Description of the topic to be studied

The purpose of this study is to explore the county-level effects of elderly migration on the relationship between migration and mortality, using a novel method for decomposing parallel process effects separately into age structure factors and time ordering factors. This is accomplished by fitting NCHS age-sex-race-standardized mortality rates for the population aged at least sixty-five years, and net migration rates from intercensal estimates, to a parallel process latent growth curve model, testing for mediation by the proportion of a county's population aged at least sixty-five.

Theoretical focus

Heeding the call to research correlates of the recently demonstrated non-metropolitan mortality penalty, one of the more likely forces driving this emerging reversal of a long-standing metropolitan mortality penalty could very well be inter-county migration. As health care infrastructure favors more populous places, the financial viability of metropolitan centers may temporarily attract the terminally ill to more populated places, only to return to their rural homes to die. Additionally, several other spatially-dependent social phenomena are likely to drive migration and mortality. The silver-tsunami has had a very heavy hand in spatially concentrating the elderly, while colleges displace the average US county age structure with a heavy concentration of the young adult population. Further still, reverse migration of jobs to the sun belt likely attract working-age persons, children included.

Before socioeconomic (and other, even more nuanced) effects can be explored in greater detail, the one-way migration streams likely to influence mortality at the county level need to be better understood. Similarly, time-ordering of the migration-mortality relationship has in recent research come to be formidable problem. In other words, which comes first: mortality effects on

migration, or migration effects on mortality? Disentangling these seemingly unrelated age-specific migration determinants and their associated mortality outcomes is more difficult than initial prospects forecast, especially when incorporating mediating correlates, such as socioeconomic differentials, market disparities, and even age structure. A concise method for analyzing the relationship between mortality and migration needs to be developed that also synthesizes cross-sectional trends into longitudinal ones, while testing for mediation of any number of secondary variables.

Data and research methods

Mortality data are drawn from NCHS compressed mortality file for the years 1968-2007. Death counts among those aged at least sixty-five from the five years surrounding each time period are summed and used as the numerator in the calculation of age-sex-race-specific mortality rates, with the US Census Bureau's intercensal population estimates as the denominator. These rates are then applied to the US 2000 Standard Million as the reference population. For example, the elderly population mortality level for a county in 1970 is calculated by summing deaths among those aged sixty-five and older for each age-sex-race category for the years 1968, 1969, 1970, 1971, and 1972, then dividing each category by its corresponding age-sex-race intercensal estimate, then applying said rates to the 2000 US Standard Million. This process is repeated for the years 1975, 1980, 1985, 1990, 1995, 2000, and 2005. Migration data are calculated using the residual method, focusing on the net migration rates of the population aged at least sixty-five years. Age structure is drawn from US Census Bureau estimates and tabulations of percent of population aged at least 65 years.

These variables will be combined into two parallel process latent growth curve mediation models: one assessing the time-lagged effects of migration on mortality, and one assessing the

time-lagged effects of mortality on migration. In this model, the latent endogenous variables *migration* and *mortality* are considered parallel processes, so their slopes are assumed to be predicted by their own intercepts as well as each other's intercepts. To test for mediation by proportion of population aged at least sixty-five, the latent exogenous variable *age structure* will be indicated separately by the percentage of the county's own population that is aged at least sixty-five.

Expected findings

The findings will highlight statistically significant evidence for two separate time-ordered population phenomena. The first phenomenon is indirect mediation of a county's elderly population mortality trajectory by direct covariance of its elderly population migration level with the proportion of the county's population aged at least sixty-five. The second phenomenon is indirect mediation of a county's elderly population migration trajectory by direct covariance of its elderly population mortality level with the proportion of the county's population aged at least sixty-five. The implication is migration does have a measurable and statistically significant impact on mortality rates at the county level. Therefore, migration rates should be part of the demographic standardization process for small areas (i.e., counties) in the U.S.