Exposure to Segregation and Health Outcomes in Childhood

Bethany Boettner
Department of Sociology
The Ohio State University

Abstract

INTRODUCTION

Health disparities are a persistent component of racial inequality in the United States. Racial and ethnic minority children, especially Black and Hispanic children, disproportionately experience increased rates of morbidity, especially stemming from chronic conditions such as asthma, obesity, and diabetes (McDaniel, Paxson, and Waldfogel 2006; Von Hippel et al. 2007; Rosenbaum 2008). Additionally, disparities in child wellbeing tend to translate into substantial disparities in adult wellbeing due to the cumulative exposure to systematic social, economic, and political exclusion over time. Research on health and wellbeing has increasingly focused on metropolitan areas and neighborhoods as influential contexts that create and maintain these disparities (Williams and Jackson 2005; Diez Roux and Mair 2010). Yet few studies assess how *cumulative* exposure to disadvantaged, segregated neighborhoods over the life course influences health, particularly among children.

Segregation has been associated with a wide range of negative health outcomes among African-Americans. Segregation increases African American adult mortality (Jackson et al. 2000; LaVeist 2003), and racial isolation is positively associated with poor self-rated health, obesity, and low birth weight (Subramanian et al. 2005; Chang 2006; Bell et al. 2006; Grady and Ramirez 2008). Black mothers in hypersegregated metropolitan areas experience higher rates of pre-term birth than Blacks in hypersegregated areas, and in addition, Black-White gaps in preterm birth are also larger in hypersegregated areas (Osypuk and Acevedo-Garcia 2008). However, the association between segregation and well-being has not been entirely negative among African Americans. Racial clustering was protective of birth outcomes among Blacks (Bell et al. 2006), and in contrast to previous findings on mortality, Inagami et al (2006) find that living in predominantly Black neighborhoods reduces mortality levels relative to Blacks

living in less isolated areas. Although generally segregation is considered to be detrimental to the well being of African Americans, existing research is not entirely consistent in these findings.

Current evidence is even more mixed regarding the role of segregation in determining the health of Hispanics. The relationship between segregation and Hispanic health varies across racial/ethnic identity, immigrant status, and health outcome measures. Several studies find positive health effects of living in Hispanic neighborhoods. Higher neighborhood Hispanic concentration was related to less depression and mortality and better self-rated health among elderly Mexicans living within the Southwest (Ostir et al. 2003; Patel et al. 2003; Eschbach et al. 2004). Among children and adolescents, neighborhood Hispanic concentration is associated with healthier dietary habits overall (Lee and Cubbin 2002). However, others have found negative effects of Hispanic segregation. Residential isolation reduces physical health for Puerto Rican adults and increases depressive symptoms for Mexican adults (Lee and Ferraro 2007; Lee 2009). Neighborhoods with high concentrations of poor Hispanics also are related to increased health risk behaviors such as substance use and delinquency among Hispanic youth, particularly for U.S.-born Hispanics (Frank, Cerda, and Rendon 2007).

Research on links between segregation and health largely ignores childhood well being and cumulative exposure to segregated neighborhoods. Life course processes are important for determining health and wellbeing, as early life sets in motion health trajectories into adulthood and later life, especially chronic conditions (Kuh and Ben-Schlomo 1997). Until recently, work on neighborhood effects has not adequately addressed early life neighborhood exposures in longitudinal research (Diez Roux and Mair 2010). Children may spend more time within neighborhoods attending schools and playing in local backyards and parks than their parents, who may leave the neighborhood more often for work or other activities. Finally, although

research on childhood outcomes has examined the cumulative effects of exposure to neighborhood poverty (Jackson and Mare 2007; Crowder and South 2011), few have assessed the cumulative effects of exposure to segregated neighborhoods, either in children or adults (see Kramer and Hogue 2009 for a review). Exposure to segregation is often a long-term neighborhood condition, particularly for urban and poor minority children, which may result in cumulative disadvantages to both socioeconomic and health outcomes. Understanding the effects of segregation on children's health and wellbeing is paramount in understanding the early determinants of health disparities.

I address the relationships between segregation and health for White, African American, and Hispanic children, including the effects of cumulative exposure to segregation using data from five waves of the Early Childhood Longitudinal Survey Kindergarten Class 1998-1999 (ECLS-K). These data spans 8 years, from 1998 to 2007. I investigate whether exposure to residential segregation is predictive of racial/ethnic inequalities in childhood health using three health measures that unequally affect minority children, obesity, poor parent-rated health, and asthma diagnosis.

Segregation

Residential segregation is a key defining characteristic in the American metropolis and a powerful force for explaining racial inequality across neighborhoods. Hypersegregation is defined as areas that are highly segregated on five measures: evenness, exposure, clustering, concentration, and centralization (Massey and Denton 1993). Almost 40% of all African Americans live in metropolitan areas that are hypersegregated, and 60% live in areas highly segregated on the evenness dimension (Iceland, Weinberg, and Steinmetz 2002). Overall, levels

of residential segregation are lower for Hispanics than Blacks but have not decreased over time (Iceland and Nelson 2008). By 2000, Hispanics in both New York and Los Angeles were hypersegregated (Wilkes and Iceland 2004). However, new immigrant destinations the Southeast and Midwest are also becoming increasingly segregated, especially for foreign-born Hispanics (Park and Iceland 2011).

Although segregation is less pervasive for Hispanics than African Americans, the social and economic consequences of segregation are observed in both groups. Among African Americans, segregation contributes to suboptimal educational attainment and employment outcomes (Cutler and Glaeser 1997; Card and Rothstein 2007; Massey and Fisher 2006). Among both African Americans and Hispanics, segregation exacerbates levels of crime and homicide (Krivo et al. 2009; Feldmeyer 2010). Residential segregation is also associated with lower rates of homeownership, as well as lower housing quality among homeowners and high rates of foreclosure (Flippen 2010; Rugh and Massey 2010).

Segregation negatively influences African Americans in part because it is rooted in both interpersonal and institutional discrimination. White avoidance of African-American neighbors contributed to the emergence and to the persistence of Black-White segregation levels, due in large part to negative stereotypes about Black residents and neighborhoods (Zubrinsky and Bobo 1996; Quillian 2002). Although Blacks are willing to move into balanced, integrated communities at rates significantly higher than Whites, Blacks fear hostility from Whites in majority White neighborhoods that have no visible Black presence (Krysan and Farley 2002). As Blacks moved in large numbers out of the South into the North after World War I during the Great Migration in search of economic opportunities, housing discrimination also kept Blacks out of predominantly White neighborhoods (Tolnay 2003). Effective institutional barriers to

entry into these communities include restrictive covenants that denied deed transfers to non-White families as well as financial policies that restricted the ability of Blacks to qualify for loans in White neighborhoods (Massey and Denton 1993; Pager and Shepherd 2005). When these methods were less effective, Whites also used violence to drive out current minority residents and prevent potential minority residents from moving in. These forces resulted in urban segregated ghettos that experience high rates of unemployment, social disorganization, and crime (Wilson 1996).

In contrast to the negative underpinnings of residential segregation for African Americans, research on ethnic enclaves suggest that living ethnic and immigrant neighborhoods may be beneficial to new immigrants because of cohesive social networks and the social support they are likely to provide to same-race and co-ethnic neighbors, suggesting Hispanic communities may be beneficial to Hispanic residents (Portes and Zhou 1993). Ethnic communities can provide new immigrants with employment opportunities, reduced language barriers, knowledge about affordable housing and health care, and cultural and familial ties, all of which may help new immigrants adapt and acculturate to their new communities. Selective acculturation and strong ties to an ethnic community help buffer the second generation from downward socioeconomic trajectories and lead to improved chances of socioeconomic mobility (Zhou and Bankston 1998; Hirschman 2001; Portes, Fernandez-Kelly, and Haller 2009). However, poor immigrants are more likely than their nonpoor counterparts to reside in socially disorganized and economically disadvantaged ethnic enclaves that are detrimental, not beneficial, to socioeconomic attainment in the next generation (Portes and Zhou 1993; Zhou 1997). In 2000, 27% of all Hispanic children lived in poverty, and rates are even higher among the first and second generations (36% and 28%, respectively) compared to third generation

Hispanic children (23%) (Lichter, Qian, and Crowley 2005). Residing in poor ethnic enclaves may be particularly detrimental to these children in the absence of strong organization and collective efficacy to ward off the associated consequences of poverty.

Patterns of acculturation are also strongly related to segregation. Hispanics that are native-born, have higher socioeconomic status, and better English language proficiency are more likely to move into neighborhoods with fewer Hispanics and more Whites (South, Crowder, and Chavez 2005; Iceland and Scopilliti 2008). Although higher socioeconomic attainment and acculturation may facilitate migration into more racially diverse neighborhoods, it may also prevent native born Hispanics from maintaining important social ties with co-ethnics. For Hispanics, the health consequences of migration to less segregated areas with fewer co-ethnics remain unclear.

New immigrant destinations, those with only a recent history of immigration, are growing increasingly segregated as the size of foreign-born and Hispanic population rises rapidly, and this segregation is not buffered by economic attainment among Hispanics (Lichter et al. 2010). Children, particularly immigrant Hispanic children, are more vulnerable to school dropout in new immigrant destinations than in older, defined immigrant gateways, as schools and communities are unable to provide additional support to immigrant children for whom English is a second language (Fischer 2010). For Hispanic children, the effects of place segregation may be highly complex, a mixture of economic and structural factors that vary by generation.

Segregation and Health

The major pathways that link segregation to health include restricted socioeconomic status and high concentrations of poverty, exposure to discrimination and subsequent elevated

stress levels, and poor neighborhood environmental quality (Acevedo-Garcia et al. 2003). Williams and colleagues (Williams and Collins 2001; Williams and Jackson 2005) argue that racial segregation is a fundamental cause of racial disparities in health primarily through its impact on individual socioeconomic status and neighborhood poverty. Extant research regarding residential segregation and health finds a significant negative association between segregation and wellbeing even after accounting for differential levels of SES at the individual and aggregate level (Subramanian et al. 2005; Osypuk and Acevedo-Garcia 2008; LaVeist 2003). Although health disparities are reduced when accounting for socioeconomic differences between racial/ethnic groups, individual and aggregate differences in SES cannot fully explain the link between segregation and health.

As discrimination is a major force in creating and perpetuating residential segregation, it also serves as a mediating pathway between segregation and health. Racial discrimination has been found to be detrimental to both mental and physical health, although the relationship appears stronger for the former than the latter (Williams, Neighbors, and Jackson 2003). Investigators have primarily explained this association by invoking the stress process model and arguing that exposure to racial discrimination predominantly impacts health by elevating levels of psychosocial stress to such an extent as to interfere an individual's ability to effectively cope with everyday life stressors such as financial hardship and parenting (Williams and Sternthal 2010). For African Americans, both major life events of race-related mistreatment and negative everyday encounters can be upsetting, stressful, and cause cumulative harm over the life course (Feagin and Sikes 1994). Among African Americans, personal experiences with racism result in poorer self-rated physical health and health behaviors (Borrell et al. 2006; Borrell et al. 2010), and, more consistently, increased psychological distress (Williams et al. 1997; Jackson et al.

1996; Schulz et al. 2006). In Black adolescents, perceived discrimination increases anger and depression, as well as decreases self-esteem, resiliency, academic performance, and perceived academic ability (Wong, Eccles, and Sameroff 2003).

Overall discrimination helps to create and maintain segregation across neighborhoods; however, within neighborhoods, more racial integration may foster an atmosphere that encourages discrimination rather than tolerance (Welch et al. 2001; Hunt et al. 2007). Studying race-based stress and social support, Swaroop (2005) finds that the influence of exposure to other-race neighbors and isolation from same-race neighbors varies across racial groups. For Blacks, exposure to more White neighbors and fewer Black neighbors increases perceived discrimination; for Latinos, exposure to more Black neighbors increases perceived discrimination and decreases socializing among neighbors. This decrease in perceived discrimination may be responsible for findings that segregation has positive benefits to health, by reducing stress and increasing social support in segregated Black neighborhoods (e.g. Bell et al. 2006; Inagami et al. 2006).

Finally, the relationship between segregation and the built environment suggests that neighborhood effects on health are likely to be complex. Segregated neighborhoods have fewer grocery stores, as well as reduced availability of inexpensive healthy foods, recreational facilities, and parks (Zenk et al. 2005; Moore and Diez Roux 2006; Moore et al. 2008). Residents of segregated neighborhoods are also exposed to increased pollution, lead, and other environmental toxins (Morello-Froesch and Lopez 2006). Although low income, racial minority neighborhoods are generally poor environments for child wellbeing (Jackson and Mare 2007; Collins et al. 2008), some research suggests that this relationship may not be straightforward. Among children in the Fragile Families study, those living in housing projects played outside

more often than those living elsewhere, which may be a result of playgrounds that have been specifically built as part of these developments for the use of its residents. (Kimbro, Brooks-Gunn, and McLanahan 2011). While increased levels of physical activity has been shown to be beneficial for a wide range of health outcomes among children, extensive time spent outside may increase the likelihood that a child is exposed to neighborhood physical and social disorder.

Cumulative Exposure

Life course perspectives on health stress the importance of cumulative risk processes in determining wellbeing (Kuh and Ben-Schlomo 1997). According to the weathering hypothesis, the chronic stress of economic and social disadvantage, racism, and political marginalization increase the psychological and physiological toll of everyday life on African Americans, which in turn triggers accelerated aging especially during prime childbearing years (Geronimus et al. 2006). African Americans experience faster rates of decline in health than whites, with increasingly higher rates of morbidity and mortality across the life course (Geronimus et al. 2001; Geronimus et al. 2010). Evidence suggests this process starts early in adulthood, with worsening outcomes as age increases, especially for women's birth outcomes (Geronimus 1996). Additionally, upward social mobility does not offer a health benefit in birth outcomes to Black women as it does to White mothers (Colen et al. 2006). Given the cumulative and convincing evidence of weathering among Black women, it is important to understand why Black-White health inequalities emerge at early ages and what factors cause them to grow more pronounced over time.

Although life course research has been focused on individual-level cumulative disadvantage (Hertzman and Power 2003), recent work on educational attainment and fertility

behavior has begun to focus on cumulative exposure to neighborhood-level disadvantage (Clampet-Lundquist and Massey 2008; Crowder and South 2011). Racial differences in cumulative exposure to poverty are much larger than single point in time measures of poverty (Timberlake 2007). Both Black and Hispanic families living in poverty are more likely to live in segregated neighborhoods than their nonpoor counterparts (Iceland et al. 2010). In studying cumulative exposure to poverty, Jackson and Mare (2007) find that cumulative measures do not explain educational attainment and childhood health any better than poverty measures captured at single point in time. However, they use data from the Los Angeles Family and Neighborhoods Survey (L.A. FANS) that includes only 2 years residential data and one time measurement of outcomes, and just two waves of the Child Development Supplement to the Panel Study of Income Dynamics (PSID-CDS). Although the PSID-CDS data contains longer residential histories of focal children than L.A. FANS, it includes relatively few Hispanics that cannot be analyzed separately. Additionally, Jackson and Mare only measure general overall health, and do not include any measures of specific physical health outcomes.

Even less consideration has been given to empirically examining the influence of cumulative exposure to segregation on health, despite the theoretical importance of cumulative disadvantage of segregated neighborhoods (Massey 2004; Diez Roux and Mair 2010). Using a retrospective recall of five social context measures throughout the life course, LaVeist (2003) finds that multidimensional, lifetime exposure to segregated schools, work places, child neighborhoods, and current neighborhoods accelerates mortality among African Americans. Survival rates for African Americans with high lifetime exposure was 20% lower than Blacks with low exposure, and only some of this relationship is explained by socioeconomic status, gender, and prior health status. Similarly, among African Americans, childhood exposure to

segregation is associated with smoking among African Americans independent of adult exposure (Landrine and Klonoff 2000).

Finally, assessments of residential mobility programs such as Moving to Opportunity (MTO) have generally found positive health outcomes for African Americans moving into lower poverty and less segregated neighborhoods, particularly for mental health and obesity outcomes, suggesting that disrupting the cumulative exposure to poverty and segregation is beneficial (Kling et al. 2004; Leventhal and Brooks-Gunn 2003; Ludwig et al. 2008). However, the MTO program was not specifically designed to reduce participants exposure to residential segregation, and many African Americans moved to lower poverty neighborhoods that were still highly segregated. Moreover, recent critiques of the MTO program suggest that findings from this experiment may suffer from selection bias. (Clampet-Lundquist and Massey 2009; Ludwig et al. 2008). Finally, beneficial outcomes from MTO are likely hampered by participants' initial poor health status (Osypuk and Glymour 2011).

I expand on these prior findings by critically assessing the role of residential segregation in child wellbeing among Whites, Blacks, and Hispanics. I examine the extent to which metropolitan level residential segregation impacts child wellbeing among African American and Hispanic youth, and whether the impact of segregation on health is cumulative over time. Although I expect segregation generally to have negative effects on health, I expect that racial isolation may actually be beneficial, by reducing experiences of stress and discrimination, and increasing social support and networks.

1) *Black-White segregation measured by the dissimilarity index will be detrimental to African American children's health, but not to White and Hispanic children.*

2) *Hispanic-White dissimilarity will be detrimental to Hispanic children's health, but not to White and African American children*

3) *Black residential isolation will be beneficial to African American children's health, but not to White and Hispanic children.*

4) *Hispanic residential isolation will be beneficial to Hispanic children's health, but not to White and African American children.*

5) *Due to cumulative exposure to segregation, chronic exposure to residential segregation will be detrimental to the health of African American children relative to White and Hispanic children.*

Data and Methods

Data

The data for the subsequent analyses comes from the restricted version of the Early Childhood Longitudinal Survey Kindergarten Class of 1998-1999 data (ECLS-K). The ECLS-K is a nationally representative longitudinal study of approximately 20,000 kindergarteners in 1998-1999 that were re-interviewed in first grade (1999-2000), third grade (2002), fifth grade (2004), and eighth grade (2007). Data for the kindergarten wave are taken from the spring assessment unless otherwise noted. Pertinent information was collected from students (i.e. respondents), parents, teachers, school administrators, as well as directly assessed by specially trained interviewers. Respondents' home addresses were collected during each round and subsequently geocoded. The longitudinal design and wealth of sources make the ECLS-K ideal for assessing child health over the early life course while providing the ability to link geographic information to a nationally representative sample with large minority student samples.

Dependent Variables

I capture physical health using two measures of physical health (obesity and asthma), one measure of global health (parent-rated health). Obesity and parent-rated health are measured at

each wave, but questions concerning whether or not the respondent has been diagnosed with asthma are only asked in waves during 3rd, 5th, and 8th grade, therefore, analyses where asthma is the dependent variable contain a subset of observations.

Body Mass Index (BMI) is calculated from interviewers' measurements of height and weight during each round of child assessments, as mass in kilograms divided by height in meters squared, is compared to gender-specific BMI-for-age growth charts from the Centers for Disease Control and Prevention (CDC). Based on recommendations from the CDC and Institute of Medicine, I categorize children as obese if their combined height and weight measurements put them at or above the 95th percentile for their gender and age. Previous research has established that children in this category experience an increased risk of secondary complications such as cardiovascular disease (Krebs et al. 2007; Kuczmarski et al. 2002). Parents report whether their child has ever been diagnosed with asthma by a doctor. They also report how healthy the child is on a scale from 1, which indicates excellent health, to 5 which indicates poor health. In multivariate models, parent-rated health has been dichotomously recoded, where 1 represents fair or poor health and 0 represents good, very good, or excellent health.

Independent Variables

The independent variables of interest capture the racial segregation of the metropolitan area in which the respondent resides during each wave of data collection. Respondent's addresses are matched to the corresponding Metropolitan Statistical Areas (MSA) or the Primary Metropolitan Statistical Areas (PMSA). I use two dimensions of segregation, evenness and exposure, calculated by the Census Bureau using Census 2000 data (Iceland, Weinberg, and Steinmetz 2002). *Evenness*, the degree to which the percentage of minority members in smaller

residential areas matches the overall metropolitan area percentage, is measured by the dissimilarity index, which can be interpreted as the percent of minority residents (Black or Hispanic, respectively) who would have to move census tracts for each census tract to match the percentage of that minority that live in the MSA/PMSA as a whole. *Exposure* is the degree to which residents are exposed to members of other racial group by sharing the same neighborhoods, and is measured in this study by the isolation index, the weighted average percentage Black or Hispanic within census tracts averaged across the MSA/PMSA (Massey and Denton 1993). Both indices are on a scale of 0-100 with greater values indicating higher levels of residential segregation. For the models assessing chronic exposure, I count the number of rounds of data collection the child has experience levels of 60% or greater for each segregation measure, which is generally considered to be high exposure for ascertaining hypersegregation (Denton and Massey 1989; Wilkes and Iceland 2004). I categorize children as chronically exposed if they have experienced 4 or 5 rounds of exposure to high segregation, compared to children who have experienced fewer rounds. Most children experience either all rounds in high segregation or none or 1, so I dichotomize the chronic exposure variables comparing high exposure to low exposure, the reference category.

I control for a number of demographic and socioeconomic characteristics including child's gender (female is reference), age (in years), race (non-Hispanic White, non-Hispanic Black, or Hispanic), total household size, whether or not the child resides in a single parent household, and whether the child has no health insurance coverage, compared to either private or government insurance, because at the time of the Kindergarten interview in 1998-1999 parents were only asked to report if the focal child had any health insurance but were not asked to specify the type of coverage. I also incorporate a composite measure of socioeconomic status

constructed by the ECLS-K that combines mother's and father's educational attainment, income, and occupational prestige and categorizes students into quintiles based on the combination of these measures.

Analytic Strategy

Analyses are restricted to respondents who have complete data on variables of interest including geocoded information, and I include respondents who have at least two waves of data. This provides information from a sample of 6,650 non-Hispanic Whites, 1,160 non-Hispanic Blacks, and 2,240 Hispanics, and a total of 39,110 observations. I employ multilevel logistic regression techniques to predict the likelihood of being obese, being diagnosed with asthma, and parent-reported poor health using population averaged models and robust standard errors by child. For the final set of chronic exposure models, I restrict the sample to the last interview round in 8th grade in order to measure chronic exposure, and use Huber-White corrections to standard errors and cluster individual observations within MSA to account for heteroskedasticity and non-independence of observations. Sampling weights are applied to descriptive analyses to correct for both the survey non-response of those who are lost to follow up and the complex survey design of the ECLS-K. Unweighted sample sizes are rounded to the nearest 10 per restricted data agreement with the Institute of Education Services and the National Center for Education Statistics.

Results

Weighted descriptive statistics by race are presented in Table 1 for respondent's first interview and last interview, except for asthma which is presented as lifetime diagnosis rates due to the more limited sample years in which this question was asked. Clear racial disparities in all three outcome measures are apparent. Over 50% of White children are reported as being in Excellent health by parents at both time points, but only 40-45% of Blacks and Hispanics are rated to be in excellent health. Twice as many Blacks and Hispanics are in good health as Whites, and almost 5% are rated as being in fair or poor health. Although all groups experience increases in rates of obesity between the first and last years, Hispanics start at much higher rates, almost 20% at the first interview, compared to only 9% of White and 12% of African American children. By the last interview, over 20% of African Americans are also obese. Finally, a quarter of African American children are ever diagnosed with asthma by their last interview.

Residential patterning also varies by race. Black children experience much higher levels of residential segregation than either White or Hispanic children. White and Hispanic children live in metropolitan areas that have, on average, Black-White dissimilarity indices of 59 and 57, respectively, in their last interviews, while their African American counterparts reside in MSAs that have average Black-White dissimilarity indices of 64. Not surprisingly, Hispanics experience the highest levels of Hispanic-White segregation, with average Hispanic-White dissimilarity of 51, compared to 44 among Whites and 45 among Blacks. Blacks also live in metropolitan areas where the average Black residents live in neighborhoods that are 59% Black, and Hispanics live in metropolitan areas where the average Hispanic lives in a neighborhood that is 53% Hispanic.

Half of African American children live in single parent households, compared to only about a quarter of Hispanics, and less than 20% of Whites. Racial differences in health insurance are also apparent. Although 5% or less of White children have no health insurance of any kind at both first and last interviews, 9% of Blacks and 20% of Hispanics at the first interview do not have coverage. By their last interview, just 4% of Blacks have no coverage, but 12% of Hispanics still lack health insurance coverage of any kind. Finally, racial disparities in socioeconomic status, a combined measure of education, income, and occupation, are quite pronounced. Less than 10% of Whites at both times fall in the bottom quintile of family SES, but a third of Blacks and 40% of Hispanics do. In contrast, a third of White children fall into the top quintile of family SES, yet less than 10% of Blacks and Hispanics do.

Multilevel logistic regression analyses are presented by health outcome and separately by Black and Hispanic segregation measures in Tables 2 (poor health), 3 (asthma), and 4 (obesity). Models 1 and 2 present the effect of Black-White Dissimilarity and Black Isolation measures, and Models 3 and 4 present the effects Hispanic-White Dissimilarity and Hispanic Isolation, respectively. All models include interactions between segregation measures and each racial group to estimate whether the influences of segrgation on health differs by racial/ethnic group.

Table 2 presents the odds of being in fair or poor health for Whites, Blacks, and Hispanics. In Model 1, Blacks are 2.5 times more like than Whites to be in poor health, but the difference is not significant, whereas the odds of poor health are much higher for Hispanics, who are 5.8 times more likely to be in poor health than Whites. The main effects of Black-White dissimilarity are not significant, therefore although the interaction between Black-White dissimilarity and Hispanic is significant, I do not interpret it. For Model 2 presents the estimates of Black isolation on poor health, and Figure 2 presents the predicted probabilities. The main

effects of Black isolation are positive, so as the average percentage Black across tracts in an MSA increases, the probability of poor health increases for Whites, although the effect size is small, a 1% in the odds of poor health for each 1% increase in Black isolation. The interaction is not significant for Blacks, suggesting that the relationship between Black isolation and poor health is similar for Whites and Blacks. The relationship is negative for Hispanics, but the effect size is smaller, a 0.2% (=exp(ln(1.01)+ln(.99))) decrease in the odds of poor health with each 1% increase in Black isolation. In model 2, the odds of poor health among Hispanics is now 3.6 times higher, and 2.3 times higher for Blacks, relative to Whites.

Hispanic-White dissimilarity and Hispanic isolation, shown in models 3 and 4 of Table 2, do not have significant main effects nor interaction effects with race on the odds of poor health. However, controlling for Hispanic segregation measures reduces the racial disparity in poor health between Hispanics and Whites, where the odds of poor health is just 1.5 times higher for Hispanics and not significantly different from Whites.

Table 3 presents the logistic regression models for asthma diagnosis. None of the main effects of Black-White residential dissimilarity, Black isolation, Hispanic-White dissimilarity, and Hispanic isolation are significantly associated with asthma diagnosis, the only race interaction term that is significant is the Hispanic race by Hispanic isolation term. In that model, Model 4, both Black and Hispanics are 1.73 and 1.78 times more likely to be diagnosed with asthma. For Hispanics, Hispanic isolation is negatively associated with the odds of asthma, but again the effect size is small, a 1% (=exp(ln(1.0)+ln(.99))) decrease in the odds of asthma for each 1% increase in Hispanic isolation.

As shown in Table 4, the association between residential segregation and obesity also varies by race. Black-White dissimilarity and Black isolation are not significantly associated

with obesity for any group, but Hispanic-White dissimilarity as well as Hispanic isolation are associated with obesity for Hispanics. Hispanic-White dissimilarity is positively associated with the odds of obesity, a 1% (=exp(ln1.0+ln1.01) increase in the odds of obesity for each 1% increase in Hispanic-White dissimilarity and Hispanic isolation.

Table 5 presents the level of chronic exposure by residential segregation measure and race, weighted to adjust for survey design. Two-thirds of African Americans live in highly segregation MSAs in at least 4 rounds of data collection. The level of exposure is lower for Whites, at 54%, and Hispanics, at 45%. The differences in exposure to Black Isolation are more pronounced. Over half of African Americans but only about 30% of Whites and Hispanics experience high levels of chronic exposure to Black Isolation. Given the lower levels overall of Hispanic-White dissimilarity, only 14% of Whites and Blacks experience chronic Hispanic segregation, but 21% of Hispanic so. Similar to Black isolation, Hispanics experience Hispanic isolation at much higher rates than the other groups; 36% of Hispanics but only 13% of Blacks and 5% of Whites experience chronic exposure to high levels of Hispanic isolation.

Table 6 presents the results from the logistic regressions of chronic exposures on health for segregation measures. Due to small sample sizes reporting poor health, stratification by race is not possible, although it would be preferable given the potential differences in the impact of chronic exposure. Exposure to Black-White segregation and Black isolation does not have any significant cumulative effects on health for any of the three health measures. Cumulative exposure to Hispanic-White dissimilarity reduces the likelihood of poor health by 62%. In contrast, cumulative exposure to Hispanic isolation increases the odds of poor health by a factor of 2. Chronic Hispanic-White dissimilarity and Hispanic isolation do not significantly predict the odds of asthma diagnosis or obesity. However, these estimates should be read cautiously. Given

the low rates of chronic exposure to Hispanic segregation, and the low rates overall of poor health, they are quite sensitive to small cell sizes.

Discussion

This paper examines the role of residential segregation in determining health and wellbeing across the early life course. Among African American adults, segregation has generally been detrimental to health, although Black isolation levels has been more consistently linked to negative outcomes than Black-White dissimilarity. Among Hispanics, the relationship varies considerably across health outcomes and segregation measures. The goal of this research was to extend this conceptual model to children, examining the role of segregation in determining racial disparities in child health as well as the added effects of cumulative exposure to residential segregation.

I find no evidence to support hypothesis 1, that Black-White dissimilarity would be detrimental to the health of Black children. Among African American children, Black-White segregation is not associated with the likelihood of poor health, asthma, or obesity after accounting for other individual level characteristics. The results also do not support a protective effect of Black isolation against poor health for Black children. Similar to Black-White dissimilarity, isolation is not significantly associated with any of the three health outcomes among African Americans. These findings are contrary to findings in the adult health literature that Black-White residential dissimilarity is related to worse health outcomes for Black adults as well as infants (Bell et al. 2006; Chang 2006; Subramanian et al. 2005). This divergent finding warrants more inquiries. Black-White segregation may not affect Black children adversely, either because exposure to segregation is cumulative across the life course and the effects do not contribute to racial inequality in health until later or because the processes of health inequality

for young African Americans is not tied to residential segregations on the metropolitan level. It is also possible that because children are less likely to be mobile around a city, the lower level neighborhood processes may be more important for racial inequalities in early life than indices at the metropolitan level can tease out.

As previous research has shown, the relationship between segregation and Hispanic health varies across both segregation and health measures. I find that Black isolation levels are protective against poor health for Hispanic children, an unexpected finding. In support of Hypothesis 2 that dissimilarity would be detrimental to the health of Hispanic children, Hispanic-White segregation is harmful but only for obesity levels. Hispanic obesity increases with dissimilarity as well as with Hispanic isolation, which is in contrast to the hypothesized benefit of Hispanic isolation for Hispanic children. However, Hispanic isolation does decrease the odds of asthma diagnosis among Hispanic children. Therefore, Hispanic children living in areas with greater exposure to other Hispanics and more separation from other racial groups, neighborhoods that are generally considered to be positive environments because of ethnic social ties and support, have lower rates of asthma but higher rates of obesity. Living in more unequal metropolitan areas may expose Hispanics to more racism and discrimination, as well as providing fewer resources to help increase health and well-being in the face of socioeconomic and racial adversity, but it is unclear why this effect is only obesity and not poor health or asthma. Rates of exercise among Hispanic adults are also lower among those living in more segregated areas (Mellerson et al. 2010), so if this health behavior is passed on to children it may help explain why obesity is particularly affected by Hispanic-White segregation.

Although cumulative exposure to segregation was hypothesized to increase the likelihood of poor health, African American segregation is not related to the odds of poor health, obesity, or

asthma. Only Hispanic-White dissimilarity and Hispanic isolation are associated with the odds of poor health, a decrease in the likelihood of poor health with higher levels of Hispanic-White dissimilarity, and an increase in the likelihood of poor health with high levels of Hispanic isolation. The lack of association between Black-White segregation and health may reflect the shorter time spans in the early life course; by age 14, the cumulative nature of segregation may not be fully in effect. This may also reflect the limitations in the ECLS-K in calculating true duration measures of actual exposure, since only current residential place is geocoded at each round of data collection, and detailed residential histories in between rounds are not recorded. Also, while many children changes residences within metropolitan areas, few change residences across metropolitan areas, resulting in less variation in cumulative exposure to segregation. Further analyses are warranted to assess whether the cumulative nature of segregation varies across racial groups.

Finally, I note an important limitation with this study. Measuring residential segregation at the metropolitan level reports important information about how residential patterns vary across neighborhoods, and so is a relative measure of residential inequality. However, measuring segregation at the MSA level clearly misses important variation across individuals that results in different exposure to residential patterns. Future research on the health effects of residential segregation may benefit from new measures designed to decompose regional variation into smaller spatial units that may better assess individual level experiences situated in the broader context of residential segregation patterns (Lee et al. 2008).

Overall, the results suggest that effect of segregation on child health is highly dependent upon segregation measure and health outcome, and not consistent across racial groups. This suggests that although segregation may be a determining factor in adult health, early life

exposure to residential segregation is not a consistent determinant of health disparities. The health of Hispanic children is more sensitive to these residential patterns than Whites and Blacks, even if the directions of the relationships vary by segregation and health measure, and may signify important variations within Hispanics as a group. By assessing the role of segregation among children and especially Hispanic children, this research broadens our understanding of the social processes that create health disparities and under what circumstances residential segregation does influence child health. Research into the mechanisms that translate residential segregation into health outcomes needs to be sensitive to racial/ethnic differences in the effect of segregation measures, and pay particular attention to the reasons how and why dissimilarity and isolation measures differentially effect health.

	White First	White Last	Black First	Black Last	Hispanic First	Hispanic Last
Health						
Excellent	59%	55%	45%	44%	40%	45%
Very Good	29%	33%	33%	34%	34%	30%
Good	11%	10%	18%	18%	21%	19%
Fair	2%	2%	4%	4%	5%	5%
Poor	0%	0%	0%	1%	0%	0%
Obese	9%	16%	12%	21%	19%	25%
Asthma, ever diagnosed		18%		24%		17%
Black-White Dissimilarity	59.82	59.28	64.07	63.67	58.22	57.39
Black Isolation	46.08	45.44	59.39	58.97	46.20	45.14
Hispanic-White Dissimilarity	44.03	44.08	45.51	45.42	50.57	49.99
Hispanic Isolation	26.77	26.87	29.2	29.02	53.31	52.76
Age, years	6.55	12.2	6.53	11.85	6.61	12.31
Male	51%	53%	52%	54%	53%	52%
Single Parent Household	15%	19%	50%	49%	23%	26%
No Health Insurance	5%	4%	9%	4%	20%	12%
Household Size	4.42	4.38	4.52	4.57	4.86	4.86
Socioeconomic Status Quintile						
Lowest Quintile	7%	7%	30%	30%	41%	38%
Second Quintile	17%	16%	23%	24%	22%	23%
Third Quintile	20%	22%	21%	21%	16%	19%
Fourth Quintile	25%	24%	17%	17%	14%	12%
Highest Quintile	32%	31%	8%	8%	7%	8%
Number of Persons Across all years	6,650		1,660		2,440	

Table 1: Weighted Descriptive Statistics by First and Last Interview and Race

	Poor Health Model 1	Poor Health Model 2	Poor Health Model 3	Poor Health Model 4
Black	2.58	2.31*	1.63	1.81**
	(1.29)	(0.74)	(0.58)	(0.32)
Hispanic	5.80**	3.57**	1.50	1.50
	(2.30)	(0.72)	(0.54)	(0.32)
Male	1.27**	1.26**	1.26**	1.26**
	(0.10)	(0.10)	(0.10)	(0.10)
Age, years	1.01	1.01	1.01	1.01
	(0.01)	(0.01)	(0.01)	(0.01)
Single Parent Household	1.22*	1.23*	1.22*	1.23*
	(0.11)	(0.11)	(0.11)	(0.11)
Household Size	1.05	1.05	1.05	1.05
	(0.03)	(0.03)	(0.03)	(0.03)
No Health Insurance	0.91	0.92	0.92	0.92
	(0.10)	(0.10)	(0.10)	(0.10)
Socioeconomic Status Quintiles	0.67**	0.67**	0.67**	0.68**
	(0.02)	(0.02)	(0.02)	(0.02)
Black-White Dissimilarity	1.01			
	(0.00)			
Black*Black-White Dissim	0.99			
	(0.01)			
Hispanic*Black-White Dissim	0.98*			
	(0.01)			
Black Isolation		1.01*		
		(0.00)		
Black*Black Isolation		1.00		
		(0.01)		
Hispanic*Black Isolation		0.99*		
		(0.00)		
Hispanic-White Dissimilarity			0.99	
			(0.00)	
Black * Hispanic-White Dissim			1.00	
			(0.01)	
Hispanic * Hispanic-White Dissim			1.01	
			(0.01)	
Hispanic Isolation				1.00
				(0.00)
Black * Hispanic Isolation				1.00
				(0.01)
Hispanic * Hispanic Isolation				1.01
				(0.00)
N	39110	39110	39110	39110
χ^2	408.19	413.64	401.75	403.43

*p<.05, **p<.01, one-tailed. Robust standard errors are in parentheses.

Table 2: Odds Ratios from Logistic Regression of Segregation on Poor Health

	Asthma Model 1	Asthma Model 2	Asthma Model 3	Asthma Model 4
Black	1.37	2.18**	1.62	1.73**
	(0.52)	(0.54)	(0.44)	(0.22)
Hispanic	0.64	0.97	1.41	1.78**
	(0.19)	(0.15)	(0.41)	(0.28)
Male	1.67**	1.67**	1.68**	1.68**
	(0.10)	(0.10)	(0.10)	(0.10)
Age, years	1.05**	1.05**	1.05**	1.05**
	(0.01)	(0.01)	(0.01)	(0.01)
Single Parent Household	1.11	1.11	1.11	1.11
	(0.06)	(0.06)	(0.06)	(0.06)
Household Size	0.97	0.97	0.97	0.97
	(0.02)	(0.02)	(0.02)	(0.02)
No Health Insurance	0.84	0.84	0.84	0.84
	(0.07)	(0.07)	(0.07)	(0.07)
Socioeconomic Status Quintiles	1.01	1.01	1.01	1.00
	(0.02)	(0.02)	(0.02)	(0.02)
Black-White Dissimilarity	1.00			
	0.00			
Black*Black-White Dissim	1.00			
	(0.01)			
Hispanic*Black-White Dissim	1.01			
	(0.00)			
Black Isolation		1.00		
		(0.00)		
Black*Black Isolation		1.00		
		(0.00)		
Hispanic*Black Isolation		1.00		
		(0.00)		
Hispanic-White Dissimilarity			1.00	
			(0.00)	
Black * Hispanic-White Dissim			1.00	
			(0.01)	
Hispanic * Hispanic-White Dissim			0.99	
			(0.01)	
Hispanic Isolation				1.00
				(0.00)
Black * Hispanic Isolation				1.00
				(0.00)
Hispanic * Hispanic Isolation				0.99**
				(0.00)
N	20180	20180	20180	20180
χ^2	221.47	218.34	218.70	228.00

*p<.05, **p<.01, one-tailed. Robust standard errors are in parentheses.

Table 3: Odds Ratios from Logistic Regression of Segregation on Asthma

	Obesity	Obesity	Obesity	Obesity

	Model 1	Model 2	Model 3	Model 4
Black	0.99	1.17	1.11	1.33*
	(0.33)	(0.27)	(0.27)	(0.15)
Hispanic	1.43	1.75**	0.95	1.44**
	(0.31)	(0.21)	(0.21)	(0.18)
Male	1.22**	1.22**	1.22**	1.22**
	(0.06)	(0.06)	(0.06)	(0.06)
Age, years	1.08**	1.08**	1.08**	1.08**
	0.00	0.00	0.00	0.00
Single Parent Household	1.07	1.08	1.08	1.08
	(0.04)	(0.04)	(0.04)	(0.04)
Household Size	0.97	0.98	0.97	0.98
	(0.01)	(0.01)	(0.01)	(0.01)
No Health Insurance	0.91	0.91*	0.91*	0.91*
	(0.04)	(0.04)	(0.04)	(0.04)
Socioeconomic Status Quintiles	0.92**	0.92**	0.92**	0.92**
	(0.01)	(0.01)	(0.01)	(0.01)
Black-White Dissimilarity	1.00			
	(0.00)			
Black*Black-White Dissim	1.01			
	(0.01)			
Hispanic*Black-White Dissim	1.00			
	(0.00)			
Black Isolation		1.00		
		(0.00)		
Black*Black Isolation		1.00		
		(0.00)		
Hispanic*Black Isolation		1.00		
		(0.00)		
Hispanic-White Dissimilarity			1.00	
			(0.00)	
Black * Hispanic-White Dissim			1.01	
			(0.01)	
Hispanic * Hispanic-White Dissim			1.01**	
			(0.00)	
Hispanic Isolation				1.00
				(0.00)
Black * Hispanic Isolation				1.00
				(0.00)
Hispanic * Hispanic Isolation				1.01*
				(0.00)
N	39110	39110	39110	39110
χ^2	597.04	593.97	594.26	586.94

*p<.05, **p<.01, one-tailed. Robust standard errors are in parentheses.

Table 4: Odds Ratios from Logistic Regression of Segregation on Obesity

	White	Black	Hispanic
Chronic Black-White Dissimilarity >60	54%	65%	45%
Chronic Black Isolation >60	28%	56%	31%
Chronic Hispanic-White Dissimilarity >60	14%	14%	21%
Chronic Hispanic Isolation >60	5%	13%	36%

Table 5: Cumulative Exposure to Segregation by Race in Last Interview

	Poor Health Model 1	Poor Health Model 2	Asthma Model 1	Asthma Model 2	Obese Model 1	Obese Model 2
African American	1.91	1.8	1.49**	1.47**	1.32	1.37*
	(0.66)	(0.62)	(0.21)	(0.19)	(0.19)	(0.21)
Hispanic	2.50**	2.13**	0.88	0.91	1.45**	1.50***
	(0.67)	(0.53)	(0.11)	(0.11)	(0.17)	(0.17)
Male	1.09	1.09	1.58**	1.58**	1.45**	1.46**
	(0.21)	(0.21)	(0.13)	(0.13)	(0.10)	(0.10)
Age, years	1.16	1.13	0.97	0.97	0.86	0.85
	(0.31)	(0.29)	(0.13)	(0.12)	(0.09)	(0.09)
Single Parent Household	1.38	1.39	1.21	1.21	1	0.99
	(0.33)	(0.34)	(0.13)	(0.13)	(0.09)	(0.09)
Household Size	1.05	1.06	0.94	0.94	0.95	0.95
	(0.07)	(0.07)	(0.03)	(0.03)	(0.03)	(0.03)
No Health Insurance	0.87	0.81	0.9	0.92	1.35	1.37
	(0.23)	(0.21)	(0.17)	(0.17)	(0.27)	(0.27)
Socioeconomic Status Quintiles	0.64**	0.65**	1.03	1.03	0.79**	0.78**
	(0.06)	(0.06)	(0.04)	(0.04)	(0.03)	(0.03)
Chronic Black-White Dissimilarity >60	0.93		0.94		0.82	
	(0.24)		(0.10)		(0.10)	
Chronic Black Isolation >60	0.91		0.95		1.25	
	(0.24)		(0.10)		(0.15)	
Chronic Hispanic-White Dissimilarity >60		0.38***		1.06		1.11
		(0.08)		(0.14)		(0.16)
Chronic Hispanic Isolation >60		2.00*		0.88		0.94
		(0.60)		(0.15)		(0.14)
N	5140	5140	5140	5140	5140	5140
χ^2	139.01	114.16	77.77	77.9	141.45	142.65

*p<.05, **p<.01, one-tailed. Robust standard errors are in parentheses.

Table 6: Odds Ratios from Logistic Regression of Chronic Exposure to Segregation on Health

REFERENCES

Acevedo-Garcia, Dolores, Kimberly A. Lochner, Theresa L. Osypuk, and S. V. Subramanian. 2003. "Future Directions in Residential Segregation and Health Research: A Multilevel Approach." *American Journal of Public Health* 93:215-221.

Bell, Janice F., Frederick J. Zimmerman, Gunnar R. Almgren, Jonathan D. Mayer, and Colleen E. Huebner. 2006. "Birth outcomes among urban African-American women: A multilevel analysis of the role of racial residential segregation." *Social Science & Medicine* 63:3030-3045.

Borrell, Luisa N. 2006. "Self-reported hypertension and race among Hispanics in the National Health Interview Survey." *Ethnicity & Disease* 16:71-77.

Borrell, Luisa N., Ana V. Diez Roux, David R. Jacobs Jr., Steven Shea, Sharon A. Jackson, Sandi Shrager, and Roger S. Blumenthal. 2010. "Perceived racial/ethnic discrimination, smoking and alcohol consumption in the Multi-Ethnic Study of Atherosclerosis (MESA)." *Preventive Medicine* 51:307-312.

Card, David, and Jesse Rothstein. 2007. "Racial segregation and the black-white test score gap." *Journal of Public Economics* 91:2158-2184.

Chang, Virginia W. 2006. "Racial residential segregation and weight status among US adults." *Social Science & Medicine* 63:1289-1303.

Clampet-Lundquist, Susan, and Douglas S. Massey. 2008. "Neighborhood Effects on Economic Self-Sufficiency: A Reconsideration of the Moving to Opportunity Experiment." *The American Journal of Sociology* 114:107-143.

Colen, Cynthia G., Arline T. Geronimus, John Bound, and Sherman A. James. 2006. "Maternal Upward Socioeconomic Mobility and Black-White Disparities in Infant Birthweight." *American Journal of Public Health* 96:2032-2039.

Collins, James W., Jennifer Wambach, Richard J. David, and Kristin M. Rankin. 2008. "Women's Lifelong Exposure to Neighborhood Poverty and Low Birth Weight: A Population-Based Study." *Maternal and Child Health Journal* 13:326-333.

Crowder, Kyle, and Scott J. South. 2011. "Spatial and temporal dimensions of neighborhood effects on high school graduation." *Social Science Research* 40:87-106.

Cutler, David M., and Edward L. Glaeser. 1997. "Are Ghettos Good or Bad?" *The Quarterly Journal of Economics* 112:827-872.

Diez Roux, Ana V., and Christina Mair. 2010. "Neighborhoods and health." *Annals of the New York Academy of Sciences* 1186:125-145.

Eschbach, Karl, Glenn V. Ostir, Kushang V. Patel, Kyriakos S. Markides, and James S. Goodwin. 2004. "Neighborhood Context and Mortality Among Older Mexican Americans: Is There a Barrio Advantage?" *American Journal of Public Health* 94:1807-1812.

Feagin, Joe R., and Melvin P. Sikes. 1994. *Living with racism: the black middle-class experience*. Boston, MA: Beacon Press.

Feldmeyer, Ben. 2010. "The Effects of Racial/Ethnic Segregation on Latino and Black Homicide." *Sociological Quarterly* 51:600-623.

Fischer, Mary J. 2010. "Immigrant educational outcomes in new destinations: An exploration of high school attrition." *Social Science Research* 39:627-641.

Flippen, Chenoa Anne. 2010. "The Spatial Dynamics of Stratification: Metropolitan Context, Population Redistribution, and Black and Hispanic Homeownership." *Demography* 47:845-868.

Frank, Reanne, Magdalena Cerda, and Maria Rendon. 2007. "Barrios and Burbs: Residential Context and Health-Risk Behaviors among Angeleno Adolescents." *Journal of Health and Social Behavior* 48:283-300.

Geronimus, Arline T. 1996. "Black/white differences in the relationship of maternal age to birthweight: A population-based test of the weathering hypothesis." *Social Science & Medicine* 42:589-597.

Geronimus, Arline T. 2001. "Understanding and eliminating racial inequalities in women's health in the United States: the role of the weathering conceptual framework." *Journal of the American Medical Women's Association* 56:133-136.

Geronimus, Arline T., Margaret Hicken, Danya Keene, and John Bound. 2006. "Weathering and Age Patterns of Allostatic Load Scores Among Blacks and Whites in the United States." *American Journal of Public Health* 96:826-833.

Geronimus, Arline T., Margaret Hicken, Jay Pearson, Sarah Seashols, Kelly Brown, and Tracey Cruz. 2010. "Do US Black Women Experience Stress-Related Accelerated Biological Aging?" *Human Nature* 21:19-38.

Grady, Sue C, and Iván J Ramírez. 2008. "Mediating medical risk factors in the residential segregation and low birthweight relationship by race in New York City." *Health & Place* 14:661-677.

Hertzman, Clyde, and Chris Power. 2003. "Health and human development: understandings from life-course research." *Developmental Neuropsychology* 24:719-744.

von Hippel, Paul T., Brian Powell, Douglas B. Downey, and Nicholas J. Rowland. 2007. "The Effect of School on Overweight in Childhood: Gain in Body Mass Index During the School Year and During Summer Vacation." *American Journal of Public Health* 97:696-702.

Hirschman, Charles. 2001. "The Educational Enrollment of Immigrant Youth: A Test of the Segmented-Assimilation Hypothesis." *Demography* 38:317-336.

Hunt, Matthew O., Lauren A. Wise, Marie-Claude Jipguep, Yvette C. Cozier, and Lynn Rosenberg. 2007. "Neighborhood Racial Composition and Perceptions of Racial Discrimination: Evidence From the Black Women's Health Study." *Social Psychology Quarterly* 70:272-289.

Iceland, John, and Kyle Anne Nelson. 2008. "Hispanic Segregation in Metropolitan America: Exploring the Multiple Forms of Spatial Assimilation." *American Sociological Review* 73:741-765.

Iceland, John, and Melissa Scopiletti. 2008. "Immigrant Residential Segregation in U.S. Metropolitan Areas, 1990–2000." 45:79-94.

Iceland, John, Kimberly A. Goyette, Kyle Anne Nelson, and Chaowen Chan. 2010. "Racial and ethnic residential segregation and household structure: A research note." *Social Science Research* 39:39-47.

Iceland, John, Daniel Weinberg, and Erika Steinmetz. 2002. *Racial and Ethnic Residential Segregation in the United States: 1980-2000*. U.S. Government Printing Office: Washington, DC.

Inagami, Sanae, Luisa N. Borrell, Mitchell D. Wong, Jing Fang, Martin F. Shapiro, and Steven M. Asch. 2006. "Residential Segregation and Latino, Black and White Mortality in New York City." *Journal of Urban Health* 83:406-420.

Jackson, James S., Tony Brown, David R. Williams, Myriam Torres, Sherrill L. Sellers, and Kendrick Brown. 1996. "Racism and the physical and mental health status of African Americans: a thirteen year national panel study." *Ethnicity & Disease* 6:132-147.

Jackson, Margot I., and Robert D. Mare. 2007. "Cross-sectional and longitudinal measurements of neighborhood experience and their effects on children." *Social Science Research* 36:590-610.

Jackson, Sharon A., Roger T. Anderson, Norman J. Johnson, and Paul D. Sorlie. 2000. "The relation of residential segregation to all-cause mortality: a study in black and white." *American Journal of Public Health* 90:615-617.

Kimbro, Rachel Tolbert, Jeanne Brooks-Gunn, and Sara McLanahan. 2011. "Young children in urban areas: Links among neighborhood characteristics, weight status, outdoor play, and television watching." *Social Science & Medicine* 72:668-676.

Kling, Jeffrey R., Jeffrey B. Liebman, Lawrence F. Katz, and Lisa Sanbonmatsu. 2004. "Moving To Opportunity And Tranquility: Neighborhood Effects On Adult Economic Self-Sufficiency And Health From A Randomized Housing Voucher Experiment."

Kramer, Michael R., and Carol R. Hogue. 2009. "Is Segregation Bad for Your Health?" *Epidemiologic Reviews* 31:178 -194.

Krebs, Nancy F., John H. Himes, Dawn Jacobson, Theresa A. Nicklas, Patricia Guilday, and Dennis Styne. 2007. "Assessment of Child and Adolescent Overweight and Obesity." *Pediatrics* 120:S193-228.

Krivo, Lauren J., Ruth D. Peterson, and Danielle C. Kuhl. 2009. "Segregation, Racial Structure, and Neighborhood Violent Crime." *American Journal of Sociology* 114:1765-1802.

Krysan, Maria, and Reynolds Farley. 2002. "The Residential Preferences of Blacks: Do They Explain Persistent Segregation?" *Social Forces* 80:937-980.

Kuczmarski, Robert J et al. 2002. "2000 CDC Growth Charts for the United States: methods and development." *Vital and Health Statistics. Series 11, Data from the National Health Survey* 1-190.

Kuh, Diana, and Yoav Ben-Shlomo, eds. 1997. *A Life Course Approach to Chronic Disease Epidemiology*. New York: Oxford University Press.

Landrine, Hope, and Elizabeth A. Klonoff. 2000. "Racial Segregation and Cigarette Smoking Among Blacks: Findings at the Individual Level." *Journal of Health Psychology* 5:211 - 219.

LaVeist, Thomas A. 2003. "Racial Segregation and Longevity among African Americans: An Individual-Level Analysis." *Health Services Research* 38:1719-1734.

Lee, Barrett A., Sean F. Reardon, Glenn Firebaugh, Chad R. Farrell, Stephen A. Matthews, and David O'Sullivan. 2008. "Beyond the Census Tract: Patterns and Determinants of Racial Segregation at Multiple Geographic Scales." *American Sociological Review* 73:766-791.

Lee, Min-Ah. 2009. "Neighborhood residential segregation and mental health: A multilevel analysis on Hispanic Americans in Chicago." *Social Science & Medicine* 68:1975-1984.

Lee, Min-Ah, and Kenneth F. Ferraro. 2007. "Neighborhood Residential Segregation and Physical Health among Hispanic Americans: Good, Bad, or Benign?" *Journal of Health and Social Behavior* 48:131-148.

Lee, Rebecca E., and Catherine Cubbin. 2002. "Neighborhood Context and Youth Cardiovascular Health Behaviors." *American Journal of Public health* 92:428-436.
Leventhal, Tama, and Jeanne Brooks-Gunn. 2003. "Moving to Opportunity: an Experimental Study of Neighborhood Effects on Mental Health." *American Journal of Public Health* 93:1576-1582.
Lichter, Daniel T, Zhenchao Qian, and Martha L Crowley. 2005. "Child Poverty Among Racial Minorities and Immigrants: Explaining Trends and Differentials." *Social Science Quarterly* 86:1037-1059.
Lichter, Daniel T., Domenico Parisi, Michael C. Taquino, and Steven Michael Grice. 2010. "Residential segregation in new Hispanic destinations: Cities, suburbs, and rural communities compared." *Social Science Research* 39:215-230.
Ludwig, Jens, Jeffrey B. Liebman, Jeffrey R. Kling, Greg J. Duncan, Lawrence F. Katz, Ronald C. Kessler, and Lisa Sanbonmatsu. 2008. "What Can We Learn about Neighborhood Effects from the Moving to Opportunity Experiment?" *The American Journal of Sociology* 114:144-188.
Massey, Douglas S. 2004. "Segregation and Stratification: A Biosocial Perspective." *Du Bois Review: Social Science Research on Race* 1:7-25.
Massey, Douglas S., and Nancy A. Denton. 1989. "Hypersegregation in U.S. Metropolitan Areas: Black and Hispanic Segregation along Five Dimensions." *Demography* 26:373-391.
Massey, Douglas S., and Mary J. Fischer. 2006. "The effect of childhood segregation on minority academic performance at selective colleges." *Ethnic and Racial Studies* 29:1.
Massey, Douglas, and Nancy Denton. 1993. *American Apartheid: Segregation and the Making of the Underclass*. Cambridge, MA: Harvard University Press.
McDaniel, Marla, Christina Paxson, and Jane Waldfogel. 2006. "Racial Disparities in Childhood Asthma in the United States: Evidence From the National Health Interview Survey, 1997 to 2003." *Pediatrics* 117:e868-877.
Moore, Latetia V., and Ana V. Diez Roux. 2006. "Associations of Neighborhood Characteristics With the Location and Type of Food Stores." *American Journal of Public Health* 96:325-331.
Moore, Latetia V., Ana V. Diez Roux, Kelly R. Evenson, Aileen P. McGinn, and Shannon J. Brines. 2008. "Availability of Recreational Resources in Minority and Low Socioeconomic Status Areas." *American Journal of Preventive Medicine* 34:16-22.
Morello-Frosch, Rachel, and Russ Lopez. 2006. "The riskscape and the color line: Examining the role of segregation in environmental health disparities." *Environmental Research* 102:181-196.
Ostir, G V, K Eschbach, K S Markides, and J S Goodwin. 2003. "Neighbourhood composition and depressive symptoms among older Mexican Americans." *Journal of Epidemiology and Community Health* 57:987-992.
Osypuk, Theresa L., and Dolores Acevedo-Garcia. 2008. "Are Racial Disparities in Preterm Birth Larger in Hypersegregated Areas?" *American Journal of Epidemiology* 167:1295 - 1304.
Osypuk, Theresa L., and M. Maria Glymour. 2011. "Examining the mental health effects of a housing mobility program by vulnerable subgroups: who may benefit, and who may not, from moves to lowpoverty neighborhoods?" *Presented at the annual meeting of the Population Association of America,* Washington, D.C.

Pager, Devah, and Hana Shepherd. 2008. "The Sociology of Discrimination: Racial Discrimination in Employment, Housing, Credit, and Consumer Markets." *Annual Review of Sociology* 34:181-209.

Park, Julie, and John Iceland. 2011. "Residential segregation in metropolitan established immigrant gateways and new destinations, 1990-2000." *Social Science Research* 40:811-821.

Patel, K, Karl Eschbach, Laura Rudkin, M. Kristen Peek, and Kyriakos S. Markides. 2003. "Neighborhood context and self-rated health in older Mexican Americans." *Annals of Epidemiology* 13:620-628.

Portes, Alejandro, and Min Zhou. 1993. "The New Second Generation: Segmented Assimilation and Its Variants." *Annals of the American Academy of Political and Social Science* 530:74-96.

Portes, Alejandro, Patricia Fernandez-Kelly, and William Haller. 2009. "The Adaptation of the Immigrant Second Generation in America: A Theoretical Overview and Recent Evidence." *Journal of Ethnic & Migration Studies* 35:1077-1104.

Quillian, Lincoln. 2002. "Why Is Black-White Residential Segregation So Persistent?: Evidence on Three Theories from Migration Data." *Social Science Research* 31:197-229.

Rosenbaum, Emily. 2008. "Racial/Ethnic Differences in Asthma Prevalence: The Role of Housing and Neighborhood Environments." *Journal of Health and Social Behavior* 49:131 -145.

Rugh, Jacob S., and Douglas S. Massey. 2010. "Racial Segregation and the American Foreclosure Crisis." *American Sociological Review* 75:629 -651.

Schulz, Amy J., Clarence C. Gravlee, David R. Williams, Barbara A. Israel, Graciela Mentz, and Zachary Rowe. 2006. "Discrimination, Symptoms of Depression, and Self-Rated Health Among African American Women in Detroit: Results From a Longitudinal Analysis." *American Journal of Public Health* 96:1265-1270.

South, Scott J, Kyle Crowder, and Erick Chavez. 2005. "Geographic Mobility and Spatial Assimilation among U. S. Latino Immigrants." *International Migration Review* 39:577-607.

Subramanian, S.V., Dolores Acevedo-Garcia, and Theresa L. Osypuk. 2005. "Racial Residential Segregation and Geographic Heterogeneity in Black/White Disparity in Poor Self-Rated Health in the US: a Multilevel Statistical Analysis." *Social Science & Medicine* 60:1667-1679.

Swaroop, Sapna. 2005. *The Social Consequences of Racial Residential Integration*. Ph.D. dissertation, Department of Sociology, University of Michigan, Ann Arbor, MI.

Timberlake, Jeffrey M. 2007. "Racial and Ethnic Inequality in the Duration of Children's Exposure to Neighborhood Poverty and Affluence." *Social Problems* 54:319-342.

Tolnay, Stewart E. 2003. "The African American 'Great Migration' and Beyond." *Annual Review of Sociology* 29:209-232.

Welch, Susan, Lee Sigelman, Timothy Bledsoe, and Michael Combs. 2001. *Race and Place: Race Relations in an American City*. Cambridge University Press.

Wilkes, Rima, and John Iceland. 2004. "Hypersegregation in the Twenty-First Century." *Demography* 41:23-36.

Williams, David R., and Chiquita Collins. 2001. "Racial residential segregation: a fundamental cause of racial disparities in health." *Public Health Reports (Washington, D.C.: 1974)* 116:404-416.

Williams, David R., and Pamela Braboy Jackson. 2005. "Social Sources Of Racial Disparities In Health." *Health Affairs* 24:325-334.
Williams, David R., and Michelle Sternthal. 2010. "Understanding Racial-ethnic Disparities in Health." *Journal of Health and Social Behavior* 51:S15 -S27.
Williams, David R., Harold W. Neighbors, and James S. Jackson. 2003. "Racial/Ethnic Discrimination and Health: Findings From Community Studies." *American Journal of Public Health* 93:200-208.
Williams, David R., Yan Yu, James S. Jackson, and Norman B. Anderson. 1997. "Racial Differences in Physical and Mental Health: Socio-economic Status, Stress and Discrimination." *Journal of Health Psychology* 2:335-351.
Wilson, William J. 1996. *When Work Disappears: The World of the New Urban Poor*. New York: Knopf.
Wong, Carol A., Jacquelynne S. Eccles, and Arnold Sameroff. 2003. "The Influence of Ethnic Discrimination and Ethnic Identification on African American adolescents' School and Socioemotional Adjustment." *Journal of Personality* 71:1197-1232.
Zenk, Shannon N., Amy J. Schulz, Barbara A. Israel, Sherman A. James, Shuming Bao, and Mark L. Wilson. 2005. "Neighborhood Racial Composition, Neighborhood Poverty, and the Spatial Accessibility of Supermarkets in Metropolitan Detroit." *American Journal of Public Health* 95:660-667.
Zhou, Min. 1997. "Segmented Assimilation: Issues, Controversies, and Recent Research on the New Second Generation." *International Migration Review* 31:975-1008.
Zhou, Min, and Carl L. Bankston. 1998. *Growing Up American: How Vietnamese Children Adapt to Life in the United States.* New York: Russell Sage Foundation.
Zubrinsky, Camille L., and Lawrence Bobo. 1996. "Prismatic Metropolis: Race and Residential Segregation in the City of the Angels." *Social Science Research* 25:335-374.