Neighborhood Disadvantage and Mortality: New Insights for Racial and Ethnic Differences

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Abstract

Mortality researchers focusing on racial and ethnic differences have uncovered elevated risks for non-Hispanic blacks and a paradox among Hispanics, relative to whites. Higher mortality for blacks is in part attributable to disadvantages in socioeconomic status but similarly disadvantaged Hispanics often have lower mortality risks than more advantaged whites. We use the National Health Interview Survey linked to prospective mortality and residential characteristics of respondent's neighborhoods to examine the association between neighborhood concentrated disadvantage, race/ethnicity, and mortality. We find that foreign born Hispanics have the lowest risks of all-cause mortality and that increased disadvantage at the neighborhood level predicts increased mortality risk, after accounting for important socioeconomic and other characteristics of adults. However, racial and ethnic minority status conditions the association of neighborhood disadvantage for mortality. More disadvantaged neighborhoods are associated with increased mortality risks for whites and decreased risk for blacks, U.S. born Hispanics, and foreign born Hispanics. The findings lend insight into the pervasive mortality disparities among blacks and whites and suggest that the Hispanic paradox might be related to the selective segregation of Hispanics into communities that are traditionally considered wholly disadvantaged but which might hold special social capital building properties that protect the health of residents.

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Neighborhood indicators of socioeconomic status (SES) have been consistently linked to individual-level mortality, with higher levels of disadvantage linked with higher risk of mortality (LeClere, Rogers and Peters 1998, Waitzman and Smith 1998, Winkleby and Cubbin 2003, Yen and Kaplan 1999). Current thought frequently assumes that residence in neighborhoods characterized by high levels of SES is equally beneficial to all residents because of reduced exposure to stressors, better resources, health promoting norms, and access to knowledge. But access to resources may not necessarily be distributed equally within neighborhoods and additional consideration should be made to consider whether minority groups experience differential returns to neighborhood advantage. Just as individual-level markers of SES have different implications for health and mortality by race/ethnicity (Jemal et al. 2008, Meara, Richards and Cutler 2008), neighborhood-level resources may also have different implications by race/ethnic groups. While reducing neighborhood inequalities remains imperative, further research should clarify *how* neighborhood effects on mortality vary for different groups. We aim to understand how concentrated neighborhood disadvantage impacts mortality risk among U.S. racial/ethnic groups by asking two primary questions: (1): does neighborhood SES have an impact on overall mortality risk for non-Hispanic whites, non-Hispanic blacks, U.S. born Hispanics and foreign-born Hispanics, net of individual sociodemographic and compositional characteristics?, and (2) does neighborhood-level concentrated disadvantage moderate race/ethnic differences in all-cause mortality?

In general, a focus on meso-level conditions expands the scope of common social epidemiological studies beyond conventional risk factor analysis to consider how structural conditions are *uniquely* relevant for health and mortality. Our study adds to previous work by

using a large nationally-representative survey linked to restricted-access geocoded tracts and nearly 20,000 deaths from the National Death Index, with an extended mortality follow-up of 14 years. We are able to adjust for individual-level characteristics in order to address the differences between compositional and contextual effects. We focus on cross-level interactions of neighborhood disadvantage and race/ethnicity to examine the marginal effects of concentrated disadvantage on mortality by race/ethnic categories.

Supporting Literature

While high SES neighborhoods typically confer social advantages with better health-promoting infrastructure, heightened access to food and exercise opportunities, and higher levels of safety, it is possible that the benefits of these resources are not distributed equally across groups. For instance, research has shown that low SES individuals may fare poorer in high SES neighborhoods. Winkelby et al. (2006) found that among whites, low SES individuals living in socioeconomically advantaged neighborhoods had higher risks of mortality. They suggest that all individuals do not necessarily benefit from the proximity to higher quality resources found within an area. It may be that low SES individuals only superficially have access to these resources and that living in an advantaged area does not necessarily confer the access to these resources. Similarly, Finch et al. (2010) show that advantaged neighborhoods may have stronger effects on health outcomes for those that more educationally advantaged. This suggests that those in elevated social positions may be better able to take advantage of the protective features of advantaged neighborhoods, or that those in advantaged positions may be less able to buffer against negative neighborhood effects.

While racial differences in mortality are fairly well-described, they are not necessarily well-explained. Some theories have focused on identifying individual-level psychosocial factors

explaining these disparities, whereas others have emphasized the distribution of power, knowledge, and resources. Fundamental cause theory suggests that individuals in more privileged positions are better able to take advantage of their immediate resources (Link and Phelan). These resources may also extend to the role of neighborhood effects by race/ethnicity. Previous work has been frequently focused on the relationship between individual SES and neighborhood level SES. There is also reason to believe that that race/ethnic groups may also experience differential health returns to neighborhood-level characteristics. Research on non-Hispanic whites has been fairly consistent and in the expected direction, showing that mortality is generally lower in more advantaged versus less advantaged neighborhoods (Inagami et al. 2006, LeClere, Rogers and Peters 1997).

Yet, it is less clear how neighborhood disadvantage may moderate the impact of race/ethnicity. On one hand, non-Hispanic black mortality may be higher in more disadvantaged neighborhoods because of higher poverty, higher crime, and population compositions with overall higher mortality rates. Reductions in neighborhood poverty would theoretically lead to commensurate health gains. Accordingly, racial concentration and neighborhood disadvantage have been shown to explain a large portion of individual-level race effects on non-Hispanic black mortality, with neighborhood racial concentration serving as the primary explanatory factor for men (LeClere, Rogers and Peters).

According to a fundamental cause perspective, it may be that neighborhood returns on health would be compromised for blacks because of the remaining disadvantage and disproportionate allocation of key health-related resources. Alternatively stated, it may be that non-Hispanic black mortality might actually be lower in more disadvantaged neighborhoods and higher in more advantaged neighborhoods. Low SES neighborhoods may include higher levels

of racial concentration that are indicative of stronger social group cohesion. Hutchinson et al. (2009) found lower black mortality in neighborhoods with higher black concentration and with higher social capital, with the lowest mortality in neighborhoods with both characteristics. Therefore, higher levels of social capital, stronger social networks, and less race or class discrimination in lower SES neighborhoods be more protective for minorities than residing in higher SES neighborhood. Racial minorities in high SES neighborhoods may feel isolated or as if they are not necessarily part of the community because of racial identity. This may lead to health compromising behaviors. Conversely, it is possible that shared experiences of stress exposure and racial concentration in low SES neighborhoods may lead to a communal sense of acknowledgment of adverse conditions that subsequently influence health promoting active coping styles.

The "John Henryism" hypothesis suggests that living in high SES neighborhoods may lead to more "high effort coping" among blacks (James 1994), partially as a result of large relative differences in social standing. That is, residence in a higher resource neighborhood may not confer substantial protective effects on low SES residents if they do not have the means to access those resources. If so, it may help explain why similarly socioeconomically situated blacks have persistently higher mortality risks than whites. For example, findings from the Moving to Opportunities studies have not shown clear health advantages for non-Hispanic blacks moving into high SES neighborhoods. While there have been some demonstrated advantages in specific health outcomes such as diabetes, higher SES neighborhoods there have also seen insubstantial changes in mental health and some negative health effects due to disturbances of social networks.

It is also unclear how neighborhood advantage may influence Hispanic mortality. Hispanics may have higher mortality risk in poorer, Hispanic concentrated areas, although much of this association is explained by individual level characteristics (Wight et al. 2010). It is also possible that Hispanics may not experience the same advantages of high SES neighborhoods as non-Hispanic whites. Despite higher levels of poverty, lower education levels, and poorer quality jobs, Hispanics maintain a mortality advantage, as evidenced by the extensive Hispanic Paradox literature. This advantage appears to be even greater when compositional controls for SES are included in the analysis (Eschbach et al. 2004). A higher concentration of Hispanics may engender higher levels of collective efficacy, stronger social networks, and an ability to better navigate health promoting services. This "barrio effect" may be even stronger for foreign-born Hispanics, as Hispanic concentrated areas present fewer language barriers for the foreign-born. For example, Eschbach et al. (2004) finds lower mortality in higher Mexican American concentrated neighborhoods, similar to results reported by LeClere et al. (1997).

Hypotheses

We set out to determine how neighborhood disadvantage influences mortality differences by race/ethnicity. Accordingly, we present three primary hypotheses:

H1:   *NH white mortality risk will be positively associated with neighborhood disadvantage*

H2a: *NH black mortality risk will be positively associated with neighborhood disadvantage.*

H2b: *NH black mortality risk will be negatively associated with neighborhood disadvantage*

H3a: *Hispanic mortality risk will be positively associated with neighborhood disadvantage*

H3b: *Hispanic mortality risk will be negatively associated with neighborhood disadvantage, and the association will be more pronounced among foreign born than among U.S. born Hispanics*

Data & Methods

We use data from the restricted-use 1997-2004 National Health Interview Survey-Linked Mortality File with mortality follow-up through 2011. The data are matched to 2000 U.S. Census data at the tract level. The data set suits this research because it is large, nationally representative, includes a large number of deaths, and allows us to examine the link between tract-level data and mortality. Given the restricted nature of the data, all data analysis was limited to the Texas Research Data Center (TX-RDC). We restrict our sample to adults ages 25 to 65 years old to (1) address the relevance of completed education; (2) to reduce the mobility of younger adults who have recently graduated college; and (3) to limit the biases due to different causes of death for young and old populations. We restrict our analysis to self-identified non-Hispanic black, non-Hispanic white, U.S. born Hispanics, and foreign-born Hispanics. Focusing on these demographic categories results in a sample of 320,445 respondents, of whom 18, 836 have died during the follow-up period.

We use multilevel logistic regression models to examine all-cause mortality by race/ethnicity. Our dependent variable is all cause mortality. To address our first objective, we estimate random intercept models, allowing the odds of death to vary across neighborhoods while holding the associations of individual and neighborhood factors as fixed. To address the second objective we allow the effect of race and ethnicity of the individual to vary across neighborhoods of varying concentrated disadvantage.

Results (in brief)

Table 1 presents the descriptive statistics on the distribution of individual and neighborhood-level covariates.

See Tables 1 and 2 and Figure 1.

Model 1 of Table 2 shows that blacks and U.S. born Hispanics have significantly higher odds of mortality than whites after basic sociodemographic controls. Controlling for marital status, and especially socioeconomic differences in Model 2 attenuates those higher odds for blacks and, more importantly, flips the association for U.S. and foreign born Hispanics so that they have lower odds than whites.

Model 3 shows that even after accounting for important individual risk factors, adults living in more disadvantaged neighborhoods face higher odds of mortality. The association of concentrated disadvantage on mortality risk is explained by the inclusion of other neighborhood level risk factors, most clearly the educational attainment of neighborhood residents (Model 4). However, Model 5 provides evidence that the apparent attenuation of concentrated disadvantage may be due to the different effects concentrated disadvantage has on mortality risks by race/ethnicity. Turning to the predicted probabilities presented in Figure 1, we find that the probability of mortality for whites increases from approximately .05 in the least disadvantaged neighborhoods to approximately .11 in the most disadvantaged neighborhoods. But the probability of death for racial and ethnic minority adults actually declines with more disadvantaged neighborhood status, and this can most clearly been seen among foreign-born Hispanics.

Discussion (in brief)

Our findings emphasize the importance of understanding *how* neighborhood SES may have different implications for various race/ethnic groups. The relatively lower mortality that we find among U.S. minority groups in concentrated disadvantaged areas suggests that the negative neighborhood qualities that may increase mortality risk for whites may not necessarily apply to

minorities. And in fact, low SES neighborhoods may actually offer a form of protection from factors that hinder health, particularly for foreign-born Hispanics. We offer a few potential explanations for our findings.

Neighborhood resources influence mortality outcomes in a variety of ways through existing "opportunity structures" (Macintyre and Ellaway 2000). First, physical environment can influence mortality through engagement in health compromising or health promoting behaviors. Behaviors such as smoking or poor diets may be influenced by neighborhood norms, degree of community integration, or the political or ethnic history of the community. While low SES areas are typically characterized by health compromising behaviors, they may actually be linked to health promoting norms for certain groups.

`Second, neighborhood conditions may influence exposure to stressors with physiological repercussions. Various hormones (e.g., epinephrine, norepinephrine, and cortisol) are linked to both immune and central nervous systems (Glaser and Kiecolt-Glaser 2005, McEwen 1998). Consistent exposure to environmental stressors may lead to maladaptive physiological responses, resulting in higher levels of disease such as coronary heart disease and hypertension (McEwen 1998, Seeman et al. 1997). Exposure to stressors may have two potential effects on minority groups. Individuals from lower status groups may be more affected by stressors because of heightened exposures that also potentially combine with health compromising coping strategies (Glaser and Kiecolt-Glaser 2005). But, it is also possible that social processes of group cohesion, ethnic concentration, or economic homogeneity may reduce the exposure or the impacts of chronic stressors. For instance, strong racial/ethnic identity has been shown to buffer the negative effects of discrimination (Mossakowski 2003). In fact, group level exposure to stressors may lead to a general sense of acknowledgment of adverse conditions that promote active coping

styles and offset the negative health implications of stress and discrimination (Clark et al. 1999, Krieger 1990, Noh and Kaspar 2003, Williams 1997).

Third, while neighborhood-level services widely vary, these may have direct relationships on neighborhood organization or social capital. The quality of schools, availability of transportation, social welfare, health facilities, or policing are important factors for overall health and well-being. While lower SES neighborhoods have fewer neighborhood-level services, the lack of available service may actually have influence on the levels of social capital within the neighborhoods. Higher levels of social networks and social trust may facilitate coordination and cooperation that influence norms and the collective efficacy to mobilize (Krieger 2001, Putnam 1995, Sampson, Raudenbush and Earls 1997). For instance, collective efficacy has been suggested as a potential way to offset community-level threats (Browning et al. 2006)

Fourth, neighborhoods share physical features of the natural and built environment. This may include shared water, air quality, and climate, as well as infrastructure. Neighborhood walkability due to street layout, urban sprawl, land use, park access, and safety concerns. Lack of walkability is not limited to low SES communities, with suburban developments frequently reliant on personal transportation and limited availability of walking opportunities. Low SES residents, particularly those in urban areas, may be more likely to walk because of mixed use development, and the prohibitive costs of owning automobiles that may lead to longer commutes to use public transportation. Housing conditions and related stressors (e.g., overcrowding, heating, plumbing, cold, and noise) also contribute to both indirect and direct impacts on health. Depending on the circumstances, the magnitude of housing related stressors may be related to social comparisons of relative housing options.

Limitations

There are a number of limitations and directions for future research generated through this study. By focusing specifically on adults at one time point, we may be finding underestimated neighborhood effects. It is likely that neighborhood effects begin at a young age and operates through the quality of education, educational attainment, and the development of health-related behaviors. Although, current neighborhood effects may highlight the accumulation of exposure to disadvantage and the various effects of health over the life course (Leventhal and Brooks-Gunn 2000, O'Campo et al. 1997). We also recognize that a focus on U.S. census tracts may underestimate the total effects of neighborhoods on health by disregarding the importance of surrounding areas (Inagami, Cohen and Finch 2007). We are unable to identify the types of neighborhoods that the individuals grew up in and have little insights into neighborhood selection or individual-level residential mobility. Due to data limitations, we are limited in our inclusion of covariates and are unable to include either important health promoting or health compromising behaviors, social psychological resources, or a more inclusive set of neighborhood-level factors that would provide additional insights into explanatory pathways. More research including further individual and specific contextual-level variables would offer additional insights into the pathways that link neighborhoods to mortality.

Conclusion

Nonetheless, our results highlight the importance of understanding people within the context of their social and physical environments. Neighborhood-level resources and knowledge are likely to extend beyond simple measures of advantage and disadvantage. Thus, while policy interventions and public health considerations should continue to address neighborhood disadvantage and reduce material inequities, additional consideration should be made to consider

how race/ethnic minorities in so-called "advantaged" neighborhoods may actually represent a

health risk for specific groups of individuals.

Table 1. Unweighted sample means and proportions for individual- and neighborhood-level covariates, U.S. adults age 25 to 65.

	Total	NH white	NH black		U.S. born Hispanic		Foreign born Hispanic	
Mortality	0.06	0.06	0.08	***	0.05	**	0.05	***
Individual-level covariates								
age	42.96	43.92	42.50	***	40.06	***	40.17	***
Gender								
male	0.48	0.49	0.42	***	0.46	***	0.49	
Marital status								
married	0.66	0.70	0.45	***	0.59	***	0.71	***
divorced or separated	0.15	0.15	0.22	***	0.17	***	0.12	***
widowed	0.02	0.02	0.04	***	0.02		0.02	
never married	0.16	0.13	0.29	***	0.21	***	0.15	***
Years of education	13.22	13.79	13.29	***	12.85	***	10.41	***
Family income	$53,408	$59,604	$42,692	***	$46,079	***	$36,912	***
Employment status								
employed	0.77	0.78	0.73	***	0.74	***	0.70	***
unemployed	0.03	0.02	0.04	***	0.03	***	0.03	***
not in the labor force	0.21	0.20	0.22	***	0.23	***	0.27	***
Region								
northeast	0.18	0.20	0.18	***	0.09	***	0.16	***
midwest	0.22	0.27	0.18	***	0.07	***	0.07	***
south	0.37	0.34	0.55	***	0.38	***	0.33	**
west	0.23	0.19	0.09	***	0.45	***	0.44	***
Neighborhood-level covariates								
concentrated disadvantage	0.00	-0.35	0.79	***	0.48	***	0.69	***
public assistance	0.08	0.06	0.12	***	0.12	***	0.13	***
poverty	0.13	0.09	0.18	***	0.18	***	0.20	***
unemployment	0.06	0.05	0.09	***	0.08	***	0.09	***
female headed household	0.12	0.10	0.21	***	0.15	***	0.16	***
less than high school educated	0.21	0.16	0.26	***	0.30	***	0.37	***
non-Hispanic black	0.12	0.06	0.46	***	0.07	***	0.10	***
Hispanic	0.16	0.07	0.12	***	0.46	***	0.51	***
foreign born	0.13	0.08	0.12	***	0.20	***	0.33	***

N = 320,445

Deaths = 18,836

Restricted to whites (N=212,420), blacks (N=42,527), US born Hispanics (N=24,014), and Foreign born Hispanics (N=41,484) age 25 to 65
Interviewed between 1997 and 2004, mortality follow-up to 2011
Tests of significance are between whites and the other groups

Table 2. Odds ratios of mortailty risk from multi-level logistic regressions, U.S. adults age 25 to 65, 1997-2004.

	Model 1		Model 2		Model 3		Model 4		Model 5	
Individual level										
Race/ethnicity (non-Hispanic white, ref)										
non-Hispanic black	1.62	***	1.24	***	1.11	***	1.08	**	1.12	***
U.S. born Hispanic	1.17	***	0.90	**	0.84	***	0.81	***	0.82	***
Foreign born Hispanic	1.04		0.66	***	0.60	***	0.58	***	0.61	***
Age	1.09	***	1.08	***	1.08	***	1.08	***	1.08	***
Gender (female, ref)										
male	1.60	***	1.95	***	1.95	***	1.95	***	1.95	***
Region (Northeast, ref)										
Midwest	1.07	*	1.08	**	1.10	***	1.10	***	1.09	**
South	1.26	***	1.20	***	1.23	***	1.15	***	1.13	***
West	1.10	***	1.08	**	1.09	**	1.09	**	1.07	*
Marital status (married, ref)										
divorced or separated			1.47	***	1.45	***	1.45	***	1.45	***
widowed			1.39	***	1.38	***	1.37	***	1.37	***
never married			1.46	***	1.43	***	1.44	***	1.44	***
Educational attainment			0.94	***	0.95	***	0.95	***	0.95	***
Logged family income equivalence			0.76	***	0.77	***	0.78	***	0.78	***
Employment status (employed, ref)										
unemployed			1.27	***	1.26	***	1.27	***	1.27	***
not in the labor force			2.09	***	2.08	***	2.08	***	2.08	***
Neighborhood level										
Concentrated Disadvantage					1.12	***	1.01		1.09	***
Controls (proportion logged)										
less than high school education							1.22	***	1.19	***
non-Hispanic black							1.03	***	1.02	***
Hispanic							1.02		1.02	
foreign born							0.98		0.98	
Interactions										
black x concentrated disadvantage									0.90	***
U.S. born Hispanic x concentrated disadvantage									0.90	**
foreign born Hispanic x concentrated disadvantage									0.88	***
Level 1 N	320445									
Level 2 N	11715									

Analyses replicated on data set that drops all respondents in neighborhoods with less than 10 observations. Results do not change. Sample is reduced 6% to N = 301,547.

All models control for total population in the neighborhood and year of survey.

Mortality follow-up to 2011

Figure 1.

Concentrated Disadvantage - All level 1 and 2 controls (full sample)
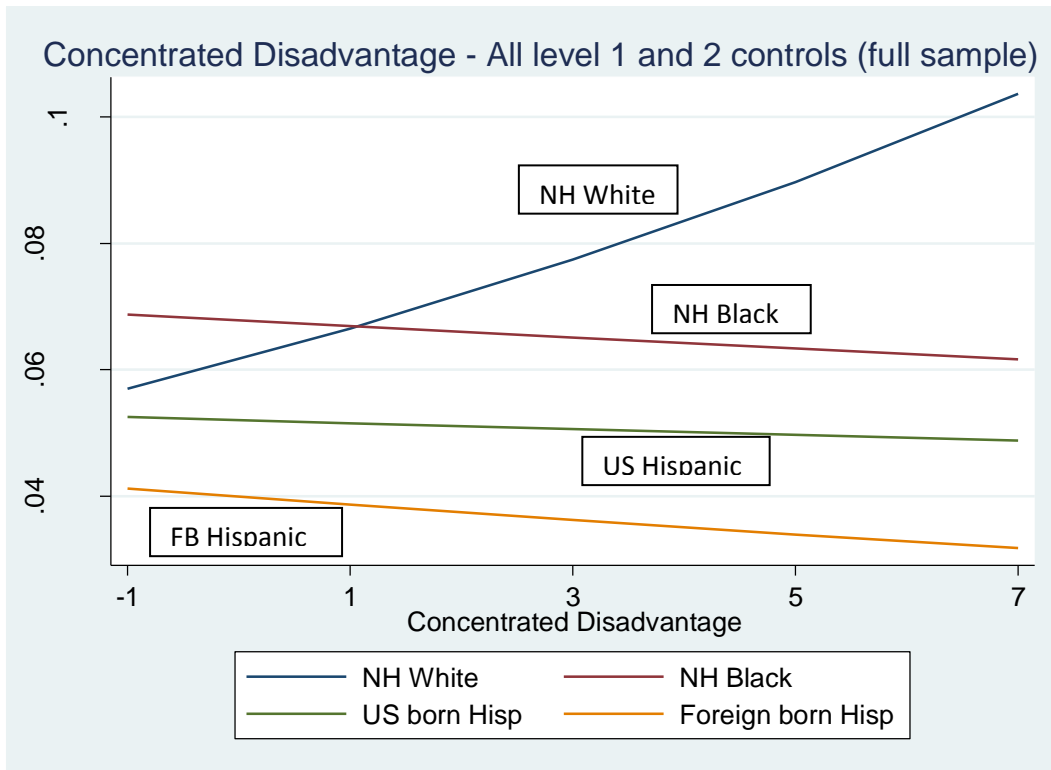
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