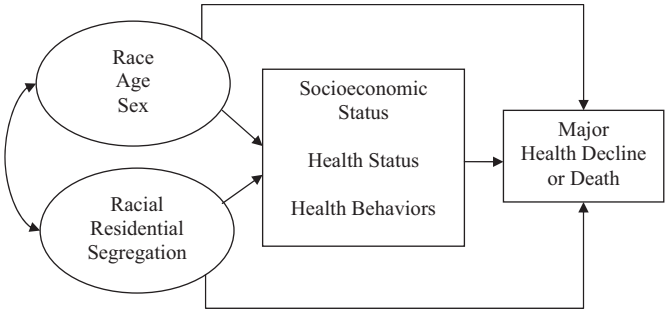

Fig. 1. Conceptual model of racial residential segregation, individual level factors and health outcomes.

2. Methods

2.1. Data sources

For this study we use two data sources. The first includes Wave 1 (1992) and Wave 5 (2000) of the Health and Retirement Study (HRS), a longitudinal, nationally representative, multistage area probability sample of U.S. households. Supported by the National Institute on Aging and conducted by the University of Michigan's Institute for Social Research, the first wave of data collection targeted non-institutionalized persons in the contiguous U.S. ages 51–61 (born 1931–1941) and their spouses. For the initial interview, in-home, face-to-face interviews were conducted for 7608 households yielding 12,652 individual respondents (an overall response rate of 82%). Subjects were subsequently interviewed every two years. Blacks, Hispanics and Florida residents were over sampled. By design, the HRS staff provided sampling and analytical weights only for the targeted "age-eligible" respondents and their "age-eligible" spouses/partners to adjust for over sampling and non-response bias. A more detailed description of the overall study design and sampling methods are provided elsewhere (Heeringa and Connor, 1995). Complete details on the HRS are available online at ⟨http://hrsonline.isr.umich.edu⟩. Our second data source is the 1990 U.S. Decennial Census (**U.S. Census Bureau, 1990**) from which we obtained the necessary population values at the Metropolitan Statistical Area (MSA) and census tract levels in order to compute our focal independent variable LQRRS. The U.S. Census data was then merged with HRS restricted baseline data gathered in 1992 that included subjects' census tract information.

2.2. Subjects

Because of the HRS complex survey design and our desire to produce nationally representative estimates for this age group in our final analysis, we were limited to using those respondents for whom sampling and analysis weights were provided. By design, these were the targeted "age-eligible" respondents and spouses/partners mentioned above, ages 51–61 in 1992, numbering 9824 individuals of the original 12,652 respondents, the balance of which were spouses of the age eligible respondents outside of the 51–61 age range. Next, 85 (0.9%) respondents had incomplete records for either the 1992 or 2000 interview and were excluded. An additional 1399 (14.2%) were lost to follow-up over the 8-year period. This left us with 8340 respondents initially available who had complete records in both waves of data collection or who had died during the period 1992–2000. Among these 8340 respondents we excluded an additional 1687 persons (17.1%) who were rural (non-MSA) residents. This left 5975 persons who had complete records plus 678 persons who died in the period 1992–2000 for a total study sample of 6653. We used both publicly available HRS data files and a restricted data file containing geographic identifiers for each respondent. Finally, because of the sensitive nature of the geographic identifiers, this study was approved by a local institutional review board and the staff of the Health and Retirement Study.