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Article

Neighborhood context and birth outcomes: Going beyond neighborhood disadvantage, incorporating affluence

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Introduction

Poor birth outcomes, such as preterm birth (PTB; < 37 weeks) or low birth weight (LBW; < 2500 g), are important markers of future life chances. PTB is the leading risk factor for infant mortality in the United States (Goldenberg, Culhane, Iams, & Romero, 2008); both PTB and LBW are associated with neurodevelopmental problems, language disorders, learning disabilities, and poor adult health (Behrman & Butler, 2007; Goldenberg & Culhane, 2007). Poor birth outcomes are highly stratified by race-ethnicity and socioeconomic status. Black women consistently exhibit a twofold risk of PTB and LBW relative to White women; some Hispanic and Asian subgroups, such as Puerto Ricans and Cambodians, also exhibit excess risk relative to Whites (Blumenshine, Egerter, Barclay, Cubbin, & Braveman, 2010; Martin et al., 2008). That poor and some minority populations bear a disproportionate burden of poor health at birth is a key public health challenge facing the United States (Healthy People, 2020).

The etiology of poor birth outcomes is multifactorial, yet we have only a preliminary understanding of the full set of risk factors and causal pathways contributing to LBW and PTB. Known risk factors have been identified at the individual- and neighborhood-level. Neighborhood deprivation (Buka, Brennan, Rich-Edwards, Raudenbush, & Earls, 2003; Messer et al., 2006b; Pickett, Ahern, Selvin, & Abrams, 2002), residential segregation (Mendez, Hogan, & Culhane, 2014), local crime rates (Messer, Kaufman, Dole, Savitz, & Laraia, 2006a; Morenoff, 2003; Schempf, Strobino, & O'Campo, 2009), and low neighborhood-level education (Messer et al., 2008; Nkansah-Amankra, Luchok, Hussey, Watkins, & Liu, 2010; Pearl, Braveman, & Abrams, 2001; Subramanian, Chen, Rehkopf, Waterman, & Krieger, 2006) are well-documented risk factors of LBW and PTB. Yet only one study has examined the effect of neighborhood affluence on birth outcomes (Roberts, 1997).

Neighborhood affluence is distinct in both its definition — it signals the presence of highly educated, wealthy residents employed in prestigious occupations who can effectively draw local institutions to their community that can stabilize the neighborhood and meet the basic needs of residents — and its implications for health — health-promoting institutions benefit all residents, regardless of individual-level socioeconomic status. A strong body of evidence indicates neighborhood affluence is a key predictor of self-reported health and objectively-measured health status that persists in its effect when other key covariates are included, such as neighborhood disadvantage, individual-level socioeconomic status and insurance coverage (Browning & Cagney, 2003; Browning, Cagney, & Wen, 2003; Cagney, Browning, & Wen, 2005; King, Morenoff, & House, 2011; Matthews & Yang, 2010; Wen, Browning, & Cagney, 2003). Several of these studies even show that neighborhood disadvantage is no longer a statistically significant predictor of health status once neighborhood affluence is considered.

The one study that has examined affluence in relation to birth outcomes examined a single outcome (LBW) in one location (Chicago) and did not run race-specific models (Roberts, 1997) — an important feature of any neighborhood analysis on the basis that long-standing patterns of residential segregation in the U.S. imply women of various racial or ethnic groups occupy different spaces. Moreover, most studies examining neighborhood disadvantage and birth outcomes have not explored racial or ethnic differences beyond Black-White disparities; such an examination is essential given that Hispanics and Asians comprise rapidly growing segments of the U.S. population (Ennis, Ríos-Vargas, & Albert, 2011; Pew Research Center, 2013). In addition, a pressing question in the neighborhood effects literature is, through what mechanism does neighborhood context affect health (Matthews & Yang, 2010; Wen et al., 2003)? This question has received inadequate attention in birth outcomes studies. Overall, a more comprehensive assessment of the role of neighborhood affluence is likely to reveal promising new insights into the social determinants of poor infant health.

This study contributes to this discourse by developing new hypotheses of how the sociological construct of neighborhood affluence may affect birth outcomes, and how this association may be mediated by prenatal health behaviors. We also discuss how neighborhood affluence may differentially affect the birth outcomes of Black, White, Hispanic, and Asian women. We then test the association between neighborhood affluence and two birth outcomes (LBW, PTB) and assess

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the extent to which these associations are mediated by a key prenatal health behavior (prenatal smoking). We do so using race/ethnic-stratified multilevel models and population-based birth record data from The State of New Jersey over a ten-year period (1996–2006). We conclude by discussing the key implication of our study as it relates to including neighborhood affluence in future studies assessing the etiology of poor birth outcomes.

Background

Social environments are central to individual-level health. Social environments shape social norms that govern behaviors, attitudes, and practices; constrain opportunities for individuals to engage in health-promoting behaviors; regulate access to resources that people can use to procure health; facilitate a high degree of social control that can limit the opportunity for individuals to engage in illegal or harmful behavior; and mediate stressors that, in turn, may lead to the adoption of unhealthy coping mechanisms (Kawachi & Berkman, 2003; Link & Phelan, 1995; Sampson, 2003; Sampson, Morenoff, & Gannon-Rowley, 2002).

Neighborhood context and birth outcomes

Culhane and Elo (2005) developed a conceptual framework linking neighborhood context (indicated by the social environment, service environment, and physical characteristics) to birth outcomes via a pathway mediated by individual-level health behaviors, psychosocial factors, and social support, as well as maternal stress physiology. We use this framework to guide our study.

In accordance with their framework, emerging evidence suggests living in an impoverished, resource-poor neighborhood; exposure to dilapidated housing; residential instability; institutional practices (e.g., redlining); residential segregation; and exposure to environmental toxicants increase the risk of PTB and LBW (Behrman & Butler, 2007; Bell, Zimmerman, Almgren, Mayer, & Huebner, 2006; Buka et al., 2003; Culhane & Elo, 2005; Debbink & Bader, 2011; Grady, 2006; Halfon & Hochstein, 2002; Hogan, Rowley, Bennett, & Taylor, 2012; Hogue, Hoffman, & Hatch, 2001; Lu et al. 2010; Misra, Guyer, & Allston, 2003; Morenoff, 2003; Walton, 2009).

Neighborhood disadvantage, in particular, has received a great deal of attention in this literature. Several studies using the Neighborhood Deprivation Index (NDI), a measure created by public health scholars specifically with birth outcomes in mind (Messer et al., 2006b), have produced convincing evidence linking neighborhood deprivation with PTB risk [see for example, Messer et al., 2006a; O'Campo et al., 2008]. The NDI includes an indicator of education (proportion of individuals with less than a high school degree) and an indicator of occupational prestige (proportion of males in management and professional occupations), along with several other indicators related to poverty and income. Similarly, other deprivation indices used in perinatal epidemiology combine indicators of education, occupational prestige, or housing values, along with indictors of poverty, unemployment, crowded housing, and/or family composition in the same index [see (Messer et al., 2006b) for a review]. Our goal is to draw on sociological theory and research to disentangle indicators reflecting the sociological construct of neighborhood affluence (education, occupational prestige, housing values) from those of neighborhood disadvantage (e.g., poverty, unemployment).

With respect to evidence of pathways linking neighborhood context to birth outcomes, maternal stress is a key mediator of the effect of neighborhood poverty on LBW (Nkansah-Amankra, 2010) and birth weight, along with perceived locus of control and social support (Schempf et al., 2009). Violent crime mediates at least part of the effect of neighborhood disadvantage on birth weight (Masi, Hawkley, Piotrowski, & Pickett, 2007) and of residential isolation segregation on preterm birth among Black women (Kramer, Cooper, Drews-Botsch, Waller, & Hogue, 2010). The most convincing evidence of mediation demonstrates maternal behavioral risk factors—such as prenatal smoking, drug use, and delayed prenatal care—explained a substantial proportion (30%) of the association between neighborhood disadvantage and lower birth weight (Schempf et al., 2009).

Neighborhood affluence and birth outcomes

Neighborhood affluence is not simply the absence of disadvantage, but rather a unique and independent attribute of neighborhoods that plays a key role in contributing to an individual's wellbeing. The conceptual distinctions between neighborhood affluence and disadvantage are well-described in sociological theory; we discuss this in more detail below. An empirical distinction has also been demonstrated with factor analyses producing two orthogonal factors reflecting neighborhood disadvantage and affluence (Morenoff et al. 2007).

Urban sociologists have long-since theorized about how neighborhoods impact individuals. Social disorganization theory argues that neighborhoods characterized by high concentrations of poverty are also resource-poor; meaning, they do not effectively draw or maintain local institutions that provide key social, economic, and health-related resources to its residents (Kornhauser, 1978; Shaw & McKay, 1942). Yet local institutions thrive in neighborhoods comprised of high concentrations of middle- and upper-class residents who can reliably provide resources to ensure their survival; this is the key concept reflected by neighborhood affluence. All residents, in turn, benefit from the local institution's resources and services (Browning & Cagney, 2003; Robert, 1998), regardless of their individual-level socioeconomic status or resources.

Neighborhood affluence is commonly operationalized by educational attainment (the proportion of individuals ages 25+ with a college degree or higher), occupational prestige (the proportion of individuals ages 16+ employed in professional or managerial positions), and wealth (median housing values) (King et al., 2011; Morenoff et al., 2007). Central to this literature is that affluence is not equivalent to aggregate levels of high school completion or college education; instead, additional indicators of occupational prestige and wealth (not income), play a key role.

Multiple studies have shown that, when neighborhood poverty and neighborhood affluence are considered jointly, poverty has inconsistent effects on poor health while affluence consistently protects against poor health (Browning & Cagney, 2003; Browning et al., 2003; Wen et al., 2003). If similar evidences emerges in the case of birth outcomes, this would support the necessity of shifting our conceptual understanding of how neighborhood context impacts birth outcomes by including both neighborhood affluence and disadvantage.

We propose high levels of neighborhood affluence can enhance a mother's ability to secure access to high-quality prenatal healthcare services and other local institutional resources that may reduce her level of stress or elicit healthy coping mechanisms that translate into the adoption of healthy prenatal behaviors. Such neighborhoods may also foster opportunities for pregnant women to engage in physical activity and secure access to healthy foods, and are more likely to contain local organizations that help women realize their reproductive intentions (e.g., family planning, breastfeeding). In turn, access to quality care, healthy diets, healthy prenatal behaviors, and routine engagement in moderate physical activity can protect against the risk of poor birth outcomes. Therefore, we hypothesize that:

H_1:. Neighborhood affluence is inversely associated with the risk of poor birth outcomes, net of neighborhood disadvantage.

This hypothesis is buttressed by studies that have assessed poor birth outcomes using constructs similar to that which is discussed here. Roberts (1997) used a measure of neighborhood socioeconomic status (the proportion of white-collar workers, median family income, and median adult education level) to indicate "neighborhood quality", and showed low levels of neighborhood quality were associated with an