Background

One “puzzle” in the demographic literature is the existence of a Black-White mortality crossover. Throughout most of the life course, Blacks have higher mortality rates than Whites; in later life, at approximately 80 years old, the survival curves of Blacks and Whites cross, so that Blacks have lower mortality rates than Whites (Nam, Weatherby, & Ockay 1978; Manton, Poss, & Wing 1979; Wing, Manton, Stallard, Hames, & Tryoler 1985; Manton & Stallard 1997; Corti et al 1999; Johnson 2000; Dupre, Franzese, & Parrado 2006). Some have argued that the crossover is an artifact of poor data, specifically due to age misreporting that exaggerates age at death for Blacks (Coale & Kisker 1986; Preston, Elo, Rosenwaike, & Hill 1996; Hill, Preston, & Rosenwaike 2000). Others have found that a Black-White mortality crossover still exists when data is adjusted to correct for age misreporting, although the crossover is pushed back to later ages (Lynch, Brown, & Harmsen 2003). In general, most data point to the existence of a mortality crossover in varied time periods, parts of the world, and subgroups, although the effect may be somewhat exaggerated by age misreporting (Nam 1995; Elo & Preston 1997).

The explanation for Black-White morality crossover is based on notions of selective survival, population heterogeneity, and frailty. The heterogeneity/frailty explanation suggests that within any subgroup of the population, members of that group will be heterogeneous in their susceptibility to mortality. Selective survival occurs when those high mortality rates affect the most frail members of the subgroup in early life, leaving more robust members to survive to old age. The subgroup’s mortality rates then decrease at older ages because the composition of the group has changed (Horiuchi & Wilmoth 1998; Lynch, Brown and Harmsen 2003). In the case
of the Black-White mortality crossover, Blacks face more adverse conditions and higher mortality rates than Whites throughout the early life course. The more frail members of the Black population will die first and the mortality rate for Blacks will subsequently decrease as the subgroup as a whole becomes more homogeneous with respect to robust survivors (Markides & Machalek 1984; Liu & Witten 1995). The White subgroup, on the other hand, will not have experienced the same degree of selective survival because living conditions support survival for most individuals; thus the composition of the White subgroup will not change as much over time and the Black subgroup will be more robust.

A recent study takes a novel approach to mortality crossover by comparing the Navajo subgroup with the rest of the U.S. population, finding evidence for a mortality crossover even after adjustment for age overstatement (Thornton 2004). This study emphasizes the difference between advantaged and disadvantaged groups as the basis for selective mortality that affects changing aggregate mortality rates of subgroups. We propose that this basis of advantage and disadvantage is central to understanding the Black-White mortality crossover, and that an analysis explicitly focusing on socioeconomic status is greatly needed.

**Theoretical Focus**

A powerful perspective in medical sociology is that socioeconomic status is the fundamental cause of disease and health disparity (Link & Phelan 1995). In this study, we explore the “fundamental cause” of mortality crossover by examining the existence of a socioeconomic mortality crossover between subgroups that are relatively advantaged or disadvantaged on education. This approach is based on literature noting that socioeconomic status often drives racial differences in health and mortality in general (Williams & Collins 1995; Hayward, Crimmins, Miles, & Yang 2000), but that there are also interactive effects of race and
socioeconomic status on mortality (Menchik 1993). Other studies have noted the strong impact of education on health (House, Lepkowski, Kinney, Mero, Kessler, & Herzog 1994; Ross & Wu 1996; Beckett 2000).

We propose that examination of a socioeconomic mortality crossover is an important addition to the literature on Black-White mortality crossover. The heterogeneity/frailty explanation of the Black-White crossover has been widely accepted, but is largely descriptive. An analysis based on socioeconomic status would help to explain why racial differences in heterogeneity and frailty exist. Thus we examine two research questions in this study: (1) Does a socioeconomic mortality crossover exist in the US?; and (2) Does the effect of socioeconomic status on mortality vary by race?

**Data**

We analyze data from the Duke Established Populations for Epidemiologic Studies of the Elderly (EPESE). This dataset is ideal for examining mortality crossovers because 1) the focus on older adults and oversample of Blacks provides statistical power to detect interaction effects implicated in a crossover, and 2) the four wave panel design provides time-varying covariates and enhances confidence in age reporting.


Measures include socioeconomic indicators of education (1-7 years, 8-11 years, 12+ years) and income (measured in quartiles). Race is measured dichotomously (Black and White). We also test covariates that may mediate the effect of socioeconomic status on mortality.
crossover. Health indicators include cigarette smoking (pack years), BMI (dichotomous indicators of obesity and underweight), alcohol consumption (dichotomous indicator of heavy use), functional impairment (dichotomized Rosow-Breslau), self-reported health (dichotomized), and health index of chronic conditions. Resource indicators include perceived social support and marital status. We also include gender and religious attendance (three dichotomous indicators of once a week or more, infrequently, and never attend/only attend once or twice per year). All indicators are time-varying when possible.

Methods

We adopt the analytical framework of Dupre, Franzese, and Parrado (2006) to examine how a social factor that varies by race (socioeconomic status) moderates the Black-White mortality crossover. First, we establish the Black-White crossover. Second, we include socioeconomic indicators of education and income. Third, we include interaction terms of socioeconomic status and race as well as age. Fourth, we include factors that mediate the relationship between socioeconomic status and health: health status (self-rated health, functional impairments, health index), health risks (smoking, drinking, BMI), and health resources (marital status, perceived social support, and religious attendance).

Expected Findings

First, we expect to find a Black-White mortality crossover at later ages. Second, we expect to find a socioeconomic mortality crossover at later ages. Both of these effects would be evidenced by Disadvantaged-Advantaged risk ratios greater than 1.0 at earlier ages, then “crossing” to less than 1.0 at older ages. In regards to the joint effects of race and SES, we do not expect that SES will fully explain away the Black-White mortality crossover. Instead, we expect to find an interactive effect, with the effect of SES varying by race.
References


