The Sociospatial Context of Health Disparities

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Health disparities across race, ethnicity, and socioeconomic status remain sources of enduring concern for social scientists, clinicians, and policy makers. Evidence of the magnitude and breadth of the health gap continues to mount, generating increased interest in identifying its roots. Increasingly, researchers are seeking to understand the origins of health status in broader contextual factors, including the social and economic features of residential spatial and neighborhood environments. A long history of research has documented the dramatically different conditions in which distinct racial, ethnic, and socioeconomic groups have resided (Massey and Denton 1993). These conditions have been linked with a host of negative health outcomes in an emerging focus on the neighborhood context of health and well-being. This research, however, remains incipient; plagued by ongoing concerns regarding selection, endogeneity, and causality; and limited with respect to the measurement of relevant health outcomes and disease processes (Diez Roux 2007). We apply neighborhood theory to understanding variation in blood pressure across neighborhood context using recently collected data from the Dallas Heart Study (DHS). The DHS is an innovative, longitudinal data collection effort that offers an unprecedented opportunity to explore the "upstream" contextual origins of health disparities by race, ethnicity, and socioeconomic status. The DHS combines extensive survey -based measures of socio-demographic characteristics with a wealth of carefully measured biomarkers related to cardiovascular health.

Theoretical Background

We draw on a *social capital/collective efficacy* perspective on neighborhood functioning to develop a theory of the link between neighborhood context and cardiovascular health. This approach suggests that neighborhoods with limited structural resources suffer from weak norms encouraging the social control of public space and, more generally, pro-social (including health-enhancing) activities. For instance, the capacity of neighborhood residents to act on behalf of health-relevant goals such as safe public streets and parks, and correspondingly reduced crime levels, may contribute to the health status of local adults through a number of mechanisms. Normative orientations encouraging safe public space and reduced crime levels at the neighborhood level may directly limit fear and the associated development of "allostatic load" (with corresponding exposure to a variety of potentially health-compromising stress mediators such as catecholamines and cortisol; McEwen 1998). Adults who reside in neighborhoods with strong pro-social norms and limited crime levels may also be more likely to use outdoor space for recreational activity and exercise, reducing the likelihood of a range of poor health outcomes. Theoretical approaches emphasizing the health-benefits of strong and effective normative orientations limiting neighborhood crime have been fruitfully applied to understanding contextual variation in adult self-rated health (Browning and Cagney 2002, 2003) and all-cause mortality (Browning, Wallace, Feinberg, and Cagney 2006) in the context of Chicag. The DHS offers an opportunity to examine the impact of neighborhood crime levels in an alternative US urban context and, critically, to examine their effects on carefully measured biomarkers longitudinally.

Data

The 2000-2002 Dallas Heart Study is a probability-based sample of Dallas County residents aged 18 to 65 years (Victor et al. 2004). A household health interview was completed for 6,101 subjects (visit 1—54% black) that incorporated a number of modules including demographic background, socioeconomic status, health history, neighborhood, social support, acculturation, and discrimination. The DHS used a variety of methods for assessing cardiovascular health, including genetics, advanced imaging modalities, survey research, and clinical research center approaches. A subsample of participants 30 to 65 years of age provided in-home fasting blood and urine samples (visit 2—phlebotomy) and underwent multiple imaging studies, including cardiac magnetic resonance imaging and electron beam computed tomography (visit 3—clinic). Participation rates were 80.4% for interviews, 75.1% for phlebotomy visits, and 87.4% for clinic visits. We employ a subsample of 1780-1800 respondents residing in the City of Dallas to analyze the effect of both overall violence rates and lagged changes in the violence rate on blood pressure measures. Data from the 2000 Census and the 1999-2001 National Neighborhood Crime Study on census tract-level violent crime rates in Dallas were merged with the DHS in order to investigate the effects of both crime and neighborhood structural characteristics on blood pressure.

Analytic Strategy

We employ hierarchical linear models to investigate the impact of neighborhood context on individual level blood pressure. HLM provides a flexible framework for multilevel modeling that can decompose variance across individuals and neighborhoods and take into account the possible non-independence of observations

with neighborhood (census tract). We model continuous measures of systolic and diastolic blood pressure taken from visits 1 and 2 of the DHS (occurring between 2000 and 2001) separately, including individual characteristics, measures of the aggravated assault rate for 1999 and the *change* in the aggravated assault rate between 1999 and 2000, and the visit 1 measure of systolic/diastolic blood pressure (a highly conservative assessment as it essentially captures the effects of changes in violence rates on short-term changes in blood pressure between DHS visits.

Results

Results from Table 1 indicate that standard individual level controls including African American race/ethnicity, male gender, and waist circumference are positively associated with both systolic and diastolic blood pressure (DHS visit 2), even after controlling for prior levels of both (DHS visit 1). However, both models indicate that the *change* in the aggravated assault rate between 1999 and 2000 is also positively associated with visit 2 blood pressure levels, indicating that changing neighborhood crime levels influence short-term changes in blood pressure.

Summary

These findings offer evidence of neighborhood crime effects on blood pressure in a rigorous, multilevel analytic context. Changes in crime rates exert nontrivial influence on changes in blood pressure (both systolic and diastolic) in an urban US sample. These findings offer more convincing evidence of the potentially causal role of neighborhood context effects on cardiovascular health.

References

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Systolic/Diastolic Blood Pressure Regressed on Individual Characteristics and Neighborhood Violence Rates

Independent Variables	Systolic 1	Diastolic 1
Individual/family level		
Race/ethnicity		
African american	4.67 **	1.56 **
Latino	-2.00	-.08
Age	.53 ***	.02
Male	4.63 ***	1.03 **
Education (vs. HS)		
Less than HS	.87	-.74
Some HS	2.71	.02
Some college	1.09	.01
College plus	-.42	-.71
Don't smoke	-1.10	-.46
PC married	-1.67	-.38
Waist circumference	.29 ***	.08 ***
Visit 1 systolic	.64 ***	
Visit 1 diastolic		.65 ***
Neighborhood level		
1999 Assault rate	.06 *	.02
1999-2000 Change in Assault rate	.15 *	.10 *