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Double-jeopardy: The joint impact of neighborhood disadvantage and low social cohesion on cumulative risk of disease among African American men and women in the Jackson Heart Study

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ABSTRACT

Objectives: Few studies have examined the joint impact of neighborhood disadvantage and low social cohesion on health. Moreover, no study has considered the joint impact of these factors on a cumulative disease risk profile among a large sample of African American adults. Using data from the Jackson Heart Study, we examined the extent to which social cohesion modifies the relationship between neighborhood disadvantage and cumulative biological risk (CBR)—a measure of accumulated risk across multiple physiological systems.

Methods: Our analysis included 4408 African American women and men ages 21–85 residing in the Jackson, MS Metropolitan Area. We measured neighborhood disadvantage using a composite score of socioeconomic indicators from the 2000 US Census and social cohesion was assessed using a 5-item validated scale. Standardized z-scores of biomarkers representing cardiovascular, metabolic, inflammatory, and neuroendocrine systems were combined to create a CBR score. We used two-level linear regression models with random intercepts adjusting for socio-demographic and behavioral covariates in the analysis. A three-way interaction term was included to examine whether the relationship between neighborhood disadvantage and CBR differed by levels of social cohesion and gender.

Results: The interaction between neighborhood disadvantage, social cohesion and gender was statistically significant ($p = 0.05$) such that the association between living in a disadvantaged neighborhood and CBR was strongest for men living in neighborhoods with low levels of social cohesion ($B = 0.63$, SE: 0.32). In gender-specific models, we found a statistically significant interaction between neighborhood disadvantage and social cohesion for men ($p = 0.05$) but not for women ($p = 0.50$).

Conclusion: Neighborhoods characterized by high levels of economic disadvantage and low levels of social cohesion contribute to higher cumulative risk of disease among African American men. This suggests that they may face a unique set of challenges that put them at greater risk in these settings.

1. Introduction

A considerable amount of empirical research has linked the economic and social conditions of neighborhoods to adverse health outcomes (Chichlowska et al., 2008; Diez-Roux et al., 2001; Johns et al., 2012; Kawachi and Berkman, 2003; Kim, 2008; Kim et al., 2010; Leal and Chaix, 2011; O'Campo et al., 2008; Pickett and Pearl, 2001; Roberts, 1997; Ross and Mirowsky, 2001). Neighborhoods characterized by high rates of poverty and unemployment coupled with high levels of social disorganization represent some of the worst residential environments and have been found to be particularly detrimental to health. Individuals residing in these areas, who are overwhelmingly poor and African American, are what

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William Julius Wilson (1987) refers to as the *truly disadvantaged* because they are faced with a milieu of economic and social problems that taken together can influence a number risk factors for disease and result in an accumulation of risk across multiple physiological systems.

A complex set of social processes operate within the context of disadvantaged neighborhoods to influence disease risk. Of these processes, social cohesion has gained considerable attention within the public health literature (Baum et al., 2009; de Vries et al., 2013; Fone et al., 2007, 2014; Johns et al., 2012; Kim et al., 2010; Mair et al., 2009). Formulated by Sampson et al. (1997), social cohesion represents one dimension of the concept "collective efficacy" which is defined as the "linkages of mutual trust" (i.e. social cohesion) and the "shared willingness to intervene for the common good" (i.e. informal social control) (Sampson and Raudenbush, 1999). Within disadvantaged neighborhood settings, these "linkages" are often compromised and lead to a number of neighborhood conditions that are detrimental to health and well-being. For example, coupled with informal social control, social cohesion has been found to influence rates of crime and violence within disadvantaged neighborhoods such that lower levels of social cohesion and informal social control are associated with higher rates of crime and violence (Sampson et al., 1997). Combined with the effects of poor socioeconomic conditions, these have the potential to induce stress (Ross and Mirowsky, 2001), elevate blood pressure (Mujahid et al., 2008), promote unhealthy coping behaviors such as smoking and high alcohol use (Kuipers et al., 2012; Slopen et al., 2012), and may create environments that are unsafe for engaging in healthy behaviors such as physical activity (Cleland et al., 2010). Ultimately, this may lead to dysregulation across multiple physiological systems resulting in higher levels of cumulative biological risk. In contrast, high levels of social cohesion may be leveraged within the context of poor neighborhoods to advocate for resources that are conducive to health thereby mitigating some of the harmful effects of these settings (Altschuler et al., 2004; Swaroop and Morenoff, 2006).

It is plausible that the joint impact of neighborhood disadvantage and low levels of social cohesion is particularly detrimental to health. This may be especially true for African Americans in the United States who have historically been impacted by the confluence of economic and racial residential segregation which has resulted in their disproportionate exposure to these deleterious neighborhood environments (Massey, 2001; Massey and Denton, 1993). Additionally, these settings may represent a kind of "double jeopardy" for African American men who often face a unique set of challenges such as limited employment opportunities and exposure to a number of psychosocial stressors, including discrimination, making them particularly vulnerable to these toxic neighborhood settings. Though plausible, neighborhood socioeconomic conditions and social cohesion are often examined independently with little attention devoted to their joint impact. Additionally, of the studies that have examined their joint impact on health outcomes (Fone et al., 2007, 2014; Kim et al., 2010) no studies, that we are aware, have done so among a large sample of African Americans in relation to a profile of cumulative disease risk.

To address these gaps, we used data from the Jackson Heart Study (JHS) — the largest community-based epidemiologic study of African American adults in the United States — to examine the extent to which social cohesion modified the relationship between neighborhood disadvantage and CBR. This present study builds upon our previously published work that found an independent association between neighborhood disadvantage and CBR in this population (Barber et al., 2015). We hypothesized that the impact of living in a disadvantaged neighborhood would be strongest for individuals living in neighborhoods with low levels of social cohesion compared to individuals living in neighborhoods with high levels of social cohesion. Furthermore, based on prior findings (Kim et al., 2010), we also hypothesized that the stronger association between neighborhood disadvantage and CBR would be most salient for men.

2. Methods

2.1. Study area

The JHS is based in Jackson, Mississippi, a mid-sized metropolitan area located in the southeastern United States. In 2000 when the study began, the population of the city and surrounding areas was just under 500,000 making it the largest metropolitan area in the state of Mississippi. The median household income for the Jackson Metropolitan Area was $39,425 and the household poverty rate was 17.6%, comparable to the rest of the state but well above the 11.3% for the rest of the country (U.S. Census Bureau, 2001). Moreover, like many southern cities, a relatively large portion of the population was African American (45.5%) (U.S. Census Bureau, 2012).

2.2. Study population

The sample for this analysis was drawn from the first wave (September 2000–March 2004) of the JHS. The study population included adults aged 21–85 from three counties in the Jackson Metropolitan Area — Hinds, Madison, and Rankin — and was obtained using four sampling strategies: a random sample of adults drawn from a commercially available list of households with adults aged 35–84 (17%); volunteers aged 35–84 recruited through participant referral or outreach activities (30%); participants in the Jackson field center of the Atherosclerosis Risk in Communities (ARIC) study (31%); and relatives of JHS participants, ≥21 years of age comprising the JHS Family Sub-Study (22%). A total baseline sample of 5301 participants (men, n = 1906; women, n = 3395) were recruited into the JHS and 98.8% (n = 5236) were retrospectively geocoded to 102 census tracts (Robinson et al., 2010). Hickson et al. (2011) conducted a spatial Bayesian analysis of the JHS which showed that at the census tract level, the sample was representative of the underlying African American population living within the Jackson Metropolitan Area with two exceptions: the distribution of JHS women was more representative than JHS men, and participants residing in mixed and predominantly African American census tracts were more representative than those residing in predominantly white census tracts.

Data collection for the first wave of the study involved a home interview and an on-site clinical examination. Extensive clinical, demographic, social, cultural, and behavioral information was obtained including extensive data on a number of biomarkers representing several physiological systems. A full description of data collection methods has been provided elsewhere (Carpenter et al., 2004; Payne et al., 2005; Taylor et al., 2005). All JHS participants provided informed consent and research procedures were approved by the institutional review boards of Jackson State University, Tougaloo College, and the University of Mississippi Medical Center.

2.3. Analytic sample

The analytic sample for this study initially included all geocoded participants in the baseline sample residing in neighborhoods with data on social cohesion (n = 5227). We excluded participants with missing data on one or more of the biomarkers included in the assessment of CBR (n = 644) and behavioral covariates (n = 175). In