SSM - Population Health 2 (2016) 850–858

Contents lists available at ScienceDirect

SSM - Population Health

journal homepage: www.elsevier.com/locate/ssmph

Explaining racial and ethnic inequalities in postpartum allostatic load: Results from a multisite study of low to middle income woment

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ARTICLE INFO

Keywords:
Allostatic load
Health inequalities, race/ethnicity
Postpartum health
Socioeconomic position of women

ABSTRACT

Background: Racial and ethnic inequalities in women's health are widely documented, but not for the postpartum period, and few studies examine whether neighborhood, psychosocial, and biological factors explain these gaps in women's health.

Methods: Using prospective longitudinal data collected from 1766 low to middle income women between 2008 and 2012 by the Community Child Health Network (CCHN), we tested the extent to which adjustment for neighborhood, economic, psychological, and medical conditions following a birth explained differences between African American, Latina, and White women in an indicator of physiological dysregulation allostatic load (AL), at one year postpartum as measured by 10 biomarkers: Body Mass Index, Waist Hip Ratio, systolic and diastolic blood pressure, high sensitivity C-reactive protein, Hemoglobin A1c, high-density lipoprotein and cholesterol ratio, and diurnal cortisol.

Results: Mean postpartum AL scores were 4.65 for African American, 4.57 for Latina and 3.86 for White women. Unadjusted regression estimates for high AL for African American women (with White as the reference) were 0.80 (SD = 0.11) and 0.53 (SD = 0.15) for Latina women. Adjustment for household poverty, neighborhood, stress, and resilience variables resulted in a reduction of 36% of the excess risk in high AL for African Americans versus Whites and 42% of the excess risk for Latinas compared to Whites.

Conclusions: Racial and ethnic inequalities in AL were accounted for largely by household poverty with additional contributions by psychological, economic, neighbourhood and medical variables. There remained a significant inequality between African American, and Latina women as compared to Whites even after adjustment for this set of variables. Future research into health inequalities among women should include a fuller consideration of the social determinants of health including employment, housing and prepregnancy medical conditions.

1. . Introduction

Women's health during the childbearing years is important for reproductive success (Craft, 1997; Atrash, Jack, and Johnson, 2008) and according to life course theory, postpartum health status can promote or hinder healthy aging (Morton, Mustillo, and Feraro, 2014; Vasunilashorn & Martinson, 2013; Davis, Stange, and Horwitz, 2012; Perng et al., 2015; McClure, Mustillo, and Feraro, 2013). Women's health prior to and during pregnancy has been the focus of the large majority of maternal health scholarship, while postpartum health receives far less research attention than the period of pregnancy or pre-pregnancy (Meltzer-Brody & Stuebe, 2014; Fahey & Shenassa, 2013). Postpartum markers of health and well-being can help us predict women's future health (Davis et al., 2012; Karlamangla,

Abbreviations: AL, Allostatic Load; CCHN, Community Child Health Network; FPL, Federal Poverty Level

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http://dx.doi.org/10.1016/j.ssmph.2016.10.014
Received 13 July 2016; Received in revised form 19 October 2016; Accepted 28 October 2016
2352-8273/

Singer, and Seeman, 2006; Wu et al., 2016), making the postpartum period a critically important phase in women's lives. Further, the well-known health inequalities by race, ethnicity, and socioeconomic position demonstrated for pregnancy seem to continue during the postpartum period for a variety of outcomes including utilization of health care (Glasheen et al., 2015; DiBari et al., 2014; Seplowitz et al., 2015), psychosocial well-being (Glasheen et al., 2015; Liu & Tronick, 2014; Phelan et al., 2015), and exposure to stressors such as discrimination (Rosenthal et al., 2015).

There is a growing interest in the impact of stress including cumulative adversity over the lifetime, and the physiological toll resulting from ongoing activation of stress responses at or around the time of childbearing (Phelan et al., 2015; Hobel, Goldstein, and Barrett, 2008; Dominguez et al., 2008; Gonzalez et al., 2009). In their highly influential theory, McEwen and colleagues defined allostatic load (AL) as the cumulative toll on multiple body systems of adaptation to stressful events and chronic stressful life conditions (McEwen, 1998; McEwen and Stellar, 1993). Indices of AL combine multi-systemic biomarkers (for example, blood pressure, serum cholesterol, body mass index, and C-reactive protein [CRP]) into a composite risk score. In initial studies of middle-aged and older populations (Singer & Ryff, 1999; Seeman et al., 1997), higher AL predicted greater morbidity and mortality (Karlamangla et al., 2006; Seeman et al., 2001, 2004; Gruenwald et al., 2006). Broader population studies (Mattei et al., 2010; Hwang et al., 2014) further established that AL is a mediator of disease risk in humans, and that it varies with socioeconomic position (SEP), race/ethnicity, and gender (Wu et al., 2016; Beckie, 2012; Geronimus et al., 2006). In addition, chronic life stress, including exposure to chronic and persistent discrimination, is linked to higher AL (Juster, McEwen, and Lupien, 2010; Brody et al., 2014). More recent studies of maternal populations establish the need to look further at AL during the childbearing years (Premji, 2014; Shannon, King, and Kennedy, 2007; Hux & Roberts, 2015; Morrison et al., 2013), in part because AL could enable us to detect risks for a mother and her child prior to or during pregnancy. For example, Wallace and Harville (2013), who studied a small set of biomarkers taken between 26 and 28 weeks gestation in 42 White and Black pregnant women, found that gestational age at birth decreased significantly with increasing AL adjusted for smoking and body mass (Wallace & Harville, 2013; Wallace et al., 2013a, 2013b).

Growing income inequalities in the United States are a defining issue of our time (Kondo et al., 2009). Hundreds of studies have demonstrated the adverse impact of increased economic inequalities and poverty on population health and mortality by documenting gaps by income or by race (Kondo et al., 2009; Aizer & Currie, 2014; Costa-Font & Hernández-Quevedo, 2012; Pickett & Wilkinson, 2015). Yet research into whether and how structural, social, and biological factors explain these growing health and social gaps is sparse. In the US, studies of health inequalities have heavily emphasized differences by race or ethnicity, with too little attention to the joint impact of both race/ethnicity and socioeconomics on health. Authors have argued that without such joint consideration (Braveman, 2008; Kawachi, Norman, and Robinson, 2008; Mechanic, 2008; Sparks, 2009; Williams & Jackson, 2005), we cannot identify the key drivers of inequalities (Kawachi et al., 2008).While some studies have suggested that genetic differences might explain health gaps between different races, such explanations for racial inequities have been long discounted (Braveman, 2008; Williams & Jackson, 2005; Kaufman et al., 2015; Gravlee, 2009). Finally, research that takes advantage of strong longitudinal designs and contextual data in the study of social and health inequalities is still too rare.

In 2003, using community-based participatory research methods (Jagosh et al., 2012), the Community Child Health Network (CCHN) established by the Eunice Kennedy Shriver National Institute of Child Health and Human Development began a multisite observational study to better understand multiple health and social determinants of AL during the interconception period (Ramey et al., 2015). The concept of AL as wear-and-tear on body systems leading to premature weathering among people living in poverty, and the need to examine multiple levels (e.g. individual and neighbourhood) of both risk and resilience factors, were unifying concepts for our study and mutually endorsed by community and academic partners (Wu et al., 2016; Ramey et al., 2015). While community members affirmed the role of stress as a contributor to AL in high-risk populations, they also felt strongly that we needed to study sources of resilience. Furthermore, in the past two decades, many scholars have critiqued the overreliance on individual factors to explain health at the expense of assessing impacts from physical and social contexts (Borrell et al., 2014; Rajaratnam, Burke, and O'Campo, 2006; O'Campo et al., 1997; Ncube et al., 2016), therefore, our interest included neighborhoods and how they serve as a context contributing to inequalities (Nkansah-Amankra et al., 2010; O'Campo, 2003) which was strongly endorsed by our community partners. Moreover, we took advantage of the wide variability in neighborhood context offered by our multisite study which included urban and non-urban settings.

In this study, we extend the prior preliminary findings of the CCHN longitudinal study examining the patterns of AL by poverty group and race and ethnicity over the first year postpartum to determine whether levels of inequality are stable or dynamic during this period (Shalowitz et al., unpublished manuscript). Here we investigate whether neighborhood and individual economic, psychosocial, and health conditions at birth or 6 months postpartum explain the AL gaps by race/ethnicity at 12 months postpartum. Our hypothesis is that economic, stress, and resilience factors assessed at the individual level and neighborhood deprivation assessed at the community level would account for a substantial portion of race and ethnic inequalities in AL scores.

2. Methods

2.1. Study design

The CCHN study was conducted in three urban sites (Washington, DC; Baltimore, MD; Los Angeles County, CA), one suburban site (Lake County, IL), and one rural site (seven counties in eastern North Carolina) all of which had high documented maternal child health disparities(Ramey et al., 2015). Women were recruited and enrolled between 2008 and 2010 during postpartum hospital stays following childbirth, except in North Carolina where participants were recruited in clinics during pregnancy or postpartum. Mothers who met the following criteria were eligible to participate: (1) 18 to 40 years of age; (2) self-identification as White/Caucasian, Latina/Hispanic, and/or African American/Black; (3) ability to converse in English or Spanish; (4) anticipated residence in one of the target zip codes for at least 6 months; (5) 4 or fewer children; and (6) no plans to be surgically sterilized following the birth of the index child. We over-sampled mothers living in low income neighborhoods and preterm births. With the mother's permission, the baby's father (or father figure) was invited to participate in the study.

Community research staff trained in the study protocol conducted interviews in English or Spanish during in-person visits when index children were approximately 1 month (T1), 6 months (T2), 12 months (T3), and 24 months (T5) of age, and during a brief telephone interview at 18 months (T4). With very few exceptions, assessments were done in participants' homes. Interviewers were also trained to collect biological data during T2 and T3 study visits, including: 1) blood pressure; 2) height and weight for calculation of BMI; 3) waist and hip circumference measurements; 4) blood spots for C-reactive protein (CRP), hemoglobin A1c (HbA1c), high-density (HDL) and low-density lipoprotein (LDL) cholesterol assays; and 5) diurnal salivary cortisol measured upon waking, 30 min later, and before bedtime on two consecutive days.